From Transcriptomic Signatures to Active-Site Docking and ADMET Properties Prediction: Bioinformatics-Guided Exploration of Binding Mechanisms of Cardioprotective Phytoconstituents Against Dysregulated Targets in Hypertrophic Cardiomyopathy

Basavaraj Vastrad[1], Shivaling Pattanashetti[2], Chanabasayya Vastrad*[2]

1. Department of Pharmaceutical Chemistry, K.L.E. College of Pharmacy, Gadag, Karnataka 582101, India.
2. Biostatistics and Bioinformatics, Chanabasava Nilaya, Bharthinagar, Dharwad 580001, Karnataka, India.

* Chanabasayya Vastrad

channu.vastrad@gmail.com

Ph: +919480073398

Chanabasava Nilaya, Bharthinagar,

Dharwad 580001 , Karanataka, India.

Abstract

Hypertrophic cardiomyopathy (HCM) is a global health problem characterized by left ventricle become thick and stiff with effect of indication including chest pain, fluttering, fainting and shortness of breath. In this investigation, we aimed to identify diagnostic markers and analyzed the therapeutic potential of essential genes. Next generation sequencing (NGS) dataset GSE180313 was obtained from the Gene Expression Omnibus (GEO) database and used to identify differentially expressed genes (DEGs) in HCM. DEGs were screened using the DESeq2 Rbioconductor tool. Then, Gene Ontology (GO) and REACTOME pathway enrichment analyses were performed. Moreover, a protein-protein interaction (PPI) network of the DEGs was constructed, and module analysis was performed. Next, miRNA-hub gene regulatory network, TF-hub gene regulatory network and drug-hub gene interaction network were constructed and analyzed. Next, diagnostic values of hub genes were assessed by receiver operating characteristic (ROC) curve analysis. Finely, molecular docking and ADMET studies were performed. By performing DEGs analysis, total 958 DEGs (479 up regulated genes and 479 down regulated genes) were successfully identified from GSE180313, respectively. GO and REACTOME pathway enrichment analyses revealed that GO functions and signaling pathways were significantly enriched including response to stimulus, multicellular organismal process, metabolism and extracellular matrix organization. The hub genes of FN1, SOX2, TUBA4A, RPS2, TUBA1C, ESR1, SNCA, LCK, PAK1 and APLNR might be associated with HCM. The hub gens of FN1 and TPM3, together with corresponding predicted miRNAs (e.g., hsa-mir-374a-5p and hsa-miR-8052), SH3KBP1 and ESR1 together with corresponding predicted TFs (e.g PRRX2 and STAT3) and CHRNA4 and CHRM3 together with corresponding predicted drug molecules (e.g. Succinylcholine and Umeclidinium) were found to be significantly correlated with HCM. Molecular Docking study revealed that all tested phytoconstituents effectively occupied LGALS3 and ESR1. ADMET analysis found that all screened compounds have adequate solubility and high projected intestine absorption, indicating their appropriateness for oral administration, This investigation could serve as a basis for further understanding the molecular pathogenesis and potential therapeutic targets of HCM.

Keywords: hypertrophic cardiomyopathy; bioinformatics; differentially expressed genes; protein-protein interaction; next generation sequencing; molecular docking

Introduction

Hypertrophic cardiomyopathy (HCM) is a prevalent heritable cardiovascular disease [Argulian et al. 2016], which affects around 1:500 (0.2%) of the world's population [Massera et al. 2023]. HCM is primarily characterized by left ventricle become thick and stiff [Teekakirikul et al. 2019]. The clinical incidence of HCM is high, and its main features include chest pain, fluttering, fainting and shortness of breath [Varma et al. 2014]. Studies have revealed that the progression of HCM is related to genetic factors [Pérez-Sánchez et al. 2018]. Complications of HCM can include atrial fibrillation [Rowin et al. 2023], blocked blood flow [Seiler et al. 1991], mitral valve disease [Griffeth et al. 2024], dilated cardiomyopathy [Puckelwartz et al. 2021], heart failure [Liang et al. 2023], cardiac death [Moore et al. 2019], myocardial infarction [Ariss et al. 2022], myocardial ischemia [Cecchi et al. 2009], coronary artery disease [Tower-Rader Cecchi et al. 2017], cardiac arrest [Gupta et al. 2016], atherosclerosis [Maron et al. 1979], cardiac fibrosis [Xu et al. 2021], hypercholesterolemia [Marziliano et al. 2021], inflammation [Becker et al. 2020], hypertension [Arabadjian et al. 2023], obesity [Zaromytidou and Savvatis, 2023] and diabetes mellitus [Subramanian et al. 2023]. Medications (beta blockers, calcium channel blockers, mavacamten, amiodarone and Warfarin) [Wheeler et al. 2023; Bright et al. 1991; Nag et al. 2023; Boriani et al. 2002; Noseworthy et al. 2016] and Surgeries or other procedures (septal myectomy, septal ablation, implantable cardioverter-defibrillator, cardiac resynchronization therapy, ventricular assist device and heart transplant) [Cui et al. 2022; Maron et al. 2021; Radu et al. 2023; Sreenivasan et al. 2021; Loyaga-Rendon et al. 2021] are the current feasible treatment of HCM patients. Despite advancement in diagnosis and treatment, the prognosis of HCM patient's remains destitute, this has become an effective topic of clinical and fundamental investigation. Hence, dynamic novel diagnosis biomarkers thoughtful the damage of heart muscles is engaging for the timely diagnoses and therapies of HCM.

The recent next generation sequencing (NGS) analysis of specimens from sufferers and normal individuals enables us to investigate various diseases [Ganekal et al. 2023; Giriyappagoudar et al. 2023]. Genetic mutations, epigenetic alterations and aberrant molecular signaling pathways are associated in the HCM

[Seidman and Seidman, 2011; Greco and Condorelli, 2015; Hassoun et al. 2021]. Recently, numerous specific genes have been identified to participate in the advancement of HCM. For instance, it was reported that the expression level of ACTN2 [Chiu et al. 2010], MYBPC3 [Tudurachi et al. 2023], MYOZ2 [Osio et al. 2007], ACTC [Mogensen et al. 1999] and NEXN [Wang et al. 2010] were considerably higher in damaged heart muscles from HCM sufferers in contrast to normal heart muscles. RAS signaling pathway [Gelb and Tartaglia, 2011], Hippo/YAP signaling pathway [Wang et al. 2014], Akt/GSK-3β signaling pathway [Luckey et al. 2009], alcineurin-NFAT signaling pathway [Braz et al. 2003] and mTOR signaling pathway [Schramm et al. 2012] reveals that the treatment manipulation of such signaling pathways can offer novel enlightenment for the treatment of HCM. These finding suggested the key roles of few function genes in HCM development. However, the diagnostic value of many genes has not been studied in HCM.

NGS technology and bioinformatics analysis have been broadly applied to screen for genetic modification at the genomic level. Our main determination is to explore the connection between HCM and its complications. First, we download the GSE180313 [Ranjbarvaziri et al. 2021] dataset file in the NCBI-Gene Expression Omnibus database (NCBI-GEO) (https://www.ncbi.nlm.nih.gov/geo) [Clough and Barrett, 2016] database for analysis, then use DESeq2 [Love et al. 2014] to draw the differentially expressed genes (DEGs) distribution map of the HCM and normal control samples in the dataset. Immediately after, we performed gene ontology (GO) and REACTOME pathway enrichment analysis on these DEGs. By constructing protein-protein interaction (PPI) network, we screened for the highest scoring modules and hub genes. Immediately afterward miRNA-hub gene regulatory network, TF-hub gene regulatory network and drug-hub gene interaction network were built by Cytoscape to predict the underlying microRNAs (miRNAs), transcription factors (TFs) and drug molecules linked with hub genes. To validate that these hub genes can serve as biomarkers of HCM, we determined diagnostic value of hub gene by receiver operating characteristic (ROC) curve analysis. molecular docking and ADMET studies for phytoconstituents were carried out. This investigation will develop our perceptive of the molecular mechanisms of HCM and supply genomic-targeted therapy preference for HCM.

Materials and Methods

Next generation sequencing (NGS) data source

The publicly accessible NGS data were all obtained from the NCBI-GEO. NGS dataset deposited by Ranjbarvaziri et al. (2021), accession no. GSE180313, containing 20 samples (13 HCM samples and 7 normal control samples) were employed in the current investigation. The GSE180313 dataset generated using the GPL24676 platform (Illumina NovaSeq 6000 (Homo sapiens)).

Identification of DEGs

Determining DEGs between HCM and normal blood samples was performed using DESeq2 [Love et al. 2014]. DESeq2 is an R bioconductor tool that allows users to determine DEGs for various experimental situations. The adjusted P-values (adj. P) and Benjamini and Hochberg false discovery rate were used to find statistically significant genes [Green and Diggle, 2007]. The screening criteria of DEGs were set as false discovery rate (FDR) $\leq$ 0.05, and |log2 fold change (FC)| > 0.828 for up regulated genes and |log2 fold change (FC)| < -1.219 for down regulated genes. The volcano plot and heatmap were generated using the “ggplot2” and “gplot” packages in the R bioconductor software.

GO and pathway enrichment analyses of DEGs

Online biological information can be establish in the g:Profiler (http://biit.cs.ut.ee/gprofiler/) [Reimand et al. 2007] program. A essential bioinformatics tool for annotating genes and examining their biological processes is the GO (http://www.geneontology.org) [Thomas, 2017]. GO enrichment analysis includes biological processes (BP), cellular components (CC), and molecular functions (MF). The REACTOME pathway (https://reactome.org/) [Fabregat et al. 2018] is a database tool for analyzing large-scale molecular data sets produced by high-throughput experimental techniques to superior understand high-level biological processes and systems. $P < 0.05$ was considered statistically significant.

Construction of the PPI network and module analysis

The Cytoscape software (version 3.10.2) (http://www.cytoscape.org/) [Shannon et al. 2003] and HIPPIE (Human Integrated Protein-Protein Interaction rEference) (https://cbdm-01.zdv.uni-mainz.de/~mschaefer/hippie/) [Schaefer et al. 2013]

interactome database were used to establish the PPI analysis of the DEGs. First, the HIPPIE PPI database was used to construct the PPI network. The PPI network was visualized using Cytoscape (version 3.10.2). Subsequently, genes with the top interaction scores were screened as hub genes using the node degree [Luo et al. 2017], betweenness [Li et al. 2017], stress [Gilbert et al. 2021] and closeness [Li et al. 2020] algorithms of the Network Analyzer plugin in Cytoscape software. And PEWCC algorithm [Zaki et al 2013] was used for identifying significant modules.

Construction of the miRNA-hub gene regulatory network

miRNet (https://www.mirnet.ca/) [Fan et al 2018] is a bioinformatics platform for predicting miRNAs. In the current investigation, the targets of the hub gene were predicted using eight databases: TarBase, miRTarBase, miRecords, miRanda, miR2Disease, HMDD, PhenomiR, SM2miR, PharmacomiR, EpimiR, starBase, TransmiR, ADmiRE, and TAM 2.0. The miRNA-hub gene regulatory network was depicted and visualized using Cytoscape software [Shannon et al. 2003].

Construction of the TF-hub gene regulatory network

NetworkAnalyst (https://www.networkanalyst.ca/) [Zhou et al 2019] is a bioinformatics platform for predicting TFs. In the current investigation, the targets of the hub gene were predicted using Jasper database. The TF-hub gene regulatory network was depicted and visualized using Cytoscape software [Shannon et al. 2003].

Construction of the drug-hub gene interaction network

NetworkAnalyst (https://www.networkanalyst.ca/) [Zhou et al 2019] is a bioinformatics platform for predicting drug molecules. In the current investigation, the targets of the hub gene were predicted using DrhuBank database. The drug-hub gene interaction network was depicted and visualized using Cytoscape software [Shannon et al. 2003].

Receiver operating characteristic curve (ROC) analysis

To determine the sensitivity and specificity of the selected hub genes for HCM diagnosis, the visualization tool "pROC" package in R software [Robin et al. 2011] was used to construct a receiver operating characteristic (ROC) curve. The area

under the curve (AUC) was calculated for each dataset, and hub genes with an AUC exceptional 0.7 were classified as holding a strong inequitable capacity for HCM.

Insilico molecular docking studies

Swiss-model, RCSB PDB, Prank web, NCBI Gene, ChEMBL, BindingDB, DoGSiteScorer, ChemDraw, Avogadro tool, Autodock 1.7.1, and Autodock Vina tools, Biovia Discovery Studio client 2021, ADMET lab 3.0 web server.

Receptor selection based on gene information

The selection of target receptor structuresfor molecular docking was initiated by identifying genes of interest relevant to the disease condition under study. Genes showing differential expression or known functional involvement in disease pathophysiology were prioritized based on genomic and transcriptomic data [Barabási et al., 2011; Subramanian et al., 2005]. The corresponding protein products of these genes were then retrieved using UniProt (https://www.uniprot.org/) and NCBI Gene (https://www.ncbi.nlm.nih.gov/gene/) databases. These databases provide curated information on gene-protein relationships, functional domains, isoforms, and organism-specific variants [UniProt 2023].

Once the protein names and UniProt accessions were determined, three-dimensional structures of these proteins were searched in the Protein Data Bank (PDB) (https://www.rcsb.org/). Priority was given to experimentally determined structures (X-ray crystallography or cryo-EM) derived from Homo sapiens, with resolutions ≤2.5 Å and co-crystallised ligands when available. Structures were evaluated for completeness, presence of functional domains, and biologically relevant binding conformations. In cases where multiple structures were available, the one with the most complete and biologically relevant ligand-protein interaction site was selected [Berman et al., 2000; Plewczynski et al., 2011].

If co-crystallised ligands were present in the selected PDB entry, these were examined to confirm their biological relevance (e.g., substrate, inhibitor, agonist). The functional nature of the ligand was cross-validated using ligand bioactivity databases such as ChEMBL (https://www.ebi.ac.uk/chembl/) and BindingDB

(https://www.bindingdb.org/), where half-maximal inhibitory concentration (IC_{50}), binding affinity (K_d), or other pharmacological data are reported [Gaulton et al., 2017; Liu et al., 2007]. To confirm the presence and accessibility of druggable binding pockets, cavity detection tools such as CASTp, Fpocket, or DoGSiteScorer were used [Tian et al., 2018; Le et al., 2009].

This ensured that the selected structure was suitable for molecular docking, with a validated and accessible ligand-binding domain. Overall, this systematic approach, starting from gene selection to receptor structure identification, ensured biological relevance, structural accuracy, and docking compatibility of the chosen targets. In the present study, we have selected two genes, upregulated LGALS3 and downregulated ESR1 in present study.

The LGALS3 gene that produces galectin-3, a β-galactoside-binding lectin that plays a role in hypertrophic cardiomyopathy by causing myocardial fibrosis, inflammation, and unfavorableremodeling [Emet et al., 2018; Yakar et al., 2016]. Elevated galectin-3 levels in HCM patients correlate with increased ventricular mass and fibrosis, as well as risk factors such as sudden cardiac death and arrhythmias, indicating its clinical significance in HCM development and prognosis.Galectin-3 is increased in stressed or failing myocardium, promoting macrophage activation, fibroblast proliferation, and collagen deposition. These processes are directly associated with abnormal cardiac remodeling, which drives diastolic dysfunction and disease progression in HCM [Sharma et al., 2004].

Estrogen receptor α (ESR1) inhibits cardiomyocyte hypertrophy, reduces inflammation, and regulates cellular stress responses. Estrogen-ERα signaling inhibits cardiomyocyte hypertrophy and pathological remodeling via genomic and non-genomic mechanisms [Luo et al., 2016].Although direct large-scale studies of ESR1 expression in HCM are rare, mutations in the ESR1 gene have been related with variation in left ventricular hypertrophy among HCM patients, indicating a role in disease phenotypic change [Lind et al., 2008].Furthermore, experimental evidence suggests that estrogen can decrease left ventricular and cardiomyocyte hypertrophy via receptor-mediated pathways, bolstering the rationale for studying ESR1 regulation in hypertrophic disorders [Ueda et al., 2020]. However, this selection does not necessarily imply that other potential targets lack significance or therapeutic relevance.

Selection phytoconstituents

Puerarin is a natural isoflavone glycoside produced from Pueraria lobata. It's been extensively explored for its cardioprotective and cardiac remodeling properties. Preclinical research suggests that puerarin effectively inhibits pathological hypertrophic development, decreases myocyte mortality, suppresses fibroblast proliferation, and attenuates inflammatory and oxidative stress pathways related to cardiac remodeling [Lv et al., 2022;Zhou et al., 2021].Oleuropein, a polyphenolic chemical found in olives and olive leaf extracts, is renowned for wide cardioprotective activities, including antioxidant, anti-inflammatory, and anti-remodeling actions [Christodoulou et al., 2024;Omar et al., 2010]. Swertiamarin is an iridoid glycoside that exhibits significant antioxidant and anti-inflammatory properties in heart damage models. Swertiamarin has exhibited considerable restoration of oxidative stress indicators and pro-inflammatory cytokines in experimental myocardial infarction, indicating its potential function in alleviating heart stress and remodeling [Wang et al., 2023].Mangiferin, a xanthone glucoside found in many plants, has been shown to provide myocardial protection, antifibrotic action, and anti-apoptotic properties [Imran et al., 2017;Hou et al., 2013].

Although the selected phytoconstituentsSwertiamarin, Puerarin, Oleuropein, and Mangiferinhave previously been reported to exhibit general cardioprotective, antioxidant, and anti-inflammatory activities in a variety of cardiovascular and myocardial injury models, their molecular mechanisms of action in hypertrophic cardiomyopathy remain unclear. Importantly, none of these drugs have been thoroughly tested for their structural interactions with HCM-specific, transcriptomically dysregulated targets such as the upregulated fibrotic mediator LGALS3 and the downregulated cardioprotective receptor ESR1. The current study thus employs a target-driven mechanistic repositioning strategy, in which well-characterized cardioprotective phytochemicals are re-examined for their potential to modulate disease-relevant molecular drivers of HCM, rather than being interpreted as established or disease-specific modulators in hypertrophic cardiomyopathy.

Receptor and ligand preparation

The targets selected with their structural information are presented in Table 1. Using the Swiss-Model web server, the missing residues were remodelled and downloaded in pdb format [Waterhouse et al., 2018]. Following the identification of the binding sites utilising the server Prank web [Jendele et al., 2019],the protein's pdb format was entered into Software Auto Dock Tools 1.7.1, and water molecules and atoms were eliminated. The receptor has also been checked for missing amino acid residues, Kollman charges have been fixed, and only polar hydrogens have been inserted. In order to cover the entire receptor, the grid was fixed using the Autogrid program. The grid dimension file [Morris et al., 2008] was then saved. The phytoconstituents (Fig. 1), structures were drawn using ChemDraw and copied as SMILES then loaded into Avogadro software to convert them 2D to 3D structures in PDB format [Hanwell et al., 2012]. The ligand's pdb format was then loaded into Auto Dock Tools 1.7.1, and the ligand molecule's root was identified, selected and saved as pdbqt format. Lastly, the pdbqt format was used to save the ligand molecule.

Performing autodockvina

Auto Dock Vina can be executed using the command line (cmd) or the Autodock tool. The configuration file was ready for Autodock Vina to execute; the grid dimension file that was previously saved includes the protein's n-points, active site, and x, y, and z coordinates. That information was added to the configuration file, which was made to contain the protein's active site details. It also comes with an output file in pdbqt format and a log file in .txt format. The command line was used to run Autodock Vina. “vina.exe -- config config.txt” was the command used to launch Auto Dock Vina. Docked coordinates were output in the pdbqt format when the program was finished. Receptor-ligand interactions were then visualised using the file, and binding affinity was ascertained using the log.txt file [Riyaphan et al., 2021].

Visualization of molecular docking results

The docking results were visualized using the Biovia Discovery Studio Client 2021 application. The pdbqt files for the receptor and the output docked file were both loaded into Biovia, and a 2D docked image of the ligand was visualised and

exported in PNG format, which is connected to various amino acids [James et al., 2025].

In silico ADMET properties prediction

However, high binding affinity alone is insufficient. ADMET profiling, evaluating Absorption, Distribution, Metabolism, Excretion, and Toxicity, is essential to ensure that candidate compounds possess favourable pharmacokinetic properties and safety profiles. Without this, compounds may fail in later stages despite strong docking results. Integration of docking with in silico ADMET prediction streamlines compound selection by filtering out unsuitable leads early in the discovery pipeline [Xiong et al., 2021]. ADMET properties were predicted with the help of the ADMET lab 2.0 free web server, as previously reported by[Ahmad et al., 2023].

Results

Identification of DEGs

We selected GSE180313 NGS dataset to analyze and identify the DEGs. A total of 958 DEGs were identified, which include 479 up regulated DEGs and 479 down regulated DEGs (Table 2). The volcano plot and heatmap are shown in Fig. 2 and Fig. 3.

GO and pathway enrichment analyses of DEGs

The GO enrichment analysis revealed the following most GO significant enrichment terms: (1) BP: response to stimulus, multicellular organism development, multicellular organismal process and cell communication; (2) CC: cell periphery, membrane, plasma membrane and cellular anatomical entity; and (3) MF: oxidoreductase activity, transporter activity, signaling receptor binding and molecular function regulator activity (Table 3 and Fig.4 to Fig.5). The REACTOME pathway enrichment analysis revealed that the DEGs were particularly enriched in metabolism, cardiac conduction, extracellular matrix organization and GPCR ligand binding (Table 4 and Fig.4 to Fig.5).

Construction of the PPI network and module analysis

The visual PPI network of 958 DEGs was constructed using Cytoscape software. The PPI network was composed of 5887 nodes and 10291 edges (Fig. 6). Among the 5887 nodes, 958 hub genes with the highest nodes degree, betweenness, stress and closeness were screened based on the Cytoscape software analysis results. The results were as follows: FN1, SOX2, TUBA4A, RPS2, TUBA1C, ESR1, SNCA, LCK, PAK1 and APLNR (Table 5). The two significant modules with the highest degree were screened, and GO and pathway enrichment of genes in these two modules was analyzed using g:Profiler online tools. The key modules were obtained using PEWCC. Module 1 contained 53 nodes and 66 edges (Fig. 7), mainly involved in response to stimulus, multicellular organism development and cell periphery (Fig. 8). Module 2 was comprised of 36 nodes and 40 edges (Fig. 9), which were associated with multicellular organismal process, cell communication and cytokine signaling in immune system (Fig. 10).

Construction of the miRNA -hub gene regulatory network

The related miRNA-hub gene regulatory network was shown in Fig. 11. The miRNA-hub gene regulatory network was composed of 2481 nodes [Hub gene:301, miRNA: 2180] and 28559 edges. In the miRNA-hub gene regulatory network, FN1 was regulated by different 439 miRNAs (ex: hsa-mir-374a-5p); TFRC was regulated by different 422 miRNAs (ex: hsa-miR-520d-5p); FKBP5 was regulated by different 305 miRNAs (ex: hsa-miR-34a-5p); FHL2 was regulated by different 291 miRNAs (ex: hsa-mir-4646-5p); RPLP0 was regulated by different 232 miRNAs (ex: hsa-mir-548aw); TPM3 was regulated by different 456 miRNAs (ex: hsa-miR-8052); ESR1 was regulated by different 266 miRNAs (ex: hsa-mir-302b-3p); CHRM3 was regulated by different 226 miRNAs (ex:hsa-miR-194-5p); TMEM30B was regulated by different 203 miRNAs (ex: hsa-mir-548i); PAK1 was regulated by different 162 miRNAs (ex: hsa-miR-524-5p) (Table 6).

Construction of the TF-hub gene regulatory network

The related TF-hub gene regulatory network was shown in Fig. 12. The TF-hub gene regulatory network was composed of 382 [Hub gene:83, TF: 299] nodes and 2359 edges. In the TF-hub gene regulatory network, SH3KBP1 was regulated by 20 different TFs (ex: PRRX2); FHL2 was regulated by 19 different TFs (ex: SRY);

FKBP5 was regulated by 17 different TFs (ex: USF2); TFRC was regulated by 15 different TFs (ex: BRCA1); FN1 was regulated by 14 different TFs (STAT1); ESR1 was regulated by 26 different TFs (ex: STAT3); TP63 was regulated by 21 different TFs (ex: FOS); PTPRR was regulated by 16 different TFs (ex: MEF2A); TPM3 was regulated by 13 different TFs (ex: MEF2A); SNCA was regulated by 11 different TFs (ex: GATA2) (Table 6).

Construction of the drug-hub gene interaction network

The related drug-hub gene interaction network was shown in Fig. 13 and Fig. 14 . In the drug-hub gene interaction network, up regulated genes such as CHRNA4 was targeted by 50 different drug molecules (ex: Succinylcholine), GRIN2A was targeted by 34 different drug molecules (ex: Memantine), SCN1A was targeted by 27 different drug molecules (ex: Phenacemide), VDR was targeted by 22 different drug molecules (ex: Lexacalcitol) and CA14 was targeted by 21 different drug molecules (ex: Zonisamide) (Table 7), while down regulated genes such as CHRM3 was targeted by 94 different drug molecules (ex: Umeclidinium), GABRE was targeted by 76 different drug molecules (ex: Bromazepam), NOS2 was targeted by 53 different drug molecules (ex: Dipyrithione), KIT was targeted by 28 different drug molecules (ex: Midostaurin) and LCK was targeted by 26 different drug molecules (ex: Nintedanib) (Table 7).

Receiver operating characteristic curve (ROC) analysis

The ROC curve was utilized to assess the diagnostic efficacy of hub genes in predicting HCM occurrence and advancement. A greater AUC value demonstrate better predictive efficacy. The AUC values of the hub genes were FN1-AUC:0.934, SOX2-AUC:0.919, TUBA4A-AUC:0.923, RPS2-AUC:0.891, TUBA1C-AUC:0.908, ESR1-AUC:0.927, SNCA-AUC:0.900, LCK-AUC:0.938, PAK1-AUC:0.895 and APLNR-AUC:0.897 suggesting that these hub genes all display remarkable predictive ability for obesity occurrence and development (Fig. 15).

Insilico molecular docking studies

Analysis of molecular docking with LGALS3

A molecular docking investigation was conducted to evaluate the binding behavior of various phytoconstituents inside the carbohydrate recognition domain (CRD) of LGALS3, an elevated mediator of fibrosis and inflammatory remodeling in hypertrophic cardiomyopathy. All tested compounds fit effectively into the expected active pocket, suggesting structural compatibility with the LGALS3 binding cavity.

The reference co-crystallized ligand QB2 has a binding affinity of -6.565 kcal/mol and interacts with critical residues involved in galectin-3 carbohydrate recognition, making it a reliable baseline for comparison study. Notably, numerous phytochemicals had binding affinities comparable to or greater than that of the reference ligand (Table 8) .Puerarin had the highest binding affinity (-6.807 kcal/mol) of all chemicals tested. Puerarin formed stable hydrogen bond interactions with GLU72 and ARG50, which are important residues for ligand anchoring within the CRD. In addition, pi-pi stacking interaction with TRP69, a residue often described as crucial for galectin-3 ligand stability, strengthened the binding pose. Hydrophobic interactions with VAL34 led to pocket stability, indicating a good mix of polar and non-polar interactions.Oleuropein had a high binding affinity (-6.423 kcal/mol) and established several hydrogen bonds with ARG50, HIS46, ASN62, and ASN67, showing extensive polar interaction networks in the CRD. The presence of pi-pi interaction with TRP69 strengthens its stable accommodation in the active pocket. Oleuropein's many interactions suggest that it may effectively compete with endogenous ligands implicated in galectin-3-mediated fibrotic signaling.Swertiamarin and Mangiferin showed moderate but constant binding affinities. Swertiamarin particularly targeted residues like ARG32, ASP36, and HIS46, generating hydrogen bonds that kept the ligand in the binding groove. Mangiferin formed hydrogen connections with LYS64 and ASN67, as well as hydrophobic contacts with VAL34, demonstrating that pocket occupancy (Fig. 16 and Fig. 17) was sustained despite the significantly lower docking scores.

Molecular docking analysis of ESR1

Docking tests were carried out against ESR1 (PDB ID: 1A52), which reflects the receptor's agonist-bound active conformation, to investigate the potential

restoration of cardioprotective estrogensignaling. ESR1 was found to be a downregulated gene in hypertrophic cardiomyopathy, which justifies further research into ligand interactions inside the agonist-binding pocket.

The co-crystallized ligand 17β-estradiol has the highest binding affinity (-10.754 kcal/mol), establishing hydrogen bonds with residues that activate receptors and stabilize helix-12. This binding mode served as a standard for evaluating phytochemical docking scores (Table. 9). Oleuropein has the highest binding affinity (-7.745 kcal/mol) of all the substances tested. Oleuropein formed several hydrogen bonds with GLY217, ASP47, LYS225, LEU221, HIS220, and ALA46, demonstrating a wide range of polar interactions within the ligand-binding cavity. Furthermore, π-π stacking interaction with PHE100 and hydrophobic interactions with LEU83 and LEU87 enhanced overall complex stability. These interactions indicate that oleuropein effectively fills the estradiol-binding pocket, potentially supporting receptor stability in an agonist-like orientation.Puerarin had a moderate binding affinity (-6.559 kcal/mol) and interacted with GLU49, THR43, and LYS225 via hydrogen bonding, as well as hydrophobic interactions with LEU221 and ALA46. These interactions overlap with residues involved in agonist stabilization, implying a potential modulatory effect.Swertiamarin and Mangiferin exhibited reduced binding affinities but remained stable within the agonist-binding cavity. Their interaction patterns were dominated by hydrogen bonds with polar residues and hydrophobic interactions with aliphatic amino acids bordering the pocket (Fig. 18 and Fig. 19), indicating ligand accommodation without causing adverse steric conflicts.

Drug-likeness properties evaluation

The drug-likeness assessment found that Swertiamarin and Puerarin met Lipinski's rule of five, indicating desirable physicochemical qualities for oral bioavailability. Oleuropein and Mangiferin, on the other hand, did not meet Lipinski's criterion, owing to their larger molecular weight and increased polar surface area, which are typical of polyphenolic phytoconstituents.Despite these violations, all compounds had acceptable rotatable bond numbers and polarity ranges, indicating that aberrations may not rule out biological activity, especially in the context of natural product-based therapies.

ADMET properties analysis

ADMET profiling (Table.10) revealed that all investigated phytoconstituents had appropriate aqueous solubility, as measured by ESOL Log S values. All substances were anticipated to have high human intestinal absorption, indicating a favorable oral absorption potential.Caco-2 permeability values ranged from low to moderate, which is consistent with the molecules' polar nature. All drugs demonstrated minimal BBB permeability, lowering the possibility of central nervous system-related side effects, which is beneficial for cardiovascular therapies.According to P-glycoprotein substrate prediction, Puerarin, Oleuropein, and Mangiferin may be P-gp substrates, but Swertiamarin has lower P-gp liability. Importantly, all substances showed modest inhibitory activity against CYP2C9 and CYP3A4, indicating a lower chance of drug-drug interactions. Cardiotoxicity prediction found modest hERG inhibition probability, while carcinogenicity prediction was limited across all drugs, indicating an overall positive safety profile.

Discussion

HCM is a cardiovascular disorder with high rates of pervasiveness and mortality [Siontis et al. 2014]. Therefore, sensitive and specific biomarkers of HCM are urgently needed to be detected. In the current investigations, bioinformatic and NGS methods are promising methods to analyze the key genes and signaling pathways, which might contribute new indication for diagnosis, therapy, and prognosis of HCM.

In this investigation, we analyzed the HCM NGS data GSE146638 screened from the GEO database. It includes 7 normal control samples and 13 HCM samples. We identified 958 DEGs, including 479 up-regulated genes and 479 down-regulated genes. SAA1 [Pan and Zhang, 2020], MYH6 [Yang et al. 2024] and MSTN (myostatin) [Qi et al. 2020] are mainly associated with HCM. SAA1 [Pan and Zhang, 2020], MYH6 [Zhao et al. 2021] and MSTN (myostatin) [Mahmoudabady et al. 2008] plays a role in diagnosis of dilated cardiomyopathy. SAA1 [Xiao et al. 2023], SERPINA3 [Delrue et al. 2021], MYH6 [Anfinson et al. 2022], ESM1 [Watanabe et al. 2021] and MSTN (myostatin) [Wang et al. 2023] served as a biomarkers for heart failure diagnosis and prognosis. SAA1 [Wang et al. 2014], SERPINA3 [Zhao et al. 2020], ESM1 [Watanabe et al. 2021] and

MSTN (myostatin) [Lim et al. 2018] have been known to be involved in myocardial infarction progression. SAA1 [Yeh et al. 2022], SERPINA3 [Li et al. 2021], IL1RL1 [Lin et al. 2017], ESM1 [Sun et al. 2019] and MSTN (myostatin) [Dschietzig, 2014] have a significant prognostic potential in coronary artery disease. SAA1 [Leow et al. 2013] and MSTN (myostatin) [Verzola et al. 2017] are molecular markers for the diagnosis and prognosis of atherosclerosis. Studies had shown that SAA1 [Xiao et al. 2023] and MSTN (myostatin) [Biesemann et al. 2015] were associated with cardiac fibrosis. Studies have found that SAA1 [Bich et al. 2022], RNASE2 [Ong et al. 2023], SERPINA3 [Soman et al. 2022], IL1RL1 [Yu et al. 2020], ESM1 [Zeng et al. 2021] and MSTN (myostatin) [Verzola et al. 2020] are altered expressed in inflammation. The altered expression of SAA1 [Alharbi et al. 2021], IL1RL1 [Yu et al. 2020], ESM1 [Janke et al. 2006] and MSTN (myostatin) [Amor et al. 2019] might indicate increased risk of obesity. SAA1 [Wang et al. 2023], PTPRN (protein tyrosine phosphatase receptor type N) [Garranzo-Asensio et al. 2022], MYH6 [Trombetta et al. 2012], ESM1 [Qiu et al. 2017] and MSTN (myostatin) [Amor et al. 2019] plays an indispensable role in diabetes mellitus. MYH6 [Fu et al. 2021] and CUX2 [Wang et al. 2018] could be an early detection markers for atrial fibrillation. MYH6 [Zhao et al. 2021] plays a significant role in cardiac death. Study suggested that MYH6 [Lam et al. 2015] as potential diagnostic biomarker for cardiac arrest. Recently, mounting investigation has revealed that ESM1 [Hong et al. 2022] was vital for the onset and developmental process of mitral valve disease. MSTN (myostatin) [Castillero et al. 2015] has been demonstrated to be involved in myocardial ischemia. These findings suggest that significant DEGs can serve as candidate diagnostic biomarkers or drug targets for the clinical treatment of HCM.

g:Profiler online tool was used to predict the significantly enriched GO and REACTOME pathways. It has been confirmed that the pathogenesis of HCM is related to signaling pathways include metabolism [Timmer and Knaapen, 2013], cardiac conduction [Fitzgerald and Kusumoto, 2018], muscle contraction [Harada and Potter, 2004], neutrophil degranulation [Riascos-Bernal and Sibinga, 2022], metabolism of lipids [Frey and Olson, 2002], extracellular matrix organization [Viola et al. 2023], GPCR ligand binding [Liu et al. 2019], signaling by receptor tyrosine kinases [Sadoshima et al. 1995] and signal transduction [Jamshidi et al. 2004]. The expression of CD177 [Yang et al. 2019], ALOX15B [Magnusson et al.

2012], EREG (epiregulin) [Harada et al. 2015], FCN3 [Plovsing et al. 2016], SSTR5 [Liu et al. 2022], SFRP5 [Sun et al. 2021], SLAMF1 [Wang et al. 2015], CD163 [Etzerodt et al. 2014], AQP4 [Tourdias et al. 2011], PCK1 [Ko et al. 2018], VDR (vitamin D receptor) [Garg et al. 2019], SERPINE1 [Chen et al. 2021], AZGP1 [Na et al. 2017], VSIG4 [Liu et al. 2023], ELANE (elastase, neutrophil expressed) [Thanarajasingam et al. 2021], FKBP5 [Liu et al. 2023], MFSD2A [Ungaro et al. 2017], RBP4 [Pazos-Pérez et al. 2024], HMGCS2 [Chen et al. 2022], MOG (myelin oligodendrocyte glycoprotein) [Lalive et al. 2006], C3 [Jia et al. 2015], FGFR4 [Czaya et al. 2022], ITLN1 [Kerr et al. 2014], IL18R1 [Liu et al. 2012], TIMP4 [Koskivirta et al. 2006], LYVE1 [Johnson et al. 2007], GRIP1 [Miao et al. 2016], IL20RA [Lamichhane et al. 2021], HCRTR1 [Dong et al. 2024], LGR6 [Krishnamoorthy et al. 2023], SOX2 [Njouendou et al. 2023], TWIST2 [Ding et al. 2022], NPPC (natriuretic peptide C) [Bükülmez et al. 2014], SPP1 [Wu et al. 2024], CD109 [Aono et al. 2023], S1PR3 [Tian et al. 2024], BMP7 [Smoljan et al. 2023], SLC7A11 [Lv et al. 2024], MLXIPL (MLX interacting protein like) [Guo et al. 2023], AGTR1 [Musso et al. 2019], PTX3 [Ramirez et al. 2019], EPHB2 [Ernst et al. 2019], SLC2A1 [Petakh et al. 2024], TGM2 [Chang et al. 2024], FHL2 [van de Pol et al. 2020], CD38 [Zhang et al. 2024], FGF7 [Geervliet et al. 2023]. OSR1 [Liu et al. 2023], STXBP2 [Fujikawa et al. 2023], CRLF1 [Lu et al. 2024], POMC (proopiomelanocortin) [Ito et al. 2013], APOB (apolipoprotein B) [Webb et al. 2022], OLFM4 [Ren et al. 2021], BMAL1 [Chen et al. 2023], HEY2 [Lina et al. 2019], ARG2 [Li et al. 2019], LPCAT3 [Hu et al. 2007], IL15RA [Meghnem et al. 2022], FABP4 [Ma et al. 2024], PTGS1 [Plaza-Díaz et al. 2017], C1QTNF1 [Kim and Park, 2019], LMCD1 [Bai et al. 2023], TPO (thyroid peroxidase) [Nielsen et al. 2009], LOX (lysyl oxidase) [Huang et al. 2021], ADAMTS5 [Sharma et al. 2020], CD63 [Yu et al. 2021], HAS2 [Kim et al. 2022], NQO1 [Mondal et al. 2018], SIGLEC1 [Boz et al. 2024], NGFR (nerve growth factor receptor) [Zhao et al. 2024], PRDX6 [Yang et al. 2022], DHCR24 [Martiskainen et al. 2017], PDPN (podoplanin) [Quintanilla et al. 2019], AKR1C1 [Wang et al. 2007], CTSB (cathepsin B) [Fang et al. 2020], GLRX2 [Liu et al. 2024], PRKCD (protein kinase C delta) [Yang et al. 2019], RAMP1 [Liu et al. 2022], LGALS3 [Sun et al. 2020], SLAMF8 [Zeng et al. 2020], FTH1 [Sun et al. 2023], HMOX1 [Wu et al. 2024], BCL6 [Zhu et al. 2019], MPST (mercaptopyruvate sulfurtransferase) [Zhang et al. 2022], GAREM1 [Wu et al. 2024], RNASE6 [Li et al. 2022], PMVK (phosphomevalonate kinase) [Berner et

al. 2023], FIBCD1 [Shahgoli et al. 2023], SLCO4A1 [Koller et al. 2022], SYN2 [Chugh et al. 2015], TRPC4 [Lee et al. 2020], ELN (elastin) [Wu et al. 2020], NALCN (sodium leak channel, non-selective) [Wang et al. 2023], NINJ2 [Zhang et al. 2024], ADAMTS15 [Zuo et al. 2023], LAMB3 [Liu et al. 2024], MMP19 [Bister et al. 2004], SLCO2A1 [Nakanish et al. 2020], STEAP4 [Qiao et al. 2024], GPSM1 [Yan et al. 2022], CYP4B1 [Ashkar et al. 2004], LDHA (lactate dehydrogenase A) [Song et al. 2019], GNMT (glycine N-methyltransferase) [Liu et al. 2020], PTDSS1 [Sekar et al. 2022], B3GNT7 [Wang et al. 2023], RPSA (ribosomal protein SA) [Jiang et al. 2023], BCAT1 [Papathanassiu et al. 2017], RPS5 [Li et al. 2024], SFRP4 [Kida et al. 2023], CD1C [Benlahrech et al. 2015], TRPM8 [Straub, 2014], CST1 [Du et al. 2023], UCMA (upper zone of growth plate and cartilage matrix associated) [Seuffert et al. 2018], RSPO2 [Li et al. 2020], ARMS2 [Zeng et al. 2013], ALOX15 [Caravaca et al. 2022], CTLA4 [Miska et al. 2018], PENK (proenkephalin) [Hu et al. 2016], IL1B [Yi et al. 2018], SCUBE2 [Lin et al. 2024], CTSG (cathepsin G) [Gao et al. 2018], CX3CR1 [Feng et al. 2015], CX3CR1 [Flamant et al. 2021], FRZB (frizzled related protein) [Huang et al. 2021], ZNF365 [Wu et al. 2021], CMA1 [Carl-McGrath et al. 2009], E2F7 [Zhou et al. 2022], RGS4 [Meng et al. 2018], THBS4 [Mäemets-Allas et al. 2023], GDF6 [Cui et al. 2021], ENPP2 [Chattopadhyay et al. 2023], GDF15 [Schwarz et al. 2023], TGFB2 [Huang et al. 2015], C1QTNF3 [Lv et al. 2022], MYOC (myocilin) [Itakura et al. 2015], CXCL10 [Gotsch et al. 2007], MME (membrane metalloendopeptidase) [Wang et al. 2023], BDNF (brain derived neurotrophic factor) [Carniel and da Rocha, 2021], EGR3 [Kwon et al. 2024], PTN (pleiotrophin) [Linnerbauer et al. 2022], OLR1 [Kang et al. 2015], THY1 [Schubert et al. 2011], MDK (midkine) [Sakamoto and Kadomatsu, 2012], ANGPTL7 [Zhao et al. 2019], TNFRSF11B [Zhang et al. 2023], DIO2 [Cheng et al. 2012], TAGLN3 [Arnaud et al. 2022], SMOC2 [Huang et al. 2024], PLAC8 [Zhao et al. 2022], HTR2B [Lu et al. 2021], UCHL1 [Zhu et al. 2024], LUM (lumican) [Li et al. 2021], TP73 [Zhang et al. 2023], TRPV3 [Szöllősi et al. 2018], PRF1 [Sidore et al. 2021], PROS1 [Maimon et al. 2021], CD7 [Liu et al. 2000], ARID5A [Nyati et al. 2020], FREM1 [Kashem et al. 2021], SLC26A4 [Do et al. 2021], ESR1 [Zhang et al. 2023], NOS2 [Béchade et al. 2014], SNCA (synuclein alpha) [Forloni, 2023], EPHA3 [Xu et al. 2023], ACE (angiotensin I converting enzyme) [Gaddam et al. 2017], NT5E [Schädlich et al. 2022], PDE5A [Li et al. 2021], PLCE1 [Li et al. 2019], PAK1 [Chen et al. 2024], SOX8 [Hu et al. 2021],

APOE (apolipoprotein E) [Christensen et al. 2011], P2RX1 [Wang et al. 2022], BCL6B [Cai et al. 2019], EGR2 [Bo et al. 2022], GLI1 [Sheng et al. 2021], PRDM1 [Lee et al. 2020], SCT (secretin) [Sato et al. 2017], HLA-DPA1 [Lantermann et al. 2002], FCN1 [Munthe-Fog et al. 2012], EGR1 [Lehman et al. 2022], TFPI2 [Hisaka et al. 2004], DUSP6 [Liu et al. 2022], IL34 [Lin et al. 2019], IER3 [Arlt and Schäfer, 2011], RUNX1 [Lappas, 2018], LTB (lymphotoxin beta) [Giles et al. 2018], SCN8A [Alrashdi et al. 2021], TPM3 [Mansfield et al. 2016], LAMP5 [Gracia-Maldonado et al. 2022], IGFBP2 [Wang et al. 2023], RHCG (Rh family C glycoprotein) [Liu et al. 2024], GZMB (granzyme B) [Turner et al. 2019], CXCL9 [Richmond et al. 2023], MMP25 [Blumenthal et al. 2010], PALM3 [Chen et al. 2017], PRSS8 [Keppner et al. 2016], SELL (selectin L) [Kumari et al. 2021], GZMA (granzyme A) [Garzón-Tituaña et al. 2021], KCNN3 [Dolga et al. 2012], FSCN1 [Huang et al. 2022], HAS3 [Lee et al. 2022], SYTL2 [Xie et al. 2024], SV2A [Metaxas et al. 2019], PTPRH (protein tyrosine phosphatase receptor type H) [Chen et al. 2022], LSP1 [Le et al. 2015], TREH (trehalase) [Panigrahi et al. 2019], CXCL11 [Kochumon et al. 2020], CXCL3 [Bao et al. 2024], CXCL2 [Tsutsui et al. 2018], CXCL14 [Witte et al. 2017], ADAMTS8 [Wågsäter et al. 2008], ANGPTL8 [Abu-Farha et al. 2023] and FMOD (fibromodulin) [Zhao et al. 2023] have been observed to be altered in inflammation. IGFBP2 [Wang et al. 2023] HOPX (HOP homeobox) [Güleç et al. 2014], EREG (epiregulin) [Han et al. 2022], KCNIP2 [Liu et al. 2019], AQP4 [Berland et al. 2018], CCN5 [Yoon et al. 2010], VDR (vitamin D receptor) [Simpson, 2011], KCNK3 [Lambert et al. 2018], RBP4 [Gao et al. 2016], FGFR4 [Liu et al. 2024], TIMP4 [Yarbrough et al. 2014], LYVE1 [Jiang et al. 2020], LGR6 [Zhao et al. 2024], SOX2 [Zhao et al. 2018], NPPC (natriuretic peptide C) [Agrawal et al. 2019], SLC7A11 [Zhang et al. 2022], TFEC (transcription factor EC) [Zhao et al. 2021], AGTR1 [Kelly et al. 2011], ITGA7 [Bugiardini et al. 2022], FHL2 [Friedrich et al. 2014], CD38 [Guan et al. 2017], HCN4 [Wei-qing et al. 2011], POMC (proopiomelanocortin) [Chalmers et al. 2008], APOB (apolipoprotein B) [Ye et al. 2018], BMAL1 [Yu et al. 2022], HEY2 [Yu et al. 2010], RAP1GAP [Gao et al. 2021], IGFBP2 [Sharples et al. 2013], FABP4 [Sun et al. 2021], C1QTNF1 [Wu et al. 2018], LMCD1 [Ferreira et al. 2019], LOX (lysyl oxidase) [Galán et al. 2017], DMPK (DM1 protein kinase) [O'Cochlain et al. 2004], EDN1 [Castro et al. 2007], CTSB (cathepsin B) [Wu et al. 2015], KCNH2 [Bains et al. 2022], HMOX1 [Song et al. 2024], CORIN (corin, serine peptidase) [Wang et al. 2008], CA14 [Vargas and Alvarez, 2012], TRPC4

[Camacho Londoño et al. 2015], ELN (elastin) [Zhang et al. 2022], ADAMTS2 [Wang et al. 2017], LDHA (lactate dehydrogenase A) [Dai et al. 2020], LEF1 [Lai et al. 2019], IRX2 [Wang et al. 2023], CX3CR1 [Weisheit et al. 2021], RGS4 [Wang et al. 2008], THBS4 [Sure and Katakam, 2016], GDF15 [Hanatani et al. 2014], KIT (KIT proto-oncogene, receptor tyrosine kinase) [Sonnenschein et al. 2021], ABCG2 [Higashikuni et al. 2012], MDK (midkine) [Zhang et al. 2020], DIO2 [Ferdous et al. 2020], PCDH17 [Long et al. 2020], UCHL1 [Cao et al. 2023], LUM (lumican) [Rixon et al. 2023], TRPV3 [Qi et al. 2019], SLC26A4 [Tang et al. 2021], ACE (angiotensin I converting enzyme) [Yuan et al. 2017], PDE5A [Liu et al. 2018], PAK1 [Wang et al. 2014], APOE (apolipoprotein E) [Qin et al. 2010], EGR1 [Hsu et al. 2013], RUNX1 [Xu et al. 2023], KIF1A [Akasaka et al. 2020], ATRNL1 [He et al. 2024] and ANGPTL8 [Hu et al. 2022] plays a vital role in the development of HCM. HOPX (HOP homeobox) [Trivedi et al. 2011], FCN3 [Prohászka et al. 2013], SFRP5 [An et al. 2021], CD163 [Ptaszynska-Kopczynska et al. 2016], TFRC (transferrin receptor) [Zhou et al. 2024], AQP4 [Xu et al. 2024], CCN5 [Huang et al. 2020], VDR (vitamin D receptor) [Hao and Chen, 2019], SERPINE1 [Li et al. 2024], AZGP1 [Huscher et al. 2021], VSIG4 [Xie et al. 2022], FGF12 [Liu et al. 2022], RBP4 [An et al. 2021], HMGCS2 [Wang et al. 2024], FGFR4 [Fuchs et al. 2023], TIMP4 [Chaturvedi and Tyagi, 2016], SOX2 [Liang et al. 2021], NPPC (natriuretic peptide C) [Agrawal et al. 2019], PRODH (proline dehydrogenase 1) [Moreira et al. 2019], BMP7 [Aluganti Narasimhulu et al. 2020], SLC7A11 [Wang et al. 2023], AGTR1 [de Denus et al. 2018], PTX3 [Helleberg et al. 2022], GPD1L [Valdivia et al. 2009], ITGA7 [Bugiardini et al. 2022], ATP2A2 [Angrisano et al. 2014], HCN4 [Paterek et al. 2021], POMC (proopiomelanocortin) [Bienertová-Vasků et al. 2009], APOB (apolipoprotein B) [Li et al. 2024], BMAL1 [Ma et al. 2024], HEY2 [Liu et al. 2010], IGFBP2 [Girerd et al. 2020], FABP4 [Harada et al. 2020], LOX (lysyl oxidase) [López et al. 2013], ADAMTS5 [Barallobre-Barreiro et al. 2021], HAS2 [Chowdhury et al. 2017], NQO1 [Blanco et al. 2008], PRDX6 [Xiong et al. 2024], EDN1 [Taylor et al. 2009], HSPB7 [Cappola et al. 2010], CTSB (cathepsin B) [Wu et al. 2015], RAMP1 [Cueille et al. 2002], LGALS3 [Vlachou et al. 2022], KCNH2 [Sugiyama et al. 2011], F8 [Raffield et al. 2020], CD276 [Anzalone et al. 2013], CORIN (corin, serine peptidase) [Dong et al. 2010], ELN (elastin) [Hou et al. 2021], SLC6A6 [Li et al. 2023], PALLD (palladin, cytoskeletal associated protein) [Liu et al. 2021], DHRS7C [Lu et al. 2012], TKT (transketolase) [Wang et al.

2022], SFRP4 [Ren et al. 2024], IRX1 [Zeng et al. 2019], ALOX15 [Sandstedt et al. 2018], CTLA4 [Shang et al. 2024], PENK (proenkephalin) [Siranart et al. 2023], RGS4 [Borges et al. 2023], THBS4 [Meng et al. 2024], CRISPLD1 [Khadjeh et al. 2020], GDF15 [Kosum et al. 2024], CXCL10 [Altara et al. 2016], BDNF (brain derived neurotrophic factor) [Behnoush et al. 2024], THY1 [Li et al. 2020], ABCG2 [Higashikuni et al. 2012], ANGPTL7 [Zhang et al. 2020], SMOC2 [Chen et al. 2024], UCHL1 [Wu et al. 2022], LUM (lumican) [Engebretsen et al. 2013], NOS2 [Nishijima et al. 2011], ACE (angiotensin I converting enzyme) [McNamara et al. 2004], PDE5A [Westermann et al. 2012], PAK1 [Ai et al. 2011], SSC5D [Ge et al. 2023], IL34 [Tao et al. 2017], BOC (BOC cell adhesion associated, oncogene regulated) [Ahmed et al. 2020], RUNX1 [Qi et al. 2023], GZMB (granzyme B) [Zeglinski and Granville, 2020], KCNN3 [Rahm et al. 2021], CXCL14 [Zeng et al. 2019], ADAMTS8 [Li et al. 2023], FMOD (fibromodulin) [Andenæs et al. 2018] and CX3CR1 [Flamant et al. 2021] expression were significantly higher in patients with heart failure. The expression levels of ALOX15B [Wuest et al. 2014], SFRP5 [Jia et al. 2023], F5 [Redondo et al. 1999], CD163 [Aristoteli et al. 2006], PLA2G2A [Shuvalova et al. 2015], VDR (vitamin D receptor) [Raljević et al. 2021], SERPINE1 [Koch et al. 2010], AZGP1 [Huscher et al. 2021], FKBP5 [Wang et al. 2020], RBP4 [Ji et al. 2023], C3 [Cai et al. 2019], ITLN1 [Güçlü-Geyik et al. 2022], TIMP4 [Kuliczkowski et al. 2017], LYVE1 [Cho et al. 2019], NPPC (natriuretic peptide C) [Prickett et al. 2020], MLXIPL (MLX interacting protein like) [Loika et al. 2023], AGTR1 [Tran et al. 2024], PTX3 [Knapp et al. 2024], GPD1L [Westaway et al. 2011], FN1 [Page et al. 2022], CMTM5 [Zhang et al. 2017], APOB (apolipoprotein B) [Pencina et al. 2015], IGFBP2 [Wang et al. 2023], FABP4 [Zhao et al. 2024], C1QTNF1 [Zhao et al. 2020], LOX (lysyl oxidase) [Ma et al. 2011], ADAMTS5 [Wang et al. 2019], CD63 [Murakami et al. 1996], NQO1 [Zhou et al. 2008], PROCR (protein C receptor) [Kallel et al. 2012], SIGLEC1 [Xiong et al. 2009], EDN1 [Gupta, 2022], LGALS3 [Li et al. 2022], F8 [Raffield et al. 2020], HMOX1 [Sarutipaiboon et al. 2020], CORIN (corin, serine peptidase) [Wang et al. 2021], NINJ2 [Yan et al. 2024], SFRP4 [Ji et al. 2017], ALOX15 [Kaur et al. 2018], IL1B [Dorajoo et al. 2023], CX3CR1 [Loh et al. 2023], FRZB (frizzled related protein) [Guan et al. 2021], CRISPLD1 [Wang et al. 2018], GDF15 [Li et al. 2020], APLNR (apelin receptor) [Wang et al. 2020], CXCL10 [Karimabad et al. 2021], BDNF (brain derived neurotrophic factor) [Shobeiri et al. 2023], EGR3 [Li et al. 2014], OLR1

[Mohammed et al. 2022], ABCG2 [Han et al. 2015], S1PR5 [Xiong et al. 2022], ESR1 [Zhang et al. 2023], CUBN (cubilin) [Park et al. 2020], ACE (angiotensin I converting enzyme) [Danchin et al. 2006], PDE5A [Dang et al. 2021], GNB3 [von Beckerath et al. 2003], APOE (apolipoprotein E) [Anoop et al. 2010], F2RL3 [Zhao et al. 2022], F2R [Gigante et al. 2007], TNNT1 [Guay et al. 2016], FCN1 [Mo et al. 2019], EGR1 [Peng and Xiang, 2019], TFPI2 [Zhou et al. 2019], IL34 [Fan et al. 2016], RUNX1 [Zhong et al. 2022], GZMB (granzyme B) [Zeglinski and Granville, 2020], TREH (trehalase) [Jamialahmadi et al. 2022], CXCL2 [Yang et al. 2020], CXCL14 [Schories et al. 2023] and ANGPTL8 [Morinaga et al. 2023] have been proved to be altered in coronary artery disease. The study showed that ALOX15B [Magnusson et al. 2012], EREG (epiregulin) [Wang et al. 2023], SFRP5 [Tong et al. 2019], CD163 [Zhang et al. 2024], PLA2G2A [Monroy-Muñoz et al. 2017], VDR (vitamin D receptor) [Schnatz et al. 2012], SERPINE1 [Koch et al. 2010], AZGP1 [Huscher et al. 2021], ELANE (elastase, neutrophil expressed) [Wen et al. 2018], RBP4 [Zhou et al. 2018], C3 [Garcia-Arguinzonis et al. 2021], FGFR4 [Sellier et al. 2023], TIMP4 [Hu et al. 2021], NPPC (natriuretic peptide C) [Lumsden et al. 2010], SPP1 [Wu et al. 2024], BMP7 [Davies et al. 2003], SLC7A11 [Wang et al. 2024], CFD (complement factor D) [Murakami et al. 2023], AGTR1 [Campbell et al. 2010], PTX3 [Otani et al. 2024], EPHB2 [Braun et al. 2011], SLC2A1 [Zhou et al. 2024], FHL2 [Chu et al. 2010], CD38 [Kong et al. 2024], FGF7 [Wu et al. 2023], C1QA [Dong et al. 2024], CRLF1 [Lan et al. 2024], POMC (proopiomelanocortin) [Rinne et al. 2018], APOB (apolipoprotein B) [Singh and Prabhakaran, 2024], BMAL1 [Xie et al. 2020], IGFBP2 [Wang et al. 2024], ARG2 [Rafnsson et al. 2020], FABP4 [Gormez et al. 2020], C1QTNF1 [Zhang et al. 2022], LOX (lysyl oxidase) [Ovchinnikova et al. 2014], ADAMTS5 [Didangelos et al. 2012], CD63 [Cha et al. 2004], HAS2 [Zhu et al. 2020], NQO1 [Hur et al. 2010], SIGLEC1 [Nasser et al. 2024], PRDX6 [Phelan et al. 2003], EDN1 [Gupta et al. 2020], CTSB (cathepsin B) [Li et al. 2024], LGALS3 [Djordjevic et al. 2022], HMOX1 [Wu et al. 2022], BCL6 [Wei et al. 2015], RNASE6 [Fang et al. 2021], EPN1 [Brophy et al. 2019], CORIN (corin, serine peptidase) [Jiang et al. 2018], ELN (elastin) [Maedeker et al. 2021], PRIMA1 [Wang et al. 2019], NINJ2 [Zhang et al. 2016], PALLD (palladin, cytoskeletal associated protein) [Hoke et al. 2011], GNMT (glycine N-methyltransferase) [Chen et al. 2012], BCAT1 [Tan et al. 2022], SFRP4 [Zhang et al. 2022], RSPO2 [Singla et al. 2021], CTLA4 [Poels et al. 2020], CTSG

(cathepsin G) [Wang et al. 2014], CX3CR1 [Rowinska et al. 2017], ENPP2 [Chattopadhyay et al. 2023], GDF15 [Huang et al. 2021], CXCL10 [Prapiadou et al. 2024], BDNF (brain derived neurotrophic factor) [Bi et al. 2020], PTN (pleiotrophin) [Li et al. 2010], OLR1 [Yang et al. 2023], MDK (midkine) [Zhang et al. 2021], TNFRSF11B [Wang et al. 2020], LUM (lumican) [Onda et al. 2002], TP73 [Ni et al. 2021], ACE (angiotensin I converting enzyme) [Okwan-Duodu et al. 2019], PAK1 [Singh et al. 2015], GNB3 [Grove et al. 2007], APOE (apolipoprotein E) [Marais, 2021], EGR1 [Blaschke et al. 2004], TFPI2 [Crawley et al. 2002], IL34 [Law et al. 2021], TNFSF13B [Fajar et al. 2024], LTB (lymphotoxin beta) [Owens et al. 2010], RSAD2 [Hayderi et al. 2024], ITGAX (integrin subunit alpha X) [Wang et al. 2023], CXCL9 [Wu et al. 2024], GZMB (granzyme B) [Hiebert et al. 2013], TREH (trehalase) [Zhong et al. 2023], CXCL2 [Chang et al. 2024], CXCL14 [He et al. 2023], ADAMTS8 [Wågsäter et al. 2008] and ANGPTL8 [Zheng et al. 2018] were related to atherosclerosis. Altered expression of EREG (epiregulin) [Han et al. 2022], FCN3 [Lidani et al. 2021], CD163 [Walker et al. 2014], CCN5 [Yoon et al. 2010], VDR (vitamin D receptor) [Panizo et al. 2017], SERPINE1 [Khan et al. 2024], VSIG4 [Wang et al. 2023], TIMP4 [Ye et al. 2021], LYVE1 [Jiang et al. 2020], BMP7 [Ouyang et al. 2022], SLC7A11 [Wang et al. 2023], PTX3 [Xu et al. 2022], EPHB2 [Su et al. 2017], TGM2 [Griffin et al. 2020], FHL2 [Anwaier et al. 2022], CRLF1 [Luo et al. 2023], BMAL1 [Hang et al. 2023], GPD1 [Wang et al. 2022], FABP4 [Du et al. 2024], LOX (lysyl oxidase) [López et al. 2013], CTSB (cathepsin B) [Wu et al. 2015], PRKCD (protein kinase C delta) [Chintalgattu and Katwa, 2009], LGALS3 [Fu et al. 2020], CORIN (corin, serine peptidase) [Gladysheva et al. 2023], SMOC1 [Wang and Wu, 2018], ELN (elastin) [Wang et al. 2021], LDHA (lactate dehydrogenase A) [Wu et al. 2024], RPS5 [Zhang et al. 2021], SFRP4 [Matsushima et al. 2010], ALOX15 [Sandstedt et al. 2018], IRX2 [Ma et al. 2023], CYTL1 [Kim et al. 2016], RGS4 [Guo et al. 2021], GDF15 [Guo et al. 2021], CXCL10 [Aziz et al. 2023], BDNF (brain derived neurotrophic factor) [Zou and Hao, 2024], SULF1 [Ji et al. 2024], SMOC2 [Rui et al. 2023], HTR2B [Castillero et al. 2024], UCHL1 [Gong et al. 2021], LUM (lumican) [Mohammadzadeh et al. 2020], TRPV3 [Liu et al. 2018], ACE (angiotensin I converting enzyme) [Liu et al. 2016], APOE (apolipoprotein E) [Hada et al. 2022], GLI1 [Wang et al. 2018], EGR1 [Li et al. 2021], DKK2 [Li et al. 2022], RUNX1 [Ni et al. 2021], GZMB (granzyme B) [Shen et al. 2016], CXCL9 [Lin et al. 2019] and ADAMTS8 [Zha et

al. 2022] have been observed to be associated with cardiac fibrosis. EREG (epiregulin) [Song et al. 2022], SFRP5 [Koutaki et al. 2021], SPINK1 [Abass et al. 2022], CD163 [Cinkajzlová et al. 2017], PLA2G2A [Varastehpour et al. 2006], TFRC (transferrin receptor) [Qiu et al. 2024], CCN5 [Kim et al. 2018], PCK1 [Vimaleswaran et al. 2010], VDR (vitamin D receptor) [Akter et al. 2022], SERPINE1 [Su et al. 2023], KCNK3 [Chen et al. 2017], ELANE (elastase, neutrophil expressed) [Mansuy-Aubert et al. 2013], FKBP5 [Willmer et al. 2022], RBP4 [Kilicarslan et al. 2020], CPNE5 [Wang et al. 2015], MOG (myelin oligodendrocyte glycoprotein) [Stiebel-Kalish et al. 2022], C3 [Castellano-Castillo et al. 2018], FGFR4 [Ge et al. 2014], ITLN1 [Güçlü-Geyik et al. 2023], TIMP4 [Sakamuri et al. 2017], LYVE1 [Michurina et al. 2016], NPPC (natriuretic peptide C) [Agrawal et al. 2019], SPP1 [Yang et al. 2019], BMP7 [Casana et al. 2022], SLC7A11 [Li et al. 2023], CFD (complement factor D) [Mathews et al. 2014], AGTR1 [Adiyeva et al. 2023], PTX3 [Bonacina et al. 2019], EPHB2 [Suzuki et al. 2022], GPD1L [He et al. 2017], FHL2 [Sommer et al. 2023], CD38 [Barbosa et al. 2007], OSR1 [Davies et al. 2014], POMC (proopiomelanocortin) [Ito et al. 2013], APOB (apolipoprotein B) [Ying et al. 2012], BMAL1 [Zhan et al. 2024], IGFBP2 [Boughanem et al. 2021], ARG2 [Zaytouni et al. 2017], IL15RA [Loro et al. 2015], GPD1 [Li et al. 2017], FABP4 [Osorio-Conles et al. 2023], PTGS1 [Plaza-Díaz et al. 2017], LOX (lysyl oxidase) [Huang et al. 2021], NQO1 [Di Francesco et al. 2020], EDN1 [Li et al. 2015], CTSB (cathepsin B) [Araujo et al. 2018], PRKCD (protein kinase C delta) [Patel et al. 2016], RAMP1 [Hosono et al. 2024], TSKU (tsukushi, small leucine rich proteoglycan) [Li et al. 2021], LGALS3 [Baek et al. 2015], NID1 [Pérez-Díaz et al. 2023], ACACB (acetyl-CoA carboxylase beta) [Ma et al. 2013], BCL6 [Senagolage et al. 2018], MPST (mercaptopyruvate sulfurtransferase) [Katsouda et al. 2022], CD276 [Picarda et al. 2022], HIF3A [Shen et al. 2020], ADH1B [Morales et al. 2021], ELN (elastin) [Martinez-Santibanez et al. 2015], AIF1L [Parikh et al. 2022], LAMB3 [Jiao et al. 2016], MMP19 [Pendás et al. 2004], SLC6A6 [Bhutia et al. 2022], STEAP4 [Ozmen et al. 2016], GPSM1 [Tang et al. 2024], CHDH (choline dehydrogenase) [Chirita-Emandi et al. 2020], RETSAT (retinol saturase) [Schupp et al. 2009], PNMT (phenylethanolamine N-methyltransferase) [Peters et al. 2003], RPLP0 [Pérez-Gómez et al. 2023], TKT (transketolase) [Tian et al. 2020], TNMD (tenomodulin) [Tolppanen et al. 2010], SFRP4 [Bukhari et al. 2019], TRPM8 [Sanders et al. 2021], ALOX15 [Ke et al. 2012], CTLA4 [Santos et al. 2018], IL1B [Maculewicz

et al. 2022], CX3CR1 [Sun et al. 2022], RGS4 [Michaelides et al. 2020], ENPP2 [Nishimura et al. 2014], GDF15 [Siddiqui et al. 2022], C1QTNF3 [Maeda and Wakisaka, 2020], APLNR (apelin receptor) [De Los Santos et al. 2023], CXCL10 [Meyhöfer et al. 2024], BDNF (brain derived neurotrophic factor) [Sandrini et al. 2018], OLR1 [Khaidakov et al. 2011], THY1 [Picke et al. 2018], CHRNA3 [Varga et al. 2018], ABCG2 [Cheng et al. 2017], ANGPTL7 [Abu-Farha et al. 2017], DIO2 [Bradley et al. 2018], PLAC8 [Barragán-Zúñiga et al. 2022], PHOSPHO1 [Suchacki et al. 2020], HTR2B [Choi et al. 2021], LUM (lumican) [Strieder-Barboza et al. 2022], TRPV3 [Hu et al. 2024], ESR1 [Guclu-Geyik et al. 2020], NOS2 [Vilela et al. 2022], EPHA3 [Zhang et al. 2022], ACE (angiotensin I converting enzyme) [Sawada et al. 2015], GNB3 [Ozdemir et al. 2017], APOE (apolipoprotein E) [Farup et al. 2020], GDF9 [Arıkan et al. 2023], SCT (secretin) [Xue et al. 2022], EGR1 [Zhang et al. 2013], IL34 [Chang et al. 2014], RUNX1 [Zhang et al. 2023], GZMB (granzyme B) [El Mesallamy et al. 2014], CXCL9 [Duarte et al. 2015], TREH (trehalase) [Arai et al. 2013], CXCL11 [Kochumon et al. 2020], IGSF1 [Ghanny et al. 2021], CXCL2 [Pan et al. 2024], CXCL14 [Cereijo et al. 2021], ANGPTL8 [Perdomo et al. 2021], C1QTNF12 [Wei et al. 2012] and INHBE (inhibin subunit beta E) [Deaton et al. 2022] might serve as therapeutic targets for obesity. The altered expression of FCN3 [Lu et al. 2012], SFRP5 [Li et al. 2019], CD163 [Jasiewicz et al. 2014], TFRC (transferrin receptor) [Yang et al. 2024], AQP4 [González-Marrero et al. 2022], VDR (vitamin D receptor) [Nabil et al. 2024], KCNK3 [Lambert et al. 2018], FGF12 [Yeo et al. 2020], RBP4 [Li et al. 2019], HMGCS2 [Singh et al. 2018], MOG (myelin oligodendrocyte glycoprotein) [Chaudhuri et al. 2022], C3 [Chen et al. 2020], FGFR4 [Al-Daghri et al. 2017], TIMP4 [Wetzl et al. 2017], GRIP1 [Wang et al. 2016], SOX2 [Jiang et al. 2022], NPPC (natriuretic peptide C) [Agrawal et al. 2019], EIF4EBP1 [Li et al. 2022], SPP1 [Chen et al. 2023], BMP7 [Liu et al. 2016], KCNK2 [Shima et al. 2024], PPP1R1A [Grimm et al. 2023], CFD (complement factor D) [Cheng et al. 2024], AGTR1 [Zeng et al. 2023], PTX3 [Helleberg et al. 2022], SEPTIN4 [Zhang et al. 2023], EPHB2 [Xing et al. 2019], ATP2A2 [Wang et al. 2024], FHL2 [Li et al. 2019], CD38 [Qiu et al. 2023], FGF7 [Zhou et al. 2019], OSR1 [Brown et al. 2021], POMC (proopiomelanocortin) [do Carmo et al. 2011], APOB (apolipoprotein B) [Dong et al. 2022], BMAL1 [Kurbatova et al. 2014], IGFBP2 [Yang et al. 2020], CHGB (chromogranin B) [Zhang et al. 2009], FABP4 [Furuhashi et al. 2015], SDK1 [Oguri et al. 2010],

LOX (lysyl oxidase) [Vadasz et al. 2019], HAS2 [Tseng et al. 2022], NQO1 [Kim et al. 2013], CAMK1D [Du et al. 2021], NGFR (nerve growth factor receptor) [Goten et al. 2021], PRDX6 [Liao et al. 2023], EDN1 [Schiffrin, 2018], PRKCD (protein kinase C delta) [Novokhatska et al. 2013], RAMP1 [Sabharwal et al. 2019], LGALS3 [Barman et al. 2021], KCNK1 [Shima et al. 2024], HMOX1 [Song et al. 2024], BCL6 [Chen et al. 2019], HIF3A [Xu et al. 2023], CORIN (corin, serine peptidase) [Wang et al. 2008], ADH1B [Yokoyama et al. 2013], TRPC4 [Alzoubi et al. 2013], ELN (elastin) [Maedeker et al. 2021], LDHA (lactate dehydrogenase A) [Wu et al. 2024] PNMT (phenylethanolamine N-methyltransferase) [Huang et al. 2011], TRPM8 [Huang et al. 2017], CTLA4 [Tomaszewski et al. 2022], IL1B [Yanagisawa et al. 2009], RXFP2 [Zhang et al. 2024], CX3CR1 [Ahadzadeh et al. 2018], THBS4 [Palao et al. 2018], GDF15 [Sökmen et al. 2019], APLNR (apelin receptor) [Stanchev et al. 2024], CXCL10 [Hong et al. 2022], BDNF (brain derived neurotrophic factor) [Nemcsik et al. 2016], LEFTY2 [Ashiq et al. 2023], OLR1 [Sciacqua et al. 2014], CHRNA3 [Wu et al. 2020], MDK (midkine) [Guzel et al. 2018], DIO2 [Kang et al. 2023], CHRM3 [Cowley et al. 2018], HTR2B [Fang et al. 2024], UCHL1 [Tang et al. 2024], SLC26A4 [Kim et al. 2017], ESR1 [Zhou et al. 2022], NOS2 [Shnayder et al. 2021], ACE (angiotensin I converting enzyme) [Ishigami et al. 1995], PDE5A [Li et al. 2021], PLCE1 [Atchison et al. 2020], SCG2 [Wen et al. 2007], KCNA5 [Vera-Zambrano et al. 2023], GNB3 [Sydorchuk et al. 2023], APOE (apolipoprotein E) [de Leeuw et al. 2004], F2RL3 [Deng et al. 2024], F2R [Gigante et al. 2007], GLI1 [Chu et al. 2018], PRDM1 [Wu et al. 2023], SCT (secretin) [Zaw et al. 2019], EGR1 [Suginobe et al. 2023], RUNX1 [Ma et al. 2024], TNFRSF4 [Mashimo et al. 2008], TPM3 [Xu et al. 2021], DLGAP1 [Takahashi et al. 2021], GZMB (granzyme B) [Mao et al. 2018], CXCL9 [Jandl et al. 2022], SLC16A9 [Simino et al. 2013], KCNN3 [Koot et al. 2016], TREH (trehalase) [Forte et al. 2021], ADAMTS8 [Omura et al. 2019], ANGPTL8 [Jiao et al. 2023] and FMOD (fibromodulin) [Liang et al. 2023] were observed to be associated with the progression of hypertension. FCN3 [Barkai et al. 2019], SSTR5 [Sawicki, 2006], SFRP5 [Li et al. 2019], SLAMF1 [Tabassum et al. 2012], SPINK1 [Schneider et al. 2002], CD163 [Cao et al. 2024], PLA2G2A [Monroy-Muñoz et al. 2017], AQP4 [Li et al. 2022], CCN5 [Kim et al. 2018], PCK1 [Hu et al. 2019], VDR (vitamin D receptor) [Alfaqih et al. 2022], SERPINE1 [Fan et al. 2018], ACVR1C [Emdin et al. 2019], GRB14 [Popineau et al. 2016], FKBP5

[Sidibeh et al. 2018], RBP4 [Ji et al. 2023], HMGCS2 [Shukla et al. 2017], C3 [Castellano-Castillo et al. 2018], FGFR4 [Ge et al. 2014], ITLN1 [Güçlü-Geyik et al. 2023], TIMP4 [Kuliczkowski et al. 2017], LYVE1 [Michurina et al. 2016], SOX2 [Gu et al. 2011], NPPC (natriuretic peptide C) [Prickett et al. 2019], SPP1 [Xiao et al. 2024], BMP7 [Casana et al. 2022], SLC7A11 [Xia et al. 2023], MLXIPL (MLX interacting protein like) [Mtiraoui et al. 2012], AGTR1 [Liu et al. 2024], PTX3 [Mutlu et al. 2017], EPHB2 [Broquères-You et al. 2012], SLC2A1 [Petakh et al. 2024], TGM2 [Kolokotronis et al. 2024], FHL2 [Habibe et al. 2022], CD38 [Antonelli and Ferrannini, 2004], FGF7 [Alwahsh et al. 2021], OSR1 [Guo et al. 2021], HCN4 [Parveen et al. 2023], POMC (proopiomelanocortin) [Ito et al. 2013], APOB (apolipoprotein B) [Hwang et al. 2012], BMAL1 [Gao et al. 2023], IGFBP2 [Boughanem et al. 2021], CHGB (chromogranin B) [Herold et al. 2020], FCGR3A [Alizadeh et al. 2007], IL15RA [Bobbala et al. 2017], GPD1 [Li et al. 2017], FABP4 [Wang et al. 2021], TPO (thyroid peroxidase) [Chang et al. 1998], NQO1 [Zhang et al. 2022], SIGLEC1 [Guo et al. 2024], CAMK1D [Du et al. 2021], PRDX6 [Pacifici et al. 2014], EDN1 [Maslat et al. 2023], CTSB (cathepsin B) [Li et al. 2023], TSKU (tsukushi, small leucine rich proteoglycan) [Li et al. 2024], LGALS3 [Zhou et al. 2022], NID1 [Khattab and Torkamani, 2022], HMOX1 [Jirásková et al. 2023], AKR1B1 [Dieter et al. 2022], ACACB (acetyl-CoA carboxylase beta) [Chan et al. 2022], HIF3A [Main et al. 2016], CORIN (corin, serine peptidase) [Fathy et al. 2015], ADH1B [Yokoyama et al. 2013], TRPC4 [Sung et al. 2014], NINJ2 [Peng et al. 2023], STEAP4 [Zhong et al. 2024], GPSM1 [Ding et al. 2020], LDHA (lactate dehydrogenase A) [Sanchez et al. 2021], ETNPPL (ethanolamine-phosphate phospho-lyase) [Wang et al. 2023], HK3 [Islam et al. 2024], BCAT1 [Alfaqih et al. 2021], NMRAL1 [Gao et al. 2022], SFRP4 [Bukhari et al. 2019], FOXA1 [Fogarty et al. 2014], ALOX15 [He et al. 2023], CTLA4 [Ahmadi et al. 2013], PENK (proenkephalin) [van Hateren et al. 2015], IL1B [Jiao et al. 2021], HBB (hemoglobin subunit beta) [Liu et al. 2022], SCUBE2 [Ali et al. 2019], CX3CR1 [Njerve et al. 2012], RGS4 [Zhang et al. 2022], ENPP2 [Nishimura et al. 2014], GDF15 [Al-Kuraishy et al. 2022], TGFB2 [Gao et al. 2022], CXCL10 [Antonelli et al. 2014], BDNF (brain derived neurotrophic factor) [Bi et al. 2020], LRRN1 [Antikainen et al. 2024], LEFTY2 [Ashiq et al. 2023], ABCG2 [Szabó et al. 2021], ANGPTL7 [Xu et al. 2020], TNFRSF11B [Biscetti et al. 2014], DIO2 [Nair et al. 2012], CHRM3 [Guo et al. 2006], PLAC8 [Sasaki et al. 2015], PHOSPHO1 [Suchacki et al. 2020], HTR2B

[Choi et al. 2021], UCHL1 [Costes et al. 2011], LUM (lumican) [Strieder-Barboza et al. 2022], ESR1 [Dahlman et al. 2008], NOS2 [Gusti et al. 2021], CUBN (cubilin) [Tsekmekidou et al. 2020], ACE (angiotensin I converting enzyme) [Pedersen-Bjergaard et al. 2001], PAK1 [Veluthakal et al. 2018], GNB3 [Rizvi et al. 2017], APOE (apolipoprotein E) [El-Lebedy et al. 2018], EGR2 [Lu et al. 2018], OAS3 [Park et al. 2018], SCT (secretin) [Gilliam-Vigh et al. 2023], HLA-DPA1 [Varney et al. 2010], FCN1 [Anjosa et al. 2016], EGR1 [Ke et al. 2023], TFPI2 [Guo et al. 2023], IL34 [Chang et al. 2014], RUNX1 [Zhong et al. 2022], KIF1A [Charles Bronson et al. 2021], KCNJ15 [Fukuda et al. 2013], GZMB (granzyme B) [El Mesallamy et al. 2014], GRIA3 [Li et al. 2019], COLEC12 [Peng et al. 2015], GPR27 [Chopra et al. 2020], TREH (trehalase) [Arai et al. 2013], KCNIP1 [Xu et al. 2018], CXCL11 [Kochumon et al. 2020], CXCL14 [Cereijo et al. 2021], ANGPTL8 [Zheng et al. 2018], C1QTNF12 [Wei et al. 2012], INHBE (inhibin subunit beta E) [Sugiyama et al. 2018] and FMOD (fibromodulin) [Lee et al. 2021] are the main regulators of diabetes mellitus. SFRP5 [Ding et al. 2022], F5 [Ridker et al. 1995], CD163 [Shao et al. 2020], AQP4 [Warth et al. 2007], CCN5 [Zolfaghari et al. 2022], VDR (vitamin D receptor) [Raljević et al. 2021], SERPINE1 [Morange et al. 2007], AZGP1 [Huscher et al. 2021], VSIG4 [Wang et al. 2023], RBP4 [Zhang et al. 2021], C3 [Fang et al. 2023], TIMP4 [Weir et al. 2011], SPP1 [Shen et al. 2024], BMP7 [Jin et al. 2018], SLC7A11 [Li et al. 2023], TFEC (transcription factor EC) [Wang et al. 2022], CFD (complement factor D) [Hao et al. 2023], AGTR1 [Tran et al. 2024], PTX3 [Xu et al. 2022], EPHB2 [Jiang et al. 2024], FGF7 [Mei et al. 2022], FN1 [Yao et al. 2022], HCN4 [Song et al. 2011], STXBP2 [Yamada et al. 2017], POMC (proopiomelanocortin) [Gumede et al. 2024], APOB (apolipoprotein B) [Marston et al. 2022], BMAL1 [Ruan et al. 2024], RAP1GAP [Shan et al. 2024], FABP4 [Aleksandrova et al. 2019], LOX (lysyl oxidase) [González-Santamaría et al. 2016], ADAMTS5 [Lee et al. 2011], CD63 [van der Zee et al. 2006], EDN1 [Palacín et al. 2009], DHCR24 [Han et al. 2019, PDPN (podoplanin) [Cimini et al. 2019], CTSB (cathepsin B) [Wu et al. 2015], FCER1G [Xiao et al. 2021], LGALS3 [Chalise et al. 2022], KCNH2 [Wang et al. 2020], HMOX1 [Yang et al. 2024], CORIN (corin, serine peptidase) [Feistritzer and Metzler, 2016], TRPC4 [Jung et al. 2011], ELN (elastin) [Skjøt-Arkil et al. 2013], ADAMTS2 [Lee et al. 2012], QSOX1 [Vanhaverbeke et al. 2019], BCAT1 [Lai et al. 2021], TRPM8 [Alves et al. 2020], LEF1 [Cho et al. 2020], CTLA4 [Yip et al. 2007], PENK

(proenkephalin) [Ng et al. 2014], IL1B [Pan et al. 2022], CX3CR1 [Pucci et al. 2013], F2RL2 [Wu et al. 2023], GDF15 [Dogon et al. 2024], BDNF (brain derived neurotrophic factor) [Okada et al. 2012], OLR1 [Trabetti et al. 2006], ABCG2 [Higashikuni et al. 2010], MDK (midkine) [Takenaka et al. 2009], HTR2B [Snider et al. 2021], UCHL1 [Wu et al. 2022], ESR1 [Puzianowska-Kuźnicka, 2012], NOS2 [Zheng et al. 2004], CUBN (cubilin) [McMahon et al. 2014], ACE (angiotensin I converting enzyme) [Liu et al. 2016], PDE5A [Li et al. 2021], PAK1 [Liu et al. 2020], GNB3 [Chang et al. 2012], APOE (apolipoprotein E) [Shao et al. 2022], F2RL3 [Corbin et al. 2022], F2R [Gigante et al. 2010], EGR2 [Bo et al. 2022], GLI1 [Wang et al. 2018], EGR1 [Li et al. 2021], TFPI2 [Guo et al. 2023], DUSP6 [Wu and Zhang, 2024], IL34 [Kashiwagi et al. 2022], GZMB (granzyme B) [Xu et al. 2024], CXCL9 [Lin et al. 2019], RUNX1 [Ni et al. 2021], TREH (trehalase) [Farag et al. 2023], CXCL2 [Guo et al. 2020] and ADAMTS8 [Zhao et al. 2011] are associated to the risk of myocardial infarction. SFRP5 [Zeng et al. 2023], CD163 [Chen et al. 2020], AQP4 [Jiang et al. 2021], TIMP4 [Takawale et al. 2014], SOX2 [Li et al. 2023], NPPC (natriuretic peptide C) [Tarazón et al. 2019], SPP1 [Yuan and Fu, 2024], SLC7A11 [Pang et al. 2024], TGFA (transforming growth factor alpha) [Herrmann et al. 2011], PTX3 [Shimizu et al. 2015], EPHB2 [Yang et al. 2016], GPD1L [Valdivia et al. 2009], FHL2 [Goltz et al. 2016], CD38 [Zhang et al. 2020], FN1 [Zhang et al. 2022], HCN4 [Yu et al. 2011], APOB (apolipoprotein B) [Benn et al. 2007], BMAL1 [Yu et al. 2022], LOX (lysyl oxidase) [Valls-Lacalle et al. 2021], PRDX6 [Mu et al. 2022], CTSB (cathepsin B) [Wu et al. 2022], PRKCD (protein kinase C delta) [Sivaraman et al. 2009], LGALS3 [Rong et al. 2020], HMOX1 [Tan et al. 2024], CORIN (corin, serine peptidase) [Wang et al. 2018], ELN (elastin) [Wang et al. 2021], CACNA2D3 [Liu et al. 2024], STEAP4 [Luo et al. 2019], BCAT1 [Fu et al. 2022], SFRP4 [Zeng et al. 2019], TRPM8 [Cheng et al. 2019], ALOX15 [Cai et al. 2023], IL1B [Yu et al. 2010], GDF15 [Dogon et al. 2024], APLNR (apelin receptor) [Zheng et al. 2023], CXCL10 [Safa et al. 2016], BDNF (brain derived neurotrophic factor) [Fioranelli et al. 2023], PTN (pleiotrophin) [Christman et al. 2005], MDK (midkine) [Horiba et al. 2006], UCHL1 [Geng et al. 2022], ESR1 [Kabir et al. 2015], ACE (angiotensin I converting enzyme) [Pepine, 1998], PLCE1 [Li et al. 2019], PAK1 [Liu et al. 2020], APOE (apolipoprotein E) [Shao et al. 2022], EGR1 [Li et al. 2024], TFPI2 [Luo et al. 2023], DUSP6 [Wu et al. 2019], IL34 [Zhuang et al. 2023], RUNX1 [Zhang et al. 2022], GZMB (granzyme B) [Santos-

Zas et al. 2021], EDA2R [Guan et al. 2023], FSCN1 [Huang et al. 2023], HAS3 [Piroth et al. 2022], TREH (trehalase) [Wang et al. 2024] and CXCL14 [Liu et al. 2021] are found to be associated with myocardial ischemia. Studies show that CD163 [Urbonaviciene et al. 2011], PLA2G2A [Akinkuolie et al. 2019], GPD1L [Huang et al. 2018], GSTM3 [Juang et al. 2020], APOB (apolipoprotein B) [Nakano et al. 2008], HEY2 [Bezzina et al. 2013], FABP4 [Saito et al. 2021], CTSB (cathepsin B) [Dai et al. 2021], LGALS3 [Maiolino et al. 2015], GDF15 [Andersson et al. 2020], CUBN (cubilin) [McMahon et al. 2014], ACE (angiotensin I converting enzyme) [Domanski et al. 1999], GNB3 [Birkner et al. 2023], EGR1 [Xie et al. 2023], KCNN3 [Ivanova et al. 2017] and TREH (trehalase) [Iwai et al. 2012] are involved in the cardiac death. CD163 [Sbrana et al. 2020], PLA2G2A [Lemaitre et al. 2016], AQP4 [Nakayama et al. 2016], FGF12 [Velíšková et al. 2021], IL18R1 [Zhang et al. 2022], PTX3 [Ristagno et al. 2015], GPD1L [Valdivia et al. 2009], KCNH2 [Bileišienė et al. 2021], ELN (elastin) [Markush et al. 2023], GDF15 [Herrmann et al. 2022], BDNF (brain derived neurotrophic factor) [D'Cruz et al. 2002, PTN (pleiotrophin) [Liu et al. 2021], UCHL1 [Ebner et al. 2020], KCNA5 [Nielsen et al. 2007] and APOE (apolipoprotein E) [Kida et al. 1995] plays an essential role in facilitating cardiac arrest. Altered expression of TFRC (transferrin receptor) [Xu et al. 2015], CCN5 [Kim et al. 2018], FKBP5 [Wada et al. 2021], RBP4 [Bobbert et al. 2009], HMGCS2 [Wang et al. 2024], XRCC4 [Fredette et al. 2019], NPPC (natriuretic peptide C) [Tarazón et al. 2019], BMP7 [Ouyang et al. 2022], SLC7A11 [Lin et al. 2024], HMOX2 [Cetin-Atalay et al. 2023], GPD1L [Huang et al. 2018], DIRAS3 [Zhuo et al. 2017], ITGA7 [Esposito et al. 2013], FHL2 [Arimura et al. 2007], CD38 [Wang et al. 2023], HCN4 [Yildirim et al. 2022], APOB (apolipoprotein B) [Yokoyama et al. 2004], BMAL1 [Li et al. 2020], HEY2 [Sakata et al. 2002], IGFBP2 [Yu et al. 2023], LPCAT3 [Iqbal et al. 2023], LOX (lysyl oxidase) [Sivakumar et al. 2008], DMPK (DM1 protein kinase) [Damanafshan et al. 2018], NQO1 [Wu et al. 2022], EDN1 [Matsa et al. 2014], DHCR24 [Dong et al. 2018], HSPB7 [Stark et al. 2010], CTSB (cathepsin B) [Mehra et al. 2017], LGALS3 [Nguyen et al. 2019], KCNH2 [Maddali et al. 2022, HMOX1 [Zhen et al. 2024], HIF3A [Guo et al. 2021], CORIN (corin, serine peptidase) [Tripathi et al. 2019], ADAMTS2 [Rau et al. 2017], SLC6A6 [Ansar et al. 2020], PALLD (palladin, cytoskeletal associated protein) [Mastrototaro et al. 2023], SERINC2 [Hu et al. 2023], NMRAL1 [Gao et al. 2022], CTLA4 [Ruppert et al. 2010], CX3CR1

[Jeyalan et al. 2023], GDF15 [May et al. 2022], CXCL10 [Nogueira et al. 2012], BDNF (brain derived neurotrophic factor) [Costa et al. 2018], DIO2 [Wang et al. 2010], MYOZ1 [Arola et al. 2007], TP63 [Poloni et al. 2019], ACE (angiotensin I converting enzyme) [Küçükarabaci et al. 2008], PAK1 [Raut et al. 2015], GNB3 [Dewi et al. 2023], APOE (apolipoprotein E) [Jurkovicova et al. 2006], CACNG8 [Ortega et al. 2015], TNNT1 [Streff et al. 2019], HLA-DPA1 [Liu et al. 2006], IL34 [Xi et al. 2023], IER3 [Zhou et al. 2017], GZMB (granzyme B) [Zeglinski and Granville, 2020], CXCL9 [Nogueira et al. 2012], KCNN3 [Ortega et al. 2015], HAS3 [Wang et al. 2014] and TREH (trehalase) [Hieda et al. 2022] have been reported to be associated with dilated cardiomyopathy. VDR (vitamin D receptor) [Al-Nbaheen, 2023], PTX3 [Zanetti et al. 2014], FN1 [Page et al. 2022], APOB (apolipoprotein B) [Akdim et al. 2010], ADAMTS5 [Muneshige et al. 2011], CX3CR1 [Combadière et al. 2008], ABCG2 [Zhang et al. 2020], MDK (midkine) [Narita et al. 2008], ACE (angiotensin I converting enzyme) [Kondo et al. 2015], GNB3 [Suwazono et al. 2006], APOE (apolipoprotein E) [Sullivan et al. 1997] and CXCL3 [Martín-Fuentes et al. 2009] have been revealed to be associated with hypercholesterolemia. VSIG4 [Ding et al. 2023], FKBP5 [Wang et al. 2023], C3 [Dernellis et al. 2006], TIMP4 [Ye et al. 2021], SPP1 [Wang et al. 2021], BMP7 [Zhao et al. 2017], CFD (complement factor D) [Ding et al. 2023], AGTR1 [Feng et al. 2017], PTX3 [Bostan et al. 2020], FN1 [Zhu et al. 2022], HCN4 [Fraile et al. 2024], APOB (apolipoprotein B) [Zhong et al. 2022], BMAL1 [Wang et al. 2024], C1QC [Ding et al. 2023], FABP4 [López-Canoa et al. 2021], LOX (lysyl oxidase) [Adam et al. 2011], CD63 [Choudhury et al. 2007], NQO1 [Li et al. 2018], KCNH2 [Li et al. 2015], CORIN (corin, serine peptidase) [Chen et al. 2015], CDHR3 [Nakano et al. 2016], ELN (elastin) [Wang et al. 2021], RGS4 [Borges et al. 2023], GDF15 [Fragão-Marques et al. 2021], CXCL10 [Chen et al. 2021], BDNF (brain derived neurotrophic factor) [Pressler et al. 2024], ABCG2 [Wu et al. 2023, SMOC2 [Zhang et al. 2022], UCHL1 [Bi et al. 2020], ESR1 [Golubić et al. 2014], MYOZ1 [Martin et al. 2015], ACE (angiotensin I converting enzyme) [Gensini et al. 2003], PAK1 [DeSantiago et al. 2018], KCNA5 [Wang et al. 2022], GNB3 [Schreieck et al. 2004], APOE (apolipoprotein E) [Li et al. 2022], IL34 [Ma et al. 2023], KCNN3 [Rahm et al. 2021], KCNIP1 [Tsai et al. 2016] and FMOD (fibromodulin) [Liang et al. 2023] have been identified as a targets for atrial fibrillation. AGTR1 [Chou et al. 2022], PTX3 [Polat et al. 2015], LOX (lysyl oxidase) [Purushothaman et al. 2017], TGFB2 [Renard et al. 2013], ACE

(angiotensin I converting enzyme) [Meurs et al. 2018] and GLIS1 [Yu et al. 2019] are correlates positively with the incidence of mitral valve disease. The results suggest that enriched genes might affect the disease progression of HCM and its associated complications include inflammation, heart failure, coronary artery disease, atherosclerosis, cardiac fibrosis, obesity, hypertension, diabetes mellitus, myocardial infarction, myocardial ischemia, cardiac death, cardiac arrest, dilated cardiomyopathy, hypercholesterolemia, atrial fibrillation and mitral valve disease. Novel biomarkers for HCM is listed in Table 11.

The PPI network was constructed using the HIPPIE database, and the analysis of significant modules was performed. Finally, we identified hub genes form PPI network and modules. FN1 [Page et al. 2022], ESR1 [Zhang et al. 2023], APLNR (apelin receptor) [Wang et al. 2020], LOX (lysyl oxidase) [Ma et al. 2011] and APOE (apolipoprotein E) [Anoop et al. 2010] can be used as an important therapeutic targets for coronary artery disease. FN1 [Page et al. 2022] and APOE (apolipoprotein E) [Sullivan et al. 1997] have become a potential biomarkers for hypercholesterolemia. Altered expression of FN1 [Yao et al. 2022], ESR1 [Puzianowska-Kuźnicka, 2012], PAK1 [Liu et al. 2020], LOX (lysyl oxidase) [González-Santamaría et al. 2016] and APOE (apolipoprotein E) [Shao et al. 2022] were associated with prognosis in myocardial infarction. FN1 [Zhang et al. 2022], SOX2 [Li et al. 2023], ESR1 [Kabir et al. 2015], PAK1 [Liu et al. 2020], APLNR (apelin receptor) [Zheng et al. 2023], LOX (lysyl oxidase) [Valls-Lacalle et al. 2021] and APOE (apolipoprotein E) [Shao et al. 2022] expression was shown to be regulated in myocardial ischemia. FN1 [Zhu et al. 2022], ESR1 [Golubić et al. 2014], PAK1 [DeSantiago et al. 2018], LOX (lysyl oxidase) [Adam et al. 2011] and APOE (apolipoprotein E) [Li et al. 2022] are implicated in atrial fibrillation. In many clinical studies, SOX2 [Njouendou et al. 2023], ESR1 [Zhang et al. 2023], SNCA (synuclein alpha) [Forloni, 2023], PAK1 [Chen et al. 2024], TGM2 [Chang et al. 2024], LOX (lysyl oxidase) [Huang et al. 2021], APOE (apolipoprotein E) [Christensen et al. 2011] and HLA-DPA1 [Lantermann et al. 2002] have been linked to the start of inflammation. Previous study confirmed that SOX2 [Zhao et al. 2018], PAK1 [Wang et al. 2014], LOX (lysyl oxidase) [Galán et al. 2017] and APOE (apolipoprotein E) [Qin et al. 2010] are strongly associated with HCM. The altered expression of SOX2 [Liang et al. 2021], PAK1 [Ai et al. 2011] and LOX (lysyl oxidase) [López et al. 2013] are related to

prognosis in heart failure. SOX2 [Jiang et al. 2022], ESR1 [Zhou et al. 2022], APLNR (apelin receptor) [Stanchev et al. 2024], LOX (lysyl oxidase) [Vadasz et al. 2019] and APOE (apolipoprotein E) [de Leeuw et al. 2004] played an important role in hypertension. SOX2 [Gu et al. 2011], ESR1 [Dahlman et al. 2008], PAK1 [Veluthakal et al. 2018], TGM2 [Kolokotronis et al. 2024], APOE (apolipoprotein E) [El-Lebedy et al. 2018] and HLA-DPA1 [Varney et al. 2010] were involved in regulating the occurrence of diabetes mellitus. Previous studies have been reported that altered expression of ESR1 [Guclu-Geyik et al. 2020], APLNR (apelin receptor) [De Los Santos et al. 2023], LOX (lysyl oxidase) [Huang et al. 2021] and APOE (apolipoprotein E) [Farup et al. 2020] increased the risk of obesity. PAK1 [Singh et al. 2015], LOX (lysyl oxidase) [Ovchinnikova et al. 2014] and APOE (apolipoprotein E) [Marais, 2021] have been found to have a strong association with atherosclerosis. PAK1 [Raut et al. 2015], LOX (lysyl oxidase) [Sivakumar et al. 2008], APOE (apolipoprotein E) [Jurkovicova et al. 2006] and HLA-DPA1 [Liu et al. 2006] expression has been reported with dilated cardiomyopathy progression. TGM2 [Griffin et al. 2020], LOX (lysyl oxidase) [López et al. 2013] and APOE (apolipoprotein E) [Hada et al. 2022] are important in the successful progression of cardiac fibrosis. Altered expression and activity of LOX (lysyl oxidase) [Purushothaman et al. 2017] has been demonstrated in mitral valve disease. recent studies have proposed that APOE (apolipoprotein E) [Kida et al. 1995] is associated with the development and progression of cardiac arrest. Our studies have shown that novel biomarkers such as TUBA4A, RPS2 and LCK (LCK proto-oncogene, Src family tyrosine kinase) are involved in the regulation of HCM. We assumed that these hub genes might play a essential role in the pathogenesis of HCM; however, this hypothesis needs to be verified in future investigation.

It is evident that miRNA-hub gene regulatory network and TF-hub gene regulatory network play a key part in the development of HCM. In this way, it increases the knowledge of HCM identification and contributes to targeted therapeutic management strategies and HCM prediction. FN1 [Page et al. 2022], FKBP5 [Wang et al. 2020], ESR1 [Zhang et al. 2023], hsa-miR-34a-5p [Yalım et al. 2023], BRCA1 [Powell et al. 2018], STAT1 [Zhao et al. 2024], STAT3 [Ouyang et al. 2022], MEF2A [Muhammad Sulaiman et al. 2024] and GATA2 [Luo et al. 2021] participates in the regulation of the pathophysiological process in

coronary artery disease. Studies have demonstrated that the altered expression of FN1 [Page et al. 2022] in patients with hypercholesterolemia. Recent studies have demonstrated that the FN1 [Yao et al. 2022], ESR1 [Puzianowska-Kuźnicka, 2012], PAK1 [Liu et al. 2020], hsa-miR-34a-5p [Wang and Cao, 2020], PRRX2 [Bai et al. 2020], BRCA1 [Shukla et al. 2011], STAT1 [Zhang et al. 2023], STAT3 [Bao et al. 2024], MEF2A [Guella et al. 2009] and GATA2 [Izadpanah et al. 2021] are associated with myocardial infarction. FN1 [Zhang et al. 2022], FHL2 [Goltz et al. 2016], ESR1 [Kabir et al. 2015], PAK1 [Liu et al. 2020], SRY (sex determining region Y) [Liu et al. 2019], STAT1 [Zhou et al. 2019] and STAT3 [Mahdiani et al. 2022] are important in the development of myocardial ischemia. Recent studies have proposed that the FN1 [Zhu et al. 2022], FKBP5 [Wang et al. 2023], ESR1 [Golubić et al. 2014], PAK1 [DeSantiago et al. 2018], STAT1 [Tsai et al. 2008] and STAT3 [Hsu et al. 2019] are associated with in atrial fibrillation. TFRC (transferrin receptor) [Zhou et al. 2024], PAK1 [Ai et al. 2011], BRCA1 [Wang et al. 2024], STAT1 [Shi et al. 2024] and STAT3 [Zhuang et al. 2022] are associated with progression of heart failure. TFRC (transferrin receptor) [Qiu et al. 2024], FKBP5 [Willmer et al. 2022], FHL2 [Sommer et al. 2023], RPLP0 [Pérez-Gómez et al. 2023], ESR1 [Guclu-Geyik et al. 2020], BRCA1 [Bhardwaj et al. 2023], STAT1 [Li et al. 2023], STAT3 [Su et al. 2020] and GATA2 [Menghini et al. 2005] are involved in the progression of obesity. The abnormal expression of TFRC (transferrin receptor) [Yang et al. 2024], FHL2 [Li et al. 2019], TPM3 [Xu et al. 2021], ESR1 [Zhou et al. 2022], CHRM3 [Cowley et al. 2018], BRCA1 [Chida-Nagai et al. 2019], STAT1 [Jandl et al. 2022], STAT3 [Bisserier et al. 2021], FOS (Fos proto-oncogene, AP-1 transcription factor subunit) [Altura et al. 2003] and GATA2 [Zhang et al. 2022] have been reported in hypertension. TFRC (transferrin receptor) [Xu et al. 2015], FKBP5 [Wada et al. 2021], FHL2 [Arimura et al. 2007], PAK1 [Raut et al. 2015], TP63 [Poloni et al. 2019], hsa-miR-34a-5p [Wu et al. 2021], hsa-miR-194-5p [Wang et al. 2024], BRCA1 [Nozynski et al. 2016], STAT3 [Li et al. 2019] and MEF2A [Qiao et al. 2020] are the risk factors of dilated cardiomyopathy. FKBP5 [Liu et al. 2023], FHL2 [van de Pol et al. 2020], TPM3 [Mansfield et al. 2016]. ESR1 [Zhang et al. 2023], PAK1 [Chen et al. 2024], SNCA (synuclein alpha) [Forloni, 2023], hsa-mir-374a-5p [Perez-Sanchez et al. 2022], hsa-miR-34a-5p [Mirra et al. 2022], BRCA1 [Bruand et al. 2021], STAT1 [Ploeger et al. 2022], STAT3 [Hu et al. 2019], FOS (Fos proto-oncogene, AP-1 transcription factor subunit) [Catar et al. 2013], MEF2A [Cilenti et al. 2021]

and GATA2 [Baba et al. 2024] might be involved in the process of inflammation. Studies have also confirmed that FKBP5 [Sidibeh et al. 2018], FHL2 [Habibe et al. 2022], ESR1 [Dahlman et al. 2008], CHRM3 [Guo et al. 2006], PAK1 [Veluthakal et al. 2018], STAT1 [Cao et al. 2022] and STAT3 [Zhang et al. 2022] participates in diabetes mellitus. FHL2 [Friedrich et al. 2014], PAK1 [Wang et al. 2014, STAT1 [Shi et al. 2024], STAT3 [Wang et al. 2018] and MEF2A [Konno et al. 2010] have been reported to be correlated with HCM. FHL2 [Chu et al. 2010], PAK1 [Singh et al. 2015], hsa-miR-34a-5p [Yalım et al. 2023], hsa-miR-524-5p [Li et al. 2018], SRY (sex determining region Y) [Cai et al. 2015], BRCA1 [van Bommel et al. 2021], STAT1 [Zhang et al. 2022], STAT3 [Yang et al. 2024], MEF2A [Zhou et al. 2015] and GATA2 [Yin et al. 2020] have been reported to be associated with atherosclerosis. FHL2 [Anwaier et al. 2022], PRRX2 [Bai et al. 2020], BRCA1 [Yao et al. 2013], STAT1 [Dai et al. 2013], STAT3 [Jiang et al. 2024], MEF2A [Chen et al. 2016] and GATA2 [Wang et al. 2022] are a pivotal regulator of cardiac fibrosis. STAT3 [Huang et al. 2015] is associated with the progression of cardiac arrest. MEF2A [Naya et al. 2002] serves a vital role in cardiac death. SH3KBP1, TMEM30B, PTPRR (protein tyrosine phosphatase receptor type R), hsa-miR-520d-5p, hsa-mir-4646-5p, hsa-mir-548aw, hsa-miR-8052, hsa-mir-302b-3p, hsa-mir-548i, USF2 and EN1 might be a novel biomarkers associated with HCM and might be involved in the development of HCM. The results therefore were in accordnce with previous studies and suggested that the hub genes, miRNAs and TFs served significant roles in the development of HCM and its associated complications.

For further investigating the action of drug on hub gene targets in ARDS. Our findings suggest that drugs- Succinylcholine, Memantine, Umeclidinium, Bromazepam target hub genes include CHRNA4, GRIN2A, CHRM3 and GABRE, potentially controlling the development of HCM.

Hypertrophic cardiomyopathy (HCM) is a multifactorial myocardial condition in which pathological hypertrophy, increasing interstitial fibrosis, and poor cardioprotective signaling work together to cause abnormal cardiac remodeling. Therapeutic techniques that address both fibrotic remodeling and the loss of protective molecular pathways are therefore particularly important. In this study, an integrated in-silico framework was used to test four bioactive phytoconstituents Swertiamarin, Puerarin, Oleuropein, and Mangiferin against two

biologically different but complimentary targets, LGALS3 and ESR1, found from HCM transcriptome analysis.

LGALS3 (galectin-3) upregulation in HCM indicates its critical role in fibroblast activation, collagen deposition, and inflammatory signaling, all of which contribute to myocardial stiffness and diastolic dysfunction. Docking study revealed that all tested phytoconstituents effectively occupied LGALS3's carbohydrate recognition domain, engaging conserved residues such as TRP69, ARG50, and HIS46, which are required for galectin-3 ligand recognition and downstream signalling. Notably, Puerarin and Oleuropein had binding affinities comparable to or greater than those of the co-crystallized reference ligand, indicating a high potential for competitive interference with galectin-3-mediated fibrotic signaling. These chemicals' capacity to form a dense hydrogen-bonding network with π-π interactions within the LGALS3 binding pocket suggests a persistent and physiologically relevant inhibitory binding mechanism. From a disease standpoint, such inhibition may translate into attenuation of extracellular matrix buildup and suppression of maladaptive cardiac remodeling typical of HCM.

In parallel, transcriptome study indicated ESR1 downregulation, which is consistent with reduced estrogen-mediated cardioprotective signaling in HCM. Estrogen receptor-α inhibits pathological hypertrophy via regulating calcium levels, oxidative stress, and inflammation in cardiomyocytes. Docking against the agonist-bound ESR1 structure (PDB ID: 1A52) revealed that phytoconstituents may be stably accommodated within the estradiol-binding cavity, generating interactions with residues implicated in receptor stability and activation. Although their binding affinities were lower than those of estradiol, the observed interaction patterns point to a modulatory rather than antagonistic role, which could be especially useful in restoring basal cardioprotective signaling without generating excessive hormonal activation. Oleuropein had the most favorable interaction profile with ESR1, indicating that it could operate as a partial agonist or stabilizer of receptor activation in the context of ESR1 downregulation.

The current study examines the convergence of binding efficacy and pharmacokinetic feasibility. Despite the structural complexity associated with phytochemicals, ADMET analysis found that all screened compounds have

adequate solubility and high projected intestine absorption, indicating their appropriateness for oral administration. Importantly, the consistently low anticipated hERG inhibition across all drugs addresses a crucial safety concern in HCM, where arrhythmogenic risk is naturally high. The lack of considerable CYP2C9 and CYP3A4 inhibition suggests a minimal risk of harmful drug-drug interactions, which is critical for patients who frequently get long-term treatment. Furthermore, the minimal BBB permeability seen across all drugs suggests target specificity for peripheral cardiac tissues, reducing undesired central nervous system effects.

The integration of docking and ADMET properties with *in silico* drug development promotes a multi-target treatment approach in HCM. While LGALS3 suppression may reduce fibrosis-induced structural remodeling, ESR1 modulation provides a parallel pathway for restoring endogenous cardioprotective signaling. Within this paradigm, Puerarin and Oleuropein appear as leading contenders, combining significant target engagement with favorable safety and pharmacokinetic profiles, while Swertiamarin and Mangiferin provide supportive interaction patterns that may contribute to synergistic cardioprotective benefits.

In conclusion, via bioinformatics analysis of NGS data from HCM human models, we identified and selected several essential DEGs that are associated in the development of HCM and its associated complication. Furthermore, our results indicate that the identified DEGs not only are linked with numerious GO terms and functions, and signaling pathways, but also could construct complex PPI, miRNA-hub gene regulatory network and TF-hub gene regulatory network. In addition, a lot of DEGs with distinct GO functions and signaling pathways could form significant modules. Our investigations provides novel insight on HCM advancement not only in the gene level, but also in the GO functions, signaling pathways and module levels. The identified DEGs, associated GO functions, signaling pathways, and modules could serve as potentially diagnostic and therapeutic targets for HCM. In addition, our investigations has some limitations. For example, the identified DEGs, associated GO functions, signaling pathways, and modules were only generated from bioinformatics analysis. These analysed data still need to be further confirmed in clinical specimens in future investigations. Despite these limitations, the results of our investigations for further

examining the roles and associated molecular mechanisms mediated by identified key genes, associated GO functions, signaling pathways, and modules in HCM.

Our study used an integrated *insilico* strategy to identify phytoconstituents with possible significance to hypertrophic cardiomyopathy by focusing on both upregulated LGALS3 and downregulated ESR1. The docking results showed stable and positive interactions of the screened phytochemicals within functionally relevant binding pockets of both targets, whereas ADMET analysis revealed acceptable pharmacokinetic features and low predicted cardiotoxicity. These findings support the potential of the selected phytoconstituents as multi-target modulators capable of reducing fibrosis-related remodeling and restoring cardioprotective signaling in hypertrophic cardiomyopathy.

Despite these encouraging findings, the research is hampered by its dependence on computational projections. Molecular docking and ADMET analyses do not adequately account for dynamic protein behavior, downstream signaling consequences, or *invivo* pharmacokinetics. As a result, experimental validation with biochemical tests, cellular hypertrophy models, and animal investigations is required to confirm the therapeutic utility of the identified lead candidates.

Acknowledgement

I thanks very much to Daniel Bernstein, Stanford University School of Medicine, Stanford, California, USA, the author who deposited their NGS dataset GSE180313, into the public GEO database.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent

No informed consent because this study does not contain human or animals participants.

Availability of data and materials

The datasets supporting the conclusions of this article are available in the GEO (Gene Expression Omnibus) (https://www.ncbi.nlm.nih.gov/geo/) repository. [(GSE180313) https://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE180313]

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding

The authors received no financial support for the research

Author Contributions

B. V. - Writing original draft, and review and editing

S.P. - Formal analysis and validation

C. V. - Software and investigation

Authors

Basavaraj Vastrad ORCID ID: 0000-0003-2202-7637

Shivaling Pattanashetti ORCID ID: 0009-0003-9246-1604

Chanabasayya Vastrad ORCID ID: 0000-0003-3615-4450

References

Abass MK, Al Shamsi A, Jan I, Masalawala MSY, Deeb A. Combined SPINK1 mutations induce early-onset severe chronic pancreatitis in a child with severe obesity. Endocrinol Diabetes Metab Case Rep. 2022. doi:10.1530/EDM-22-0273

Abu-Farha M, Cherian P, Al-Khairi I, Madhu D, Tiss A, Warsam S, Alhubail A, Sriraman D, Al-Refaei F, Abubaker J. Plasma and adipose tissue level of angiopoietin-like 7 (ANGPTL7) are increased in obesity and reduced after physical exercise. PLoS One. 2017;12(3):e0173024. doi:10.1371/journal.pone.0173024

Abu-Farha M, Madhu D, Hebbar P, Mohammad A, Channanath A, Kavalakatt S, Alam-Eldin N, Alterki F, Taher I, Alsmadi O, et al. The Proinflammatory Role of ANGPTL8 R59W Variant in Modulating Inflammation through NF-κB Signaling Pathway under TNFα Stimulation. Cells. 2023;12(21):2563. doi:10.3390/cells12212563

Adam O, Theobald K, Lavall D, Grube M, Kroemer HK, Ameling S, Schäfers HJ, Böhm M, Laufs U. Increased lysyl oxidase expression and collagen cross-linking during atrial fibrillation. J Mol Cell Cardiol. 2011;50(4):678-685. doi:10.1016/j.yjmcc.2010.12.019

Adiyeva M, Aukenov N, Nurzhanova A, Slamkhanova N, Kerimkulova A. The effect of AGTR1, AGT, LPL, ADRB2 gene polymorphisms on central obesity in adolescents of the Kazakh population. Bratisl Lek Listy. 2023;124(1):53-58. doi:10.4149/BLL_2023_008

Agrawal V, Fortune N, Yu S, Fuentes J, Shi F, Nichols D, Gleaves L, Poovey E, Wang TJ, Brittain EL, et al. Natriuretic peptide receptor C contributes to disproportionate right ventricular hypertrophy in a rodent model of obesity-induced heart failure with preserved ejection fraction with pulmonary hypertension. Pulm Circ. 2019;9(4):2045894019878599. doi:10.1177/2045894019895452

Ahadzadeh E, Rosendahl A, Czesla D, Steffens P, Prüßner L, Meyer-Schwesinger C, Wanner N, Paust HJ, Huber TB, Stahl RAK, et al. The chemokine receptor CX3CR1 reduces renal injury in mice with angiotensin II-induced hypertension. Am J Physiol Renal Physiol. 2018;315(6):F1526-F1535. doi:10.1152/ajprenal.00149.2018

Ahmad I, Kuznetsov AE, Pirzada AS, Alsharif KF, Daglia M, Khan H. Computational pharmacology and computational chemistry of 4-hydroxyisoleucine: Physicochemical, pharmacokinetic, and DFT-based approaches. Front Chem. 2023;11:1145974. doi:10.3389/fchem.2023.1145974

Ahmadi S, Rostamzadeh J, Khosravi D, Shariati P, Shakiba N. Association of CTLA-4 gene 49A/G polymorphism with the incidence of type 1 diabetes mellitus in the Iranian Kurdish population. Pak J Biol Sci. 2013;16(24):1929-1935. doi:10.3923/pjbs.2013.1929.1935

Ahmed S, Ahmed A, Bouzina H, Lundgren J, Rådegran G. Elevated plasma endocan and BOC in heart failure patients decrease after heart transplantation in association with improved hemodynamics. Heart Vessels. 2020;35(11):1614-1628. doi:10.1007/s00380-020-01656-3

Ai X, Jiang A, Ke Y, Solaro RJ, Pogwizd SM. Enhanced activation of p21-activated kinase 1 in heart failure contributes to dephosphorylation of connexin 43. Cardiovasc Res. 2011;92(1):106-114. doi:10.1093/cvr/cvr163

Akasaka T, Ocorr K, Lin L, Vogler G, Bodmer R, Grossfeld P. Overexpression of Kif1A in the Developing Drosophila Heart Causes Valvar and Contractility Defects: Implications for Human Congenital Heart Disease. J Cardiovasc Dev Dis. 2020;7(2):22. doi:10.3390/jcdd7020022

Akdim F, Visser ME, Tribble DL, Baker BF, Stroes ES, Yu R, Flaim JD, Su J, Stein EA, Kastelein JJ. Effect of mipomersen, an apolipoprotein B synthesis inhibitor, on low-density lipoprotein cholesterol in patients with familial hypercholesterolemia. Am J Cardiol. 2010;105(10):1413-1419. doi:10.1016/j.amjcard.2010.01.003

Akinkuolie AO, Lawler PR, Chu AY, Caulfield M, Mu J, Ding B, Nyberg F, Glynn RJ, Ridker PM, Hurt-Camejo E, et al. Group IIA Secretory Phospholipase A2, Vascular Inflammation, and Incident Cardiovascular Disease. Arterioscler Thromb Vasc Biol. 2019;39(6):1182-1190. doi:10.1161/ATVBAHA.118.311894

Akter R, Afrose A, Sharmin S, Rezwan R, Rahman MR, Neelotpol S. A comprehensive look into the association of vitamin D levels and vitamin D

receptor gene polymorphism with obesity in children. Biomed Pharmacother. 2022;153:113285. doi:10.1016/j.biopha.2022.113285

Al-Daghri NM, Mohammed AK, Al-Attas OS, Draz HM, Alokail MS. Gender-Specific Association Between FGFR4 Gly388Arg Gene Variants and Hypertension. Genet Test Mol Biomarkers. 2017;21(7):422-427. doi:10.1089/gtmb.2016.0320

Aleksandrova K, Drogan D, Weikert C, Schulze MB, Fritsche A, Boeing H, Pischon T. Fatty Acid-Binding Protein 4 and Risk of Type 2 Diabetes, Myocardial Infarction, and Stroke: A Prospective Cohort Study. J Clin Endocrinol Metab. 2019;104(12):5991-6002. doi:10.1210/jc.2019-00477

Alfaqih MA, Abu-Khdair ZE, Khabour O, Kheirallah KA, Khanfar M. A single nucleotide polymorphism in BCAT1 gene is associated with type 2 diabetes mellitus. Acta Biochim Pol. 2021;69(1):19-24. doi:10.18388/abp.2018_5481

Alfaqih MA, Araidah A, Amarin Z, Saadeh R, Al-Shboul O, Khanfar M, Allouh MZ. Association of vitamin D levels and polymorphisms in vitamin D receptor with type 2 diabetes mellitus. Biomed Rep. 2022;18(1):3. doi:10.3892/br.2022.1585

Alharbi KK, Alshammary AF, Aljabri OS, Ali Khan I. Relationship Between Serum Amyloid A1 (SAA1) Gene Polymorphisms Studies with Obesity in the Saudi Population. Diabetes Metab Syndr Obes. 2021;14:895-900. doi:10.2147/DMSO.S294948

Ali H, Rustam R, Aprilia D, Arizal C, Gusadri IB, Utami PR. Upregulation of SCUBE2 expression in dyslipidemic type 2 diabetes mellitus is associated with endothelin-1. Diabetes Metab Syndr. 2019;13(5):2869-2872. doi:10.1016/j.dsx.2019.07.058

Alizadeh BZ, Valdigem G, Coenen MJ, Zhernakova A, Franke B, Monsuur A, van Riel PL, Barrera P, Radstake TR, Roep BO, et al. Association analysis of functional variants of the FcgRIIa and FcgRIIIa genes with type 1 diabetes, celiac disease and rheumatoid arthritis. Hum Mol Genet. 2007;16(21):2552-2559. doi:10.1093/hmg/ddm194

Al-Kuraishy HM, Al-Gareeb AI, Alexiou A, Papadakis M, Nadwa EH, Albogami SM, Alorabi M, Saad HM, Batiha GE. Metformin and growth differentiation factor 15 (GDF15) in type 2 diabetes mellitus: A hidden treasure. J Diabetes. 2022;14(12):806-814. doi:10.1111/1753-0407.13334

Al-Nbaheen MS. Genetic association between vitamin D receptor gene and Saudi patients confirmed with Familial Hypercholesterolemia. Acta Biochim Pol. 2023;70(4):829-834. doi:10.18388/abp.2020_6638

Alrashdi B, Dawod B, Tacke S, Kuerten S, Côté PD, Marshall JS. Mice Heterozygous for the Sodium Channel Scn8a (Nav1.6) Have Reduced Inflammatory Responses During EAE and Following LPS Challenge. Front Immunol. 2021;12:533423. doi:10.3389/fimmu.2021.533423

Altara R, Manca M, Hessel MH, Gu Y, van Vark LC, Akkerhuis KM, Staessen JA, Struijker-Boudier HA, Booz GW, Blankesteijn WM. CXCL10 Is a Circulating Inflammatory Marker in Patients with Advanced Heart Failure: a Pilot Study. J Cardiovasc Transl Res. 2016;9(4):302-314. doi:10.1007/s12265-016-9703-3

Altura BM, Kostellow AB, Zhang A, Li W, Morrill GA, Gupta RK, Altura BT. Expression of the nuclear factor-kappaB and proto-oncogenes c-fos and c-jun are induced by low extracellular Mg2+ in aortic and cerebral vascular smooth muscle cells: possible links to hypertension, atherogenesis, and stroke. Am J Hypertens. 2003;16(9 Pt 1):701-707. doi:10.1016/s0895-7061(03)00987-7

Aluganti Narasimhulu C, Singla DK. The Role of Bone Morphogenetic Protein 7 (BMP-7) in Inflammation in Heart Diseases. Cells. 2020;9(2):280. doi:10.3390/cells9020280

Alves QL, de Jesus RLC, Silva DF. Beneficial Effects Induced by TRPM8 Channels Activation to Treat Myocardial Infarction. Am J Hypertens. 2020;33(3):214-217. doi:10.1093/ajh/hpz195

Alwahsh SM, Qutachi O, Starkey Lewis PJ, Bond A, Noble J, Burgoyne P, Morton N, Carter R, Mann J, Ferreira-Gonzalez S, et al. Fibroblast growth factor 7 releasing particles enhance islet engraftment and improve metabolic control following islet transplantation in mice with diabetes. Am J Transplant. 2021;21(9):2950-2963. doi:10.1111/ajt.16488

Alzoubi A, Almalouf P, Toba M, O'Neill K, Qian X, Francis M, Taylor MS, Alexeyev M, McMurtry IF, Oka M, et al. TRPC4 inactivation confers a survival benefit in severe pulmonary arterial hypertension. Am J Pathol. 2013;183(6):1779-1788. doi:10.1016/j.ajpath.2013.08.016

Amor M, Itariu BK, Moreno-Viedma V, Keindl M, Jürets A, Prager G, Langer F, Grablowitz V, Zeyda M, Stulnig TM. erum Myostatin is Upregulated in Obesity and Correlates with Insulin Resistance in Humans. Exp Clin Endocrinol Diabetes. 2019;127(8):550-556. doi:10.1055/a-0641-5546

An Y, Wang Q, Wang H, Zhang N, Zhang F. Clinical significance of sFRP5, RBP-4 and NT-proBNP in patients with chronic heart failure. Am J Transl Res. 2021;13(6):6305-6311.

Andenæs K, Lunde IG, Mohammadzadeh N, Dahl CP, Aronsen JM, Strand ME, Palmero S, Sjaastad I, Christensen G, Engebretsen KVT, Tønnessen T. The extracellular matrix proteoglycan fibromodulin is upregulated in clinical and experimental heart failure and affects cardiac remodeling. PLoS One. 2018;13(7):e0201422. doi:10.1371/journal.pone.0201422

Andersson J, Fall T, Delicano R, Wennberg P, Jansson JH. GDF-15 is associated with sudden cardiac death due to incident myocardial infarction. Resuscitation. 2020;152:165-169. doi:10.1016/j.resuscitation.2020.05.001

Anfinson M, Fitts RH, Lough JW, James JM, Simpson PM, Handler SS, Mitchell ME, Tomita-Mitchell A. Significance of α-Myosin Heavy Chain (MYH6) Variants in Hypoplastic Left Heart Syndrome and Related Cardiovascular Diseases. J Cardiovasc Dev Dis. 2022;9(5):144. doi:10.3390/jcdd9050144

Angrisano T, Schiattarella GG, Keller S, Pironti G, Florio E, Magliulo F, Bottino R, Pero R, Lembo F, Avvedimento EV, et al. Epigenetic switch at atp2a2 and myh7 gene promoters in pressure overload-induced heart failure. PLoS One. 2014;9(9):e106024. doi:10.1371/journal.pone.0106024

Anjosa ZP, Santos MM, Rodrigues NJ, Lacerda GA, Araujo J, Silva JA, Tavares NA, Guimarães RL, Crovella S, Brandão LA. Polymorphism in ficolin-1 (FCN1) gene is associated with an earlier onset of type 1 diabetes mellitus in children and

adolescents from northeast Brazil. J Genet. 2016;95(4):1031-1034. doi:10.1007/s12041-016-0719-x

Anoop S, Misra A, Meena K, Luthra K. Apolipoprotein E polymorphism in cerebrovascular & coronary heart diseases. Indian J Med Res. 2010;132:363-378.

Ansar M, Ranza E, Shetty M, Paracha SA, Azam M, Kern I, Iwaszkiewicz J, Farooq O, Pournaras CJ, Malcles A, et al. aurine treatment of retinal degeneration and cardiomyopathy in a consanguineous family with SLC6A6 taurine transporter deficiency. Hum Mol Genet. 2020;29(4):618-623. doi:10.1093/hmg/ddz303

Antikainen AA, Haukka JK, Kumar A, Syreeni A, Hägg-Holmberg S, Ylinen A, Kilpeläinen E, Kytölä A, Palotie A, Putaala J, et al. Whole-genome sequencing identifies variants in ANK1, LRRN1, HAS1, and other genes and regulatory regions for stroke in type 1 diabetes. Sci Rep. 2024;14(1):13453. doi:10.1038/s41598-024-61840-7

Antonelli A, Ferrannini E. CD38 autoimmunity: recent advances and relevance to human diabetes. J Endocrinol Invest. 2004;27(7):695-707. doi:10.1007/BF03347507

Antonelli A, Ferrari SM, Corrado A, Ferrannini E, Fallahi P. CXCR3, CXCL10 and type 1 diabetes. Cytokine Growth Factor Rev. 2014;25(1):57-65. doi:10.1016/j.cytogfr.2014.01.006

Anwaier G, Xie TT, Pan CS, Li AQ, Yan L, Wang D, Chen FK, Weng DZ, Sun K, Chang X, et al. QiShenYiQi Pill Ameliorates Cardiac Fibrosis After Pressure Overload-Induced Cardiac Hypertrophy by Regulating FHL2 and the Macrophage RP S19/TGF-β1 Signaling Pathway. Front Pharmacol. 2022;13:918335. doi:10.3389/fphar.2022.918335

Anzalone R, Corrao S, Lo Iacono M, Loria T, Corsello T, Cappello F, Di Stefano A, Giannuzzi P, Zummo G, Farina F, et al. Isolation and characterization of CD276+/HLA-E+ human subendocardial mesenchymal stem cells from chronic heart failure patients: analysis of differentiative potential and immunomodulatory markers expression. Stem Cells Dev. 2013;22(1):1-17. doi:10.1089/scd.2012.0402

Aono Y, Suzuki Y, Horiguchi R, Inoue Y, Karayama M, Hozumi H, Furuhashi K, Enomoto N, Fujisawa T, Nakamura Y, et al. CD109 on Dendritic Cells Regulates Airway Hyperreactivity and Eosinophilic Airway Inflammation. Am J Respir Cell Mol Biol. 2023;68(2):201-212. doi:10.1165/rcmb.2022-0109OC

Arabadjian M, Nicolas B, Montgomery S, Pleasure M, Collins M, Reuter M, Massera D, Shimbo D, Sherrid M. Clinical course and outcomes in adults with co-occurring hypertrophic cardiomyopathy and hypertension: a scoping review protocol. BMJ Open. 2023;13(7):e075087. doi:10.1136/bmjopen-2023-075087

Arai C, Miyake M, Matsumoto Y, Mizote A, Yoshizane C, Hanaya Y, Koide K, Yamada M, Hanaya T, Arai S, et al. Trehalose prevents adipocyte hypertrophy and mitigates insulin resistance in mice with established obesity. J Nutr Sci Vitaminol (Tokyo). 2013;59(5):393-401. doi:10.3177/jnsv.59.393

Araujo TF, Cordeiro AV, Vasconcelos DAA, Vitzel KF, Silva VRR. The role of cathepsin B in autophagy during obesity: A systematic review. Life Sci. 2018;209:274-281. doi:10.1016/j.lfs.2018.08.024

Argulian E, Sherrid MV, Messerli FH. Misconceptions and Facts About Hypertrophic Cardiomyopathy. Am J Med. 2016;129(2):148-152. doi:10.1016/j.amjmed.2015.07.035

Arıkan FB, Sagsoz N. Effects of obesity on the serum BMP15, GDF9, and kisspeptin concentrations in women of reproductive age. J Med Biochem. 2023;42(3):392-400. doi:10.5937/jomb0-37329

Arimura T, Hayashi T, Matsumoto Y, Shibata H, Hiroi S, Nakamura T, Inagaki N, Hinohara K, Takahashi M, Manatsu SI, et al. Structural analysis of four and half LIM protein-2 in dilated cardiomyopathy. Biochem Biophys Res Commun. 2007;357(1):162-167. doi:10.1016/j.bbrc.2007.03.128

Ariss RW, Khan Minhas AM, Nazir S, Patel MM, Nesheiwat Z, Mhanna M, Kayani WT, Moukarbel GV, Nasir K, Jneid H. Outcomes and Revascularization Strategies of ST-Elevation Myocardial Infarction in Patients With Hypertrophic Cardiomyopathy. Curr Probl Cardiol. 2022;47(11):101102. doi:10.1016/j.cpcardiol.2022.101102

Aristoteli LP, Møller HJ, Bailey B, Moestrup SK, Kritharides L. The monocytic lineage specific soluble CD163 is a plasma marker of coronary atherosclerosis. Atherosclerosis. 2006;184(2):342-347. doi:10.1016/j.atherosclerosis.2005.05.004

Arlt A, Schäfer H. Role of the immediate early response 3 (IER3) gene in cellular stress response, inflammation and tumorigenesis. Eur J Cell Biol. 2011;90(6-7):545-552. doi:10.1016/j.ejcb.2010.10.002

Arnaud L, Benech P, Greetham L, Stephan D, Jimenez A, Jullien N, García-González L, Tsvetkov PO, Devred F, Sancho-Martinez I, et al. APOE4 drives inflammation in human astrocytes via TAGLN3 repression and NF-κB activation. Cell Rep. 2022;40(7):111200. doi:10.1016/j.celrep.2022.111200

Arola AM, Sanchez X, Murphy RT, Hasle A, Li H, Elliott PM, McKenna WJ, Towbin JA, Bowles NE. Mutations in PDLIM3 and MYOZ1 encoding myocyte Z line proteins are infrequently found in idiopathic dilated cardiomyopathy. Mol Genet Metab. 2007;90(4):435-440. doi:10.1016/j.ymgme.2006.12.008

Ashiq S, Sabar MF. Association of maternal hypertension and diabetes with variants of the NKX2-5, LEFTY1 and LEFTY2 genes in children with congenital heart defects: a case-control study from Pakistani Population. Mol Biol Rep. 2023;50(6):5013-5020. doi:10.1007/s11033-023-08418-0

Ashkar S, Mesentsev A, Zhang WX, Mastyugin V, Dunn MW, Laniado-Schwartzman M. Retinoic acid induces corneal epithelial CYP4B1 gene expression and stimulates the synthesis of inflammatory 12-hydroxyeicosanoids. J Ocul Pharmacol Ther. 2004;20(1):65-74. doi:10.1089/108076804772745473

Atchison DK, O'Connor CL, Menon R, Otto EA, Ganesh SK, Wiggins RC, Smrcka AV, Bitzer M. Hypertension induces glomerulosclerosis in phospholipase C-ε1 deficiency. Am J Physiol Renal Physiol. 2020;318(5):F1177-F1187. doi:10.1152/ajprenal.00541.2019

Aziz S, Yalan L, Raza MA, Lemin J, Akram HMB, Zhao W. GSK126 an inhibitor of epigenetic regulator EZH2 suppresses cardiac fibrosis by regulating the EZH2-PAX6-CXCL10 pathway. Biochem Cell Biol. 2023;101(1):87-100. doi:10.1139/bcb-2022-0224

Baba H, Kimura N, Kanegane H, Miya F, Kosaki K, Morio T, Koike R. GATA2 deficiency of a novel missense variant with multiorgan inflammation. Rheumatology (Oxford). 2024;63(8):e226-e228. doi:10.1093/rheumatology/keae062

Baek JH, Kim SJ, Kang HG, Lee HW, Kim JH, Hwang KA, Song J, Chun KH. Galectin-3 activates PPARγ and supports white adipose tissue formation and high-fat diet-induced obesity. Endocrinology. 2015;156(1):147-156. doi:10.1210/en.2014-1374

Bai WW, Tang ZY, Shan TC, Jing XJ, Li P, Qin WD, Song P, Wang B, Xu J, Liu Z, et al. Up-regulation of paired-related homeobox 2 promotes cardiac fibrosis in mice following myocardial infarction by targeting of Wnt5a. J Cell Mol Med. 2020;24(3):2319-2329. doi:10.1111/jcmm.14914

Bai Y, Tian M, He P, Zhang Y, Chen J, Zhao Z, Lan J, Zhang B. LMCD1 is involved in tubulointerstitial inflammation in the early phase of renal fibrosis by promoting NFATc1-mediated NLRP3 activation. Int Immunopharmacol. 2023;121:110362. doi:10.1016/j.intimp.2023.110362

Bains S, Zhou W, Dotzler SM, Martinez K, Kim CJ, Tester DJ, Ye D, Ackerman MJ. Suppression and Replacement Gene Therapy for KCNH2-Mediated Arrhythmias. Circ Genom Precis Med. 2022;15(6):e003719. doi:10.1161/CIRCGEN.122.003719

Bao H, Wang X, Zhou H, Zhou W, Liao F, Wei F, Yang S, Luo Z, Li W. PCSK9 regulates myofibroblast transformation through the JAK2/STAT3 pathway to regulate fibrosis after myocardial infarction. Biochem Pharmacol. 2024;220:115996. doi:10.1016/j.bcp.2023.115996

Bao Y, Tong C, Xiong X. CXCL3: A key player in tumor microenvironment and inflammatory diseases. Life Sci. 2024;348:122691. doi:10.1016/j.lfs.2024.122691

Barabási AL, Gulbahce N, Loscalzo J. Network medicine: a network-based approach to human disease. Nat Rev Genet. 2011;12(1):56-68. doi:10.1038/nrg2918

Barallobre-Barreiro J, Radovits T, Fava M, Mayr U, Lin WY, Ermolaeva E, Martínez-López D, Lindberg EL, Duregotti E, Daróczi L, et al. Extracellular Matrix in Heart Failure: Role of ADAMTS5 in Proteoglycan Remodeling. Circulation. 2021;144(25):2021-2034. doi:10.1161/CIRCULATIONAHA.121.055732

Barbosa MT, Soares SM, Novak CM, Sinclair D, Levine JA, Aksoy P, Chini EN. The enzyme CD38 (a NAD glycohydrolase, EC 3.2.2.5) is necessary for the development of diet-induced obesity. FASEB J. 2007;21(13):3629-3639. doi:10.1096/fj.07-8290com

Barkai LJ, Sipter E, Csuka D, Prohászka Z, Pilely K, Garred P, Hosszúfalusi N. Decreased Ficolin-3-mediated Complement Lectin Pathway Activation and Alternative Pathway Amplification During Bacterial Infections in Patients With Type 2 Diabetes Mellitus. Front Immunol. 2019;10:509. doi:10.3389/fimmu.2019.00509

Barman SA, Bordan Z, Batori R, Haigh S, Fulton DJR. Galectin-3 Promotes ROS, Inflammation, and Vascular Fibrosis in Pulmonary Arterial Hypertension. Adv Exp Med Biol. 2021;1303:13-32. doi:10.1007/978-3-030-63046-1_2

Barragán-Zúñiga LJ, Marchat LA, Carrasco-Wong I, Blanco-Castaneda R, Salas-Pacheco JM, Simental-Mendia LE, Correa-Ramírez MM, Sosa-Macías M, Gutiérrez J, Galaviz-Hernandez C. Evaluation of the PLAC8 Gene in Mexican Women With and Without Preeclampsia and Obesity. Front Med (Lausanne). 2022;9:795309. doi:10.3389/fmed.2022.795309

Béchade C, Colasse S, Diana MA, Rouault M, Bessis A. NOS2 expression is restricted to neurons in the healthy brain but is triggered in microglia upon inflammation. Glia. 2014;62(6):956-963. doi:10.1002/glia.22652

Becker RC, Owens AP 3rd, Sadayappan S. Tissue-level inflammation and ventricular remodeling in hypertrophic cardiomyopathy. J Thromb Thrombolysis. 2020;49(2):177-183. doi:10.1007/s11239-019-02026-1

Behnoush AH, Khalaji A, Fazlollahpour-Naghibi A, Bagheri K, Goshtasbi P, Mohseni G, El Kanty AE, Vinciguerra C, Cannavo A. Circulating brain-derived

neurotrophic factor levels and heart failure: A systematic review and meta-analysis. ESC Heart Fail. 2024. doi:10.1002/ehf2.14916

Benlahrech A, Duraisingham S, King D, Verhagen L, Rozis G, Amjadi P, Ford T, Kelleher P, Patterson S. Human blood CD1c dendritic cells stimulate IL-12-independent IFN-γ responses and have a strikingly low inflammatory profile. J Leukoc Biol. 2015;97(5):873-885. doi:10.1189/jlb.1A0114-058RR

Benn M, Nordestgaard BG, Jensen GB, Tybjaerg-Hansen A. Improving prediction of ischemic cardiovascular disease in the general population using apolipoprotein B: the Copenhagen City Heart Study. Arterioscler Thromb Vasc Biol. 2007;27(3):661-670. doi:10.1161/01.ATV.0000255580.73689.8e

Berland S, Toft-Bertelsen TL, Aukrust I, Byska J, Vaudel M, Bindoff LA, MacAulay N, Houge G. A de novo Ser111Thr variant in aquaporin-4 in a patient with intellectual disability, transient signs of brain ischemia, transient cardiac hypertrophy, and progressive gait disturbance. Cold Spring Harb Mol Case Stud. 2018;4(1):a002303. doi:10.1101/mcs.a002303

Berman HM, Westbrook J, Feng Z, Gilliland G, Bhat TN, Weissig H, Shindyalov IN, Bourne PE. The Protein Data Bank. Nucleic Acids Res. 2000;28(1):235-42. doi:10.1093/nar/28.1.235

Berner J, van de Wetering C, Jimenez Heredia R, Rashkova C, Ferdinandusse S, Koster J, Weiss JG, Frohne A, Giuliani S, Waterham HR, et al. Phosphomevalonate kinase deficiency expands the genetic spectrum of systemic autoinflammatory diseases. J Allergy Clin Immunol. 2023;152(4):1025-1031.e2. doi:10.1016/j.jaci.2023.06.013

Bezzina CR, Barc J, Mizusawa Y, Remme CA, Gourraud JB, Simonet F, Verkerk AO, Schwartz PJ, Crotti L, Dagradi F, et al. Common variants at SCN5A-SCN10A and HEY2 are associated with Brugada syndrome, a rare disease with high risk of sudden cardiac death. Nat Genet. 2013;45(9):1044-1049. doi:10.1038/ng.2712

Bhardwaj P, Iyengar NM, Zahid H, Carter KM, Byun DJ, Choi MH, Sun Q, Savenkov O, Louka C, Liu C, et al. Obesity promotes breast epithelium DNA damage in women carrying a germline mutation in BRCA1 or BRCA2. Sci Transl Med. 2023;15(684):eade1857. doi:10.1126/scitranslmed.ade1857

Bhutia YD, Mathew M, Sivaprakasam S, Ramachandran S, Ganapathy V. Unconventional Functions of Amino Acid Transporters: Role in Macropinocytosis (SLC38A5/SLC38A3) and Diet-Induced Obesity/Metabolic Syndrome (SLC6A19/SLC6A14/SLC6A6). Biomolecules. 2022;12(2):235. doi:10.3390/biom12020235

Bi C, Fu Y, Li B. Brain-derived neurotrophic factor alleviates diabetes mellitus-accelerated atherosclerosis by promoting M2 polarization of macrophages through repressing the STAT3 pathway. Cell Signal. 2020;70:109569. doi:10.1016/j.cellsig.2020.109569

Bi HL, Zhang YL, Yang J, Shu Q, Yang XL, Yan X, Chen C, Li Z, Li HH. Inhibition of UCHL1 by LDN-57444 attenuates Ang II-Induced atrial fibrillation in mice. Hypertens Res. 2020;43(3):168-177. doi:10.1038/s41440-019-0354-z

Bich TCT, Quoc QL, Choi Y, Yang EM, Trinh HKT, Shin YS, Park HS. Serum Amyloid A1: A Biomarker for Neutrophilic Airway Inflammation in Adult Asthmatic Patients. Allergy Asthma Immunol Res. 2022;14(1):40-58. doi:10.4168/aair.2022.14.1.40

Bienertová-Vasků JA, Spinarová L, Bienert P, Vasků A. Association between variants in the genes for leptin, leptin receptor, and proopiomelanocortin with chronic heart failure in the Czech population. Heart Vessels. 2009;24(2):131-137. doi:10.1007/s00380-008-1090-5

Biesemann N, Mendler L, Kostin S, Wietelmann A, Borchardt T, Braun T. Myostatin induces interstitial fibrosis in the heart via TAK1 and p38. Cell Tissue Res. 2015;361(3):779-787. doi:10.1007/s00441-015-2139-2

Bileišienė N, Barysienė J, Mikštienė V, Preikšaitienė E, Marinskis G, Keževičiūtė M, Utkus A, Aidietis A. Aborted Cardiac Arrest in LQT2 Related to Novel KCNH2 (hERG) Variant Identified in One Lithuanian Family. Medicina (Kaunas). 2021;57(7):721. doi:10.3390/medicina57070721

Birkner S, Möhlendick B, Wilde B, Schoenfelder K, Boss K, Siffert W, Kribben A, Friebus-Kardash J. Single-Nucleotide Polymorphism in Genes Encoding G Protein Subunits GNB3 and GNAQ Increase the Risk of Cardiovascular Morbidity among

Patients Undergoing Renal Replacement Therapy. Int J Mol Sci. 2023;24(20):15260. doi:10.3390/ijms242015260

Biscetti F, Porreca CF, Bertucci F, Straface G, Santoliquido A, Tondi P, Angelini F, Pitocco D, Santoro L, Gasbarrini A, et al. TNFRSF11B gene polymorphisms increased risk of peripheral arterial occlusive disease and critical limb ischemia in patients with type 2 diabetes. Acta Diabetol. 2014;51(6):1025-1032. doi:10.1007/s00592-014-0664-1

Bisserier M, Katz MG, Bueno-Beti C, Brojakowska A, Zhang S, Gubara S, Kohlbrenner E, Fazal S, Fargnoli A, Dorfmuller P, et al. Combination Therapy with STAT3 Inhibitor Enhances SERCA2a-Induced BMPR2 Expression and Inhibits Pulmonary Arterial Hypertension. Int J Mol Sci. 2021;22(17):9105. doi:10.3390/ijms22179105

Bister VO, Salmela MT, Karjalainen-Lindsberg ML, Uria J, Lohi J, Puolakkainen P, Lopez-Otin C, Saarialho-Kere U. Differential expression of three matrix metalloproteinases, MMP-19, MMP-26, and MMP-28, in normal and inflamed intestine and colon cancer. Dig Dis Sci. 2004;49(4):653-661. doi:10.1023/b:ddas.0000026314.12474.17

Blanco JG, Leisenring WM, Gonzalez-Covarrubias VM, Kawashima TI, Davies SM, Relling MV, Robison LL, Sklar CA, Stovall M, Bhatia S. Genetic polymorphisms in the carbonyl reductase 3 gene CBR3 and the NAD(P)H:quinone oxidoreductase 1 gene NQO1 in patients who developed anthracycline-related congestive heart failure after childhood cancer. Cancer. 2008;112(12):2789-2795. doi:10.1002/cncr.23534

Blaschke F, Bruemmer D, Law RE. Egr-1 is a major vascular pathogenic transcription factor in atherosclerosis and restenosis. Rev Endocr Metab Disord. 2004;5(3):249-254. doi:10.1023/B:REMD.0000032413.88756.ee

Blumenthal MN, Zhong W, Miller M, Wendt C, Connett JE, Pei D. Serum metalloproteinase leukolysin (MMP-25/MT-6): a potential metabolic marker for atopy-associated inflammation. Clin Exp Allergy. 2010;40(6):859-866. doi:10.1111/j.1365-2222.2010.03475.x

Bo Z, Huang S, Li L, Chen L, Chen P, Luo X, Shi F, Zhu B, Shen L. EGR2 is a hub-gene in myocardial infarction and aggravates inflammation and apoptosis in hypoxia-induced cardiomyocytes. BMC Cardiovasc Disord. 2022;22(1):373. doi:10.1186/s12872-022-02814-3

Bobbala D, Mayhue M, Menendez A, Ilangumaran S, Ramanathan S. Trans-presentation of interleukin-15 by interleukin-15 receptor alpha is dispensable for the pathogenesis of autoimmune type 1 diabetes. Cell Mol Immunol. 2017;14(7):590-596. doi:10.1038/cmi.2015.102

Bobbert P, Weithäuser A, Andres J, Bobbert T, Kühl U, Schultheiss HP, Rauch U, Skurk C. Increased plasma retinol binding protein 4 levels in patients with inflammatory cardiomyopathy. Eur J Heart Fail. 2009;11(12):1163-1168. doi:10.1093/eurjhf/hfp153

Bonacina F, Moregola A, Porte R, Baragetti A, Bonavita E, Salatin A, Grigore L, Pellegatta F, Molgora M, Sironi M, et al. Pentraxin 3 deficiency protects from the metabolic inflammation associated to diet-induced obesity. Cardiovasc Res. 2019;115(13):1861-1872. doi:10.1093/cvr/cvz068

Borges JI, Suster MS, Lymperopoulos A. Cardiac RGS Proteins in Human Heart Failure and Atrial Fibrillation: Focus on RGS4. Int J Mol Sci. 2023;24(7):6136. doi:10.3390/ijms24076136

Boriani G, Rapezzi C, Biffi M, Branzi A. Hypertrophic cardiomyopathy with massive hypertrophy, amiodarone treatment and high defibrillation threshold at cardioverter-defibrillator implant. Int J Cardiol. 2002;83(2):171-173. doi:10.1016/s0167-5273(02)00036-0

Bostan C, Kaya A, Yiğit Z. Changes in pentraxin 3 and oxidative parameters during coronary bypass grafting and factors affecting postoperative atrial fibrillation. J Int Med Res. 2020;48(11):300060520967561. doi:10.1177/0300060520967561

Boughanem H, Yubero-Serrano EM, López-Miranda J, Tinahones FJ, Macias-Gonzalez M. Potential Role of Insulin Growth-Factor-Binding Protein 2 as Therapeutic Target for Obesity-Related Insulin Resistance. Int J Mol Sci. 2021;22(3):1133. doi:10.3390/ijms22031133

Boz V, Tesser A, Burlo F, Donadel N, Pastore S, Amaddeo A, Vittoria F, Padovan M, Di Rosa M, Tommasini A, et al. Siglec-1, an easy and contributory inflammation marker in rheumatology. Clin Transl Immunology. 2024;13(7):e1520. doi:10.1002/cti2.1520

Bradley D, Liu J, Blaszczak A, Wright V, Jalilvand A, Needleman B, Noria S, Renton D, Hsueh W. Adipocyte DIO2 Expression Increases in Human Obesity but Is Not Related to Systemic Insulin Sensitivity. J Diabetes Res. 2018;2018:2464652. doi:10.1155/2018/2464652

Braun J, Hoffmann SC, Feldner A, Ludwig T, Henning R, Hecker M, Korff T. Endothelial cell ephrinB2-dependent activation of monocytes in arteriosclerosis. Arterioscler Thromb Vasc Biol. 2011;31(2):297-305. doi:10.1161/ATVBAHA.110.217646

Braz JC, Bueno OF, Liang Q, Wilkins BJ, Dai YS, Parsons S, Braunwart J, Glascock BJ, Klevitsky R, Kimball TF, et al. Targeted inhibition of p38 MAPK promotes hypertrophic cardiomyopathy through upregulation of calcineurin-NFAT signaling. J Clin Invest. 2003;111(10):1475-1486. doi:10.1172/JCI17295

Bright JM, Golden AL, Gompf RE, Walker MA, Toal RL. Evaluation of the calcium channel-blocking agents diltiazem and verapamil for treatment of feline hypertrophic cardiomyopathy. J Vet Intern Med. 1991;5(5):272-282. doi:10.1111/j.1939-1676.1991.tb03134.x

Brophy ML, Dong Y, Tao H, Yancey PG, Song K, Zhang K, Wen A, Wu H, Lee Y, Malovichko MV, et al. Myeloid-Specific Deletion of Epsins 1 and 2 Reduces Atherosclerosis by Preventing LRP-1 Downregulation. Circ Res. 2019;124(4):e6-e19. doi:10.1161/CIRCRESAHA.118.313028

Broquères-You D, Leré-Déan C, Merkulova-Rainon T, Mantsounga CS, Allanic D, Hainaud P, Contrères JO, Wang Y, Vilar J, Virally M, et al. Ephrin-B2-activated peripheral blood mononuclear cells from diabetic patients restore diabetes-induced impairment of postischemic neovascularization. Diabetes. 2012;61(10):2621-2632. doi:10.2337/db11-1768

Brown A, Meor Azlan NF, Wu Z, Zhang J. WNK-SPAK/OSR1-NCC kinase signaling pathway as a novel target for the treatment of salt-sensitive hypertension. Acta Pharmacol Sin. 2021;42(4):508-517. doi:10.1038/s41401-020-0474-7

Bruand M, Barras D, Mina M, Ghisoni E, Morotti M, Lanitis E, Fahr N, Desbuisson M, Grimm A, Zhang H, et al. Cell-autonomous inflammation of BRCA1-deficient ovarian cancers drives both tumor-intrinsic immunoreactivity and immune resistance via STING. Cell Rep. 2021;36(3):109412. doi:10.1016/j.celrep.2021.109412

Bugiardini E, Nunes AM, Oliveira-Santos A, Dagda M, Fontelonga TM, Barraza-Flores P, Pittman AM, Morrow JM, Parton M, Houlden H, et al. Integrin α7 Mutations Are Associated With Adult-Onset Cardiac Dysfunction in Humans and Mice. J Am Heart Assoc. 2022;11(23):e026494. doi:10.1161/JAHA.122.026494

Bukhari SA, Yasmin A, Zahoor MA, Mustafa G, Sarfraz I, Rasul A. Secreted frizzled-related protein 4 and its implication in obesity and type-2 diabetes. IUBMB Life. 2019;71(11):1701-1710. doi:10.1002/iub.2123

Bükülmez H, Khan F, Bartels CF, Murakami S, Ortiz-Lopez A, Sattar A, Haqqi TM, Warman ML. Protective effects of C-type natriuretic peptide on linear growth and articular cartilage integrity in a mouse model of inflammatory arthritis. Arthritis Rheumatol. 2014;66(1):78-89. doi:10.1002/art.38199

Cai G, Li L, Chen Y, Huang H, Yu L, Xu L. Complement C3 gene polymorphisms are associated with lipid levels, but not the risk of coronary artery disease: a case-control study. Lipids Health Dis. 2019;18(1):217. doi:10.1186/s12944-019-1163-8

Cai J, Guan W, Tan X, Chen C, Li L, Wang N, Zou X, Zhou F, Wang J, Pei F, et al. SRY gene transferred by extracellular vesicles accelerates atherosclerosis by promotion of leucocyte adherence to endothelial cells. Clin Sci (Lond). 2015;129(3):259-269. doi:10.1042/CS20140826

Cai W, Liu L, Shi X, Liu Y, Wang J, Fang X, Chen Z, Ai D, Zhu Y, Zhang X. Alox15/15-HpETE Aggravates Myocardial Ischemia-Reperfusion Injury by Promoting Cardiomyocyte Ferroptosis. Circulation. 2023;147(19):1444-1460. doi:10.1161/CIRCULATIONAHA.122.060257

Cai WY, Lin LY, Wang L, Yang L, Ye GD, Zeng Q, Cheng J, Xie YY, Chen ML, Luo QC. Inhibition of Bcl6b promotes gastric cancer by amplifying inflammation in mice. Cell Commun Signal. 2019;17(1):72. doi:10.1186/s12964-019-0387-6

Camacho Londoño JE, Tian Q, Hammer K, Schröder L, Camacho Londoño J, Reil JC, He T, Oberhofer M, Mannebach S, Mathar I, et al. A background Ca2+ entry pathway mediated by TRPC1/TRPC4 is critical for development of pathological cardiac remodelling. Eur Heart J. 2015;36(33):2257-2266. doi:10.1093/eurheartj/ehv250

Campbell CY, Fang BF, Guo X, Peralta CA, Psaty BM, Rich SS, Young JH, Coresh J, Kramer HJ, Rotter JI, et al. Associations between genetic variants in the ACE, AGT, AGTR1 and AGTR2 genes and renal function in the Multi-ethnic Study of Atherosclerosis. Am J Nephrol. 2010;32(2):156-162. doi:10.1159/000315866

Cao B, Liu M, Zhao Y, Gong C. Chronic oral mucocutaneous candidiasis, recurrent respiratory infection, hepatosplenomegaly, and autoimmune diabetes mellitus: A case report of a gain-of-function mutation of STAT1 in a Chinese boy. Front Pediatr. 2022;10:1001290. doi:10.3389/fped.2022.1001290

Cao W, Liu H, Xu Y, Hu S, Yang Y, Li L, Peng L. The silencing transcription factor REST targets UCHL1 to regulate inflammatory response and fibrosis during cardiac hypertrophy. Genes Dis. 2023;11(6):101183. doi:10.1016/j.gendis.2023.101183

Cao Y, Liang N, Kong K, Qiao X, Liu T, Fang JA, Zhang X. CD163 as a Potential Biomarker-associated Immune Inflammation in Diabetes Mellitus: A Systematic Review and Bioinformatics Analysis. Endocr Metab Immune Disord Drug Targets. 2024;24(2):208-219. doi:10.2174/1871530323666230714162324

Cappola TP, Li M, He J, Ky B, Gilmore J, Qu L, Keating B, Reilly M, Kim CE, Glessner J, et al. Common variants in HSPB7 and FRMD4B associated with advanced heart failure. Circ Cardiovasc Genet. 2010;3(2):147-154. doi:10.1161/CIRCGENETICS.109.898395

Caravaca AS, Gallina AL, Tarnawski L, Shavva VS, Colas RA, Dalli J, Malin SG, Hult H, Arnardottir H, Olofsson PS. Vagus nerve stimulation promotes resolution

of inflammation by a mechanism that involves Alox15 and requires the α7nAChR subunit. Proc Natl Acad Sci U S A. 2022;119(22):e2023285119. doi:10.1073/pnas.2023285119

Carl-McGrath S, Gräntzdörffer I, Lendeckel U, Ebert MP, Röcken C. Angiotensin II-generating enzymes, angiotensin-converting enzyme (ACE) and mast cell chymase (CMA1), in gastric inflammation may be regulated by H. pylori and associated cytokines. Pathology. 2009;41(5):419-427. doi:10.1080/00313020902885037

Carniel BP, da Rocha NS. Brain-derived neurotrophic factor (BDNF) and inflammatory markers: Perspectives for the management of depression. Prog Neuropsychopharmacol Biol Psychiatry. 2021;108:110151. doi:10.1016/j.pnpbp.2020.110151

Casana E, Jimenez V, Jambrina C, Sacristan V, Muñoz S, Rodo J, Grass I, Garcia M, Mallol C, León X, et al. AAV-mediated BMP7 gene therapy counteracts insulin resistance and obesity. Mol Ther Methods Clin Dev. 2022;25:190-204. doi:10.1016/j.omtm.2022.03.007

Castellano-Castillo D, Moreno-Indias I, Fernandez-Garcia JC, Clemente-Postigo M, Castro-Cabezas M, Tinahones FJ, Queipo-Ortuño MI, Cardona F. Complement Factor C3 Methylation and mRNA Expression Is Associated to BMI and Insulin Resistance in Obesity. Genes (Basel). 2018;9(8):410. doi:10.3390/genes9080410

Castillero E, Akashi H, Wang C, Najjar M, Ji R, Kennel PJ, Sweeney HL, Schulze PC, George I. Cardiac myostatin upregulation occurs immediately after myocardial ischemia and is involved in skeletal muscle activation of atrophy. Biochem Biophys Res Commun. 2015;457(1):106-111. doi:10.1016/j.bbrc.2014.12.057

Castillero E, Camillo C, Levine D, D'Angelo AM, Kosuri Y, Grau JB, Levy RJ, Ferrari G. Serotonin transporter deficiency in mice results in an increased susceptibility to HTR2B-dependent pro-fibrotic mechanisms in the cardiac valves and left ventricular myocardium. Cardiovasc Pathol. 2024. doi:10.1016/j.carpath.2024.107689

Castro MG, Rodríguez-Pascual F, Magán-Marchal N, Reguero JR, Alonso-Montes C, Morís C, Alvarez V, Lamas S, Coto E. Screening of the endothelin1 gene

(EDN1) in a cohort of patients with essential left ventricular hypertrophy. Ann Hum Genet. 2007;71(Pt 5):601-610. doi:10.1111/j.1469-1809.2007.00351.x

Catar R, Witowski J, Wagner P, Annett Schramm I, Kawka E, Philippe A, Dragun D, Jörres A. The proto-oncogene c-Fos transcriptionally regulates VEGF production during peritoneal inflammation. Kidney Int. 2013;84(6):1119-1128. doi:10.1038/ki.2013.217

Cecchi F, Sgalambro A, Baldi M, Sotgia B, Antoniucci D, Camici PG, Sciagrà R, Olivotto I. Microvascular dysfunction, myocardial ischemia, and progression to heart failure in patients with hypertrophic cardiomyopathy. J Cardiovasc Transl Res. 2009;2(4):452-461. doi:10.1007/s12265-009-9142-5

Cereijo R, Quesada-López T, Gavaldà-Navarro A, Tarascó J, Pellitero S, Reyes M, Puig-Domingo M, Giralt M, Sánchez-Infantes D, Villarroya F. The chemokine CXCL14 is negatively associated with obesity and concomitant type-2 diabetes in humans. Int J Obes (Lond). 2021;45(3):706-710. doi:10.1038/s41366-020-00732-y

Cetin-Atalay R, Meliton AY, Ozcan C, Woods PS, Sun KA, Fang Y, Hamanaka RB, Mutlu GM. Loss of heme oxygenase 2 causes reduced expression of genes in cardiac muscle development and contractility and leads to cardiomyopathy in mice. PLoS One. 2023;18(10):e0292990. doi:10.1371/journal.pone.0292990

Cha JK, Jo WS, Shin HC, Bae HR, Ho JM, Kim JW. Increased platelet CD63 and P-selectin expression persist in atherosclerotic ischemic stroke. Platelets. 2004;15(1):3-7. doi:10.1080/09537100310001644024

Chalise U, Daseke MJ 2nd, Kalusche WJ, Konfrst SR, Rodriguez-Paar JR, Flynn ER, Cook LM, Becirovic-Agic M, Lindsey ML. Macrophages secrete murinoglobulin-1 and galectin-3 to regulate neutrophil degranulation after myocardial infarction. Mol Omics. 2022;18(3):186-195. doi:10.1039/d1mo00519g

Chalmers JA, Lin SY, Martino TA, Arab S, Liu P, Husain M, Sole MJ, Belsham DD. Diurnal profiling of neuroendocrine genes in murine heart, and shift in proopiomelanocortin gene expression with pressure-overload cardiac hypertrophy. J Mol Endocrinol. 2008;41(3):117-124. doi:10.1677/JME-08-00501

Chan GCW, Zhi H, Hicks PJ, Freedman BI, Tang SCW. Acetyl-coenzyme A carboxylase beta gene polymorphism does not predict cardiovascular risk susceptibility in Chinese type 2 diabetic individuals. Nephrology (Carlton). 2022;27(5):404-409. doi:10.1111/nep.14017

Chang CC, Huang CN, Chuang LM. Autoantibodies to thyroid peroxidase in patients with type 1 diabetes in Taiwan. Eur J Endocrinol. 1998;139(1):44-48. doi:10.1530/eje.0.1390044

Chang EJ, Lee SK, Song YS, Jang YJ, Park HS, Hong JP, Ko AR, Kim DY, Kim JH, Lee YJ, et al. IL-34 is associated with obesity, chronic inflammation, and insulin resistance. J Clin Endocrinol Metab. 2014;99(7):E1263-E1271. doi:10.1210/jc.2013-4409

Chang S, Zhang G, Li L, Li H, Jin X, Wang Y, Li B. Sirt4 deficiency promotes the development of atherosclerosis by activating the NF-κB/IκB/CXCL2/3 pathway. Atherosclerosis. 2023;373:29-37. doi:10.1016/j.atherosclerosis.2023.04.006

Chang W, Gao W, Liu D, Luo B, Li H, Zhong L, Chen Y. The upregulation of TGM2 is associated with poor prognosis and the shaping of the inflammatory tumor microenvironment in lung squamous cell carcinoma. Am J Cancer Res. 2024;14(6):2823-2838. doi:10.62347/OBES4130

Chang WT, Wang YC, Chen CC, Zhang SK, Liu CH, Chang FH, Hsu LS. The -308G/A of Tumor Necrosis Factor (TNF)-α and 825C/T of Guanidine Nucleotide Binding Protein 3 (GNB3) are associated with the onset of acute myocardial infarction and obesity in Taiwan. Int J Mol Sci. 2012;13(2):1846-1857. doi:10.3390/ijms1302184

Charles Bronson S, Suresh E, Stephen Abraham Suresh Kumar S, Mythili C, Shanmugam A. A Novel Synergistic Association of Variants in PTRH2 and KIF1A Relates to a Syndrome of Hereditary Axonopathy, Outer Hair Cell Dysfunction, Intellectual Disability, Pancreatic Lipomatosis, Diabetes, Cerebellar Atrophy, and Vertebral Artery Hypoplasia. Cureus. 2021;13(2):e13174. doi:10.7759/cureus.13174

Chattopadhyay A, Mukherjee P, Sulaiman D, Wang H, Girjalva V, Dorreh N, Jacobs JP, Delk S, Moolenaar WH, Navab M, et al. ole of enterocyte Enpp2 and

autotaxin in regulating lipopolysaccharide levels, systemic inflammation, and atherosclerosis. J Lipid Res. 2023;64(5):100370. doi:10.1016/j.jlr.2023.100370

Chaturvedi P, Tyagi SC. Epigenetic silencing of TIMP4 in heart failure. J Cell Mol Med. 2016;20(11):2089-2101. doi:10.1111/jcmm.12901

Chaudhuri JR, Bagul JJ, Swathi A, Singhal BS, Reddy NC, Vallam KK. Myelin Oligodendrocyte Glycoprotein Antibody-Associated Disease Presenting as Intracranial Hypertension: A Case Report. Neurol Neuroimmunol Neuroinflamm. 2022;9(6):e200020. doi:10.1212/NXI.0000000000200020

Chen C, Peng H, Zeng Y, Dong G. CD14, CD163, and CCR1 are involved in heart and blood communication in ischemic cardiac diseases. J Int Med Res. 2020;48(9):300060520951649. doi:10.1177/0300060520951649

Chen CY, Ching LC, Liao YJ, Yu YB, Tsou CY, Shyue SK, Chen YM, Lee TS. Deficiency of glycine N-methyltransferase aggravates atherosclerosis in apolipoprotein E-null mice. Mol Med. 2012;18(1):744-752. doi:10.2119/molmed.2011.00396

Chen D, Ruan X, Liu Y, He Y. HMGCS2 silencing attenuates high glucose-induced in vitro diabetic cardiomyopathy by increasing cell viability, and inhibiting apoptosis, inflammation, and oxidative stress. Bioengineered. 2022;13(5):11417-11429. doi:10.1080/21655979.2022.2063222

Chen D, Zang YH, Qiu Y, Zhang F, Chen AD, Wang JJ, Chen Q, Li YH, Kang YM, Zhu GQ. BCL6 Attenuates Proliferation and Oxidative Stress of Vascular Smooth Muscle Cells in Hypertension. Oxid Med Cell Longev. 2019;2019:5018410. doi:10.1155/2019/5018410

Chen F, Xia Y, Liu Y, Zhang Y, Song W, Zhong Y, Gao L, Jin Y, Li S, et al. Increased plasma corin levels in patients with atrial fibrillation. Clin Chim Acta. 2015;447:79-85. doi:10.1016/j.cca.2015.05.017

Chen FJ, Du LJ, Zeng Z, Huang XY, Xu CY, Tan WP, Xie CM, Liang YX, Guo YB. PTPRH Alleviates Airway Obstruction and Th2 Inflammation in Asthma as a Protective Factor. J Asthma Allergy. 2022;15:133-144. doi:10.2147/JAA.S340059

Chen L, Fukuda N, Matsumoto T, Abe M. Role of complement 3 in the pathogenesis of hypertension. Hypertens Res. 2020;43(4):255-262. doi:10.1038/s41440-019-0371-y

Chen M, Pan L, Chen D, Wu Y, Ye J, Li K, Zhang N, Xu J. PAK1 Promotes Inflammation Induced by Sepsis through the Snail/CXCL2 Signaling Pathway. ACS Infect Dis. 2024;10(4):1370-1378. doi:10.1021/acsinfecdis.4c00052

Chen TY, Zhou M, Lin MQ, Liang ST, Yan Y, Wang SM, Fang CS, Li D, Ruan Y. Research Progress on the SERPINE1 Protein and Chronic Inflammatory Diseases of the Upper Respiratory Tract: A Literature Review. Int Arch Allergy Immunol. 2021;182(11):1097-1102. doi:10.1159/000516195

Chen W, Zhao S, Xing J, Yu W, Rao T, Zhou X, Ruan Y, Li S, Xia Y, Song T, et al. BMAL1 inhibits renal fibrosis and renal interstitial inflammation by targeting the ERK1/2/ELK-1/Egr-1 axis. Int Immunopharmacol. 2023;125(Pt B):111140. doi:10.1016/j.intimp.2023.111140

Chen X, Zhong X, Luo D, Lei Y, Huang R. Plasma SMOC2 Predicts Prognosis in Patients with Heart Failure: A Prospective Cohort. Int J Gen Med. 2024;17:1651-1664. doi:10.2147/IJGM.S445457

Chen XX, Tang L, Fu YM, Wang Y, Han ZH, Meng JG. Paralemmin-3 contributes to lipopolysaccharide-induced inflammatory response and is involved in lipopolysaccharide-Toll-like receptor-4 signaling in alveolar macrophages. Int J Mol Med. 2017;40(6):1921-1931. doi:10.3892/ijmm.2017.3161

Chen XY, Lv RJ, Zhang W, Yan YG, Li P, Dong WQ, Liu X, Liang ES, Tian HL, Lu QH, et al. Inhibition of myocyte-specific enhancer factor 2A improved diabetic cardiac fibrosis partially by regulating endothelial-to-mesenchymal transition. Oncotarget. 2016;7(21):31053-31066. doi:10.18632/oncotarget.8842

Chen Y, Chen X, Li H, Li Y, Cheng D, Tang Y, Sang H. Serum extracellular vesicles containing MIAT induces atrial fibrosis, inflammation and oxidative stress to promote atrial remodeling and atrial fibrillation via blockade of miR-485-5p-mediated CXCL10 inhibition. Clin Transl Med. 2021;11(8):e482. doi:10.1002/ctm2.482

Chen Y, Zeng X, Huang X, Serag S, Woolf CJ, Spiegelman BM. Crosstalk between KCNK3-Mediated Ion Current and Adrenergic Signaling Regulates Adipose Thermogenesis and Obesity. Cell. 2017;171(4):836-848.e13. doi:10.1016/j.cell.2017.09.015

Chen YX, Deng ZH, Xue-Gao, Qiang-Du, Juan-Yin, Chen GH, Li JG, Zhao YM, Zhang HT, Zhang GX, et al. Exosomes derived from mesenchymal stromal cells exert a therapeutic effect on hypoxia-induced pulmonary hypertension by modulating the YAP1/SPP1 signaling pathway. Biomed Pharmacother. 2023;168:115816. doi:10.1016/j.biopha.2023.115816

Cheng AWM, Bolognesi M, Kraus VB. DIO2 modifies inflammatory responses in chondrocytes. Osteoarthritis Cartilage. 2012;20(5):440-445. doi:10.1016/j.joca.2012.02.006

Cheng QY, Yang MC, Wu J, Jia XL, Xiao C, Lian T, Zhang SZ. Reduced cardiac ischemia/reperfusion injury by hypothermic reperfusion via activation of transient receptor potential M8 channel. Life Sci. 2019;232:116658. doi:10.1016/j.lfs.2019.116658

Cheng ST, Wu S, Su CW, Teng MS, Hsu LA, Ko YL. Association of ABCG2 rs2231142-A allele and serum uric acid levels in male and obese individuals in a Han Taiwanese population. J Formos Med Assoc. 2017;116(1):18-23. doi:10.1016/j.jfma.2015.12.002

Cheng Y, Qin W, Lin L, Gao Y, Li M. Urinary complement factor D is increased in primary malignant hypertension: a single-center, cross-sectional study. Sci Rep. 2024;14(1):16253. doi:10.1038/s41598-024-66875-4

Chida-Nagai A, Shintani M, Sato H, Nakayama T, Nii M, Akagawa H, Furukawa T, Rana A, Furutani Y, Inai K, et al. Role of BRCA1-associated protein (BRAP) variant in childhood pulmonary arterial hypertension. PLoS One. 2019;14(1):e0211450. doi:10.1371/journal.pone.0211450

Chintalgattu V, Katwa LC. Role of protein kinase C-delta in angiotensin II induced cardiac fibrosis. Biochem Biophys Res Commun. 2009;386(4):612-616. doi:10.1016/j.bbrc.2009.06.076

Chirita-Emandi A, Serban CL, Paul C, Andreescu N, Velea I, Mihailescu A, Serafim V, Tiugan DA, Tutac P, Zimbru C, et al. CHDH-PNPLA3 Gene-Gene Interactions Predict Insulin Resistance in Children with Obesity. Diabetes Metab Syndr Obes. 2020;13:4483-4494. doi:10.2147/DMSO.S277268

Chiu C, Bagnall RD, Ingles J, Yeates L, Kennerson M, Donald JA, Jormakka M, Lind JM, Semsarian C. Mutations in alpha-actinin-2 cause hypertrophic cardiomyopathy: a genome-wide analysis. J Am Coll Cardiol. 2010;55(11):1127-1135. doi:10.1016/j.jacc.2009.11.016

Cho H, Shen GQ, Wang X, Wang F, Archacki S, Li Y, Yu G, Chakrabarti S, Chen Q, Wang QK. Long noncoding RNA ANRIL regulates endothelial cell activities associated with coronary artery disease by up-regulating CLIP1, EZR, and LYVE1 genes. J Biol Chem. 2019;294(11):3881-3898. doi:10.1074/jbc.RA118.005050

Cho HM, Lee KH, Shen YM, Shin TJ, Ryu PD, Choi MC, Kang KS, Cho JY. Transplantation of hMSCs Genome Edited with LEF1 Improves Cardio-Protective Effects in Myocardial Infarction. Mol Ther Nucleic Acids. 2020;19:1186-1197. doi:10.1016/j.omtn.2020.01.007

Choi WG, Choi W, Oh TJ, Cha HN, Hwang I, Lee YK, Lee SY, Shin H, Lim A, Ryu D, et al. Inhibiting serotonin signaling through HTR2B in visceral adipose tissue improves obesity-related insulin resistance. J Clin Invest. 2021;131(23):e145331. doi:10.1172/JCI14533

Chopra DG, Yiv N, Hennings TG, Zhang Y, Ku GM. Deletion of Gpr27 in vivo reduces insulin mRNA but does not result in diabetes. Sci Rep. 2020;10(1):5629. doi:10.1038/s41598-020-62358-4

Chou HT, Shi YR, Wu JY, Tsai FJ. Angiotensin II type 1 receptor gene adenine/cytosine1166 polymorphism is not associated with mitral valve prolapse syndrome in Taiwan Chinese. Circ J. 2002;66(2):163-166. doi:10.1253/circj.66.163

Choudhury A, Chung I, Blann AD, Lip GY. Platelet surface CD62P and CD63, mean platelet volume, and soluble/platelet P-selectin as indexes of platelet function in atrial fibrillation: a comparison of "healthy control subjects" and "disease

control subjects" in sinus rhythm. J Am Coll Cardiol. 2007;49(19):1957-1964. doi:10.1016/j.jacc.2007.02.038

Chowdhury B, Xiang B, Liu M, Hemming R, Dolinsky VW, Triggs-Raine B. Hyaluronidase 2 Deficiency Causes Increased Mesenchymal Cells, Congenital Heart Defects, and Heart Failure. Circ Cardiovasc Genet. 2017;10(1):e001598. doi:10.1161/CIRCGENETICS.116.001598

Christensen DJ, Ohkubo N, Oddo J, Van Kanegan MJ, Neil J, Li F, Colton CA, Vitek MP. Apolipoprotein E and peptide mimetics modulate inflammation by binding the SET protein and activating protein phosphatase 2A. J Immunol. 2011;186(4):2535-2542. doi:10.4049/jimmunol.1002847

Christman KL, Fang Q, Yee MS, Johnson KR, Sievers RE, Lee RJ. Enhanced neovasculature formation in ischemic myocardium following delivery of pleiotrophin plasmid in a biopolymer. Biomaterials. 2005;26(10):1139-1144. doi:10.1016/j.biomaterials.2004.04.025

Christodoulou A, Nikolaou PE, Symeonidi L, Katogiannis K, Pechlivani L, Nikou T, Varela A, Chania C, Zerikiotis S, Efentakis P, et al. Cardioprotective potential of oleuropein, hydroxytyrosol, oleocanthal and their combination: Unravelling complementary effects on acute myocardial infarction and metabolic syndrome. Redox Biol. 2024;76:103311. doi:10.1016/j.redox.2024.103311

Chu PH, Yeh HI, Wu HH, Hong RC, Shiu TF, Yang CM. Deletion of the FHL2 gene attenuates the formation of atherosclerotic lesions after a cholesterol-enriched diet. Life Sci. 2010;86(9-10):365-371. doi:10.1016/j.lfs.2010.01.007

Chu X, Kheirollahi V, Lingampally A, Chelladurai P, Valasarajan C, Vazquez-Armendariz AI, Hadzic S, Khadim A, Pak O, Rivetti S, et al. GLI1+ Cells Contribute to Vascular Remodeling in Pulmonary Hypertension. Circ Res. 2024;134(11):e133-e149. doi:10.1161/CIRCRESAHA.123.323736

Chugh D, Ali I, Bakochi A, Bahonjic E, Etholm L, Ekdahl CT. Alterations in Brain Inflammation, Synaptic Proteins, and Adult Hippocampal Neurogenesis during Epileptogenesis in Mice Lacking Synapsin2. PLoS One. 2015;10(7):e0132366.. doi:10.1371/journal.pone.0132366

Cilenti F, Barbiera G, Caronni N, Iodice D, Montaldo E, Barresi S, Lusito E, Cuzzola V, Vittoria FM, Mezzanzanica L, et al. A PGE2-MEF2A axis enables context-dependent control of inflammatory gene expression. Immunity. 2021;54(8):1665-1682.e14. doi:10.1016/j.immuni.2021.05.016

Cimini M, Garikipati VNS, de Lucia C, Cheng Z, Wang C, Truongcao MM, Lucchese AM, Roy R, Benedict C, Goukassian DA, et al. Podoplanin neutralization improves cardiac remodeling and function after acute myocardial infarction. JCI Insight. 2019;5(15):e126967. doi:10.1172/jci.insight.126967

Cinkajzlová A, Lacinová Z, Kloučková J, Kaválková P, Trachta P, Kosák M, Krátký J, Kasalický M, DoleŽalová K, Mráz M, et al. An alternatively activated macrophage marker CD163 in severely obese patients: the influence of very low-calorie diet and bariatric surgery. Physiol Res. 2017;66(4):641-652. doi:10.33549/physiolres.933522

Clough E, Barrett T. The Gene Expression Omnibus Database. Methods Mol Biol. 2016;1418:93-110. doi:10.1007/978-1-4939-3578-9_5

Combadière C, Potteaux S, Rodero M, Simon T, Pezard A, Esposito B, Merval R, Proudfoot A, Tedgui A, Mallat Z. Combined inhibition of CCL2, CX3CR1, and CCR5 abrogates Ly6C(hi) and Ly6C(lo) monocytosis and almost abolishes atherosclerosis in hypercholesterolemic mice. Circulation. 2008;117(13):1649-1657. doi:10.1161/CIRCULATIONAHA.107.745091

Corbin LJ, White SJ, Taylor AE, Williams CM, Taylor K, van den Bosch MT, Teasdale JE, Jones M, Bond M, Harper MT, et al. Epigenetic Regulation of F2RL3 Associates With Myocardial Infarction and Platelet Function. Circ Res. 2022;130(3):384-400. doi:10.1161/CIRCRESAHA.121.318836

Costa HS, Lima MMO, Figueiredo PHS, Martinelli PM, Camargos ER, Chaves AT, Nunes MCP, Rocha MOC. Prognostic value of serum brain-derived neurotrophic factor levels in patients with Chagas cardiomyopathy. Mem Inst Oswaldo Cruz. 2018;113(10):e180224. doi:10.1590/0074-02760180224

Costes S, Huang CJ, Gurlo T, Daval M, Matveyenko AV, Rizza RA, Butler AE, Butler PC. β-cell dysfunctional ERAD/ubiquitin/proteasome system in type 2

diabetes mediated by islet amyloid polypeptide-induced UCH-L1 deficiency. Diabetes. 2011;60(1):227-238. doi:10.2337/db10-0522

Cowley AW Jr. Chrm3 Gene and M3 Muscarinic Receptors Contribute to Salt-Sensitive Hypertension. Hypertension. 2018;72(3):588-591. doi:10.1161/HYPERTENSIONAHA.118.11494

Crawley JT, Goulding DA, Ferreira V, Severs NJ, Lupu F. Expression and localization of tissue factor pathway inhibitor-2 in normal and atherosclerotic human vessels. Arterioscler Thromb Vasc Biol. 2002;22(2):218-224. doi:10.1161/hq0102.101842

Cueille C, Pidoux E, de Vernejoul MC, Ventura-Clapier R, Garel JM. Increased myocardial expression of RAMP1 and RAMP3 in rats with chronic heart failure. Biochem Biophys Res Commun. 2002;294(2):340-346. doi:10.1016/S0006-291X(02)00487-4

Cui H, Schaff HV, Wang S, Lahr BD, Rowin EJ, Rastegar H, Hu S, Eleid MF, Dearani JA, Kimmelstiel C, et al. Survival Following Alcohol Septal Ablation or Septal Myectomy for Patients With Obstructive Hypertrophic Cardiomyopathy. J Am Coll Cardiol. 2022;79(17):1647-1655. doi:10.1016/j.jacc.2022.02.032

Cui H, Zhang J, Li Z, Chen F, Cui H, Du X, Liu H, Wang J, Diwan AD, Zheng Z. Growth differentiation factor-6 attenuates inflammatory and pain-related factors and degenerated disc-induced pain behaviors in rat model. J Orthop Res. 2021;39(5):959-970. doi:10.1002/jor.24793

Czaya B, Heitman K, Campos I, Yanucil C, Kentrup D, Westbrook D, Gutierrez O, Babitt JL, Jung G, Salusky IB, et al. Hyperphosphatemia increases inflammation to exacerbate anemia and skeletal muscle wasting independently of FGF23-FGFR4 signaling. Elife. 2022;11:e74782. doi:10.7554/eLife.74782

Dahlman I, Vaxillaire M, Nilsson M, Lecoeur C, Gu HF, Cavalcanti-Proença C, Efendic S, Ostenson CG, Brismar K, Charpentier G, et al. Estrogen receptor alpha gene variants associate with type 2 diabetes and fasting plasma glucose. Pharmacogenet Genomics. 2008;18(11):967-975. doi:10.1097/FPC.0b013e32831101ef

Dai B, Cui M, Zhu M, Su WL, Qiu MC, Zhang H. STAT1/3 and ERK1/2 synergistically regulate cardiac fibrosis induced by high glucose. Cell Physiol Biochem. 2013;32(4):960-971. doi:10.1159/000354499

Dai C, Li Q, May HI, Li C, Zhang G, Sharma G, Sherry AD, Malloy CR, Khemtong C, Zhang Y, et al. Lactate Dehydrogenase A Governs Cardiac Hypertrophic Growth in Response to Hemodynamic Stress. Cell Rep. 2020;32(9):108087. doi:10.1016/j.celrep.2020.108087

Dai J, Zhang Q, Wan C, Liu J, Zhang Q, Yu Y, Wang J. Significances of viable synergistic autophagy-associated cathepsin B and cathepsin D (CTSB/CTSD) as potential biomarkers for sudden cardiac death. BMC Cardiovasc Disord. 2021;21(1):233. doi:10.1186/s12872-021-02040-3

Damanafshan A, Elzenaar I, Samson-Couterie B, van der Made I, Bourajjaj M, van den Hoogenhof MM, van Veen HA, Picavet DI, Beqqali A, Ehler E, et al. The MEF2 transcriptional target DMPK induces loss of sarcomere structure and cardiomyopathy. Cardiovasc Res. 2018;114(11):1474-1486. doi:10.1093/cvr/cvy091

Danchin N, Cucherat M, Thuillez C, Durand E, Kadri Z, Steg PG. Angiotensin-converting enzyme inhibitors in patients with coronary artery disease and absence of heart failure or left ventricular systolic dysfunction: an overview of long-term randomized controlled trials. Arch Intern Med. 2006;166(7):787-796. doi:10.1001/archinte.166.7.787

Dang TA, Kessler T, Wobst J, Wierer M, Braenne I, Strom TM, Tennstedt S, Sager HB, Meitinger T, Erdmann J, et al. Identification of a Functional PDE5A Variant at the Chromosome 4q27 Coronary Artery Disease Locus in an Extended Myocardial Infarction Family. Circulation. 2021;144(8):662-665. doi:10.1161/CIRCULATIONAHA.120.052975

Davies M, Fraser SA, Galic S, Choy SW, Katerelos M, Gleich K, Kemp BE, Mount PF, Power DA. Novel mechanisms of Na+ retention in obesity: phosphorylation of NKCC2 and regulation of SPAK/OSR1 by AMPK. Am J Physiol Renal Physiol. 2014;307(1):F96-F106. doi:10.1152/ajprenal.00524.2013

Davies MR, Lund RJ, Hruska KA. BMP-7 is an efficacious treatment of vascular calcification in a murine model of atherosclerosis and chronic renal failure. J Am Soc Nephrol. 2003;14(6):1559-1567. doi:10.1097/01.asn.0000068404.57780.dd

D'Cruz BJ, Fertig KC, Filiano AJ, Hicks SD, DeFranco DB, Callaway CW. Hypothermic reperfusion after cardiac arrest augments brain-derived neurotrophic factor activation. J Cereb Blood Flow Metab. 2002;22(7):843-851. doi:10.1097/00004647-200207000-00009

de Denus S, Dubé MP, Fouodjio R, Huynh T, LeBlanc MH, Lepage S, Sheppard R, Giannetti N, Lavoie J, Mansour A, et al. A prospective study of the impact of AGTR1 A1166C on the effects of candesartan in patients with heart failure. Pharmacogenomics. 2018;19(7):599-612. doi:10.2217/pgs-2018-0004

de Leeuw FE, Richard F, de Groot JC, van Duijn CM, Hofman A, Van Gijn J, Breteler MM. . Interaction between hypertension, apoE, and cerebral white matter lesions. Stroke. 2004;35(5):1057-1060. doi:10.1161/01.STR.0000125859.71051.83

De Los Santos S, Reyes-Castro LA, Coral-Vázquez RM, Mendez JP, Zambrano E, Canto P. (-)-Epicatechin increases apelin/APLNR expression and modifies proteins involved in lipid metabolism of offspring descendants of maternal obesity. J Nutr Biochem. 2023;117:109350. doi:10.1016/j.jnutbio.2023.109350

Deaton AM, Dubey A, Ward LD, Dornbos P, Flannick J; AMP-T2D-GENES Consortium; Yee E, Ticau S, Noetzli L, Parker MM, et al. Rare loss of function variants in the hepatokine gene INHBE protect from abdominal obesity. Nat Commun. 2022;13(1):4319. doi:10.1038/s41467-022-31757-8

Delrue L, Vanderheyden M, Beles M, Paolisso P, Di Gioia G, Dierckx R, Verstreken S, Goethals M, Heggermont W, Bartunek J. Circulating SERPINA3 improves prognostic stratification in patients with a de novo or worsened heart failure. ESC Heart Fail. 2021;8(6):4780-4790. doi:10.1002/ehf2.13659

Deng L, Cao C, Cai Z, Wang Z, Leng B, Chen Z, Kong F, Zhou Z, He J, Nie X, et al. STING Contributes to Pulmonary Hypertension by Targeting IFN and BMPR2 Signaling through Regulating of F2RL3. Am J Respir Cell Mol Biol. 2024;71(3):356-371. doi:10.1165/rcmb.2023-0308OC

Dernellis J, Panaretou M. Effects of C-reactive protein and the third and fourth components of complement (C3 and C4) on incidence of atrial fibrillation. Am J Cardiol. 2006;97(2):245-248. doi:10.1016/j.amjcard.2005.08.027

DeSantiago J, Bare DJ, Varma D, Solaro RJ, Arora R, Banach K. Loss of p21-activated kinase 1 (Pak1) promotes atrial arrhythmic activity. Heart Rhythm. 2018;15(8):1233-1241. doi:10.1016/j.hrthm.2018.03.041

Dewi IP, Wardhani LFK, Maghfirah I, Dewi KP, Subagjo A, Alsagaff MY, Nugroho J. Association polymorphism of guanine nucleotide-binding protein β3 subunit (GNB3) C825T and insertion/deletion of the angiotensin-converting enzyme (ACE) gene with peripartum cardiomyopathy. Front Cardiovasc Med. 2023;10:1096514. doi:10.3389/fcvm.2023.1096514

Di Francesco A, Choi Y, Bernier M, Zhang Y, Diaz-Ruiz A, Aon MA, Kalafut K, Ehrlich MR, Murt K, Ali A, et al. NQO1 protects obese mice through improvements in glucose and lipid metabolism. NPJ Aging Mech Dis. 2020;6(1):13. doi:10.1038/s41514-020-00051-6

Didangelos A, Mayr U, Monaco C, Mayr M. Novel role of ADAMTS-5 protein in proteoglycan turnover and lipoprotein retention in atherosclerosis. J Biol Chem. 2012;287(23):19341-19345. doi:10.1074/jbc.C112.350785

Dieter C, Lemos NE, de Faria Corrêa NR, Pellenz FM, Canani LH, Crispim D, Bauer AC. The A allele of the rs759853 single nucleotide polymorphism in the AKR1B1 gene confers risk for diabetic kidney disease in patients with type 2 diabetes from a Brazilian population. Arch Endocrinol Metab. 2022;66(1):12-18. doi:10.20945/2359-3997000000432

Ding N, Liu D, Duan X, Zhang J, Ma S, Chen Y. Twist2 Reduced NLRP3-Induced Inflammation of Infantile Pneumonia via Regulation of Mitochondrial Permeability Transition by FOXO1. Int Arch Allergy Immunol. 2022;183(10):1098-1113. doi:10.1159/000525063

Ding N, Zheng C. Secreted frizzled-related protein 5 promotes angiogenesis of human umbilical vein endothelial cells and alleviates myocardial injury in diabetic mice with myocardial infarction by inhibiting Wnt5a/JNK signaling. Bioengineered. 2022;13(5):11656-11667. doi:10.1080/21655979.2022.2070964

Ding Q, Tan ALM, Parra EJ, Cruz M, Sim X, Teo YY, Long J, Alsafar H, Petretto E, Tai ES, et al. Genome-wide meta-analysis associates GPSM1 with type 2 diabetes, a plausible gene involved in skeletal muscle function. J Hum Genet. 2020;65(4):411-420. doi:10.1038/s10038-019-0720-3

Ding Q, Xing J, Bai F, Shao W, Hou K, Zhang S, Hu Y, Zhang B, Zhao H, Xu Q. et al. C1QC, VSIG4, and CFD as Potential Peripheral Blood Biomarkers in Atrial Fibrillation-Related Cardioembolic Stroke. Oxid Med Cell Longev. 2023;2023:5199810. doi:10.1155/2023/5199810

Djordjevic A, Zivkovic M, Koncar I, Stankovic A, Kuveljic J, Djuric T. Tag Variants of LGALS-3 Containing Haplotype Block in Advanced Carotid Atherosclerosis. J Stroke Cerebrovasc Dis. 2022;31(1):106212. doi:10.1016/j.jstrokecerebrovasdis.2021.106212

do Carmo JM, da Silva AA, Cai Z, Lin S, Dubinion JH, Hall JE. Control of blood pressure, appetite, and glucose by leptin in mice lacking leptin receptors in proopiomelanocortin neurons. Hypertension. 2011;57(5):918-926. doi:10.1161/HYPERTENSIONAHA.110.161349

Do DC, Zhang Y, Tu W, Hu X, Xiao X, Chen J, Hao H, Liu Z, Li J, Huang SK, et al. Type II alveolar epithelial cell-specific loss of RhoA exacerbates allergic airway inflammation through SLC26A4. JCI Insight. 2021;6(14):e148147. doi:10.1172/jci.insight.148147

Dogon G, Rigal E, Potel E, Josse M, Rochette L, Bejot Y, Vergely C. Growth/differentiation factor 15 (GDF15) expression in the heart after myocardial infarction and cardioprotective effect of pre-ischemic rGDF15 administration. Sci Rep. 2024;14(1):12949. doi:10.1038/s41598-024-63880-5

Dolga AM, Letsche T, Gold M, Doti N, Bacher M, Chiamvimonvat N, Dodel R, Culmsee C. Activation of KCNN3/SK3/K(Ca)2.3 channels attenuates enhanced calcium influx and inflammatory cytokine production in activated microglia. Glia. 2012;60(12):2050-2064. doi:10.1002/glia.22419

Domanski MJ, Exner DV, Borkowf CB, Geller NL, Rosenberg Y, Pfeffer MA. Effect of angiotensin converting enzyme inhibition on sudden cardiac death in patients following acute myocardial infarction. A meta-analysis of randomized

clinical trials. J Am Coll Cardiol. 1999;33(3):598-604. doi:10.1016/s0735-1097(98)00609-3

Dong G, Yu X, Zhao M, Lin S, Meng Q. Correlation between Complement C1q A Chain (C1QA) and Macrophages in the Progression of Carotid Atherosclerosis. Iran J Public Health. 2024;53(7):1517-1527. doi:10.18502/ijph.v53i7.16046

Dong H, Zhang Y, Hu P, Wang J, Lu N. Serum apolipoprotein A1 rather than apolipoprotein B is associated with hypertension prevalence in Chinese people with coronary artery disease. Blood Press Monit. 2022;27(2):121-127. doi:10.1097/MBP.0000000000000576

Dong J, Zhang J, Cheng S, Qin B, Jin K, Chen B, Zhang Y, Lu J. A high-fat diet induced depression-like phenotype via hypocretin-HCRTR1 mediated inflammation activation. Food Funct. 2024;15(17):8661-8673. doi:10.1039/d4fo00210e

Dong N, Chen S, Yang J, He L, Liu P, Zheng D, Li L, Zhou Y, Ruan C, Plow E, et al. Plasma soluble corin in patients with heart failure. Circ Heart Fail. 2010;3(2):207-211. doi:10.1161/CIRCHEARTFAILURE.109.903849

Dong W, Guan FF, Zhang X, Gao S, Liu N, Chen W, Zhang LF, Lu D. Dhcr24 activates the PI3K/Akt/HKII pathway and protects against dilated cardiomyopathy in mice. Animal Model Exp Med. 2018;1(1):40-52. doi:10.1002/ame2.12007

Dorajoo R, Ihsan MO, Liu W, Lim HY, Angeli V, Park SJ, Chan JMS, Lin XY, Ong MS, Muniasamy U, et al. Vascular smooth muscle cells in low SYNTAX scores coronary artery disease exhibit proinflammatory transcripts and proteins correlated with IL1B activation. Atherosclerosis. 2023;365:15-24. doi:10.1016/j.atherosclerosis.2022.12.005

Dschietzig TB. Myostatin - From the Mighty Mouse to cardiovascular disease and cachexia. Clin Chim Acta. 2014;433:216-224. doi:10.1016/j.cca.2014.03.021

Du B, Jia X, Tian W, Yan X, Wang N, Cai D, Li X, Zhang H, Jin M, Wu N, et al. Associations of SUCNR1, GRK4, CAMK1D gene polymorphisms and the susceptibility of type 2 diabetes mellitus and essential hypertension in a northern

Chinese Han population. J Diabetes Complications. 2021;35(1):107752. doi:10.1016/j.jdiacomp.2020.107752

Du L, Wang X, Guo Y, Tao T, Wu H, Xu X, Zhang B, Chen T, Xu Q, Guo X. Altered lipid metabolism promoting cardiac fibrosis is mediated by CD34+ cell-derived FABP4+ fibroblasts. Exp Mol Med. 2024;56(8):1869-1886. doi:10.1038/s12276-024-01309-9

Du L, Xu C, Tang K, Shi J, Tang L, Lisha X, Lei C, Liu H, Liang Y, Guo Y. Epithelial CST1 Promotes Airway Eosinophilic Inflammation in Asthma via the AKT Signaling Pathway. Allergy Asthma Immunol Res. 2023;15(3):374-394. doi:10.4168/aair.2023.15.3.374

Duarte GV, Boeira V, Correia T, Porto-Silva L, Cardoso T, Macedo MN, Oliveira MF, Carvalho E. Osteopontin, CCL5 and CXCL9 are independently associated with psoriasis, regardless of the presence of obesity. Cytokine. 2015;74(2):287-292. doi:10.1016/j.cyto.2015.04.015

Ebner F, Moseby-Knappe M, Mattsson-Carlgren N, Lilja G, Dragancea I, Undén J, Friberg H, Erlinge D, Kjaergaard J, Hassager C, et al. Serum GFAP and UCH-L1 for the prediction of neurological outcome in comatose cardiac arrest patients. Resuscitation. 2020;154:61-68. doi:10.1016/j.resuscitation.2020.05.016

El Mesallamy HO, Hamdy NM, Mostafa DM, Amin AI. The serine protease granzyme B as an inflammatory marker, in relation to the insulin receptor cleavage in human obesity and type 2 diabetes mellitus. J Interferon Cytokine Res. 2014;34(3):179-186. doi:10.1089/jir.2013.0059

El-Lebedy D, Raslan HM, Mohammed AM. Apolipoprotein E gene polymorphism and risk of type 2 diabetes and cardiovascular disease. Cardiovasc Diabetol. 2016;15:12. doi:10.1186/s12933-016-0329-1

Emdin CA, Khera AV, Aragam K, Haas M, Chaffin M, Klarin D, Natarajan P, Bick A, Zekavat SM, Nomura A, et al. DNA Sequence Variation in ACVR1C Encoding the Activin Receptor-Like Kinase 7 Influences Body Fat Distribution and Protects Against Type 2 Diabetes. Diabetes. 2019;68(1):226-234. doi:10.2337/db18-0857

Emet S, Dadashov M, Sonsoz MR, Cakir MO, Yilmaz M, Elitok A, Bilge AK, Mercanoglu F, Oncul A, Adalet K, et al. Galectin-3: A Novel Biomarker Predicts Sudden Cardiac Death in Hypertrophic Cardiomyopathy. Am J Med Sci. 2018;356(6):537-543. doi:10.1016/j.amjms.2018.08.013

Engebretsen KV, Lunde IG, Strand ME, Waehre A, Sjaastad I, Marstein HS, Skrbic B, Dahl CP, Askevold ET, Christensen G, et al. Lumican is increased in experimental and clinical heart failure, and its production by cardiac fibroblasts is induced by mechanical and proinflammatory stimuli. FEBS J. 2013;280(10):2382-2398. doi:10.1111/febs.12235

Ernst AS, Böhler LI, Hagenston AM, Hoffmann A, Heiland S, Sticht C, Bendszus M, Hecker M, Bading H, Marti HH, et al. EphB2-dependent signaling promotes neuronal excitotoxicity and inflammation in the acute phase of ischemic stroke. Acta Neuropathol Commun. 2019;7(1):15. doi:10.1186/s40478-019-0669-7

Esposito T, Sampaolo S, Limongelli G, Varone A, Formicola D, Diodato D, Farina O, Napolitano F, Pacileo G, Gianfrancesco F, et al. Digenic mutational inheritance of the integrin alpha 7 and the myosin heavy chain 7B genes causes congenital myopathy with left ventricular non-compact cardiomyopathy. Orphanet J Rare Dis. 2013;8:91. doi:10.1186/1750-1172-8-91

Etzerodt A, Rasmussen MR, Svendsen P, Chalaris A, Schwarz J, Galea I, Møller HJ, Moestrup SK. Structural basis for inflammation-driven shedding of CD163 ectodomain and tumor necrosis factor-α in macrophages. J Biol Chem. 2014;289(2):778-788. doi:10.1074/jbc.M113.520213

Fabregat A, Jupe S, Matthews L, Sidiropoulos K, Gillespie M, Garapati P, Haw R, Jassal B, Korninger F, May B et al The Reactome Pathway Knowledgebase. Nucleic Acids Res. 2018;46(D1):D649–D655. doi:10.1093/nar/gkx1132

Fajar DR, Rostinawati T, Hamijoyo L, Sahiratmadja E, Amalia R, Barliana MI. TNFSF13B rs9514828 C>T Polymorphism is Associated with Incidence of Atherosclerosis and Therapeutic Outcomes in Patients with Systemic Lupus Erythematosus. Biologics. 2024;18:95-106. doi:10.2147/BTT.S452792

Fan Q, Li H, Qin Y, Li L, Chen L, Zhang L, Lv Y, Liang D, Liang Y, Long T, et al. Association of SERPINE1 rs6092 with type 2 diabetes and related metabolic

traits in a Chinese population. Gene. 2018;661:176-181. doi:10.1016/j.gene.2018.04.011

Fan Q, Yan X, Zhang H, Lu L, Zhang Q, Wang F, Xi R, Hu J, Chen Q, Niu W, et al. IL-34 is associated with the presence and severity of renal dysfunction and coronary artery disease in patients with heart failure. Sci Rep. 2016;6:39324. doi:10.1038/srep39324

Fan Y, Xia J (2018) miRNet-Functional Analysis and Visual Exploration of miRNA-Target Interactions in a Network Context. Methods Mol Biol 1819:215-233. doi:10.1007/978-1-4939-8618-7_10

Fang J, Bao W, Chagan-Yasutan H, Arlud S, Qin S, Wu R, He N. Mechanism of Mongolian mind-body interactive therapy in regulating essential hypertension through HTR2B: A metabolome- and transcriptome-based study. Heliyon. 2024;10(17):e37113. doi:10.1016/j.heliyon.2024.e37113

Fang W, Deng Z, Benadjaoud F, Yang C, Shi GP. Cathepsin B deficiency ameliorates liver lipid deposition, inflammatory cell infiltration, and fibrosis after diet-induced nonalcoholic steatohepatitis. Transl Res. 2020;222:28-40. doi:10.1016/j.trsl.2020.04.011

Fang Y, Li J, Niu X, Ma N, Zhao J. Hypomethylation of Rnase6 Promoter Enhances Proliferation and Migration of Murine Aortic Vascular Smooth Muscle Cells and Aggravates Atherosclerosis in Mice. Front Bioeng Biotechnol. 2021;9:695461. doi:10.3389/fbioe.2021.695461

Fang Z, Li X, Liu J, Lee H, Salciccioli L, Lazar J, Zhang M. The role of complement C3 in the outcome of regional myocardial infarction. Biochem Biophys Rep. 2023;33:101434. doi:10.1016/j.bbrep.2023.101434

Farag A, Mandour AS, Kaneda M, Elfadadny A, Elhaieg A, Shimada K, Tanaka R. Effect of trehalose on heart functions in rats model after myocardial infarction: assessment of novel intraventricular pressure and heart rate variability. Front Cardiovasc Med. 2023;10:1182628. doi:10.3389/fcvm.2023.1182628

Farup PG, Rootwelt H, Hestad K. APOE - a genetic marker of comorbidity in subjects with morbid obesity. BMC Med Genet. 2020;21(1):146. doi:10.1186/s12881-020-01082-2

Fathy SA, Abdel Hamid FF, Zabut BM, Jamee AF, Ali MA, Abu Mustafa AM. Diagnostic utility of BNP, corin and furin as biomarkers for cardiovascular complications in type 2 diabetes mellitus patients. Biomarkers. 2015;20(6-7):460-469. doi:10.3109/1354750X.2015.1093032

Feistritzer HJ, Metzler B. Corin as novel biomarker for myocardial infarction. Ann Transl Med. 2016;4(20):405. doi:10.21037/atm.2016.08.17

Feng W, Sun L, Qu XF. Association of AGTR1 and ACE2 gene polymorphisms with structural atrial fibrillation in a Chinese Han population. Pharmazie. 2017;72(1):17-21. doi:10.1691/ph.2017.6752

Feng X, Szulzewsky F, Yerevanian A, Chen Z, Heinzmann D, Rasmussen RD, Alvarez-Garcia V, Kim Y, Wang B, Tamagno I, et al. Loss of CX3CR1 increases accumulation of inflammatory monocytes and promotes gliomagenesis. Oncotarget. 2015;6(17):15077-15094. doi:10.18632/oncotarget.3730

Ferdous A, Wang ZV, Luo Y, Li DL, Luo X, Schiattarella GG, Altamirano F, May HI, Battiprolu PK, Nguyen A, et al. FoxO1-Dio2 signaling axis governs cardiomyocyte thyroid hormone metabolism and hypertrophic growth. Nat Commun. 2020;11(1):2551. doi:10.1038/s41467-020-16345-y

Ferreira DMS, Cheng AJ, Agudelo LZ, Cervenka I, Chaillou T, Correia JC, Porsmyr-Palmertz M, Izadi M, Hansson A, Martínez-Redondo V, et al. LIM and cysteine-rich domains 1 (LMCD1) regulates skeletal muscle hypertrophy, calcium handling, and force. Skelet Muscle. 2019;9(1):26. doi:10.1186/s13395-019-0214-1

Fioranelli M, Roccia MG, Przybylek B, Garo ML. The Role of Brain-Derived Neurotrophic Factor (BDNF) in Depression and Cardiovascular Disease: A Systematic Review. Life (Basel). 2023;13(10):1967. doi:10.3390/life13101967

Fitzgerald P, Kusumoto F. The effects of septal myectomy and alcohol septal ablation for hypertrophic cardiomyopathy on the cardiac conduction system. J Interv Card Electrophysiol. 2018;52(3):403-408. doi:10.1007/s10840-018-0433-0

Flamant M, Mougenot N, Balse E, Le Fèvre L, Atassi F, Gautier EL, Le Goff W, Keck M, Nadaud S, Combadière C, Boissonnas A, et al. Early activation of the cardiac CX3CL1/CX3CR1 axis delays β-adrenergic-induced heart failure. Sci Rep. 2021;11(1):17982. doi:10.1038/s41598-021-97493-z

Fogarty MP, Cannon ME, Vadlamudi S, Gaulton KJ, Mohlke KL. Identification of a regulatory variant that binds FOXA1 and FOXA2 at the CDC123/CAMK1D type 2 diabetes GWAS locus. PLoS Genet. 2014;10(9):e1004633. doi:10.1371/journal.pgen.1004633

Forloni G. Alpha Synuclein: Neurodegeneration and Inflammation. Int J Mol Sci. 2023;24(6):5914. doi:10.3390/ijms24065914

Forte M, Marchitti S, Cotugno M, Di Nonno F, Stanzione R, Bianchi F, Schirone L, Schiavon S, Vecchio D, Sarto G, et al. Trehalose, a natural disaccharide, reduces stroke occurrence in the stroke-prone spontaneously hypertensive rat. Pharmacol Res. 2021;173:105875. doi:10.1016/j.phrs.2021.105875

Fragão-Marques M, Barroso I, Farinha R, Miranda IM, Martins D, Mancio J, Rocha-Neves J, Guimarães JT, Leite-Moreira A, Falcão-Pires I. Pericardial NT-Pro-BNP and GDF-15 as Biomarkers of Atrial Fibrillation and Atrial Matrix Remodeling in Aortic Stenosis. Diagnostics (Basel). 2021;11(8):1422. doi:10.3390/diagnostics11081422

Fraile A, Cebrián J, Thuissard-Vasallo I, Pérez-Martín S, Casado R, Gil-Fournier B, Alonso-Martín J, Tamargo J, Caballero R, Delpón E, et al. Coexistent HCN4 and GATA5 Rare Variants and Atrial Fibrillation in a Large Spanish Family. Can J Cardiol. 2024;40(7):1270-1280. doi:10.1016/j.cjca.2024.02.02

Fredette ME, Lombardi KC, Duker AL, Buck CO, Phornphutkul C, Bober MB, Quintos JB. Novel xrcc4 mutations in an infant with microcephalic primordial dwarfism, dilated cardiomyopathy, subclinical hypothyroidism, and early death: expanding the phenotype of xrcc4 mutations. AACE Clin Case Rep. 2019;6(1):e1-e4. doi:10.4158/ACCR-2019-0283

Frey N, Olson EN. Modulating cardiac hypertrophy by manipulating myocardial lipid metabolism?. Circulation. 2002;105(10):1152-1154.

Friedrich FW, Reischmann S, Schwalm A, Unger A, Ramanujam D, Münch J, Müller OJ, Hengstenberg C, Galve E, Charron P, et al. FHL2 expression and variants in hypertrophic cardiomyopathy. Basic Res Cardiol. 2014;109(6):451. doi:10.1007/s00395-014-0451-8

Fu F, Lai Q, Hu J, Zhang L, Zhu X, Kou J, Yu B, Li F. Ruscogenin Alleviates Myocardial Ischemia-Induced Ferroptosis through the Activation of BCAT1/BCAT2. Antioxidants (Basel). 2022;11(3):583. doi:10.3390/antiox11030583

Fu H, Nie S, Luo P, Ruan Y, Zhang Z, Miao H, Li X, Wen S, Bai R. Galectin-3 and acute heart failure: genetic polymorphisms, plasma level, myocardial fibrosis and 1-year outcomes. Biomark Med. 2020;14(11):943-954. doi:10.2217/bmm-2020-0269

Fu T, Chen M, Xu L, Gong J, Zheng J, Zhang F, Ji N. Association of the MYH6 Gene Polymorphism with the Risk of Atrial Fibrillation and Warfarin Anticoagulation Therapy. Genet Test Mol Biomarkers. 2021;25(9):590-599. doi:10.1089/gtmb.2021.0025

Fuchs MA, Burke EJ, Latic N, Murray S, Li H, Sparks M, Abraham D, Zhang H, Rosenberg P, Hänzelmann S, et al. Fibroblast Growth Factor (FGF) 23 and FGF Receptor 4 promote cardiac metabolic remodeling in chronic kidney disease. Preprint. Res Sq. 2023;rs.3.rs-3705543. doi:10.21203/rs.3.rs-3705543/v1

Fujikawa H, Shimizu H, Nambu R, Takeuchi I, Matsui T, Sakamoto K, Gocho Y, Miyamoto T, Yasumi T, Yoshioka T, et al. Monogenic inflammatory bowel disease with STXBP2 mutations is not resolved by hematopoietic stem cell transplantation but can be alleviated via immunosuppressive drug therapy. Clin Immunol. 2023;246:109203. doi:10.1016/j.clim.2022.109203

Fukuda H, Imamura M, Tanaka Y, Iwata M, Hirose H, Kaku K, Maegawa H, Watada H, Tobe K, Kashiwagi A, et al. Replication study for the association of a single-nucleotide polymorphism, rs3746876, within KCNJ15, with susceptibility to type 2 diabetes in a Japanese population. J Hum Genet. 2013;58(7):490-493. doi:10.1038/jhg.2013.28

Furuhashi M, Mita T, Moniwa N, Hoshina K, Ishimura S, Fuseya T, Watanabe Y, Yoshida H, Shimamoto K, Miura T. Angiotensin II receptor blockers decrease serum concentration of fatty acid-binding protein 4 in patients with hypertension. Hypertens Res. 2015;38(4):252-259. doi:10.1038/hr.2015.2

Gaddam RR, Chambers S, Bhatia M. ACE and ACE2 in inflammation: a tale of two enzymes. Inflamm Allergy Drug Targets. 2014;13(4):224-234. doi:10.2174/1871528113666140713164506

Galán M, Varona S, Guadall A, Orriols M, Navas M, Aguiló S, de Diego A, Navarro MA, García-Dorado D, Rodríguez-Sinovas A, et al. Lysyl oxidase overexpression accelerates cardiac remodeling and aggravates angiotensin II-induced hypertrophy. FASEB J. 2017;31(9):3787-3799. doi:10.1096/fj.201601157RR

Ganekal P, Vastrad B, Kavatagimath S, Vastrad C, Kotrashetti S. Bioinformatics and Next-Generation Data Analysis for Identification of Genes and Molecular Pathways Involved in Subjects with Diabetes and Obesity. Medicina (Kaunas). 2023;59(2):309. doi:10.3390/medicina59020309

Gao C, Lin X, Fan F, Liu X, Wan H, Yuan T, Zhao X, Luo Y. Status of higher TGF-β1 and TGF-β2 levels in the aqueous humour of patients with diabetes and cataracts. BMC Ophthalmol. 2022;22(1):156. doi:10.1186/s12886-022-02317-x

Gao S, Zhu H, Zuo X, Luo H. Cathepsin G and Its Role in Inflammation and Autoimmune Diseases. Arch Rheumatol. 2018;33(4):498-504. doi:10.5606/ArchRheumatol.2018.6595

Gao W, Wang H, Zhang L, Cao Y, Bao JZ, Liu ZX, Wang LS, Yang Q, Lu X. Retinol-Binding Protein 4 Induces Cardiomyocyte Hypertrophy by Activating TLR4/MyD88 Pathway. Endocrinology. 2016;157(6):2282-2293. doi:10.1210/en.2015-2022

Gao X, Wei Y, Sun H, Hao S, Ma M, Sun H, Zang D, Qi C, Ge J. Role of Bmal1 in Type 2 Diabetes Mellitus-Related Glycolipid Metabolic Disorder and Neuropsychiatric Injury: Involved in the Regulation of Synaptic Plasticity and Circadian Rhythms. Mol Neurobiol. 2023;60(8):4595-4617. doi:10.1007/s12035-023-03360-5

Gao Y, Zhao D, Xie WZ, Meng T, Xu C, Liu Y, Zhang P, Bi X, Zhao Z. Rap1GAP Mediates Angiotensin II-Induced Cardiomyocyte Hypertrophy by Inhibiting Autophagy and Increasing Oxidative Stress. Oxid Med Cell Longev. 2021;2021:7848027. doi:10.1155/2021/7848027

Gao Z, Ti Y, Lu B, Song FQ, Zhang L, Hu BA, Xie JY, Zhang W, Han L, Zhong M. STAMP2 Attenuates Cardiac Dysfunction and Insulin Resistance in Diabetic Cardiomyopathy via NMRAL1-Mediated NF-κB Inhibition in Type 2 Diabetic Rats. Diabetes Metab Syndr Obes. 2022;15:3219-3229. doi:10.2147/DMSO.S374784

Garcia-Arguinzonis M, Diaz-Riera E, Peña E, Escate R, Juan-Babot O, Mata P, Badimon L, Padro T. Alternative C3 Complement System: Lipids and Atherosclerosis. Int J Mol Sci. 2021;22(10):5122. doi:10.3390/ijms22105122

Garg M, Royce SG, Tikellis C, Shallue C, Sluka P, Wardan H, Hosking P, Monagle S, Thomas M, Lubel JS, et al. The intestinal vitamin D receptor in inflammatory bowel disease: inverse correlation with inflammation but no relationship with circulating vitamin D status. Therap Adv Gastroenterol. 2019;12:1756284818822566. doi:10.1177/1756284818822566

Garranzo-Asensio M, Solís-Fernández G, Montero-Calle A, García-Martínez JM, Fiuza MC, Pallares P, Palacios-Garcia N, García-Jiménez C, Guzman-Aranguez A, Barderas R. et al. Seroreactivity Against Tyrosine Phosphatase PTPRN Links Type 2 Diabetes and Colorectal Cancer and Identifies a Potential Diagnostic and Therapeutic Target. Diabetes. 2022;71(3):497-510. doi:10.2337/db20-1206

Garzón-Tituaña M, Sierra-Monzón JL, Comas L, Santiago L, Khaliulina-Ushakova T, Uranga-Murillo I, Ramirez-Labrada A, Tapia E, Morte-Romea E, Algarate S, et al. Granzyme A inhibition reduces inflammation and increases survival during abdominal sepsis. Theranostics. 2021;11(8):3781-3795. doi:10.7150/thno.49288

Gaulton A, Hersey A, Nowotka M, Bento AP, Chambers J, Mendez D, Mutowo P, Atkinson F, Bellis LJ, Cibrián-Uhalte E, et al. The ChEMBL database in 2017. Nucleic Acids Res. 2017;45(D1):D945-D954. doi:10.1093/nar/gkw1074

Ge H, Zhang J, Gong Y, Gupte J, Ye J, Weiszmann J, Samayoa K, Coberly S, Gardner J, Wang H, et al. Fibroblast growth factor receptor 4 (FGFR4) deficiency

improves insulin resistance and glucose metabolism under diet-induced obesity conditions. J Biol Chem. 2014;289(44):30470-30480. doi:10.1074/jbc.M114.592022

Ge Y, Liu X, Chen H, Li G, Xing X, Liu J, Zhang C, Zhuge Y, Wang F. The serum soluble scavenger with 5 domains levels: A novel biomarker for individuals with heart failure. Front Physiol. 2023;14:1140856.doi:10.3389/fphys.2023.1140856

Geervliet E, Terstappen LWMM, Bansal R. Hepatocyte survival and proliferation by fibroblast growth factor 7 attenuates liver inflammation, and fibrogenesis during acute liver injury via paracrine mechanisms. Biomed Pharmacother. 2023;167:115612. doi:10.1016/j.biopha.2023.115612

Gelb BD, Tartaglia M. RAS signaling pathway mutations and hypertrophic cardiomyopathy: getting into and out of the thick of it. J Clin Invest. 2011;121(3):844-847. doi:10.1172/JCI46399

Geng B, Wang X, Park KH, Lee KE, Kim J, Chen P, Zhou X, Tan T, Yang C, Zou X, et al. UCHL1 protects against ischemic heart injury via activating HIF-1α signal pathway. Redox Biol. 2022;52:102295. doi:10.1016/j.redox.2022.102295

Gensini F, Padeletti L, Fatini C, Sticchi E, Gensini GF, Michelucci A. Angiotensin-converting enzyme and endothelial nitric oxide synthase polymorphisms in patients with atrial fibrillation. Pacing Clin Electrophysiol. 2003;26(1P2):295-298. doi:10.1046/j.1460-9592.2003.00036.x

Ghanny S, Zidell A, Pedro H, Joustra SD, Losekoot M, Wit JM, Aisenberg J. The IGSF1 Deficiency Syndrome May Present with Normal Free T4 Levels, Severe Obesity, or Premature Testicular Growth. J Clin Res Pediatr Endocrinol. 2021;13(4):461-467. doi:10.4274/jcrpe.galenos.2020.2020.0125

Gigante B, Bellis A, Visconti R, Marino M, Morisco C, Trimarco V, Galasso G, Piscione F, De Luca N, Prince JA, et al. Retrospective analysis of coagulation factor II receptor (F2R) sequence variation and coronary heart disease in hypertensive patients. Arterioscler Thromb Vasc Biol. 2007;27(5):1213-1219. doi:10.1161/ATVBAHA.107.140541

Gigante B, Bennet AM, Leander K, Vikström M, de Faire U. The interaction between coagulation factor 2 receptor and interleukin 6 haplotypes increases the risk of myocardial infarction in men. PLoS One. 2010;5(6):e11300. doi:10.1371/journal.pone.0011300

Gilbert M, Li Z, Wu XN, Rohr L, Gombos S, Harter K, Schulze WX. Comparison of path-based centrality measures in protein-protein interaction networks revealed proteins with phenotypic relevance during adaptation to changing nitrogen environments. J Proteomics. 2021;235:104114. doi:10.1016/j.jprot.2021.104114

Giles DA, Zahner S, Krause P, Van Der Gracht E, Riffelmacher T, Morris V, Tumanov A, Kronenberg M. The Tumor Necrosis Factor Superfamily Members TNFSF14 (LIGHT), Lymphotoxin β and Lymphotoxin β Receptor Interact to Regulate Intestinal Inflammation. Front Immunol. 2018;9:2585. doi:10.3389/fimmu.2018.02585

Gilliam-Vigh H, Jorsal T, Nielsen SW, Forman JL, Pedersen J, Poulsen SS, Vilsbøll T, Knop FK. Expression of Secretin and its Receptor Along the Intestinal Tract in Type 2 Diabetes Patients and Healthy Controls. J Clin Endocrinol Metab. 2023;108(12):e1597-e1602. doi:10.1210/clinem/dgad372

Girerd N, Bresso E, Devignes MD, Rossignol P. Insulin-like growth factor binding protein 2: A prognostic biomarker for heart failure hardly redundant with natriuretic peptides. Int J Cardiol. 2020;300:252-254. doi:10.1016/j.ijcard.2019.11.100

Giriyappagoudar M, Vastrad B, Horakeri R, Vastrad C. Study on Potential Differentially Expressed Genes in Idiopathic Pulmonary Fibrosis by Bioinformatics and Next-Generation Sequencing Data Analysis. Biomedicines. 2023;11(12):3109.. doi:10.3390/biomedicines11123109

Gladysheva IP, Sullivan RD, Reed GL. Falling corin and ANP activity levels accelerate development of heart failure and cardiac fibrosis. Front Cardiovasc Med. 2023;10:1120487. doi:10.3389/fcvm.2023.1120487

Goltz D, Hittetiya K, Gevensleben H, Kirfel J, Diehl L, Meyer R, Büttner R. Loss of the LIM-only protein Fhl2 impairs inflammatory reaction and scar formation

after cardiac ischemia leading to better hemodynamic performance. Life Sci. 2016;151:348-358. doi:10.1016/j.lfs.2016.02.084

Golubić K, Šmalcelj A, Sertić J, Juričić L. Estrogen receptor 1 gene (TA)n polymorphism is associated with lone atrial fibrillation in men. Croat Med J. 2014;55(1):38-44. doi:10.3325/cmj.2014.55.38

Gong Z, Ye Q, Wu JW, Zhou JL, Kong XY, Ma LK. UCHL1 inhibition attenuates cardiac fibrosis via modulation of nuclear factor-κB signaling in fibroblasts. Eur J Pharmacol. 2021;900:174045. doi:10.1016/j.ejphar.2021.174045

González-Marrero I, Hernández-Abad LG, González-Gómez M, Soto-Viera M, Carmona-Calero EM, Castañeyra-Ruiz L, Castañeyra-Perdomo A. Altered Expression of AQP1 and AQP4 in Brain Barriers and Cerebrospinal Fluid May Affect Cerebral Water Balance during Chronic Hypertension. Int J Mol Sci. 2022;23(20):12277. doi:10.3390/ijms232012277

González-Santamaría J, Villalba M, Busnadiego O, López-Olañeta MM, Sandoval P, Snabel J, López-Cabrera M, Erler JT, Hanemaaijer R, Lara-Pezzi E, et al. Matrix cross-linking lysyl oxidases are induced in response to myocardial infarction and promote cardiac dysfunction. Cardiovasc Res. 2016;109(1):67-78. doi:10.1093/cvr/cvv214

Gormez S, Erdim R, Akan G, Caynak B, Duran C, Gunay D, Sozer V, Atalar F. Relationships between visceral/subcutaneous adipose tissue FABP4 expression and coronary atherosclerosis in patients with metabolic syndrome. Cardiovasc Pathol. 2020;46:107192. doi:10.1016/j.carpath.2019.107192

Goten C, Usui S, Takashima SI, Inoue O, Okada H, Shimojima M, Sakata K, Kawashiri M, Kaneko S, Takamura M. Circulating nerve growth factor receptor positive cells are associated with severity and prognosis of pulmonary arterial hypertension. Pulm Circ. 2021;11(1):2045894021990525. doi:10.1177/2045894021990525

Gotsch F, Romero R, Friel L, Kusanovic JP, Espinoza J, Erez O, Than NG, Mittal P, Edwin S, Yoon BH, Kim CJ, et al. CXCL10/IP-10: a missing link between inflammation and anti-angiogenesis in preeclampsia?. J Matern Fetal Neonatal Med. 2007;20(11):777-792. doi:10.1080/14767050701483298

Gracia-Maldonado G, Clark J, Burwinkel M, Greenslade B, Wunderlich M, Salomonis N, Leone D, Gatti E, Pierre P, Kumar AR, et al. LAMP-5 is an essential inflammatory-signaling regulator and novel immunotherapy target for mixed lineage leukemia-rearranged acute leukemia. Haematologica. 2022;107(4):803-815. doi:10.3324/haematol.2020.257451

Greco CM, Condorelli G. Epigenetic modifications and noncoding RNAs in cardiac hypertrophy and failure. Nat Rev Cardiol. 2015;12(8):488-497. doi:10.1038/nrcardio.2015.71

Green GH, Diggle PJ. On the operational characteristics of the Benjamini and Hochberg False Discovery Rate procedure. Stat Appl Genet Mol Biol. 2007;6:Article27. doi:10.2202/1544-6115.1302

Griffeth EM, Stephens EH, Dearani JA. Hypertrophic Cardiomyopathy: Preadolescence, Mitral Valve Disease, and Midventricular Obstruction. Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu. 2024;27:69-77. doi:10.1053/j.pcsu.2023.12.001

Griffin KJ, Newell LM, Simpson KR, Beckers CML, Drinkhill MJ, Standeven KF, Cheah LT, Iismaa SE, Grant PJ, Jackson CL, et al. Transglutaminase 2 limits the extravasation and the resultant myocardial fibrosis associated with factor XIII-A deficiency. Atherosclerosis. 2020;294:1-9. doi:10.1016/j.atherosclerosis.2019.12.013

Grimm PR, Tatomir A, Rosenbaek LL, Kim BY, Li D, Delpire EJ, Fenton RA, Welling PA. Dietary potassium stimulates Ppp1Ca-Ppp1r1a dephosphorylation of kidney NaCl cotransporter and reduces blood pressure. J Clin Invest. 2023;133(21):e158498. doi:10.1172/JCI158498

Grove ML, Morrison A, Folsom AR, Boerwinkle E, Hoelscher DM, Bray MS. Gene-environment interaction and the GNB3 gene in the Atherosclerosis Risk in Communities study. Int J Obes (Lond). 2007;31(6):919-926. doi:10.1038/sj.ijo.0803545

Gu HF, Gu T, Ostenson CG, Kärvestedt L, Brismar K. Evaluation of Sox2 genetic effect on the development of type 2 diabetes. Gene. 2011;486(1-2):94-96. doi:10.1016/j.gene.2011.07.014

Guan H, Zhang J, Luan J, Xu H, Huang Z, Yu Q, Gou X, Xu L. Secreted Frizzled Related Proteins in Cardiovascular and Metabolic Diseases. Front Endocrinol (Lausanne). 2021;12:712217. doi:10.3389/fendo.2021.712217

Guan XH, Hong X, Zhao N, Liu XH, Xiao YF, Chen TT, Deng LB, Wang XL, Wang JB, Ji GJ, et al. CD38 promotes angiotensin II-induced cardiac hypertrophy. J Cell Mol Med. 2017;21(8):1492-1502. doi:10.1111/jcmm.13076

Guan ZH, Yang D, Wang Y, Ma JB, Wang GN. EDA2R knockdown alleviates myocardial ischemia/reperfusion injury through inhibiting the activation of the NF-κB signaling pathway. Exp Anim. 2024. doi:10.1538/expanim.24-0020

Guay SP, Légaré C, Brisson D, Mathieu P, Bossé Y, Gaudet D, Bouchard L. Epigenetic and genetic variations at the TNNT1 gene locus are associated with HDL-C levels and coronary artery disease. Epigenomics. 2016;8(3):359-371. doi:10.2217/epi.15.120

Guclu-Geyik F, Coban N, Can G, Erginel-Unaltuna N. The rs2175898 Polymorphism in the ESR1 Gene has a Significant Sex-Specific Effect on Obesity. Biochem Genet. 2020;58(6):935-952. doi:10.1007/s10528-020-09987-6

Güçlü-Geyik F, Erkan AF, Özuynuk AS, Ekici B, Çoban N. Val109Asp polymorphism in Intelectin 1 gene is associated with coronary artery disease severity in women. Turk Kardiyol Dern Ars. 2022;50(1):34-45. doi:10.5543/tkda.2022.21003

Guclu-Geyik F, Koseoglu P, Guven G, Can G, Kaya A, Coban N, Komurcu-Bayrak E, Erginel-Unaltuna N. Association of Intelectin 1 Gene rs2274907 A□>□T Polymorphism with Obesity, Type 2 Diabetes, Serum Intelectin-1 Levels and Lipid Profiles in Turkish Adults. Biochem Genet. 2023;61(6):2276-2292. doi:10.1007/s10528-023-10371-3

Guella I, Rimoldi V, Asselta R, Ardissino D, Francolini M, Martinelli N, Girelli D, Peyvandi F, Tubaro M, Merlini PA, et al. Association and functional analyses of MEF2A as a susceptibility gene for premature myocardial infarction and coronary artery disease. Circ Cardiovasc Genet. 2009;2(2):165-172. doi:10.1161/CIRCGENETICS.108.819326

Güleç Ç, Abacı N, Bayrak F, Kömürcü Bayrak E, Kahveci G, Güven C, Erginel Ünaltuna N. Association between non-coding polymorphisms of HOPX gene and syncope in hypertrophic cardiomyopathy. Anadolu Kardiyol Derg. 2014;14(7):617-624. doi:10.5152/akd.2014.4972

Gumede NA, Khathi A. The Role of Pro-Opiomelanocortin Derivatives in the Development of Type 2 Diabetes-Associated Myocardial Infarction: Possible Links with Prediabetes. Biomedicines. 2024;12(2):314. doi:10.3390/biomedicines12020314

Guo B, Yan S, Zhai L, Cheng Y. LncRNA HOTAIR accelerates free fatty acid-induced inflammatory response in HepG2 cells by recruiting SRSF1 to stabilize MLXIPL mRNA. Cytotechnology. 2024;76(2):259-269. doi:10.1007/s10616-023-00614-x

Guo H, Zhao X, Li H, Liu K, Jiang H, Zeng X, Chang J, Ma C, Fu Z, Lv X, et al. GDF15 Promotes Cardiac Fibrosis and Proliferation of Cardiac Fibroblasts via the MAPK/ERK1/2 Pathway after Irradiation in Rats. Radiat Res. 2021;196(2):183-191. doi:10.1667/RADE-20-00206.1

Guo J, Hang P, Yu J, Li W, Zhao X, Sun Y, Fan Z, Du Z. The association between RGS4 and choline in cardiac fibrosis. Cell Commun Signal. 2021;19(1):46. doi:10.1186/s12964-020-00682-y

Guo LY, Yang F, Peng LJ, Li YB, Wang AP. CXCL2, a new critical factor and therapeutic target for cardiovascular diseases. Clin Exp Hypertens. 2020;42(5):428-437. doi:10.1080/10641963.2019.1693585

Guo M, Guo H, Zhu J, Wang F, Chen J, Wan C, Deng Y, Wang F, Xu L, Chen Y, et al. A novel subpopulation of monocytes with a strong interferon signature indicated by SIGLEC-1 is present in patients with in recent-onset type 1 diabetes. Diabetologia. 2024;67(4):623-640. doi:10.1007/s00125-024-06098-4

Guo M, Xia Z, Hong Y, Ji H, Li F, Liu W, Li S, Xin H, Tan K, Lian Z. The TFPI2-PPARγ axis induces M2 polarization and inhibits fibroblast activation to promote recovery from post-myocardial infarction in diabetic mice. J Inflamm (Lond). 2023;20(1):35. doi:10.1186/s12950-023-00357-8

Guo Q, Zhang Y, Jiang GR, Zhang C. Decreased KLHL3 expression is involved in the activation of WNK-OSR1/SPAK-NCC cascade in type 1 diabetic mice. Pflugers Arch. 2021;473(2):185-196. doi:10.1007/s00424-020-02509-8

Guo Y, Traurig M, Ma L, Kobes S, Harper I, Infante AM, Bogardus C, Baier LJ, Prochazka M. CHRM3 gene variation is associated with decreased acute insulin secretion and increased risk for early-onset type 2 diabetes in Pima Indians. Diabetes. 2006;55(12):3625-3629. doi:10.2337/db06-0379

Guo Y, Zou J, Xu X, Zhou H, Sun X, Wu L, Zhang S, Zhong X, Xiong Z, Lin Y, et al. hort-chain fatty acids combined with intronic DNA methylation of HIF3A: Potential predictors for diabetic cardiomyopathy. Clin Nutr. 2021;40(6):3708-3717. doi:10.1016/j.clnu.2021.04.007

Gupta RM, Libby P, Barton M. Linking regulation of nitric oxide to endothelin-1: The Yin and Yang of vascular tone in the atherosclerotic plaque. Atherosclerosis. 2020;292:201-203. doi:10.1016/j.atherosclerosis.2019.11.001

Gupta RM. Causal Gene Confusion: The Complicated EDN1/PHACTR1 Locus for Coronary Artery Disease. Arterioscler Thromb Vasc Biol. 2022;42(5):610-612. doi:10.1161/ATVBAHA.122.317539

Gupta T, Paul N, Palaniswamy C, Balasubramaniyam N, Aronow WS, Kolte D, Khera S, Shah AB, Gass A. Sudden Cardiac Arrest in a Patient With Apical Hypertrophic Cardiomyopathy: Case Report and a Brief Review of Literature. Am J Ther. 2016;23(1):e276-e282. doi:10.1097/MJT.0000000000000107

Gusti AMT, Qusti SY, Bahijri SM, Toraih EA, Bokhari S, Attallah SM, Alzahrani A, Alshehri WMA, Alotaibi H, Fawzy MS. Glutathione S-Transferase (GSTT1 rs17856199) and Nitric Oxide Synthase (NOS2 rs2297518) Genotype Combination as Potential Oxidative Stress-Related Molecular Markers for Type 2 Diabetes Mellitus. Diabetes Metab Syndr Obes. 2021;14:1385-1403. doi:10.2147/DMSO.S300525

Guzel S, S Cinemre FB, Guzel EC, Kucukyalcin V, Kiziler AR, Cavusoglu C, Gulyasar T, Cinemre H, Aydemir B. Midkine levels and its relationship with atherosclerotic risk factors in essential hypertensive patients. Niger J Clin Pract. 2018;21(7):894-900. doi:10.4103/njcp.njcp_309_17

Habibe JJ, Clemente-Olivo MP, Scheithauer TPM, Rampanelli E, Herrema H, Vos M, Mieremet A, Nieuwdorp M, van Raalte DH, Eringa EC, de Vries CJM. Glucose-mediated insulin secretion is improved in FHL2-deficient mice and elevated FHL2 expression in humans is associated with type 2 diabetes. Diabetologia. 2022;65(10):1721-1733. doi:10.1007/s00125-022-05750-1

Hada Y, Uchida HA, Umebayashi R, Yoshida M, Wada J. Cilostazol Attenuates AngII-Induced Cardiac Fibrosis in apoE Deficient Mice. Int J Mol Sci. 2022;23(16):9065. doi:10.3390/ijms23169065

Han F, Chen Q, Su J, Zheng A, Chen K, Sun S, Wu H, Jiang L, Xu X, Yang M, et al. MicroRNA-124 regulates cardiomyocyte apoptosis and myocardial infarction through targeting Dhcr24. J Mol Cell Cardiol. 2019;132:178-188. doi:10.1016/j.yjmcc.2019.05.007

Han X, Bai L, Kee HJ, Jeong MH. Syringic acid mitigates isoproterenol-induced cardiac hypertrophy and fibrosis by downregulating Ereg. J Cell Mol Med. 2022;26(14):4076-4086. doi:10.1111/jcmm.17449

Han X, Gui L, Liu B, Wang J, Li Y, Dai X, Li J, Yang B, Qiu G, Feng J, et al. Associations of the uric acid related genetic variants in SLC2A9 and ABCG2 loci with coronary heart disease risk. BMC Genet. 2015;16(1):4. doi:10.1186/s12863-015-0162-7

Hanatani S, Izumiya Y, Takashio S, Kojima S, Yamamuro M, Araki S, Rokutanda T, Tsujita K, Yamamoto E, Tanaka T, et al. Growth differentiation factor 15 can distinguish between hypertrophic cardiomyopathy and hypertensive hearts. Heart Vessels. 2014;29(2):231-237. doi:10.1007/s00380-013-0337-y

Hang PZ, Liu J, Wang JP, Li FF, Li PF, Kong QN, Shi J, Ji HY, Du ZM, Zhao J. 7,8-Dihydroxyflavone alleviates cardiac fibrosis by restoring circadian signals via downregulating Bmal1/Akt pathway. Eur J Pharmacol. 2023;938:175420. doi:10.1016/j.ejphar.2022.175420

Hanwell MD, Curtis DE, Lonie DC, Vandermeersch T, Zurek E, Hutchison GR. Avogadro: an advanced semantic chemical editor, visualization, and analysis platform. J Cheminform. 2012;4(1):17. doi:10.1186/1758-2946-4-17

Hao S, Zhang J, Pei Y, Guo L, Liang Z. Complement factor D derived from epicardial adipose tissue participates in cardiomyocyte apoptosis after myocardial infarction by mediating PARP-1 activity. Cell Signal. 2023;101:110518. doi:10.1016/j.cellsig.2022.110518

Hao Y, Chen Y. Vitamin D levels and vitamin D receptor variants are associated with chronic heart failure in Chinese patients. J Clin Lab Anal. 2019;33(4):e22847. doi:10.1002/jcla.22847

Harada K, Potter JD. Familial hypertrophic cardiomyopathy mutations from different functional regions of troponin T result in different effects on the pH and Ca2+ sensitivity of cardiac muscle contraction. J Biol Chem. 2004;279(15):14488-14495. doi:10.1074/jbc.M309355200

Harada M, Kamimura D, Arima Y, Kohsaka H, Nakatsuji Y, Nishida M, Atsumi T, Meng J, Bando H, Singh R, et al. Temporal expression of growth factors triggered by epiregulin regulates inflammation development. J Immunol. 2015;194(3):1039-1046. doi:10.4049/jimmunol.1400562

Harada T, Sunaga H, Sorimachi H, Yoshida K, Kato T, Kurosawa K, Nagasaka T, Koitabashi N, Iso T, Kurabayashi M, et al. Pathophysiological role of fatty acid-binding protein 4 in Asian patients with heart failure and preserved ejection fraction. ESC Heart Fail. 2020;7(6):4256-4266. doi:10.1002/ehf2.13071

Hassoun R, Budde H, Zhazykbayeva S, Herwig M, Sieme M, Delalat S, Mostafi N, Gömöri K, Tangos M, Jarkas M, et al. Stress activated signalling impaired protein quality control pathways in human hypertrophic cardiomyopathy. Int J Cardiol. 2021;344:160-169. doi:10.1016/j.ijcard.2021.09.009

Hayderi A, Kumawat AK, Shavva VS, Dreifaldt M, Sigvant B, Petri MH, Kragsterman B, Olofsson PS, Sirsjö A, Ljungberg LU. RSAD2 is abundant in atherosclerotic plaques and promotes interferon-induced CXCR3-chemokines in human smooth muscle cells. Sci Rep. 2024;14(1):8196. doi:10.1038/s41598-024-58592-9

He H, Liao Y, Chen Y, Qin H, Hu L, Xiao S, Wang H, Yang R. Identification of ATRNL1 and WNT9A as novel key genes and drug candidates in hypertrophic

cardiomyopathy: integrative bioinformatics and experimental validation. Front Mol Biosci. 2024;11:1458434. doi:10.3389/fmolb.2024.1458434

He H, Sun D, Zeng Y, Wang R, Zhu W, Cao S, Bray GA, Chen W, Shen H, Sacks FM, et al. A Systems Genetics Approach Identified GPD1L and its Molecular Mechanism for Obesity in Human Adipose Tissue. Sci Rep. 2017;7(1):1799. doi:10.1038/s41598-017-01517-6

He K, Zhou X, Du H, Zhao J, Deng R, Wang J. A review on the relationship between Arachidonic acid 15-Lipoxygenase (ALOX15) and diabetes mellitus. PeerJ. 2023;11:e16239. doi:10.7717/peerj.16239

He P, Wang H, Cheng S, Hu F, Zhang L, Chen W, Xu Y, Zhang Y, Gu Y, Li Z, et al. Geniposide ameliorates atherosclerosis by regulating macrophage polarization via perivascular adipocyte-derived CXCL14. J Ethnopharmacol. 2023;314:116532. doi:10.1016/j.jep.2023.116532

Helleberg S, Engel A, Ahmed S, Ahmed A, Rådegran G. Higher plasma IL-6 and PTX3 are associated with worse survival in left heart failure with pulmonary hypertension. Am Heart J Plus. 2022;20:100190. doi:10.1016/j.ahjo.2022.100190

Herold Z, Herold M, Rosta K, Doleschall M, Somogyi A. Lower serum chromogranin B level is associated with type 1 diabetes and with type 2 diabetes patients with intensive conservative insulin treatment. Diabetol Metab Syndr. 2020;12:61. doi:10.1186/s13098-020-00569-5

Herrmann JL, Abarbanell AM, Wang Y, Weil BR, Poynter JA, Manukyan MC, Meldrum DR. Transforming growth factor-α enhances stem cell-mediated postischemic myocardial protection. Ann Thorac Surg. 2011;92(5):1719-1725. doi:10.1016/j.athoracsur.2011.06.057

Herrmann JR, Fink EL, Fabio A, Au AK, Berger RP, Janesko-Feldman K, Clark RSB, Kochanek PM, Jackson TC. Serum levels of the cold stress hormones FGF21 and GDF-15 after cardiac arrest in infants and children enrolled in single center therapeutic hypothermia clinical trials. Resuscitation. 2022;172:173-180. doi:10.1016/j.resuscitation.2021.11.016

Hiebert PR, Boivin WA, Zhao H, McManus BM, Granville DJ. Perforin and granzyme B have separate and distinct roles during atherosclerotic plaque development in apolipoprotein E knockout mice. PLoS One. 2013;8(10):e78939. doi:10.1371/journal.pone.0078939

Hieda T, Shingu Y, Sugimoto S, Asai H, Yamakawa T, Wakasa S. Effects of trehalose on recurrence of remodeling after ventricular reconstruction in rats with ischemic cardiomyopathy. Heart Vessels. 2022;37(3):528-537. doi:10.1007/s00380-021-01990-0

Higashikuni Y, Sainz J, Nakamura K, Takaoka M, Enomoto S, Iwata H, Tanaka K, Sahara M, Hirata Y, Nagai R, et al. The ATP-binding cassette transporter ABCG2 protects against pressure overload-induced cardiac hypertrophy and heart failure by promoting angiogenesis and antioxidant response. Arterioscler Thromb Vasc Biol. 2012;32(3):654-661. doi:10.1161/ATVBAHA.111.240341

Higashikuni Y, Sainz J, Nakamura K, Takaoka M, Enomoto S, Iwata H, Sahara M, Tanaka K, Koibuchi N, Ito S, et al. The ATP-binding cassette transporter BCRP1/ABCG2 plays a pivotal role in cardiac repair after myocardial infarction via modulation of microvascular endothelial cell survival and function. Arterioscler Thromb Vasc Biol. 2010;30(11):2128-2135. doi:10.1161/ATVBAHA.110.211755

Hisaka T, Lardeux B, Lamireau T, Wüestefeld T, Lalor PF, Neaud V, Maurel P, Desmoulière A, Kisiel W, Trautwein C, et al. Expression of tissue factor pathway inhibitor-2 in murine and human liver regulation during inflammation. Thromb Haemost. 2004;91(3):569-575. doi:10.1160/TH03-06-0358

Hoke M, Schillinger M, Dick P, Exner M, Koppensteiner R, Minar E, Mlekusch W, Schlager O, Wagner O, Mannhalter C. Polymorphism of the palladin gene and cardiovascular outcome in patients with atherosclerosis. Eur J Clin Invest. 2011;41(4):365-371. doi:10.1111/j.1365-2362.2010.02416.x

Hong C, Lu J, Chen R, Liu H, Chen H, Wu X, Guo W, Huang Z, Liao H. CXCL10 levels in diagnosis and improved hemodynamics in patients with chronic thromboembolic pulmonary hypertension undergoing balloon pulmonary angioplasty. Pulm Circ. 2022;12(2):e12091. doi:10.1002/pul2.12091

Hong HJ, Oh YI, Park SM, An JH, Kim TH, Chae HK, Seo KW, Youn HY. Evaluation of endothelial cell-specific molecule-1 as a biomarker of glycocalyx damage in canine myxomatous mitral valve disease. BMC Vet Res. 2022;18(1):261. doi:10.1186/s12917-022-03344-y

Horiba M, Kadomatsu K, Yasui K, Lee JK, Takenaka H, Sumida A, Kamiya K, Chen S, Sakuma S, Muramatsu T, et al. Midkine plays a protective role against cardiac ischemia/reperfusion injury through a reduction of apoptotic reaction. Circulation. 2006;114(16):1713-1720. doi:10.1161/CIRCULATIONAHA.106.632273

Hosono K, Yamashita A, Tanabe M, Ito Y, Majima M, Tsujikawa K, Amano H. Deletion of RAMP1 Signaling Enhances Diet-induced Obesity and Fat Absorption via Intestinal Lacteals in Mice. In Vivo. 2024;38(1):160-173. doi:10.21873/invivo.13422

Hou C, Zheng J, Liu W, Xie L, Sun X, Zhang Y, Xu M, Li Y, Xiao T. Identification and characterization of a novel ELN mutation in congenital heart disease with pulmonary artery stenosis. Sci Rep. 2021;11(1):14154. doi:10.1038/s41598-021-93736-1

Hou J, Zheng D, Zhong G, Hu Y. Mangiferin mitigates diabetic cardiomyopathy in streptozotocin-diabetic rats. Can J Physiol Pharmacol. 2013;91(9):759-763. doi:10.1139/cjpp-2013-0090

Hsu SC, Chang YT, Chen CC. Early growth response 1 is an early signal inducing Cav3.2 T-type calcium channels during cardiac hypertrophy. Cardiovasc Res. 2013;100(2):222-230. doi:10.1093/cvr/cvt190

Hsu YJ, Chang GJ, Lai YJ, Chan YH, Chen WJ, Kuo CT, Yeh YH. High-phosphate diet causes atrial remodeling and increases atrial fibrillation vulnerability via STAT3/NF-κB signaling and oxidative stress. Acta Physiol (Oxf). 2023;238(2):e13964. doi:10.1111/apha.13964

Hu C, Cai Z, Lu Y, Cheng X, Guo Q, Wu Z, Zhang Q. Nonviral vector plasmid DNA encoding human proenkephalin gene attenuates inflammatory and neuropathic pain-related behaviors in mice. Neurosci Lett. 2016;634:87-93. doi:10.1016/j.neulet.2016.09.040

Hu J, Deng Y, Ding T, Dong J, Liang Y, Lou B. Lpcat3 deficiency promotes palmitic acid-induced 3T3-L1 mature adipocyte inflammation through enhanced ROS generation. Acta Biochim Biophys Sin (Shanghai). 2022;55(1):117-130. doi:10.3724/abbs.2022161

Hu L, Wei J, Zhang Y, Wang Z, Tang J, Tang J, Gao Y, Zhang X, Li Y, Liu Y, et al. ANGPTL8 is a negative regulator in pathological cardiac hypertrophy. Cell Death Dis. 2022;13(7):621. doi:10.1038/s41419-022-05029-8

Hu M, Jana S, Kilic T, Wang F, Shen M, Winkelaar G, Oudit GY, Rayner K, Zhang DW, Kassiri Z. Loss of TIMP4 (Tissue Inhibitor of Metalloproteinase 4) Promotes Atherosclerotic Plaque Deposition in the Abdominal Aorta Despite Suppressed Plasma Cholesterol Levels. Arterioscler Thromb Vasc Biol. 2021;41(6):1874-1889. doi:10.1161/ATVBAHA.120.315522

Hu Q, Chen H, Zuo Y, He Q, He X, Simpson S Jr, Huang W, Yang H, Zhang H, Lin R. Role of PCK1 gene on oil tea-induced glucose homeostasis and type 2 diabetes: an animal experiment and a case-control study. Nutr Metab (Lond). 2019;16:12. doi:10.1186/s12986-019-0337-8

Hu S, Huang M, Mao S, Yang M, Ju H, Liu Z, Cheng M, Wu G. Serinc2 deficiency exacerbates sepsis-induced cardiomyopathy by enhancing necroptosis and apoptosis. Biochem Pharmacol. 2023;218:115903. doi:10.1016/j.bcp.2023.115903

Hu Y, Wu L, Jiang L, Liang N, Zhu X, He Q, Qin H, Chen W. Notoginsenoside R2 reduces Aβ25-35-induced neuronal apoptosis and inflammation via miR-27a/SOX8/β-catenin axis. Hum Exp Toxicol. 2021;40(12_suppl):S347-S358. doi:10.1177/09603271211041996

Hu Y, Zou W, Zhang L, Zhang S, Hu L, Song Z, Kong S, Gao Y, Zhang J, Yang Y, et al. TRPV3 facilitates lipolysis and attenuates diet-induced obesity via activation of the NRF2/FSP1 signaling axis. Free Radic Biol Med. 2024;221:155-168. doi:10.1016/j.freeradbiomed.2024.05.035

Hu YS, Han X, Liu XH. STAT3: A Potential Drug Target for Tumor and Inflammation. Curr Top Med Chem. 2019;19(15):1305-1317. doi:10.2174/1568026619666190620145052

Huang A, Li H, Zeng C, Chen W, Wei L, Liu Y, Qi X. Endogenous CCN5 Participates in Angiotensin II/TGF-β1 Networking of Cardiac Fibrosis in High Angiotensin II-Induced Hypertensive Heart Failure. Front Pharmacol. 2020;11:1235. doi:10.3389/fphar.2020.01235

Huang A, Lin YS, Kao LZ, Chiou YW, Lee GH, Lin HH, Wu CH, Chang CS, Lee KT, Hsueh YY, et al. Inflammation-induced macrophage lysyl oxidase in adipose stiffening and dysfunction in obesity. Clin Transl Med. 2021;11(9):e543. doi:10.1002/ctm2.543

Huang C, Zhang S, Hu K, Ma Q, Yang T. Phenylethanolamine N-methyltransferase gene promoter haplotypes and risk of essential hypertension. Am J Hypertens. 2011;24(11):1222-1226. doi:10.1038/ajh.2011.124

Huang CH, Tsai MS, Chiang CY, Su YJ, Wang TD, Chang WT, Chen HW, Chen WJ. Activation of mitochondrial STAT-3 and reduced mitochondria damage during hypothermia treatment for post-cardiac arrest myocardial dysfunction. Basic Res Cardiol. 2015;110(6):59. doi:10.1007/s00395-015-0516-3

Huang F, Ni M, Zhang JM, Li DJ, Shen FM. TRPM8 downregulation by angiotensin II in vascular smooth muscle cells is involved in hypertension. Mol Med Rep. 2017;15(4):1900-1908. doi:10.3892/mmr.2017.6158

Huang H, Chen YQ, Fan LL, Guo S, Li JJ, Jin JY, Xiang R. Whole-exome sequencing identifies a novel mutation of GPD1L (R189X) associated with familial conduction disease and sudden death. J Cell Mol Med. 2018;22(2):1350-1354. doi:10.1111/jcmm.13409

Huang H, Chen Z, Li Y, Gong K, Xiao L, Fu H, Yang J, Wang X, Meng Q. GDF-15 Suppresses Atherosclerosis by Inhibiting oxLDL-Induced Lipid Accumulation and Inflammation in Macrophages. Evid Based Complement Alternat Med. 2021;2021:6497568. doi:10.1155/2021/6497568

Huang Q, Sun Y, Huang W, Zhang F, He H, He Y, Huang F. FTO Positively Regulates Odontoblastic Differentiation via SMOC2 in Human Stem Cells from the Apical Papilla under Inflammatory Microenvironment. Int J Mol Sci. 2024;25(7):4045. doi:10.3390/ijms25074045

Huang Q, Yao Y, Wang Y, Li J, Chen J, Wu M, Guo C, Lou J, Yang W, Zhao L, et al. Ginsenoside Rb2 inhibits p300-mediated SF3A2 acetylation at lysine 10 to promote Fscn1 alternative splicing against myocardial ischemic/reperfusion injury. J Adv Res. 2023. doi:10.1016/j.jare.2023.12.012

Huang S, Lu W, Ge D, Meng N, Li Y, Su L, Zhang S, Zhang Y, Zhao B, Miao J. A new microRNA signal pathway regulated by long noncoding RNA TGFB2-OT1 in autophagy and inflammation of vascular endothelial cells. Autophagy. 2015;11(12):2172-2183. doi:10.1080/15548627.2015.1106663

Huang X, Zhong L, van Helvoort E, Lafeber F, Mastbergen S, Hendriks J, Post JN, Karperien M. The Expressions of Dickkopf-Related Protein 1 and Frizzled-Related Protein Are Negatively Correlated to Local Inflammation and Osteoarthritis Severity. Cartilage. 2021;12(4):496-504. doi:10.1177/1947603519841676

Huang Y, Shan G, Yi Y, Liang J, Hu Z, Bi G, Chen Z, Xi J, Ge D, Wang Q, et al. FSCN1 induced PTPRF-dependent tumor microenvironment inflammatory reprogramming promotes lung adenocarcinoma progression via regulating macrophagic glycolysis. Cell Oncol (Dordr). 2022;45(6):1383-1399. doi:10.1007/s13402-022-00726-0

Hur KY, Kim SH, Choi MA, Williams DR, Lee YH, Kang SW, Yadav UC, Srivastava SK, Jung M, Cho JW, et al. Protective effects of magnesium lithospermate B against diabetic atherosclerosis via Nrf2-ARE-NQO1 transcriptional pathway. Atherosclerosis. 2010;211(1):69-76. doi:10.1016/j.atherosclerosis.2010.01.035

Huscher D, Ebert N, Soerensen-Zender I, Mielke N, Schaeffner E, Schmitt R. Development of a prediction model for mortality and cardiovascular outcomes in older adults taking into account AZGP1. Sci Rep. 2021;11(1):11792. doi:10.1038/s41598-021-91169-4

Hwang YC, Ahn HY, Kim WJ, Park CY, Park SW. Increased apoB/A-I ratio independently associated with Type 2 diabetes mellitus: cross-sectional study in a Korean population. Diabet Med. 2012;29(9):1165-1170. doi:10.1111/j.1464-5491.2012.03622.x

Imran M, Arshad MS, Butt MS, Kwon JH, Arshad MU, Sultan MT. Mangiferin: a natural miracle bioactive compound against lifestyle related disorders. Lipids Health Dis. 2017;16(1):84. doi:10.1186/s12944-017-0449-y

Iqbal S, Jabeen F, Kahwa I, Omara T. Suberosin Alleviates Thiazolidinedione-Induced Cardiomyopathy in Diabetic Rats by Inhibiting Ferroptosis via Modulation of ACSL4-LPCAT3 and PI3K-AKT Signaling Pathways. Cardiovasc Toxicol. 2023;23(9-10):295-304. doi:10.1007/s12012-023-09804-7

Ishigami T, Iwamoto T, Tamura K, Yamaguchi S, Iwasawa K, Uchino K, Umemura S, Ishii M. Angiotensin I converting enzyme (ACE) gene polymorphism and essential hypertension in Japan. Ethnic difference of ACE genotype. Am J Hypertens. 1995;8(1):95-97. doi:10.1016/0895-7061(94)00184-D

Islam MT, Khan MAAM, Rahman S, Kibria KMK. Genetic association of novel SNPs in HK-1 (rs201626997) and HK-3 (rs143604141) with type 2 diabetes mellitus in Bangladeshi population. Gene. 2024;914:148409. doi:10.1016/j.gene.2024.148409

Itakura T, Peters DM, Fini ME. Glaucomatous MYOC mutations activate the IL-1/NF-κB inflammatory stress response and the glaucoma marker SELE in trabecular meshwork cells. Mol Vis. 2015;21:1071-1084.

Ito Y, Banno R, Shibata M, Adachi K, Hagimoto S, Hagiwara D, Ozawa Y, Goto M, Suga H, Sugimura Y, et al. GABA type B receptor signaling in proopiomelanocortin neurons protects against obesity, insulin resistance, and hypothalamic inflammation in male mice on a high-fat diet. J Neurosci. 2013;33(43):17166-17173. doi:10.1523/JNEUROSCI.0897-13.2013

Ivanova AA, Maksimov VN, Ivanoshchuk DE, Orlov PS, Novoselov VP, Savchenko SV, Voevoda MI. Association of Polymorphism in SCN5A, GJA5, and KCNN3 Gene with Sudden Cardiac Death. Bull Exp Biol Med. 2017;163(1):73-77. doi:10.1007/s10517-017-3741-y

Iwai S, Kikuchi T, Kasahara N, Teratani T, Yokoo T, Sakonju I, Okano S, Kobayashi E. Impact of normothermic preservation with extracellular type solution containing trehalose on rat kidney grafting from a cardiac death donor. PLoS One. 2012;7(3):e33157. doi:10.1371/journal.pone.0033157

Izadpanah P, Khabbzi E, Erfanian S, Jafaripour S, Shojaie M. Case-control study on the association between the GATA2 gene and premature myocardial infarction in the Iranian population. Fall-Kontroll-Studie zur Assoziation zwischen GATA2-Gen und frühzeitigem Myokardinfarkt in der iranischen Bevölkerung. Herz. 2021;46(1):71-75. doi:10.1007/s00059-019-04841-x

James JJ, Sandhya KV, Pavadai P, Sridhar KN, Sudarson S, Basavaraj BV, Srinivasan B. Exploring Placental Protein-Target Protein Interactions: In Silico and In Vitro Approaches for Osteoarthritis Therapy. Curr Protein Pept Sci. doi:10.2174/0113892037366889250322043039

Jamialahmadi T, Emami F, Bagheri RK, Alimi H, Bioletto F, Bo S, Aminzadeh B, Ansari MA, Ehsani F, Rajabi O, et al. The effect of trehalose administration on vascular inflammation in patients with coronary artery disease. Biomed Pharmacother. 2022;147:112632. doi:10.1016/j.biopha.2022.112632

Jamshidi Y, Zourlidou A, Carroll CJ, Sinclair J, Latchman DS. Signal-transduction pathways involved in the hypertrophic effect of hsp56 in neonatal cardiomyocytes. J Mol Cell Cardiol. 2004;36(3):381-392. doi:10.1016/j.yjmcc.2003.12.011

Jandl K, Marsh LM, Mutgan AC, Crnkovic S, Valzano F, Zabini D, Hoffmann J, Foris V, Gschwandtner E, Klepetko W, et al. Impairment of the NKT-STAT1-CXCL9 Axis Contributes to Vessel Fibrosis in Pulmonary Hypertension Caused by Lung Fibrosis. Am J Respir Crit Care Med. 2022;206(8):981-998. doi:10.1164/rccm.202201-0142OC

Janke J, Engeli S, Gorzelniak K, Feldpausch M, Heintze U, Böhnke J, Wellner M, Herse F, Lassalle P, Luft FC, et al. Adipose tissue and circulating endothelial cell specific molecule-1 in human obesity. Horm Metab Res. 2006;38(1):28-33. doi:10.1055/s-2006-924973

Jasiewicz M, Kowal K, Kowal-Bielecka O, Knapp M, Skiepko R, Bodzenta-Lukaszyk A, Sobkowicz B, Musial WJ, Kaminski KA. Serum levels of CD163 and TWEAK in patients with pulmonary arterial hypertension. Cytokine. 2014;66(1):40-45. doi:10.1016/j.cyto.2013.12.013

Jendele L, Krivak R, Skoda P, Novotny M, Hoksza D. PrankWeb: a web server for ligand binding site prediction and visualization. Nucleic Acids Res. 2019;47(W1):W345-W349. doi:10.1093/nar/gkz424

Jeyalan V, Austin D, Loh SX, Wangsaputra VK, Spyridopoulos I. Fractalkine/CX3CR1 in Dilated Cardiomyopathy: A Potential Future Target for Immunomodulatory Therapy?. Cells. 2023;12(19):2377. doi:10.3390/cells12192377

Ji DN, Jin SD, Jiang Y, Xu FY, Fan SW, Zhao YL, Liu XQ, Sun H, Cheng WZ, Zhang XY, et al.CircNSD1 promotes cardiac fibrosis through targeting the miR-429-3p/SULF1/Wnt/β-catenin signaling pathway. Acta Pharmacol Sin. 2024 doi:10.1038/s41401-024-01296-7

Ji Q, Zhang J, Du Y, Zhu E, Wang Z, Que B, Miao H, Shi S, Qin X, Zhao Y, et al. Human epicardial adipose tissue-derived and circulating secreted frizzled-related protein 4 (SFRP4) levels are increased in patients with coronary artery disease. Cardiovasc Diabetol. 2017;16(1):133. doi:10.1186/s12933-017-0612-9

Ji Y, Du S, Tang C, Song J, Gu X. The Value of RBP4 in Assessing Coronary Artery Elasticity in Patients with Coronary Heart Disease and Type 2 Diabetes Mellitus. Rev Cardiovasc Med. 2023;24(2):33. doi:10.31083/j.rcm2402033

Jia L, Shang S, Yang Y, Zhang J, Lin X. The synergy of serum SFRP5 levels and the TyG index in predicting coronary artery disease and prognosing major adverse cardiovascular events. Lipids Health Dis. 2023;22(1):194. doi:10.1186/s12944-023-01965-2

Jia Q, Li C, Xia Y, Zhang Q, Wu H, Du H, Liu L, Wang C, Shi H, Guo X, et al. Association between complement C3 and prevalence of fatty liver disease in an adult population: a cross-sectional study from the Tianjin Chronic Low-Grade Systemic Inflammation and Health (TCLSIHealth) cohort study. PLoS One. 2015;10(4):e0122026. doi:10.1371/journal.pone.0122026

Jiang H, Yang J, Li T, Wang X, Fan Z, Ye Q, Du Y. JAK/STAT3 signaling in cardiac fibrosis: a promising therapeutic target. Front Pharmacol. 2024;15:1336102. doi:10.3389/fphar.2024.1336102

Jiang J, Zhou Q, Sun M, Zuo F, Jiang J. Corin is highly expressed in atherosclerosis models. Biochem Biophys Res Commun. 2018;504(2):440-446. doi:10.1016/j.bbrc.2018.08.173

Jiang Q, Dong X, Hu D, Chen L, Luo Y. Aquaporin 4 inhibition alleviates myocardial ischemia-reperfusion injury by restraining cardiomyocyte pyroptosis. Bioengineered. 2021;12(1):9021-9030. doi:10.1080/21655979.2021.1992332

Jiang X, Cui J, Yang C, Song Y, Yuan J, Liu S, Hu F, Yang W, Qiao S. Elevated lymphatic vessel density measured by Lyve-1 expression in areas of replacement fibrosis in the ventricular septum of patients with hypertrophic obstructive cardiomyopathy (HOCM). Heart Vessels. 2020;35(1):78-85. doi:10.1007/s00380-019-01463-5

Jiang X, Wang W, Kang H. EPHB2 Knockdown Mitigated Myocardial Infarction by Inhibiting MAPK Signaling. Adv Biol (Weinh). 2024. doi:10.1002/adbi.202300517

Jiang Y, Hei B, Hao W, Lin S, Wang Y, Liu X, Meng X, Guan Z. Clinical value of lncRNA SOX2-OT in pulmonary arterial hypertension and its role in pulmonary artery smooth muscle cell proliferation, migration, apoptosis, and inflammatory. Heart Lung. 2022;55:16-23. doi:10.1016/j.hrtlng.2022.04.002

Jiang Y, Sun S, Quan Y, Wang X, You Y, Zhang X, Zhang Y, Liu Y, Wang B, Xu H, et al. Nuclear RPSA senses viral nucleic acids to promote the innate inflammatory response. Nat Commun. 2023;14(1):8455. doi:10.1038/s41467-023-43784-0

Jiao H, Kulyté A, Näslund E, Thorell A, Gerdhem P, Kere J, Arner P, Dahlman I. Whole-Exome Sequencing Suggests LAMB3 as a Susceptibility Gene for Morbid Obesity. Diabetes. 2016;65(10):2980-2989. doi:10.2337/db16-0522

Jiao J, Wang Z, Guo Y, Liu J, Huang X, Ni X, Gao D, Sun L, Zhu X, Zhou Q, et al. Association between IL-1B (-511)/IL-1RN (VNTR) polymorphisms and type 2 diabetes: a systematic review and meta-analysis. PeerJ. 2021;9:e12384. doi:10.7717/peerj.12384

Jiao X, Yu H, Du Z, Li L, Hu C, Du Y, Zhang J, Zhang X, Lv Q, Li F, et al. Vascular smooth muscle cells specific deletion of angiopoietin-like protein 8 prevents angiotensin II-promoted hypertension and cardiovascular hypertrophy. Cardiovasc Res. 2023;119(9):1856-1868. doi:10.1093/cvr/cvad089

Jin Y, Cheng X, Lu J, Li X. Exogenous BMP-7 Facilitates the Recovery of Cardiac Function after Acute Myocardial Infarction through Counteracting TGF-β1 Signaling Pathway. Tohoku J Exp Med. 2018;244(1):1-6. doi:10.1620/tjem.244.1

Jirásková A, Škrha J, Vítek L. Association of Low Serum Bilirubin Concentrations and Promoter Variations in the UGT1A1 and HMOX1 Genes with Type 2 Diabetes Mellitus in the Czech Population. Int J Mol Sci. 2023;24(13):10614. doi:10.3390/ijms241310614

Johnson LA, Prevo R, Clasper S, Jackson DG. Inflammation-induced uptake and degradation of the lymphatic endothelial hyaluronan receptor LYVE-1. J Biol Chem. 2007;282(46):33671-33680. doi:10.1074/jbc.M702889200

Juang JJ, Binda A, Lee SJ, Hwang JJ, Chen WJ, Liu YB, Lin LY, Yu CC, Ho LT, Huang HC, et al. GSTM3 variant is a novel genetic modifier in Brugada syndrome, a disease with risk of sudden cardiac death. EBioMedicine. 2020;57:102843. doi:10.1016/j.ebiom.2020.102843

Jung C, Gené GG, Tomás M, Plata C, Selent J, Pastor M, Fandos C, Senti M, Lucas G, Elosua R, et al. . A gain-of-function SNP in TRPC4 cation channel protects against myocardial infarction. Cardiovasc Res. 2011;91(3):465-471. doi:10.1093/cvr/cvr083

Jurkovicova D, Goncalvesova E, Sedlakova B, Hudecova S, Fabian J, Krizanova O. Is the ApoE polymorphism associated with dilated cardiomyopathy?. Gen Physiol Biophys. 2006;25(1):3-10.

Kabir ME, Singh H, Lu R, Olde B, Leeb-Lundberg LM, Bopassa JC. G Protein-Coupled Estrogen Receptor 1 Mediates Acute Estrogen-Induced Cardioprotection via MEK/ERK/GSK-3β Pathway after Ischemia/Reperfusion. PLoS One. 2015;10(9):e0135988. doi:10.1371/journal.pone.0135988

Kallel C, Cohen W, Saut N, Blankenberg S, Schnabel R, Rupprecht HJ, Bickel C, Munzel T, Tregouet DA, Morange PE. Association of soluble endothelial protein C receptor plasma levels and PROCR rs867186 with cardiovascular risk factors and cardiovascular events in coronary artery disease patients: the Athero Gene study. BMC Med Genet. 2012;13:103. doi:10.1186/1471-2350-13-103

Kang DH, Choi M, Chang S, Lee MY, Lee DJ, Choi K, Park J, Han EC, Hwang D, Kwon K, et al. Vascular Proteomics Reveal Novel Proteins Involved in SMC Phenotypic Change: OLR1 as a SMC Receptor Regulating Proliferation and Inflammatory Response. PLoS One. 2015;10(8):e0133845.doi:10.1371/journal.pone.0133845

Kang YM, Koo BS, Yi HS, Kim JT, Park B, Lee JH, Shong M, Kang YE. Association between DIO2 Thr92Ala polymorphism and hypertension in patients with hypothyroidism: Korean Genome and Epidemiology Study. Korean J Intern Med. 2023;38(2):226-237. doi:10.3904/kjim.2022.292

Karimabad MN, Kounis NG, Hassanshahi G, Hassanshahi F, Mplani V, Koniari I, Hung MY, Nadimi AE. The Involvement of CXC Motif Chemokine Ligand 10 (CXCL10) and Its Related Chemokines in the Pathogenesis of Coronary Artery Disease and in the COVID-19 Vaccination: A Narrative Review. Vaccines (Basel). 2021;9(11):1224. doi:10.3390/vaccines9111224

Kashem MA, Li H, Liu LR, Liang B, Omange RW, Plummer FA, Luo M. The Potential Role of FREM1 and Its Isoform TILRR in HIV-1 Acquisition through Mediating Inflammation. Int J Mol Sci. 2021;22(15):7825. doi:10.3390/ijms22157825

Kashiwagi M, Ozaki Y, Imanishi T, Taruya A, Kuroi A, Katayama Y, Shimamura K, Shiono Y, Tanimoto T, Kubo T, et al. Interleukin-34 levels are increased in acute myocardial infarction and associated with major adverse cardiovascular events. Coron Artery Dis. 2022;31(1):61-63. doi:10.1097/MCA.0000000000001046

Katsouda A, Valakos D, Dionellis VS, Bibli SI, Akoumianakis I, Karaliota S, Zuhra K, Fleming I, Nagahara N, Havaki S, et al. MPST sulfurtransferase

maintains mitochondrial protein import and cellular bioenergetics to attenuate obesity. J Exp Med. 2022;219(7):e20211894. doi:10.1084/jem.20211894

Kaur N, Singh J, Reddy S. Interaction between ALOX15 polymorphisms and coronary artery disease in North Indian population. Clin Exp Hypertens. 2018;40(4):398-405. doi:10.1080/10641963.2017.1384485

Ke RQ, Wang Y, Hong SH, Xiao LX. Anti-diabetic effect of quercetin in type 2 diabetes mellitus by regulating the microRNA-92b-3p/EGR1 axis. J Physiol Pharmacol. 2023;74(2):10.26402/jpp.2023.2.03. doi:10.26402/jpp.2023.2.03

Ke YH, Xiao WJ, He JW, Zhang H, Yu JB, Hu WW, Gu JM, Gao G, Yue H, Wang C, et al. Association of ALOX15 gene polymorphisms with obesity-related phenotypes in Chinese nuclear families with male offspring. Acta Pharmacol Sin. 2012;33(2):201-207. doi:10.1038/aps.2011.167

Kelly M, Bagnall RD, Peverill RE, Donelan L, Corben L, Delatycki MB, Semsarian C. A polymorphic miR-155 binding site in AGTR1 is associated with cardiac hypertrophy in Friedreich ataxia. J Mol Cell Cardiol. 2011;51(5):848-854. doi:10.1016/j.yjmcc.2011.07.001

Keppner A, Malsure S, Nobile A, Auberson M, Bonny O, Hummler E. Altered Prostasin (CAP1/Prss8) Expression Favors Inflammation and Tissue Remodeling in DSS-induced Colitis. Inflamm Bowel Dis. 2016;22(12):2824-2839. doi:10.1097/MIB.0000000000000940

Keppner A, Malsure S, Nobile A, Auberson M, Bonny O, Hummler E. Altered Prostasin (CAP1/Prss8) Expression Favors Inflammation and Tissue Remodeling in DSS-induced Colitis. Inflamm Bowel Dis. 2016;22(12):2824-2839. doi:10.1097/MIB.0000000000000940

Kerr SC, Carrington SD, Oscarson S, Gallagher ME, Solon M, Yuan S, Ahn JN, Dougherty RH, Finkbeiner WE, Peters MC, et al. Intelectin-1 is a prominent protein constituent of pathologic mucus associated with eosinophilic airway inflammation in asthma. Am J Respir Crit Care Med. 2014;189(8):1005-1007. doi:10.1164/rccm.201312-2220LE

Khadjeh S, Hindmarsh V, Weber F, Cyganek L, Vidal RO, Torkieh S, Streckfuss-Bömeke K, Lbik D, Tiburcy M, Mohamed BA, et al. CRISPLD1: a novel conserved target in the transition to human heart failure. Basic Res Cardiol. 2020;115(3):27.. doi:10.1007/s00395-020-0784-4

Khaidakov M, Mitra S, Kang BY, Wang X, Kadlubar S, Novelli G, Raj V, Winters M, Carter WC, Mehta JL. Oxidized LDL receptor 1 (OLR1) as a possible link between obesity, dyslipidemia and cancer. PLoS One. 2011;6(5):e20277. doi:10.1371/journal.pone.0020277

Khan SS, Shah SJ, Strande JL, Baldridge AS, Flevaris P, Puckelwartz MJ, McNally EM, Rasmussen-Torvik LJ, Lee DC, Carr JC, et al. Identification of Cardiac Fibrosis in Young Adults With a Homozygous Frameshift Variant in SERPINE1. JAMA Cardiol. 2021;6(7):841-846. doi:10.1001/jamacardio.2020.6909

Khattab A, Torkamani A. Nidogen-1 could play a role in diabetic kidney disease development in type 2 diabetes: a genome-wide association meta-analysis. Hum Genomics. 2022;16(1):47. doi:10.1186/s40246-022-00422-y

Kida E, Pluta R, Lossinsky AS, Golabek AA, Choi-Miura NH, Wisniewski HM, Mossakowski MJ. Complete cerebral ischemia with short-term survival in rat induced by cardiac arrest. II. Extracellular and intracellular accumulation of apolipoproteins E and J in the brain. Brain Res. 1995;674(2):341-346. doi:10.1016/0006-8993(94)01467-v

Kida H, Jiang JJ, Matsui Y, Takahashi I, Hasebe R, Kawamura D, Endo T, Shibayama H, Kondo M, Nishio Y, et al. Dupuytren's contracture-associated SNPs increase SFRP4 expression in non-immune cells including fibroblasts to enhance inflammation development. Int Immunol. 2023;35(7):303-312. doi:10.1093/intimm/dxad004

Kilicarslan M, de Weijer BA, Simonyté Sjödin K, Aryal P, Ter Horst KW, Cakir H, Romijn JA, Ackermans MT, Janssen IM, Berends FJ, et al. RBP4 increases lipolysis in human adipocytes and is associated with increased lipolysis and hepatic insulin resistance in obese women. FASEB J. 2020;34(5):6099-6110. doi:10.1096/fj.201901979RR

Kim BG, Yoo TH, Yoo JE, Seo YJ, Jung J, Choi JY. Resistance to hypertension and high Cl- excretion in humans with SLC26A4 mutations. Clin Genet. 2017;91(3):448-452. doi:10.1111/cge.12789

Kim D, Park SY. C1q and TNF related protein 1 regulates expression of inflammatory genes in vascular smooth muscle cells. Genes Genomics. 2019;41(4):397-406. doi:10.1007/s13258-018-0770-5

Kim J, Joo S, Eom GH, Lee SH, Lee MA, Lee M, Kim KW, Kim DH, Kook H, Kwak TH, et al. CCN5 knockout mice exhibit lipotoxic cardiomyopathy with mild obesity and diabetes. PLoS One. 2018;13(11):e0207228. doi:10.1371/journal.pone.0207228

Kim J, Kim J, Lee SH, Kepreotis SV, Yoo J, Chun JS, Hajjar RJ, Jeong D, Park WJ. Cytokine-Like 1 Regulates Cardiac Fibrosis via Modulation of TGF-β Signaling. PLoS One. 2016;11(11):e0166480. doi:10.1371/journal.pone.0166480

Kim SM, Song GY, Shim A, Lee JH, Eom CB, Liu C, Yang YM, Seki E. Hyaluronan synthase 2, a target of miR-200c, promotes carbon tetrachloride-induced acute and chronic liver inflammation via regulation of CCL3 and CCL4. Exp Mol Med. 2022;54(6):739-752. doi:10.1038/s12276-022-00781-5

Kim YH, Hwang JH, Kim KS, Noh JR, Gang GT, Kim SW, Jang SP, Lee SJ, Her SH, Jeong KH, et al. NQO1 activation regulates angiotensin-converting enzyme shedding in spontaneously hypertensive rats. Cardiovasc Res. 2013;99(4):743-750. doi:10.1093/cvr/cvt147

Knapp M, Gil-Mika M, Sawicki R, Lisowska A, Kaminski M, Sobkowicz B, Ptaszynska K. Pentraxin 3 as a marker of development and severity of stable coronary artery disease. Adv Med Sci. 2024. doi:10.1016/j.advms.2024.07.010

Ko CW, Counihan D, Wu J, Hatzoglou M, Puchowicz MA, Croniger CM. Macrophages with a deletion of the phosphoenolpyruvate carboxykinase 1 (Pck1) gene have a more proinflammatory phenotype. J Biol Chem. 2018;293(9):3399-3409. doi:10.1074/jbc.M117.819136

Koch W, Schrempf M, Erl A, Mueller JC, Hoppmann P, Schömig A, Kastrati A. 4G/5G polymorphism and haplotypes of SERPINE1 in atherosclerotic diseases of

coronary arteries. Thromb Haemost. 2010;103(6):1170-1180. doi:10.1160/TH09-10-0702

Kochumon S, Madhoun AA, Al-Rashed F, Azim R, Al-Ozairi E, Al-Mulla F, Ahmad R. Adipose tissue gene expression of CXCL10 and CXCL11 modulates inflammatory markers in obesity: implications for metabolic inflammation and insulin resistance. Ther Adv Endocrinol Metab. 2020;11:2042018820930902. doi:10.1177/2042018820930902

Koller S, Kendler J, Karacs J, Wolf A, Kreuzinger C, Von Der Decken I, Mungenast F, Mechtcheriakova D, Schreiner W, Gleiss A, et al. SLCO4A1 expression is associated with activated inflammatory pathways in high-grade serous ovarian cancer. Front Pharmacol. 2022;13:946348. doi:10.3389/fphar.2022.946348

Kolokotronis T, Majchrzak-Stiller B, Buchholz M, Mense V, Strotmann J, Peters I, Skrzypczyk L, Liffers ST, Menkene LM, Wagner M, et al. Differential miRNA and Protein Expression Reveals miR-1285, Its Targets TGM2 and CDH-1, as Well as CD166 and S100A13 as Potential New Biomarkers in Patients with Diabetes Mellitus and Pancreatic Adenocarcinoma. Cancers (Basel). 2024;16(15):2726. doi:10.3390/cancers16152726

Kondo H, Ninomiya T, Hata J, Hirakawa Y, Yonemoto K, Arima H, Nagata M, Tsuruya K, Kitazono T, Kiyohara Y. Angiotensin I-converting enzyme gene polymorphism enhances the effect of hypercholesterolemia on the risk of coronary heart disease in a general Japanese population: the hisayama study. J Atheroscler Thromb. 2015;22(4):390-403. doi:10.5551/jat.24166

Kong XY, Lauritzen KH, Dahl TB, Holm S, Olsen MB, Skjelland M, Nielsen C, Michelsen AE, Ueland T, Aukrust P, et al. CD38 deficient mice are not protected from atherosclerosis. Biochem Biophys Res Commun. 2024;705:149734. doi:10.1016/j.bbrc.2024.149734

Konno T, Chen D, Wang L, Wakimoto H, Teekakirikul P, Nayor M, Kawana M, Eminaga S, Gorham JM, Pandya K, et al. Heterogeneous myocyte enhancer factor-2 (Mef2) activation in myocytes predicts focal scarring in hypertrophic

cardiomyopathy. Proc Natl Acad Sci U S A. 2010;107(42):18097-18102. doi:10.1073/pnas.1012826107

Koot BG, Alders M, Verheij J, Beuers U, Cobben JM. A de novo mutation in KCNN3 associated with autosomal dominant idiopathic non-cirrhotic portal hypertension. J Hepatol. 2016;64(4):974-977. doi:10.1016/j.jhep.2015.11.027

Koskivirta I, Rahkonen O, Mäyränpää M, Pakkanen S, Husheem M, Sainio A, Hakovirta H, Laine J, Jokinen E, Vuorio E, et al. Tissue inhibitor of metalloproteinases 4 (TIMP4) is involved in inflammatory processes of human cardiovascular pathology. Histochem Cell Biol. 2006;126(3):335-342. doi:10.1007/s00418-006-0163-8

Kosum P, Siranart N, Mattanapojanat N, Phutinart S, Kongruttanachok N, Sinphurmsukskul S, Siwamogsatham S, Puwanant S, Ariyachaipanich A. GDF-15: a novel biomarker of heart failure predicts short-term and long-term heart-failure rehospitalization and short-term mortality in patients with acute heart failure syndrome. BMC Cardiovasc Disord. 2024;24(1):151. doi:10.1186/s12872-024-03802-5

Koutaki D, Michos A, Bacopoulou F, Charmandari E. The Emerging Role of Sfrp5 and Wnt5a in the Pathogenesis of Obesity: Implications for a Healthy Diet and Lifestyle. Nutrients. 2021;13(7):2459. doi:10.3390/nu13072459

Krishnamoorthy N, Walker KH, Brüggemann TR, Tavares LP, Smith EW, Nijmeh J, Bai Y, Ai X, Cagnina RE, Duvall MG, et al. The Maresin 1-LGR6 axis decreases respiratory syncytial virus-induced lung inflammation. Proc Natl Acad Sci U S A. 2023;120(2):e2206480120. doi:10.1073/pnas.2206480120

Küçükarabaci B, Birdane A, Güneş HV, Ata N, Değirmenci I, Başaran A, Timuralp B. Association between angiotensin converting enzyme (ACE) gene I/D polymorphism frequency and plasma ACE concentration in patients with idiopathic dilated cardiomyopathy. Anadolu Kardiyol Derg. 2008;8(1):65-66.

Kuliczkowski W, Radomski M, Gąsior M, Urbaniak J, Kaczmarski J, Mysiak A, Negrusz-Kawecka M, Bil-Lula I. MMP-2, MMP-9, and TIMP-4 and Response to Aspirin in Diabetic and Nondiabetic Patients with Stable Coronary Artery Disease: A Pilot Study. Biomed Res Int. 2017;2017:9352015. doi:10.1155/2017/9352015

Kumari S, Arora M, Singh J, Chauhan SS, Kumar S, Chopra A. L-Selectin expression is associated with inflammatory microenvironment and favourable prognosis in breast cancer. 3 Biotech. 2021;11(2):38. doi:10.1007/s13205-020-02549-y

Kurbatova IV, Topchieva LV, Korneva VA, Kolomeichuk SN, Nemova NN. Expression of circadian rhythm genes CLOCK, BMAL1, and PER1 in buccal epithelial cells of patients with essential arterial hypertension in dependence on polymorphic variants of CLOCK and BMAL1 genes. Bull Exp Biol Med. 2014;157(3):360-363. doi:10.1007/s10517-014-2566-1

Kwon Y, Kim M, Kim Y, Jeong MS, Jung HS, Jeoung D. EGR3-HDAC6-IL-27 Axis Mediates Allergic Inflammation and Is Necessary for Tumorigenic Potential of Cancer Cells Enhanced by Allergic Inflammation-Promoted Cellular Interactions. Front Immunol. 2021;12:680441. doi:10.3389/fimmu.2021.680441

Lai CH, Pandey S, Day CH, Ho TJ, Chen RJ, Chang RL, Pai PY, Padma VV, Kuo WW, Huang CY. β-catenin/LEF1/IGF-IIR Signaling Axis Galvanizes the Angiotensin-II- induced Cardiac Hypertrophy. Int J Mol Sci. 2019;20(17):4288. doi:10.3390/ijms20174288

Lai Q, Yuan G, Shen L, Zhang L, Fu F, Liu Z, Zhang Y, Kou J, Liu S, Yu B, et al. Oxoeicosanoid receptor inhibition alleviates acute myocardial infarction through activation of BCAT1. Basic Res Cardiol. 2021;116(1):3. doi:10.1007/s00395-021-00844-0

Lalive PH, Menge T, Delarasse C, Della Gaspera B, Pham-Dinh D, Villoslada P, von Büdingen HC, Genain CP. Antibodies to native myelin oligodendrocyte glycoprotein are serologic markers of early inflammation in multiple sclerosis. Proc Natl Acad Sci U S A. 2006;103(7):2280-2285. doi:10.1073/pnas.0510672103

Lam L, Ingles J, Turner C, Kilborn M, Bagnall RD, Semsarian C. Exome sequencing identifies a novel mutation in the MYH6 gene in a family with early-onset sinus node dysfunction, ventricular arrhythmias, and cardiac arrest. HeartRhythm Case Rep. 2015;1(3):141-145. doi:10.1016/j.hrcr.2015.01.022

Lambert M, Boet A, Rucker-Martin C, Mendes-Ferreira P, Capuano V, Hatem S, Adão R, Brás-Silva C, Hautefort A, Michel JB, et al. Loss of KCNK3 is a hallmark

of RV hypertrophy/dysfunction associated with pulmonary hypertension. Cardiovasc Res. 2018;114(6):880-893. doi:10.1093/cvr/cvy016

Lamichhane S, Mo JS, Sharma G, Choi TY, Chae SC. MicroRNA 452 regulates IL20RA-mediated JAK1/STAT3 pathway in inflammatory colitis and colorectal cancer. Inflamm Res. 2021;70(8):903-914. doi:10.1007/s00011-021-01486-7

Lan T, Palm KCA, Hoeben L, Diez Benavente E, Perry RN, Civelek M, de Kleijn DPV, den Ruijter HM, Pasterkamp G, Mokry M. Tobacco smoking is associated with sex- and plaque-type specific upregulation of CRLF1 in atherosclerotic lesions. Atherosclerosis. 2024. doi:10.1016/j.atherosclerosis.2024.118554

Lantermann A, Hampe J, Kim WH, Winter TA, Kidd M, Nagy M, Fölsch UR, Schreiber S. Investigation of HLA-DPA1 genotypes as predictors of inflammatory bowel disease in the German, South African, and South Korean populations. Int J Colorectal Dis. 2002;17(4):238-244. doi:10.1007/s00384-001-0382-3

Lappas M. Runt-related transcription factor 1 (RUNX1) deficiency attenuates inflammation-induced pro-inflammatory and pro-labour mediators in myometrium. Mol Cell Endocrinol. 2018;473:61-71. doi:10.1016/j.mce.2018.01.003

Law CC, Puranik R, Fan J, Fei J, Hambly BD, Bao S. Clinical Implications of IL-32, IL-34 and IL-37 in Atherosclerosis: Speculative Role in Cardiovascular Manifestations of COVID-19. Front Cardiovasc Med. 2021;8:630767. doi:10.3389/fcvm.2021.630767

Le Guilloux V, Schmidtke P, Tuffery P. Fpocket: an open-source platform for ligand pocket detection. BMC Bioinformatics. 2009;10:168. doi:10.1186/1471-2105-10-168

Le NP, Channabasappa S, Hossain M, Liu L, Singh B. Leukocyte-specific protein 1 regulates neutrophil recruitment in acute lung inflammation. Am J Physiol Lung Cell Mol Physiol. 2015;309(9):L995-L1008. doi:10.1152/ajplung.00068.2014

Lee CW, Hwang I, Park CS, Lee H, Park DW, Kang SJ, Lee SH, Kim YH, Park SW, Park SJ. Comparison of ADAMTS-1, -4 and -5 expression in culprit plaques between acute myocardial infarction and stable angina. J Clin Pathol. 2011;64(5):399-404. doi:10.1136/jcp.2010.088484

Lee CW, Hwang I, Park CS, Lee H, Park DW, Kang SJ, Lee SW, Kim YH, Park SW, Park SJ. Expression of ADAMTS-2, -3, -13, and -14 in culprit coronary lesions in patients with acute myocardial infarction or stable angina. J Thromb Thrombolysis. 2012;33(4):362-370. doi:10.1007/s11239-011-0673-7

Lee EJ, Ahmad SS, Lim JH, Ahmad K, Shaikh S, Lee YS, Park SJ, Jin JO, Lee YH, Choi I. Interaction of Fibromodulin and Myostatin to Regulate Skeletal Muscle Aging: An Opposite Regulation in Muscle Aging, Diabetes, and Intracellular Lipid Accumulation. Cells. 2021;10(8):2083. doi:10.3390/cells10082083

Lee K, Jang SH, Tian H, Kim SJ. NonO Is a Novel Co-factor of PRDM1 and Regulates Inflammatory Response in Monocyte Derived-Dendritic Cells. Front Immunol. 2020;11:1436. doi:10.3389/fimmu.2020.01436

Lee SH, Tonello R, Choi Y, Jung SJ, Berta T. Sensory Neuron-Expressed TRPC4 Is a Target for the Relief of Psoriasiform Itch and Skin Inflammation in Mice. J Invest Dermatol. 2020;140(11):2221-2229.e6. doi:10.1016/j.jid.2020.03.959

Lee SN, Yoon SA, Song JM, Kim HC, Cho HJ, Choi AMK, Yoon JH. Cell-Type-Specific Expression of Hyaluronan Synthases HAS2 and HAS3 Promotes Goblet Cell Hyperplasia in Allergic Airway Inflammation. Am J Respir Cell Mol Biol. 2022;67(3):360-374. doi:10.1165/rcmb.2021-0527OC

Lehman CW, Smith A, Kelly J, Jacobs JL, Dinman JD, Kehn-Hall K. EGR1 Upregulation during Encephalitic Viral Infections Contributes to Inflammation and Cell Death. Viruses. 2022;14(6):1210. doi:10.3390/v14061210

Lemaitre RN, Bartz TM, King IB, Brody JA, McKnight B, Sotoodehnia N, Rea TD, Johnson CO, Mozaffarian D, Hesselson S, et al. Circulating n-3 fatty acids and trans-fatty acids, PLA2G2A gene variation and sudden cardiac arrest. J Nutr Sci. 2016;5:e12. doi:10.1017/jns.2016.2

Leow KY, Goh WW, Tan SZ, Lim J, Ng K, Oh VM, Low AF, Heng CK. Variant screening of the serum amyloid A1 gene and functional study of the p.Gly90Asp variant for its role in atherosclerosis. Atherosclerosis. 2013;227(1):112-117. doi:10.1016/j.atherosclerosis.2013.01.003

Li B, Lei Z, Wu Y, Li B, Zhai M, Zhong Y, Ju P, Kou W, Shi Y, Zhang X, et al. The Association and Pathogenesis of SERPINA3 in Coronary Artery Disease. Front Cardiovasc Med. 2021;8:756889. doi:10.3389/fcvm.2021.756889

Li B, Yao Q, Guo S, Ma S, Dong Y, Xin H, Wang H, Liu L, Chang W, Zhang Y. Type 2 diabetes with hypertensive patients results in changes to features of adipocytokines: Leptin, Irisin, LGR4, and Sfrp5. Clin Exp Hypertens. 2019;41(7):645-650. doi:10.1080/10641963.2018.1529779

Li BF, Huang S, Wu K, Liu Y. Altered Cathepsin B Expression as a Diagnostic Marker of Skeletal Muscle Insulin Resistance in Type 2 Diabetes. ACS Biomater Sci Eng. 2023;9(5):2731-2740. doi:10.1021/acsbiomaterials.3c00078

Li C, Grove ML, Yu B, Jones BC, Morrison A, Boerwinkle E, Liu X. Genetic variants in microRNA genes and targets associated with cardiovascular disease risk factors in the African-American population. Hum Genet. 2018;137(1):85-94. doi:10.1007/s00439-017-1858-8

Li C, Zhou Y, Niu Y, He W, Wang X, Zhang X, Wu Y, Zhang W, Zhao L, Zheng H, et al. Deficiency of Pdk1 drives heart failure by impairing taurine homeostasis through Slc6a6. FASEB J. 2023;37(9):e23134. doi:10.1096/fj.202300272R

Li E, Li X, Huang J, Xu C, Liang Q, Ren K, Bai A, Lu C, Qian R, Sun N. BMAL1 regulates mitochondrial fission and mitophagy through mitochondrial protein BNIP3 and is critical in the development of dilated cardiomyopathy. Protein Cell. 2020;11(9):661-679. doi:10.1007/s13238-020-00713-x

Li F, Hao S, Gao J, Jiang P. EGCG alleviates obesity-exacerbated lung cancer progression by STAT1/SLC7A11 pathway and gut microbiota. J Nutr Biochem. 2023;120:109416. doi:10.1016/j.jnutbio.2023.109416

Li F, Sun X, Zheng B, Sun K, Zhu J, Ji C, Lin F, Huan L, Luo X, Yan C, et al. Arginase II Promotes Intervertebral Disc Degeneration Through Exacerbating Senescence and Apoptosis Caused by Oxidative Stress and Inflammation via the NF-κB Pathway. Front Cell Dev Biol. 2021;9:737809. doi:10.3389/fcell.2021.737809

Li F, Tian F, Wang L, Williamson IK, Sharifi BG, Shah PK. Pleiotrophin (PTN) is expressed in vascularized human atherosclerotic plaques: IFN-{gamma}/JAK/STAT1 signaling is critical for the expression of PTN in macrophages. FASEB J. 2010;24(3):810-822. doi:10.1096/fj.09-140780

Li G, Li M, Wang J, Li Y, Pan Y. United Neighborhood Closeness Centrality and Orthology for Predicting Essential Proteins. IEEE/ACM Trans Comput Biol Bioinform. 2020;17(4):1451-1458. doi:10.1109/TCBB.2018.2889978

Li H, Ding J, Liu W, Wang X, Feng Y, Guan H, Chen Z. Plasma exosomes from patients with acute myocardial infarction alleviate myocardial injury by inhibiting ferroptosis through miR-26b-5p/SLC7A11 axis. Life Sci. 2023;322:121649. doi:10.1016/j.lfs.2023.121649

Li H, Zhao Q, Liu D, Zhou B, Liao F, Chen L. Cathepsin B aggravates atherosclerosis in ApoE-deficient mice by modulating vascular smooth muscle cell pyroptosis through NF-κB / NLRP3 signaling pathway. PLoS One. 2024;19(1):e0294514. doi:10.1371/journal.pone.0294514

Li J, Gong L, Zhang R, Li S, Yu H, Liu Y, Xue Y, Huang D, Xu N, Wang Y, et al. Fibroblast growth factor 21 inhibited inflammation and fibrosis after myocardial infarction via EGR1. Eur J Pharmacol. 2021;910:174470. doi:10.1016/j.ejphar.2021.174470

Li J, Wang M, Yao L, Lu B, Gui M, Zhou X, Fu D. Yixin Granules Reduce Myocardial Inflammation and Fibrosis in Rats with Heart Failure by Inhibiting the Expression of ADAMTS8. Int Heart J. 2023;64(4):741-749. doi:10.1536/ihj.22-715

Li J, Yang W, Xie Z, Yu K, Chen Y, Cui K. Impact of VKORC1, CYP4F2 and NQO1 gene variants on warfarin dose requirement in Han Chinese patients with catheter ablation for atrial fibrillation. BMC Cardiovasc Disord. 2018;18(1):96. doi:10.1186/s12872-018-0837-x

Li L, Fu G, Liu C, Liu Y. ATF3/EGR1 regulates myocardial ischemia/reperfusion injury induced autophagy and inflammation in cardiomyocytes. Cell Mol Biol (Noisy-le-grand). 2024;70(3):125-129. doi:10.14715/cmb/2024.70.3.18

Li L, Shen C, Yao Z, Liang J, Huang C. Genetic variants of potassium voltage-gated channel genes (KCNQ1, KCNH2, and KCNE1) affected the risk of atrial fibrillation in elderly patients. Genet Test Mol Biomarkers. 2015;19(7):359-365. doi:10.1089/gtmb.2014.0307

Li M, Duan L, Cai YL, Li HY, Hao BC, Chen JQ, Liu HB. Growth differentiation factor-15 is associated with cardiovascular outcomes in patients with coronary artery disease. Cardiovasc Diabetol. 2020;19(1):120. doi:10.1186/s12933-020-01092-7

Li M, Guo K, Huang X, Feng L, Yuan Y, Li J, Lao Y, Guo Z. Association Between Serum Galectin-3 Levels and Coronary Stenosis Severity in Patients With Coronary Artery Disease. Front Cardiovasc Med. 2022;9:818162. doi:10.3389/fcvm.2022.818162

Li M, Ying M, Gu S, Zhou Z, Zhao R. Matrine alleviates hypoxia-induced inflammation and pulmonary vascular remodelling via RPS5/NF-κB signalling pathway. J Biochem Mol Toxicol. 2024;38(1):e23583. doi:10.1002/jbt.23583

Li N, Chang G, Xu Y, Ding Y, Li G, Yu T, Yao R, Li J, Shen Y, Wang X, et al. Biallelic mutations in GPD1 gene in a Chinese boy mainly presented with obesity, insulin resistance, fatty liver, and short stature. Am J Med Genet A. 2017;173(12):3189-3194. doi:10.1002/ajmg.a.38473

Li Q, Ye WX, Huang ZJ, Zhang Q, He YF. Effect of IL-6-mediated STAT3 signaling pathway on myocardial apoptosis in mice with dilated cardiomyopathy. Eur Rev Med Pharmacol Sci. 2019;23(7):3042-3050. doi:10.26355/eurrev_201904_17586

Li S, Kong F, Xu X, Song S, Wu Y, Tong J. Identification and exploration of aging-related subtypes and distinctive role of SERPINE1 in heart failure based on single-cell and bulk RNA sequencing data. J Gene Med. 2024;26(1):e3631. doi:10.1002/jgm.3631

Li S, Ma Y, Yan Y, Yan M, Wang X, Gong W, Nie S. Phosphodiesterase-5a Knock-out Suppresses Inflammation by Down-Regulating Adhesion Molecules in Cardiac Rupture Following Myocardial Infarction. J Cardiovasc Transl Res. 2021;14(5):816-823. doi:10.1007/s12265-021-10102-2

Li S, Xie X, Zeng X, Wang S, Lan J. Serum apolipoprotein B to apolipoprotein A-I ratio predicts mortality in patients with heart failure. ESC Heart Fail. 2024;11(1):99-111. doi:10.1002/ehf2.14547

Li SY, Chu PH, Huang PH, Hsieh TH, Susztak K, Tarng DC. FHL2 mediates podocyte Rac1 activation and foot process effacement in hypertensive nephropathy. Sci Rep. 2019;9(1):6693. doi:10.1038/s41598-019-42328-1

Li T, Wang Y, Zhu C, Yang Y, Long C, Chen Q. Identification of Ribonuclease 6 as an immunoinflammatory key gene associated with the glomerular injury in diabetic nephropathy. Sci Rep. 2022;12(1):19709. doi:10.1038/s41598-022-24289-0

Li TC, Li CI, Liao LN, Liu CS, Yang CW, Lin CH, Hsiao JH, Hsiao CY, Lin WY, Wu FY, et al. Associations of EDNRA and EDN1 polymorphisms with carotid intima media thickness through interactions with gender, regular exercise, and obesity in subjects in Taiwan: Taichung Community Health Study (TCHS). Biomedicine (Taipei). 2015;5(2):8. doi:10.7603/s40681-015-0008-7

Li W, Li Y, Chu Y, Wu W, Yu Q, Zhu X, Wang Q. PLCE1 promotes myocardial ischemia-reperfusion injury in H/R H9c2 cells and I/R rats by promoting inflammation. Biosci Rep. 2019;39(7):BSR20181613. doi:10.1042/BSR20181613

Li X, Ma YT, Xie X, Yang YN, Ma X, Zheng YY, Pan S, Liu F, Chen BD. Association of Egr3 genetic polymorphisms and coronary artery disease in the Uygur and Han of China. Lipids Health Dis. 2014;13:84. doi:10.1186/1476-511X-13-84

Li X, Zhang Y, Su L, Cai L, Zhang C, Zhang J, Sun J, Chai M, Cai M, Wu Q, et al. FGF21 alleviates pulmonary hypertension by inhibiting mTORC1/EIF4EBP1 pathway via H19. J Cell Mol Med. 2022;26(10):3005-3021. doi:10.1111/jcmm.17318

Li X, Zhu J, Zhong Y, Liu C, Yao M, Sun Y, Yao W, Ni X, Zhou F, Yao J, et al. Targeting long noncoding RNA-AQP4-AS1 for the treatment of retinal neurovascular dysfunction in diabetes mellitus. EBioMedicine. 2022;77:103857. doi:10.1016/j.ebiom.2022.103857

Li X, Zhu S, Song G, Zhang K, Gao W, Huang J, Lu X. Retinol-binding protein 4 is closely correlated to blood pressure level and E/A in untreated essential hypertension patients. Ann Palliat Med. 2019;8(5):645-650. doi:10.21037/apm.2019.11.07

Li XX, Mu B, Li X, Bie ZD. circCELF1 Inhibits Myocardial Fibrosis by Regulating the Expression of DKK2 Through FTO/m6A and miR-636. J Cardiovasc Transl Res. 2022;15(5):998-1009. doi:10.1007/s12265-022-10209-0

Li Y, Chen L, Shao Y, Zhang M, Zhi L, Lu Y. The effect of apolipoprotein E gene polymorphism and Lp(a) levels on coronary artery disease with atrial fibrillation. J Int Med Res. 2022;50(7):3000605221109387. doi:10.1177/03000605221109387

Li Y, Deng X, Wu X, Zhou L, Yuan G. Association of Serum Tsukushi Levels with Urinary Albumin-Creatinine Ratio in Type 2 Diabetes Patients. Diabetes Metab Syndr Obes. 2024;17:3295-3303. doi:10.2147/DMSO.S468228

Li Y, Jin L, Yan J, Huang Y, Zhang H, Zhang R, Hu C. Tsukushi and TSKU genotype in obesity and related metabolic disorders. J Endocrinol Invest. 2021;44(12):2645-2654. doi:10.1007/s40618-021-01572-x

Li Y, Li W, Tan Y, Liu F, Cao Y, Lee KY. Hierarchical Decomposition for Betweenness Centrality Measure of Complex Networks. Sci Rep. 2017;7:46491.. doi:10.1038/srep46491

Li Y, Song D, Mao L, Abraham DM, Bursac N. Lack of Thy1 defines a pathogenic fraction of cardiac fibroblasts in heart failure. Biomaterials. 2020;236:119824. doi:10.1016/j.biomaterials.2020.119824

Li Z, Chen H, Zhong F, Zhang W, Lee K, He JC. Expression of Glutamate Receptor Subtype 3 Is Epigenetically Regulated in Podocytes under Diabetic Conditions. Kidney Dis (Basel). 2019;5(1):34-42. doi:10.1159/000492933

Li Z, Liu G, Huang H. Silencing of long non-coding RNA SOX2-overlapping transcript relieves myocardial ischemia/reperfusion injury through up-regulating miRNA-146a-5p. Gen Physiol Biophys. 2023;42(2):191-199. doi:10.4149/gpb_2022065

Li Z, Sun C, Chen M, Wang B. Lumican silencing alleviates tumor necrosis factor-α-induced nucleus pulposus cell inflammation and senescence by inhibiting apoptosis signal regulating kinase 1/p38 signaling pathway via inactivating Fas ligand expression. Bioengineered. 2021;12(1):6891-6901. doi:10.1080/21655979.2021.1973781

Li ZK, Gao LF, Zhu XA, Xiang DK. LncRNA HOXA-AS3 Promotes the Progression of Pulmonary Arterial Hypertension through Mediation of miR-675-3p/PDE5A Axis. Biochem Genet. 2021;59(5):1158-1172. doi:10.1007/s10528-021-10053-y

Li ZZ, Wang F, Liu S, Li H, Wang Y. Ablation of PKM2 ameliorated ER stress-induced apoptosis and associated inflammation response in IL-1β-treated chondrocytes via blocking Rspo2-mediated Wnt/β-catenin signaling. J Cell Biochem. 2020;121(10):4204-4213. doi:10.1002/jcb.29611

Liang LW, Lumish HS, Sewanan LR, Shimada YJ, Maurer MS, Weiner SD, Sayer G, Uriel N, Clerkin KJ. Advanced Heart Failure Therapies for Hypertrophic Cardiomyopathy: State-of-the-Art Review and an Updated Analysis From UNOS. JACC Heart Fail. 2023;11(11):1473-1480. doi:10.1016/j.jchf.2023.07.004

Liang Y, Wang B, Huang H, Wang M, Wu Q, Zhao Y, He Y. Silenced SOX2-OT alleviates ventricular arrhythmia associated with heart failure by inhibiting NLRP3 expression via regulating miR-2355-3p. Immun Inflamm Dis. 2021;9(1):255-264. doi:10.1002/iid3.388

Liang Y, Zhou Y, Wang J, He Y. Downregulation of fibromodulin attenuates inflammatory signaling and atrial fibrosis in spontaneously hypertensive rats with atrial fibrillation via inhibiting TLR4/NLRP3 signaling pathway. Immun Inflamm Dis. 2023;11(10):e1003. doi:10.1002/iid3.1003

Liao J, Xie SS, Deng Y, Wu DD, Meng H, Lan WF, Dai P. PRDX6-mediated pulmonary artery endothelial cell ferroptosis contributes to monocrotaline-induced pulmonary hypertension. Microvasc Res. 2023;146:104471. doi:10.1016/j.mvr.2022.104471

Lidani KCF, Andrade FA, Beltrame MH, Chakravarti I, Tizzot MR, Cavalcanti EO, Sandri TL, Luz PR, Messias-Reason IJ. Ficolin-3 in chronic Chagas disease:

Low serum levels associated with the risk of cardiac insufficiency. Parasite Immunol. 2021;43(6):e12829. doi:10.1111/pim.12829

Lim S, McMahon CD, Matthews KG, Devlin GP, Elston MS, Conaglen JV. Absence of Myostatin Improves Cardiac Function Following Myocardial Infarction. Heart Lung Circ. 2018;27(6):693-701. doi:10.1016/j.hlc.2017.05.138

Lin CF, Su CJ, Liu JH, Chen ST, Huang HL, Pan SL. Potential Effects of CXCL9 and CCL20 on Cardiac Fibrosis in Patients with Myocardial Infarction and Isoproterenol-Treated Rats. J Clin Med. 2019;8(5):659. doi:10.3390/jcm8050659

Lin JF, Wu S, Juang JJ, Chiang FT, Hsu LA, Teng MS, Cheng ST, Huang HL, Sun YC, Liu PY, et al. IL1RL1 single nucleotide polymorphism predicts sST2 level and mortality in coronary and peripheral artery disease. Atherosclerosis. 2017;257:71-77. doi:10.1016/j.atherosclerosis.2016.12.020

Lin W, Xu D, Austin CD, Caplazi P, Senger K, Sun Y, Jeet S, Young J, Delarosa D, Suto E, et al. Function of CSF1 and IL34 in Macrophage Homeostasis, Inflammation, and Cancer. Front Immunol. 2019;10:2019. doi:10.3389/fimmu.2019.02019

Lin X, Zhao X, Chen Q, Wang X, Wu Y, Zhao H. Quercetin ameliorates ferroptosis of rat cardiomyocytes via activation of the SIRT1/p53/SLC7A11 signaling pathway to alleviate sepsis□induced cardiomyopathy. Int J Mol Med. 2023;52(6):116. doi:10.3892/ijmm.2023.5319

Lin YC, Chang YJ, Gau SS, Lo CM, Yang RB. SCUBE2 regulates adherens junction dynamics and vascular barrier function during inflammation. Cardiovasc Res. 2024. doi:10.1093/cvr/cvae132

Lina S, Lihong Q, Di Y, Bo Y, Xiaolin L, Jing M. microRNA-146a and Hey2 form a mutual negative feedback loop to regulate the inflammatory response in chronic apical periodontitis. J Cell Biochem. 2019;120(1):645-657. doi:10.1002/jcb.27422

Lind JM, Chiu C, Ingles J, Yeates L, Humphries SE, Heather AK, Semsarian C.Sex hormone receptor gene variation associated with phenotype in male hypertrophic cardiomyopathy patients. J Mol Cell Cardiol. 2008;45(2):217-222. doi:10.1016/j.yjmcc.2008.05.016

Linnerbauer M, Lößlein L, Farrenkopf D, Vandrey O, Tsaktanis T, Naumann U, Rothhammer V. Astrocyte-Derived Pleiotrophin Mitigates Late-Stage Autoimmune CNS Inflammation. Front Immunol. 2022;12:800128. doi:10.3389/fimmu.2021.800128

Liu A, Zhang Y, Xun S, Zhou G, Lin L, Mei Y. Fibroblast growth factor 12 attenuated cardiac remodeling via suppressing oxidative stress. Peptides. 2022;153:170786. doi:10.1016/j.peptides.2022.170786

Liu B, Cheng L, Gao H, Zhang J, Dong Y, Gao W, Yuan S, Gong T, Huang W. The biology of VSIG4: Implications for the treatment of immune-mediated inflammatory diseases and cancer. Cancer Lett. 2023;553:215996. doi:10.1016/j.canlet.2022.215996

Liu C, Tang M, Zhang X, Li J, Cao G. Knockdown of miR-665 Protects Against Cardiomyocyte Ischemia/Reperfusion Injury-Induced ROS Accumulation and Apoptosis Through the Activation of Pak1/Akt Signaling in Myocardial Infarction. Int Heart J. 2020;61(2):347-354. doi:10.1536/ihj.19-416

Liu D, Qiao C, Luo H. MicroRNA-1278 ameliorates the inflammation of cardiomyocytes during myocardial ischemia by targeting both IL-22 and CXCL14. Life Sci. 2021;269:118817. doi:10.1016/j.lfs.2020.118817

Liu D, Wu BX, Sun N, Yan Y, Yuan P, Qu JM, Jing ZC. Elevated Levels of Circulating Bone Morphogenetic Protein 7 Predict Mortality in Pulmonary Arterial Hypertension. Chest. 2016;150(2):367-373. doi:10.1016/j.chest.2016.03.007

Liu F, Xu W, Wang Y, Huang Z, Zhu Z, Ou W, Tang W, Fu J, Liu C, Gu Y, et al. LAMB3 Promotes Intestinal Inflammation Through SERPINA3 and Is Directly Transcriptionally Regulated by P65 in Inflammatory Bowel Disease. Inflamm Bowel Dis. 2024;30(2):257-272. doi:10.1093/ibd/izad140

Liu G, Lv Y, Wang Y, Xu Z, Chen L, Chen S, Xie W, Feng Y, Liu J, Bai Y, et al. Remote ischemic preconditioning reduces mitochondrial apoptosis mediated by calpain 1 activation in myocardial ischemia-reperfusion injury through calcium channel subunit Cacna2d3. Free Radic Biol Med. 2024;212:80-93. doi:10.1016/j.freeradbiomed.2023.12.030

Liu H, Irwanto A, Tian H, Fu X, Yu Y, Yu G, Low H, Chu T, Li Y, Shi B, et al. Identification of IL18RAP/IL18R1 and IL12B as leprosy risk genes demonstrates shared pathogenesis between inflammation and infectious diseases. Am J Hum Genet. 2012;91(5):935-941. doi:10.1016/j.ajhg.2012.09.010

Liu J, Huang S, Yu R, Chen X, Li F, Sun X, Xu P, Huang Y, Xue Y, Fu T, et al. TRPV1+ sensory nerves modulate corneal inflammation after epithelial abrasion via RAMP1 and SSTR5 signaling. Mucosal Immunol. 2022;15(5):867-881. doi:10.1038/s41385-022-00533-8

Liu J, Huang S, Yu R, Chen X, Li F, Sun X, Xu P, Huang Y, Xue Y, Fu T, et al. TRPV1+ sensory nerves modulate corneal inflammation after epithelial abrasion via RAMP1 and SSTR5 signaling. Mucosal Immunol. 2022;15(5):867-881. doi:10.1038/s41385-022-00533-8

Liu JY, Yi YZ, Guo QW, Jia KX, Li XC, Cai JJ, Shen YL, Su GM, Chen X, Zhang XY, et al. Associations of ACE I/D and AGTR1 rs5182 polymorphisms with diabetes and their effects on lipids in an elderly Chinese population. Lipids Health Dis. 2024;23(1):231. doi:10.1186/s12944-024-02222-w

Liu K, Hao Q, Wei J, Li GH, Wu Y, Zhao YF. MicroRNA-19a/b-3p protect the heart from hypertension-induced pathological cardiac hypertrophy through PDE5A. J Hypertens. 2018;36(9):1847-1857. doi:10.1097/HJH.0000000000001769

Liu L, Abken H, Pföhler C, Rappl G, Tilgen W, Reinhold U. Accumulation of CD4+CD7- T cells in inflammatory skin lesions: evidence for preferential adhesion to vascular endothelial cells. Clin Exp Immunol. 2000;121(1):94-99. doi:10.1046/j.1365-2249.2000.01260.x

Liu L, Zhou Y, Liu Z, Li J, Hu L, He L, Gao G, Kidd B, Walsh A, Jiang R, et al. Osr1 Regulates Macrophage-mediated Liver Inflammation in Nonalcoholic Fatty Liver Disease Progression. Cell Mol Gastroenterol Hepatol. 2023;15(5):1117-1133. doi:10.1016/j.jcmgh.2022.12.010

Liu M, Cheng L, Ye Q, Liu H, Shu C, Gao H, Liu X, Zhang X, Chen G. Hypericin Alleviates Chronic Kidney Disease-induced Left Ventricular Hypertrophy by

Regulation of FGF23-FGFR4 Signaling Pathway. J Cardiovasc Pharmacol. 2024;83(6):588-601. doi:10.1097/FJC.0000000000001559

Liu N, Li R, Cao J, Song X, Ma W, Liu T, Wang L, Zou J, Zhang B, Liu Z, et al. The inhibition of FKBP5 protects β-cell survival under inflammation stress via AKT/FOXO1 signaling. Cell Death Discov. 2023;9(1):247. doi:10.1038/s41420-023-01506-x

Liu Q, Peng Z, Zhou L, Peng R, Li X, Zuo W, Gou J, Zhou F, Yu S, Huang M, et al. Short-Chain Fatty Acid Decreases the Expression of CEBPB to Inhibit miR-145-Mediated DUSP6 and Thus Further Suppresses Intestinal Inflammation. Inflammation. 2022;45(1):372-386. doi:10.1007/s10753-021-01552-6

Liu Q, Tian J, Xu Y, Li C, Meng X, Fu F. Protective Effect of RA on Myocardial Infarction-Induced Cardiac Fibrosis via AT1R/p38 MAPK Pathway Signaling and Modulation of the ACE2/ACE Ratio. J Agric Food Chem. 2016;64(35):6716-6722. doi:10.1021/acs.jafc.6b03001

Liu T, Lin Y, Wen X, Jorissen RN, Gilson MK. BindingDB: a web-accessible database of experimentally determined protein-ligand binding affinities. Nucleic Acids Res. 2007;35(Database issue):D198-D201. doi:10.1093/nar/gkl999

Liu W, Li WM, Yang SS, Gao C, Li SJ, Li Y, Kong YH, Gan RT. Association of HLA class II DRB1, DPA1 and DPB1 polymorphism with genetic susceptibility to idiopathic dilated cardiomyopathy in Chinese Han nationality. Autoimmunity. 2006;39(6):461-467. doi:10.1080/08916930600893709

Liu W, Wang G, Zhang C, Ding W, Cheng W, Luo Y, Wei C, Liu J. MG53, A Novel Regulator of KChIP2 and Ito,f, Plays a Critical Role in Electrophysiological Remodeling in Cardiac Hypertrophy. Circulation. 2019;139(18):2142-2156. doi:10.1161/CIRCULATIONAHA.118.029413

Liu W, Wang Y, Zhang Y, Zhou M, Gu H, Lu M, Xia Y. Rh family C glycoprotein contributes to psoriatic inflammation through regulating the dysdifferentiation and cytokine secretion of keratinocytes. J Dermatol Sci. 2024;114(1):2-12. doi:10.1016/j.jdermsci.2024.02.007

Liu W, Ye Q, Xi W, Li Y, Zhou X, Wang Y, Ye Z, Hai K. The ERK/CREB/PTN/syndecan-3 pathway involves in heparin-mediated neuro-protection and neuro-regeneration against cerebral ischemia-reperfusion injury following cardiac arrest. Int Immunopharmacol. 2021;98:107689. doi:10.1016/j.intimp.2021.107689

Liu X, Lin L, Li Q, Ni Y, Zhang C, Qin S, Wei J. ERK1/2 communicates GPCR and EGFR signaling pathways to promote CTGF-mediated hypertrophic cardiomyopathy upon Ang-II stimulation. BMC Mol Cell Biol. 2019;20(1):14. doi:10.1186/s12860-019-0202-7

Liu X, Xu S, Li Y, Chen Q, Zhang Y, Peng L. Identification of CALU and PALLD as Potential Biomarkers Associated With Immune Infiltration in Heart Failure. Front Cardiovasc Med. 2021;8:774755. doi:10.3389/fcvm.2021.774755

Liu XQ, Jiang L, Lei L, Nie ZY, Zhu W, Wang S, Zeng HX, Zhang SQ, Zhang Q, Yard B, et al. Carnosine alleviates diabetic nephropathy by targeting GNMT, a key enzyme mediating renal inflammation and fibrosis. Clin Sci (Lond). 2020;134(23):3175-3193. doi:10.1042/CS20201207

Liu Y, Gong J, Wang Q, Wei N, Zhao L, Wu Z. Activation of the Nrf2/HO-1 axis by glutaredoxin 2 overexpression antagonizes vascular endothelial cell oxidative injury and inflammation under LPS exposure. Cytotechnology. 2024;76(2):167-178. doi:10.1007/s10616-023-00606-x

Liu Y, Liu B, Qiao YC, Niu WY. A New Case of Hb Headington (HBB: c.217A>C) Due to a New DNA Transversion, Found in a Patient with Type 2 Diabetes Mellitus. Hemoglobin. 2022;46(3):180-183. doi:10.1080/03630269.2022.2067044

Liu Y, Qi H, E M, Shi P, Zhang Q, Li S, Wang Y, Cao Y, Chen Y, Ba L, Gao J, et al. Transient receptor potential vanilloid-3 (TRPV3) activation plays a central role in cardiac fibrosis induced by pressure overload in rats via TGF-β1 pathway. Naunyn Schmiedebergs Arch Pharmacol. 2018;391(2):131-143. doi:10.1007/s00210-017-1443-7

Liu Y, Yu M, Wu L, Chin MT. The bHLH transcription factor CHF1/Hey2 regulates susceptibility to apoptosis and heart failure after pressure overload. Am J

Physiol Heart Circ Physiol. 2010;298(6):H2082-H2092. doi:10.1152/ajpheart.00747.2009

Liu ZY, Pan HW, Cao Y, Zheng J, Zhang Y, Tang Y, He J, Hu YJ, Wang CL, Zou QC, et al. Downregulated microRNA-330 suppresses left ventricular remodeling via the TGF-β1/Smad3 signaling pathway by targeting SRY in mice with myocardial ischemia-reperfusion injury. J Cell Physiol. 2019;234(7):11440-11450. doi:10.1002/jcp.27800

Loh SX, Ekinci Y, Spray L, Jeyalan V, Olin T, Richardson G, Austin D, Alkhalil M, Spyridopoulos I. Fractalkine Signalling (CX3CL1/CX3CR1 Axis) as an Emerging Target in Coronary Artery Disease. J Clin Med. 2023;12(14):4821. doi:10.3390/jcm12144821

Loika Y, Loiko E, Feng F, Stallard E, Yashin AI, Arbeev K, Kuipers AL, Feitosa MF, Province MA, Kulminski AM. Exogenous exposures shape genetic predisposition to lipids, Alzheimer's, and coronary heart disease in the MLXIPL gene locus. Aging (Albany NY). 2023;15(9):3249-3272. doi:10.18632/aging.204665

Long Y, Wang L, Li Z. SP1-induced SNHG14 aggravates hypertrophic response in in vitro model of cardiac hypertrophy via up-regulation of PCDH17. J Cell Mol Med. 2020;24(13):7115-7126. doi:10.1111/jcmm.15073

López B, González A, Lindner D, Westermann D, Ravassa S, Beaumont J, Gallego I, Zudaire A, Brugnolaro C, Querejeta R, et al. Osteopontin-mediated myocardial fibrosis in heart failure: a role for lysyl oxidase?. Cardiovasc Res. 2013;99(1):111-120. doi:10.1093/cvr/cvt100

López-Canoa JN, Couselo-Seijas M, Baluja A, González-Melchor L, Rozados A, Llorente-Cortés V, de Gonzalo-Calvo D, Guerra JM, Vilades D, Leta R, et al. Sex-related differences of fatty acid-binding protein 4 and leptin levels in atrial fibrillation. Europace. 2021;23(5):682-690. doi:10.1093/europace/euaa284

Loro E, Seifert EL, Moffat C, Romero F, Mishra MK, Sun Z, Krajacic P, Anokye-Danso F, Summer RS, Ahima RS, et al. IL-15Rα is a determinant of muscle fuel utilization, and its loss protects against obesity. Am J Physiol Regul Integr Comp Physiol. 2015;309(8):R835-R844. doi:10.1152/ajpregu.00505.2014

Love MI, Huber W, Anders S. Moderated estimation of fold change and dispersion for RNA-seq data with DESeq2. Genome Biol. 2014;15(12):550. doi:10.1186/s13059-014-0550-8

Loyaga-Rendon RY, Fermin D, Jani M, Gonzalez M, Grayburn R, Lee S, Dickinson MG, Manandhar-Shrestha NK, Boeve T, Jovinge S, et al. Changes in heart transplant waitlist and posttransplant outcomes in patients with restrictive and hypertrophic cardiomyopathy with the new heart transplant allocation system. Am J Transplant. 2021;21(3):1255-1262. doi:10.1111/ajt.16325

Lu B, Tigchelaar W, Ruifrok WP, van Gilst WH, de Boer RA, Silljé HH. DHRS7c, a novel cardiomyocyte-expressed gene that is down-regulated by adrenergic stimulation and in heart failure. Eur J Heart Fail. 2012;14(1):5-13. doi:10.1093/eurjhf/hfr152

Lu J, Li M, Zhang R, Hu C, Wang C, Jiang F, Yu W, Qin W, Tang S, Jia W. A common genetic variant of FCN3/CD164L2 is associated with essential hypertension in a Chinese population. Clin Exp Hypertens. 2012;34(5):377-382. doi:10.3109/10641963.2012.665538

Lu L, Ye X, Yao Q, Lu A, Zhao Z, Ding Y, Meng C, Yu W, Du Y, Cheng J. Egr2 enhances insulin resistance via JAK2/STAT3/SOCS-1 pathway in HepG2 cells treated with palmitate. Gen Comp Endocrinol. 2018;260:25-31. doi:10.1016/j.ygcen.2017.08.023

Lu X, Fan Y, Li M, Chang X, Qian J. HTR2B and SLC5A3 Are Specific Markers in Age-Related Osteoarthritis and Involved in Apoptosis and Inflammation of Osteoarthritis Synovial Cells. Front Mol Biosci. 2021;8:691602. doi:10.3389/fmolb.2021.691602

Lu Z, Wang D, Sun Y, Dai Y. ENO1 regulates IL-1β-induced chondrocyte inflammation, apoptosis and matrix degradation possibly through the potential binding to CRLF1. Tissue Cell. 2024;90:102504. doi:10.1016/j.tice.2024.102504

Luckey SW, Walker LA, Smyth T, Mansoori J, Messmer-Kratzsch A, Rosenzweig A, Olson EN, Leinwand LA. The role of Akt/GSK-3beta signaling in familial hypertrophic cardiomyopathy. J Mol Cell Cardiol. 2009;46(5):739-747. doi:10.1016/j.yjmcc.2009.02.010

Lumsden NG, Khambata RS, Hobbs AJ. C-type natriuretic peptide (CNP): cardiovascular roles and potential as a therapeutic target. Curr Pharm Des. 2010;16(37):4080-4088. doi:10.2174/138161210794519237

Luo C, Tang B, Qin S, Yuan C, Du Y, Yang J. GATA2 regulates the CAD susceptibility gene ADTRP rs6903956 through preferential interaction with the G allele. Mol Genet Genomics. 2021;296(4):799-808. doi:10.1007/s00438-021-01782-1

Luo S, Yang Z, Chen R, You D, Teng F, Yuan Y, Liu W, Li J, Zhang H. Cytokine receptor-like factor 1 (CRLF1) promotes cardiac fibrosis via ERK1/2 signaling pathway. J Zhejiang Univ Sci B. 2023;24(8):682-697. doi:10.1631/jzus.B2200506

Luo T, Kim JK. The Role of Estrogen and Estrogen Receptors on Cardiomyocytes: An Overview. Can J Cardiol. 2016;32(8):1017-25. doi: 10.1016/j.cjca.2015.10.021

Luo T, Zeng X, Yang W, Zhang Y. Treatment with metformin prevents myocardial ischemia-reperfusion injury via STEAP4 signaling pathway. Anatol J Cardiol. 2019;21(5):261-271. doi:10.14744/AnatolJCardiol.2019.11456

Luo X, Guo L, Dai XJ, Wang Q, Zhu W, Miao X, Gong H. Abnormal intrinsic functional hubs in alcohol dependence: evidence from a voxelwise degree centrality analysis. Neuropsychiatr Dis Treat. 2017;13:2011-2020. doi:10.2147/NDT.S142742

Luo Y, Li L, Wang L, Shang P, Pan D, Liu Y, Xu T, Li D. Downregulation of microRNA-23a confers protection against myocardial ischemia/reperfusion injury by upregulating tissue factor pathway inhibitor 2 following luteolin pretreatment in rats. Chin Med J (Engl). 2023;136(7):866-867. doi:10.1097/CM9.0000000000002389

Lv C, Zhang Q, Zhao L, Yang J, Zou Z, Zhao Y, Li C, Sun X, Lin X, Jin M. African swine fever virus infection activates inflammatory responses through downregulation of the anti-inflammatory molecule C1QTNF3. Front Immunol. 2022;13:1002616. doi:10.3389/fimmu.2022.1002616

Lv J, Shi S, Zhang B, Xu X, Zheng H, Li Y, Cui X, Wu H, Song Q. Role of puerarin in pathological cardiac remodeling: A review. Pharmacol Res. 2022 Apr;178:106152. doi: 10.1016/j.phrs.2022.106152

Lv T, Fan X, He C, Zhu S, Xiong X, Yan W, Liu M, Xu H, Shi R, He Q. SLC7A11-ROS/αKG-AMPK axis regulates liver inflammation through mitophagy and impairs liver fibrosis and NASH progression. Redox Biol. 2024;72:103159. doi:10.1016/j.redox.2024.103159

Ma D, Qu Y, Wu T, Liu X, Cai L, Wang Y. Excessive fat expenditure in MCT-induced heart failure rats is associated with BMAL1/REV-ERBα circadian rhythmic loop disruption. Sci Rep. 2024;14(1):8128. doi:10.1038/s41598-024-58577-8

Ma J, Wu N, Yuan Z, Chen Y, Li C, Xie W, Zhang Z, Li Y, Zhong L. Prognostic value of interleukin-34 and interleukin-38 in patients with newly diagnosed atrial fibrillation. Front Cardiovasc Med. 2023;9:1072164. doi:10.3389/fcvm.2022.1072164

Ma L, Murea M, Snipes JA, Marinelarena A, Krüger J, Hicks PJ, Langberg KA, Bostrom MA, Cooke JN, Suzuki D, et al. An ACACB variant implicated in diabetic nephropathy associates with body mass index and gene expression in obese subjects. PLoS One. 2013;8(2):e56193. doi:10.1371/journal.pone.0056193

Ma L, Song H, Zhang M, Zhang D. Lysyl oxidase G473A polymorphism is associated with increased risk of coronary artery diseases. DNA Cell Biol. 2011;30(12):1033-1037. doi:10.1089/dna.2011.1261

Ma X, Cao Y, Yang D, Dong Z, Wang X. Inhibition of RUNX1 slows the progression of pulmonary hypertension by targeting CBX5. Biomol Biomed. 2024. doi:10.17305/bb.2024.10720

Ma Z, Lee AYW, Kot CH, Yung PSH, Chen SC, Lui PPY. Upregulation of FABP4 induced inflammation in the pathogenesis of chronic tendinopathy. J Orthop Translat. 2024;47:105-115. doi:10.1016/j.jot.2024.06.007

Ma ZG, Yuan YP, Fan D, Zhang X, Teng T, Song P, Kong CY, Hu C, Wei WY, Tang QZ. IRX2 regulates angiotensin II-induced cardiac fibrosis by

transcriptionally activating EGR1 in male mice. Nat Commun. 2023;14(1):4967. doi:10.1038/s41467-023-40639-6

Maculewicz E, Antkowiak B, Antkowiak O, Borecka A, Mastalerz A, Leońska-Duniec A, Humińska-Lisowska K, Michałowska-Sawczyn M, Garbacz A, Lorenz K, et al. The interactions between interleukin-1 family genes: IL1A, IL1B, IL1RN, and obesity parameters. BMC Genomics. 2022;23(1):112. doi:10.1186/s12864-021-08258-x

Maddali MM, Thomas E, Al Abri IA, Patel MH, Al Maskari SN, Al Yamani MI. Dilated Cardiomyopathy Phenotype-Associated Left Ventricular Noncompaction and Congenital Long QT Syndrome Type-2 in Infants With KCNH2 Gene Mutation: Anesthetic Considerations. J Cardiothorac Vasc Anesth. 2022;36(9):3662-3667. doi:10.1053/j.jvca.2022.05.016

Maeda T, Wakisaka S. Deficiency of C1q/TNF-related protein 3 (CTRP3) decreases adipose tissue weight in diet-induced obesity mice. Mol Biol Rep. 2020;47(11):9219-9224. doi:10.1007/s11033-020-05905-6

Maedeker JA, Stoka KV, Bhayani SA, Gardner WS, Bennett L, Procknow JD, Staiculescu MC, Walji TA, Craft CS, Wagenseil JE. Hypertension and decreased aortic compliance due to reduced elastin amounts do not increase atherosclerotic plaque accumulation in Ldlr-/- mice. Atherosclerosis. 2016;249:22-29. doi:10.1016/j.atherosclerosis.2016.03.022

Mäemets-Allas K, Klaas M, Cárdenas-León CG, Arak T, Kankuri E, Jaks V. Stimulation with THBS4 activates pathways that regulate proliferation, migration and inflammation in primary human keratinocytes. Biochem Biophys Res Commun. 2023;642:97-106. doi:10.1016/j.bbrc.2022.12.052

Magnusson LU, Lundqvist A, Karlsson MN, Skålén K, Levin M, Wiklund O, Borén J, Hultén LM. Arachidonate 15-lipoxygenase type B knockdown leads to reduced lipid accumulation and inflammation in atherosclerosis. PLoS One. 2012;7(8):e43142. doi:10.1371/journal.pone.0043142

Mahdiani S, Omidkhoda N, Rezaee R, Heidari S, Karimi G. Induction of JAK2/STAT3 pathway contributes to protective effects of different therapeutics

against myocardial ischemia/reperfusion. Biomed Pharmacother. 2022;155:113751. doi:10.1016/j.biopha.2022.113751

Mahmoudabady M, Mathieu M, Dewachter L, Hadad I, Ray L, Jespers P, Brimioulle S, Naeije R, McEntee K. Activin-A, transforming growth factor-beta, and myostatin signaling pathway in experimental dilated cardiomyopathy. J Card Fail. 2008;14(8):703-709. doi:10.1016/j.cardfail.2008.05.003

Maimon A, Levi-Yahid V, Ben-Meir K, Halpern A, Talmi Z, Priya S, Mizraji G, Mistriel-Zerbib S, Berger M, Baniyash M, et al. Myeloid cell-derived PROS1 inhibits tumor metastasis by regulating inflammatory and immune responses via IL-10. J Clin Invest. 2021;131(10):e126089. doi:10.1172/JCI126089

Main AM, Gillberg L, Jacobsen AL, Nilsson E, Gjesing AP, Hansen T, Pedersen O, Ribel-Madsen R, Vaag A. DNA methylation and gene expression of HIF3A: cross-tissue validation and associations with BMI and insulin resistance. Clin Epigenetics. 2016;8(1):89. doi:10.1186/s13148-016-0258-6

Maiolino G, Rossitto G, Pedon L, Cesari M, Frigo AC, Azzolini M, Plebani M, Rossi GP. Galectin-3 predicts long-term cardiovascular death in high-risk patients with coronary artery disease. Arterioscler Thromb Vasc Biol. 2015;35(3):725-732. doi:10.1161/ATVBAHA.114.304964

Mansfield AS, Murphy SJ, Harris FR, Robinson SI, Marks RS, Johnson SH, Smadbeck JB, Halling GC, Yi ES, Wigle D, et al. Chromoplectic TPM3-ALK rearrangement in a patient with inflammatory myofibroblastic tumor who responded to ceritinib after progression on crizotinib. Ann Oncol. 2016;27(11):2111-2117. doi:10.1093/annonc/mdw405

Mansuy-Aubert V, Zhou QL, Xie X, Gong Z, Huang JY, Khan AR, Aubert G, Candelaria K, Thomas S, Shin DJ, et al. Imbalance between neutrophil elastase and its inhibitor α1-antitrypsin in obesity alters insulin sensitivity, inflammation, and energy expenditure. Cell Metab. 2013;17(4):534-548. doi:10.1016/j.cmet.2013.03.005

Mao M, Zhang M, Ge A, Ge X, Gu R, Zhang C, Fu Y, Gao J, Wang X, Liu Y, et al. Granzyme B deficiency promotes osteoblastic differentiation and calcification

of vascular smooth muscle cells in hypoxic pulmonary hypertension. Cell Death Dis. 2018;9(2):221. doi:10.1038/s41419-018-0315-5

Marais AD. Apolipoprotein E and Atherosclerosis. Curr Atheroscler Rep. 2021;23(7):34. doi:10.1007/s11883-021-00933-4

Markush D, Sanchez-Lara PA, Grand K, Wong R, Garg R. Sudden Cardiac Arrest During a Sedated Cardiac Magnetic Resonance Study in a Nonsyndromic Child with Evolving Supravalvar Aortic Stenosis Due to Familial ELN Mutation. Pediatr Cardiol. 2023;44(4):946-950. doi:10.1007/s00246-022-03089-3

Maron BJ, Epstein SE, Roberts WC. Hypertrophic cardiomyopathy and transmural myocardial infarction without significant atherosclerosis of the extramural coronary arteries. Am J Cardiol. 1979;43(6):1086-1102. doi:10.1016/0002-9149(79)90139-5

Maron BJ, Rowin EJ, Maron MS. Evolution of risk stratification and sudden death prevention in hypertrophic cardiomyopathy: Twenty years with the implantable cardioverter-defibrillator. Heart Rhythm. 2021;18(6):1012-1023. doi:10.1016/j.hrthm.2021.01.019

Marston NA, Giugliano RP, Melloni GEM, Park JG, Morrill V, Blazing MA, Ference B, Stein E, Stroes ES, Braunwald E, et al. Association of Apolipoprotein B-Containing Lipoproteins and Risk of Myocardial Infarction in Individuals With and Without Atherosclerosis: Distinguishing Between Particle Concentration, Type, and Content. JAMA Cardiol. 2022;7(3):250-256. doi:10.1001/jamacardio.2021.5083

Martin RI, Babaei MS, Choy MK, Owens WA, Chico TJ, Keenan D, Yonan N, Koref MS, Keavney BD. Genetic variants associated with risk of atrial fibrillation regulate expression of PITX2, CAV1, MYOZ1, C9orf3 and FANCC. J Mol Cell Cardiol. 2015;85:207-214. doi:10.1016/j.yjmcc.2015.06.005

Martinez-Santibanez G, Singer K, Cho KW, DelProposto JL, Mergian T, Lumeng CN. Obesity-induced remodeling of the adipose tissue elastin network is independent of the metalloelastase MMP-12. Adipocyte. 2015;4(4):264-272. doi:10.1080/21623945.2015.1027848

Martín-Fuentes P, Civeira F, Solanas-Barca M, García-Otín AL, Jarauta E, Cenarro A. Overexpression of the CXCL3 gene in response to oxidized low-density lipoprotein is associated with the presence of tendon xanthomas in familial hypercholesterolemia. Biochem Cell Biol. 2009;87(3):493-498. doi:10.1139/o09-006

Martiskainen H, Paldanius KMA, Natunen T, Takalo M, Marttinen M, Leskelä S, Huber N, Mäkinen P, Bertling E, Dhungana H, et al. DHCR24 exerts neuroprotection upon inflammation-induced neuronal death. J Neuroinflammation. 2017;14(1):215. doi:10.1186/s12974-017-0991-6

Marziliano N, Medoro A, Mignogna D, Saccon G, Folzani S, Reverberi C, Russo C, Intrieri M. Sudden Cardiac Death Caused by a Fatal Association of Hypertrophic Cardiomyopathy (MYH7, p.Arg719Trp), Heterozygous Familial Hypercholesterolemia (LDLR, p.Gly343Lys) and SARS-CoV-2 B.1.1.7 Infection. Diagnostics (Basel). 2021;11(7):1229. doi:10.3390/diagnostics11071229

Mashimo Y, Suzuki Y, Hatori K, Tabara Y, Miki T, Tokunaga K, Katsuya T, Ogihara T, Yamada M, Takahashi N, et al. Association of TNFRSF4 gene polymorphisms with essential hypertension. J Hypertens. 2008;26(5):902-913. doi:10.1097/HJH.0b013e3282f6a65e

Maslat AO, Al-Mahmood OM, Al Khawaja NM, Al-Shdefat R. Association of Genetic polymorphisms of EDN1 gene and Endothelin-1 level in patients with type 2 diabetes mellitus in the Jordanian population. Heliyon. 2023;10(1):e23676. doi:10.1016/j.heliyon.2023.e23676

Massera D, Sherrid MV, Maron MS, Rowin EJ, Maron BJ. How common is hypertrophic cardiomyopathy… really?: Disease prevalence revisited 27 years after CARDIA. Int J Cardiol. 2023;382:64-67. doi:10.1016/j.ijcard.2023.04.005

Mastrototaro G, Carullo P, Zhang J, Scellini B, Piroddi N, Nemska S, Filomena MC, Serio S, Otey CA, Tesi C, Emrich F, et al. Ablation of palladin in adult heart causes dilated cardiomyopathy associated with intercalated disc abnormalities. Elife. 2023;12:e78629. doi:10.7554/eLife.78629

Mathews JA, Wurmbrand AP, Ribeiro L, Neto FL, Shore SA. Induction of IL-17A Precedes Development of Airway Hyperresponsiveness during Diet-Induced

Obesity and Correlates with Complement Factor D. Front Immunol. 2014;5:440. doi:10.3389/fimmu.2014.00440

Matsa LS, Sagurthi SR, Ananthapur V, Nalla S, Nallari P. Endothelin 1 gene as a modifier in dilated cardiomyopathy. Gene. 2014;548(2):256-262. doi:10.1016/j.gene.2014.07.043

Matsushima K, Suyama T, Takenaka C, Nishishita N, Ikeda K, Ikada Y, Sawa Y, Jakt LM, Mori H, Kawamata S. Secreted frizzled related protein 4 reduces fibrosis scar size and ameliorates cardiac function after ischemic injury. Tissue Eng Part A. 2010;16(11):3329-3341. doi:10.1089/ten.TEA.2009.0739

May BM, Kochi AN, Magalhães APA, Scolari F, Zimerman A, Andrades M, Zimerman LI, Rohde LE, Pimentel M. Growth/differentiation factor-15 (GDF-15) as a predictor of serious arrhythmic events in patients with nonischemic dilated cardiomyopathy. J Electrocardiol. 2022;70:19-23. doi:10.1016/j.jelectrocard.2021.10.002

McMahon GM, O'Seaghdha CM, Hwang SJ, Meigs JB, Fox CS. The association of a single-nucleotide polymorphism in CUBN and the risk of albuminuria and cardiovascular disease. Nephrol Dial Transplant. 2014;29(2):342-347. doi:10.1093/ndt/gft386

McNamara DM, Holubkov R, Postava L, Janosko K, MacGowan GA, Mathier M, Murali S, Feldman AM, London B. Pharmacogenetic interactions between angiotensin-converting enzyme inhibitor therapy and the angiotensin-converting enzyme deletion polymorphism in patients with congestive heart failure. J Am Coll Cardiol. 2004;44(10):2019-2026. doi:10.1016/j.jacc.2004.08.048

Meghnem D, Maillasson M, Barbieux I, Morisseau S, Keita D, Jacques Y, Quéméner A, Mortier E. Selective Targeting of IL-15Rα Is Sufficient to Reduce Inflammation. Front Immunol. 2022;13:886213. doi:10.3389/fimmu.2022.886213

Mehra S, Kumar M, Manchanda M, Singh R, Thakur B, Rani N, Arava S, Narang R, Arya DS, Chauhan SS. Clinical significance of cathepsin L and cathepsin B in dilated cardiomyopathy. Mol Cell Biochem. 2017;428(1-2):139-147. doi:10.1007/s11010-016-2924-6

Mei L, Chen Y, Chen P, Chen H, He S, Jin C, Wang Y, Hu Z, Li W, Jin L, et al. Fibroblast growth factor 7 alleviates myocardial infarction by improving oxidative stress via PI3Kα/AKT-mediated regulation of Nrf2 and HXK2. Redox Biol. 2022;56:102468. doi:10.1016/j.redox.2022.102468

Meng X, Sun X, Zhang Y, Shi H, Deng W, Liu Y, Wang G, Fang P, Yang S. PPARγ Agonist PGZ Attenuates OVA-Induced Airway Inflammation and Airway Remodeling via RGS4 Signaling in Mouse Model. Inflammation. 2018;41(6):2079-2089. doi:10.1007/s10753-018-0851-2

Meng XM, Pang QY, Zhou ZF, Yuan JH, You L, Feng QP, Zhu BM. Histone methyltransferase MLL4 protects against pressure overload-induced heart failure via a THBS4-mediated protection in ER stress. Pharmacol Res. 2024;205:107263. doi:10.1016/j.phrs.2024.107263

Menghini R, Marchetti V, Cardellini M, Hribal ML, Mauriello A, Lauro D, Sbraccia P, Lauro R, Federici M. Phosphorylation of GATA2 by Akt increases adipose tissue differentiation and reduces adipose tissue-related inflammation: a novel pathway linking obesity to atherosclerosis. Circulation. 2005;111(15):1946-1953. doi:10.1161/01.CIR.0000161814.02942.B2

Metaxas A, Thygesen C, Briting SRR, Landau AM, Darvesh S, Finsen B. Increased Inflammation and Unchanged Density of Synaptic Vesicle Glycoprotein 2A (SV2A) in the Postmortem Frontal Cortex of Alzheimer's Disease Patients. Front Cell Neurosci. 2019;13:538. doi:10.3389/fncel.2019.00538

Meurs KM, Olsen LH, Reimann MJ, Keene BW, Atkins CE, Adin D, Aona B, Condit J, DeFrancesco T, Reina-Doreste Y, et al. Angiotensin-converting enzyme activity in Cavalier King Charles Spaniels with an ACE gene polymorphism and myxomatous mitral valve disease. Pharmacogenet Genomics. 2018;28(2):37-40. doi:10.1097/FPC.0000000000000322

Meyhöfer S, Steffen A, Plötze-Martin K, Marquardt JU, Meyhöfer SM, Bruchhage KL, Pries R. Obesity-related Plasma CXCL10 Drives CX3CR1-dependent Monocytic Secretion of Macrophage Migration Inhibitory Factor. Immunohorizons. 2024;8(1):19-28. doi:10.4049/immunohorizons.2300114

Miao CM, He K, Li PZ, Liu ZJ, Zhu XW, Ou ZB, Ruan XZ, Gong JP, Liu CA. LXRα represses LPS-induced inflammatory responses by competing with IRF3 for GRIP1 in Kupffer cells. Int Immunopharmacol. 2016;35:272-279. doi:10.1016/j.intimp.2016.04.009

Michaelides M, Miller ML, Egervari G, Primeaux SD, Gomez JL, Ellis RJ, Landry JA, Szutorisz H, Hoffman AF, Lupica CR, et al. Striatal Rgs4 regulates feeding and susceptibility to diet-induced obesity. Mol Psychiatry. 2020;25(9):2058-2069. doi:10.1038/s41380-018-0120-7

Michurina SV, Ishchenko IY, Arkhipov SA, Klimontov VV, Rachkovskaya LN, Konenkov VI, Zavyalov EL. Effects of Melatonin, Aluminum Oxide, and Polymethylsiloxane Complex on the Expression of LYVE-1 in the Liver of Mice with Obesity and Type 2 Diabetes Mellitus. Bull Exp Biol Med. 2016;162(2):269-272. doi:10.1007/s10517-016-3592-y

Mirra D, Cione E, Spaziano G, Esposito R, Sorgenti M, Granato E, Cerqua I, Muraca L, Iovino P, Gallelli L, et al. Circulating MicroRNAs Expression Profile in Lung Inflammation: A Preliminary Study. J Clin Med. 2022;11(18):5446. doi:10.3390/jcm11185446

Miska J, Lui JB, Toomer KH, Devarajan P, Cai X, Houghton J, Lopez DM, Abreu MT, Wang G, Chen Z. Initiation of inflammatory tumorigenesis by CTLA4 insufficiency due to type 2 cytokines. J Exp Med. 2018;215(3):841-858. doi:10.1084/jem.20171971

Mo XG, Liu W, Yang Y, Imani S, Lu S, Dan G, Nie X, Yan J, Zhan R, Li X, et al. NCF2, MYO1F, S1PR4, and FCN1 as potential noninvasive diagnostic biomarkers in patients with obstructive coronary artery: A weighted gene co-expression network analysis. J Cell Biochem. 2019;120(10):18219-18235. doi:10.1002/jcb.29128

Mogensen J, Klausen IC, Pedersen AK, Egeblad H, Bross P, Kruse TA, Gregersen N, Hansen PS, Baandrup U, Borglum AD. Alpha-cardiac actin is a novel disease gene in familial hypertrophic cardiomyopathy. J Clin Invest. 1999;103(10):R39-R43. doi:10.1172/JCI6460

Mohammadzadeh N, Melleby AO, Palmero S, Sjaastad I, Chakravarti S, Engebretsen KVT, Christensen G, Lunde IG, Tønnessen T. Moderate Loss of the Extracellular Matrix Proteoglycan Lumican Attenuates Cardiac Fibrosis in Mice Subjected to Pressure Overload. Cardiology. 2020;145(3):187-198. doi:10.1159/000505318

Mohammed HSE, Kamal MM, ElBadre HM, Hosni A, Elfadl AA, Mostafa MA, El-Mahdy RI. Lectin-Like OLR1 3'UTR Rs1050286 Gene Polymorphism and Plasma Oxidized-LDL in Coronary Artery Disease and Their Relation to Cardiovascular Risk and Outcomes. Rep Biochem Mol Biol. 2022;10(4):537-553. doi:10.52547/rbmb.10.4.537

Mondal NK, Saha H, Mukherjee B, Tyagi N, Ray MR. Inflammation, oxidative stress, and higher expression levels of Nrf2 and NQO1 proteins in the airways of women chronically exposed to biomass fuel smoke. Mol Cell Biochem. 2018;447(1-2):63-76. doi:10.1007/s11010-018-3293-0

Monroy-Muñoz IE, Angeles-Martinez J, Posadas-Sánchez R, Villarreal-Molina T, Alvarez-León E, Flores-Dominguez C, Cardoso-Saldaña G, Medina-Urrutia A, Juárez-Rojas JG, Posadas-Romero C, et al. PLA2G2A polymorphisms are associated with metabolic syndrome and type 2 diabetes mellitus. Results from the genetics of atherosclerotic disease Mexican study. Immunobiology. 2017;222(10):967-972. doi:10.1016/j.imbio.2016.08.014

Moore B, Semsarian C, Chan KH, Sy RW. Sudden Cardiac Death and Ventricular Arrhythmias in Hypertrophic Cardiomyopathy. Heart Lung Circ. 2019;28(1):146-154. doi:10.1016/j.hlc.2018.07.019

Morales LD, Cromack DT, Tripathy D, Fourcaudot M, Kumar S, Curran JE, Carless M, Göring HHH, Hu SL, Lopez-Alvarenga JC, et al. Further evidence supporting a potential role for ADH1B in obesity. Sci Rep. 2021;11(1):1932. doi:10.1038/s41598-020-80563-z

Morange PE, Saut N, Alessi MC, Yudkin JS, Margaglione M, Di Minno G, Hamsten A, Humphries SE, Tregouet DA, Juhan-Vague I. Association of plasminogen activator inhibitor (PAI)-1 (SERPINE1) SNPs with myocardial infarction, plasma PAI-1, and metabolic parameters: the HIFMECH study.

Arterioscler Thromb Vasc Biol. 2007;27(10):2250-2257. doi:10.1161/ATVBAHA.107.149468

Moreira JBN, Wohlwend M, Fenk S, Åmellem I, Flatberg A, Kraljevic J, Marinovic J, Ljubkovic M, Bjørkøy G, Wisløff U. Exercise Reveals Proline Dehydrogenase as a Potential Target in Heart Failure. Prog Cardiovasc Dis. 2019;62(2):193-202. doi:10.1016/j.pcad.2019.03.002

Morinaga J, Kashiwabara K, Torigoe D, Okadome Y, Aizawa K, Uemura K, Kurashima A, Matsunaga E, Fukami H, Horiguchi H, et al. Plasma ANGPTL8 Levels and Risk for Secondary Cardiovascular Events in Japanese Patients With Stable Coronary Artery Disease Receiving Statin Therapy. Arterioscler Thromb Vasc Biol. 2023;43(8):1549-1559. doi:10.1161/ATVBAHA.122.318880

Morris GM, Huey R, Lindstrom W, Sanner MF, Belew RK, Goodsell DS, Olson AJ. AutoDock4 and AutoDockTools4: Automated docking with selective receptor flexibility. J Comput Chem. 2009;30(16):2785-91. doi:10.1002/jcc.21256

Mtiraoui N, Turki A, Nemr R, Echtay A, Izzidi I, Al-Zaben GS, Irani-Hakime N, Keleshian SH, Mahjoub T, Almawi WY. Contribution of common variants of ENPP1, IGF2BP2, KCNJ11, MLXIPL, PPARγ, SLC30A8 and TCF7L2 to the risk of type 2 diabetes in Lebanese and Tunisian Arabs. Diabetes Metab. 2012;38(5):444-449. doi:10.1016/j.diabet.2012.05.002

Mu R, Ye S, Lin R, Li Y, Guo X, An L. Effects of Peroxiredoxin 6 and Its Mutants on the Isoproterenol Induced Myocardial Injury in H9C2 Cells and Rats. Oxid Med Cell Longev. 2022;2022:2576310. doi:10.1155/2022/2576310

Muhammad Sulaiman K. A Study of transcription factor MEF2A gene polymorphisms in patients with coronary artery disease. Cell Mol Biol (Noisy-le-grand). 2024;70(1):80-86.. doi:10.14715/cmb/2024.70.1.11

Muneshige K, Uchida K, Kenmoku T, Tazawa R, Nakawaki M, Ishii D, Inoue G, Takaso M. Elevation of MMP1 and ADAMTS5 mRNA expression in glenohumeral synovia of patients with hypercholesterolemia. J Orthop Surg Res. 2022;17(1):97. doi:10.1186/s13018-022-02998-6

Munthe-Fog L, Hummelshoj T, Honoré C, Moller ME, Skjoedt MO, Palsgaard I, Borregaard N, Madsen HO, Garred P. Variation in FCN1 affects biosynthesis of ficolin-1 and is associated with outcome of systemic inflammation. Genes Immun. 2012;13(7):515-522. doi:10.1038/gene.2012.27

Murakami T, Komiyama Y, Masuda M, Kido H, Nomura S, Fukuhara S, Karakawa M, Iwasaka T, Takahashi H. Flow cytometric analysis of platelet activation markers CD62P and CD63 in patients with coronary artery disease. Eur J Clin Invest. 1996;26(11):996-1003. doi:10.1046/j.1365-2362.1996.2360585.x

Murakami Y, Nishigori M, Yagi H, Osaki T, Wakabayashi M, Shirai M, Son C, Iba Y, Minatoya K, Kusano K, et al. Serum proteomic identification and validation of two novel atherosclerotic aortic aneurysm biomarkers, profilin 1 and complement factor D. Proteome Sci. 2023;21(1):11. doi:10.1186/s12953-023-00212-x

Musso G, Saba F, Cassader M, Paschetta E, De Michieli F, Pinach S, Framarin L, Berrutti M, Leone N, Parente R, et al. Angiotensin II Type 1 Receptor rs5186 Gene Variant Predicts Incident NAFLD and Associated Hypertension: Role of Dietary Fat-Induced Pro-Inflammatory Cell Activation. Am J Gastroenterol. 2019;114(4):607-619. doi:10.14309/ajg.0000000000000154

Mutlu M, Yuksel N, Takmaz T, Dincel AS, Bilgihan A, Altınkaynak H. Aqueous humor pentraxin-3 levels in patients with diabetes mellitus. Eye (Lond). 2017;31(10):1463-1467. doi:10.1038/eye.2017.87

Na HS, Kwon JE, Lee SH, Jhun J, Kim SM, Kim SY, Kim EK, Jung K, Park SH, Cho ML. Th17 and IL-17 Cause Acceleration of Inflammation and Fat Loss by Inducing α2-Glycoprotein 1 (AZGP1) in Rheumatoid Arthritis with High-Fat Diet. Am J Pathol. 2017;187(5):1049-1058. doi:10.1016/j.ajpath.2016.12.023

Nabil IK, Mahmud Z, Tamanna S, Rahman MM, Rashid G, Hossain MS, Asad HB, Kamal MA, Howlader MZH. Vitamin D deficiency and the vitamin D receptor (VDR) gene polymorphism rs2228570 (FokI) are associated with an increased susceptibility to hypertension among the Bangladeshi population. PLoS One. 2024;19(3):e0297138. doi:10.1371/journal.pone.0297138

Nag S, Gollapudi SK, Del Rio CL, Spudich JA, McDowell R. Mavacamten, a precision medicine for hypertrophic cardiomyopathy: From a motor protein to patients. Sci Adv. 2023;9(30):eabo7622. doi:10.1126/sciadv.abo7622

Nair S, Muller YL, Ortega E, Kobes S, Bogardus C, Baier LJ. Association analyses of variants in the DIO2 gene with early-onset type 2 diabetes mellitus in Pima Indians. Thyroid. 2012;22(1):80-87. doi:10.1089/thy.2010.0455

Nakanishi T, Sakiyama S, Takashima H, Honda R, Shumba MN, Nakamura Y, Kasahara K, Tamai I. Toxicological implication of prostaglandin transporter SLCO2A1 inhibition by cigarette smoke in exacerbation of lung inflammation. Toxicol Appl Pharmacol. 2020;405:115201. doi:10.1016/j.taap.2020.115201

Nakano T, Nakajima K, Niimi M, Fujita MQ, Nakajima Y, Takeichi S, Kinoshita M, Matsushima T, Teramoto T, Tanaka A. Detection of apolipoproteins B-48 and B-100 carrying particles in lipoprotein fractions extracted from human aortic atherosclerotic plaques in sudden cardiac death cases. Clin Chim Acta. 2008;390(1-2):38-43. doi:10.1016/j.cca.2007.12.012

Nakano Y, Ochi H, Onohara Y, Sairaku A, Tokuyama T, Matsumura H, Tomomori S, Amioka M, Hironomobe N, Motoda C, et al. Genetic variations of aldehyde dehydrogenase 2 and alcohol dehydrogenase 1B are associated with the etiology of atrial fibrillation in Japanese. J Biomed Sci. 2016;23(1):89. doi:10.1186/s12929-016-0304-x

Nakayama S, Migliati E, Amiry-Moghaddam M, Ottersen OP, Bhardwaj A. Osmotherapy With Hypertonic Saline Attenuates Global Cerebral Edema Following Experimental Cardiac Arrest via Perivascular Pool of Aquaporin-4. Crit Care Med. 2016;44(8):e702-e710. doi:10.1097/CCM.0000000000001671

Narita H, Chen S, Komori K, Kadomatsu K. Midkine is expressed by infiltrating macrophages in in-stent restenosis in hypercholesterolemic rabbits. J Vasc Surg. 2008;47(6):1322-1329. doi:10.1016/j.jvs.2007.12.037

Nasser M, Wadie M, Farid A, El Amir A. The Contribution of Serum Sialic Acid Binding Immunoglobulin-Like Lectin 1(sSIGLEC-1) as an IFN I Signature Biomarker in the Progression of Atherosclerosis in Egyptian Systemic Lupus

Erythematosus (SLE) Patients. Indian J Clin Biochem. 2024;39(2):291-298. doi:10.1007/s12291-023-01155-y

Naya FJ, Black BL, Wu H, Bassel-Duby R, Richardson JA, Hill JA, Olson EN. Mitochondrial deficiency and cardiac sudden death in mice lacking the MEF2A transcription factor. Nat Med. 2002;8(11):1303-1309. doi:10.1038/nm789

Nemcsik J, László A, Lénárt L, Eörsi D, Torzsa P, Kőrösi B, Cseprekál O, Tislér A, Tabák Á, Gonda X, et al. Hyperthymic affective temperament and hypertension are independent determinants of serum brain-derived neurotrophic factor level. Ann Gen Psychiatry. 2016;15:17. doi:10.1186/s12991-016-0104-4

Ng LL, Sandhu JK, Narayan H, Quinn PA, Squire IB, Davies JE, Bergmann A, Maisel A, Jones DJ. Proenkephalin and prognosis after acute myocardial infarction. J Am Coll Cardiol. 2014;63(3):280-289. doi:10.1016/j.jacc.2013.09.037

Nguyen MN, Ziemann M, Kiriazis H, Su Y, Thomas Z, Lu Q, Donner DG, Zhao WB, Rafehi H, Sadoshima J, et al. Galectin-3 deficiency ameliorates fibrosis and remodeling in dilated cardiomyopathy mice with enhanced Mst1 signaling. Am J Physiol Heart Circ Physiol. 2019;316(1):H45-H60. doi:10.1152/ajpheart.00609.2018

Ni J, Huang Z, Wang D. LncRNA TP73-AS1 promotes oxidized low-density lipoprotein-induced apoptosis of endothelial cells in atherosclerosis by targeting the miR-654-3p/AKT3 axis. Cell Mol Biol Lett. 2021;26(1):27. doi:10.1186/s11658-021-00264-x

Ni T, Huang X, Pan S, Lu Z. Dihydrolycorine Attenuates Cardiac Fibrosis and Dysfunction by Downregulating Runx1 following Myocardial Infarction. Oxid Med Cell Longev. 2021;2021:8528239. doi:10.1155/2021/8528239

Nielsen CH, Brix TH, Leslie RG, Hegedüs L. A role for autoantibodies in enhancement of pro-inflammatory cytokine responses to a self-antigen, thyroid peroxidase. Clin Immunol. 2009;133(2):218-227. doi:10.1016/j.clim.2009.07.014

Nielsen NH, Winkel BG, Kanters JK, Schmitt N, Hofman-Bang J, Jensen HS, Bentzen BH, Sigurd B, Larsen LA, Andersen PS, et al. Mutations in the Kv1.5

channel gene KCNA5 in cardiac arrest patients. Biochem Biophys Res Commun. 2007;354(3):776-782. doi:10.1016/j.bbrc.2007.01.048

Nishijima Y, Sridhar A, Bonilla I, Velayutham M, Khan M, Terentyeva R, Li C, Kuppusamy P, Elton TS, Terentyev D, et al. Tetrahydrobiopterin depletion and NOS2 uncoupling contribute to heart failure-induced alterations in atrial electrophysiology. Cardiovasc Res. 2011;91(1):71-79. doi:10.1093/cvr/cvr087

Nishimura S, Nagasaki M, Okudaira S, Aoki J, Ohmori T, Ohkawa R, Nakamura K, Igarashi K, Yamashita H, Eto K, et al. ENPP2 contributes to adipose tissue expansion and insulin resistance in diet-induced obesity. Diabetes. 2014;63(12):4154-4164. doi:10.2337/db13-1694

Njerve IU, Pettersen AÅ, Opstad TB, Arnesen H, Seljeflot I. Fractalkine and its receptor (CX3CR1) in patients with stable coronary artery disease and diabetes mellitus. Metab Syndr Relat Disord. 2012;10(6):400-406. doi:10.1089/met.2012.0052

Njouendou AJ, Szarvas T, Tiofack AAZ, Kenfack RN, Tonouo PD, Ananga SN, Bell EHMD, Simo G, Hoheisel JD, Siveke JT, et al. SOX2 dosage sustains tumor-promoting inflammation to drive disease aggressiveness by modulating the FOSL2/IL6 axis. Mol Cancer. 2023;22(1):52. doi:10.1186/s12943-023-01734-w

Nogueira LG, Santos RH, Ianni BM, Fiorelli AI, Mairena EC, Benvenuti LA, Frade A, Donadi E, Dias F, Saba B, et al. Myocardial chemokine expression and intensity of myocarditis in Chagas cardiomyopathy are controlled by polymorphisms in CXCL9 and CXCL10. PLoS Negl Trop Dis. 2012;6(10):e1867. doi:10.1371/journal.pntd.0001867

Noseworthy PA, Yao X, Shah ND, Gersh BJ. Stroke and Bleeding Risks in NOAC- and Warfarin-Treated Patients With Hypertrophic Cardiomyopathy and Atrial Fibrillation. J Am Coll Cardiol. 2016;67(25):3020-3021. doi:10.1016/j.jacc.2016.04.026

Novokhatska T, Tishkin S, Dosenko V, Boldyriev A, Ivanova I, Strielkov I, Soloviev A. Correction of vascular hypercontractility in spontaneously hypertensive rats using shRNAs-induced delta protein kinase C gene silencing. Eur J Pharmacol. 2013;718(1-3):401-407. doi:10.1016/j.ejphar.2013.08.003

Nozynski JK, Konecka-Mrowka D, Zakliczynski M, Zembala-Nozynska E, Lange D, Zembala M. BRCA1 Reflects Myocardial Adverse Remodeling in Idiopathic Dilated Cardiomyopathy. Transplant Proc. 2016;48(5):1746-1750. doi:10.1016/j.transproceed.2015.12.141

Nyati KK, Zaman MM, Sharma P, Kishimoto T. Arid5a, an RNA-Binding Protein in Immune Regulation: RNA Stability, Inflammation, and Autoimmunity. Trends Immunol. 2020;41(3):255-268. doi:10.1016/j.it.2020.01.004

O'Cochlain DF, Perez-Terzic C, Reyes S, Kane GC, Behfar A, Hodgson DM, Strommen JA, Liu XK, van den Broek W, Wansink DG, et al.Transgenic overexpression of human DMPK accumulates into hypertrophic cardiomyopathy, myotonic myopathy and hypotension traits of myotonic dystrophy. Hum Mol Genet. 2004;13(20):2505-2518. doi:10.1093/hmg/ddh266

Oguri M, Kato K, Yokoi K, Yoshida T, Watanabe S, Metoki N, Yoshida H, Satoh K, Aoyagi Y, Nozawa Y, et al. Assessment of a polymorphism of SDK1 with hypertension in Japanese Individuals. Am J Hypertens. 2010;23(1):70-77. doi:10.1038/ajh.2009.190

Okada S, Yokoyama M, Toko H, Tateno K, Moriya J, Shimizu I, Nojima A, Ito T, Yoshida Y, Kobayashi Y, et al. Brain-derived neurotrophic factor protects against cardiac dysfunction after myocardial infarction via a central nervous system-mediated pathway. Arterioscler Thromb Vasc Biol. 2012;32(8):1902-1909. doi:10.1161/ATVBAHA.112.248930

Okwan-Duodu D, Weiss D, Peng Z, Veiras LC, Cao DY, Saito S, Khan Z, Bernstein EA, Giani JF, Taylor WR, et al. Overexpression of myeloid angiotensin-converting enzyme (ACE) reduces atherosclerosis. Biochem Biophys Res Commun. 2019;520(3):573-579. doi:10.1016/j.bbrc.2019.10.078

Omar SH. Cardioprotective and neuroprotective roles of oleuropein in olive. Saudi Pharm J. 2010;18(3):111-21. doi: 10.1016/j.jsps.2010.05.005

Omura J, Satoh K, Kikuchi N, Satoh T, Kurosawa R, Nogi M, Ohtsuki T, Al-Mamun ME, Siddique MAH, Yaoita N, et al. ADAMTS8 Promotes the Development of Pulmonary Arterial Hypertension and Right Ventricular Failure: A

Possible Novel Therapeutic Target. Circ Res. 2019;125(10):884-906. doi:10.1161/CIRCRESAHA.119.315398

Onda M, Ishiwata T, Kawahara K, Wang R, Naito Z, Sugisaki Y. Expression of lumican in thickened intima and smooth muscle cells in human coronary atherosclerosis. Exp Mol Pathol. 2002;72(2):142-149. doi:10.1006/exmp.2002.2425

Ong EZ, Koh CWT, Tng DJH, Ooi JSG, Yee JX, Chew VSY, Leong YS, Gunasegaran K, Yeo CP, Oon LLE, et al. RNase2 is a possible trigger of acute-on-chronic inflammation leading to mRNA vaccine-associated cardiac complication. Med. 2023;4(6):353-360.e2. doi:10.1016/j.medj.2023.04.001

Ortega A, Tarazón E, Roselló-Lletí E, Gil-Cayuela C, Lago F, González-Juanatey JR, Cinca J, Jorge E, Martínez-Dolz L, Portolés M, et al. Patients with Dilated Cardiomyopathy and Sustained Monomorphic Ventricular Tachycardia Show Up-Regulation of KCNN3 and KCNJ2 Genes and CACNG8-Linked Left Ventricular Dysfunction. PLoS One. 2015;10(12):e0145518. doi:10.1371/journal.pone.0145518

Osio A, Tan L, Chen SN, Lombardi R, Nagueh SF, Shete S, Roberts R, Willerson JT, Marian AJ. Myozenin 2 is a novel gene for human hypertrophic cardiomyopathy. Circ Res. 2007;100(6):766-768. doi:10.1161/01.RES.0000263008.66799.aa

Osorio-Conles Ó, Ibarzabal A, Balibrea JM, Vidal J, Ortega E, de Hollanda A. FABP4 Expression in Subcutaneous Adipose Tissue Is Independently Associated with Circulating Triglycerides in Obesity. J Clin Med. 2023;12(3):1013. doi:10.3390/jcm12031013

Otani T, Moriguchi-Goto S, Nishihira K, Oguri N, Shibata Y, Matsuura Y, Kodama T, Asada Y, Hatakeyama K, Yamashita A. Intralesional pentraxin 3 increases with atherosclerotic disease progression, but may protect from thrombosis: Friend or foe?. Thromb Res. 2024;234:134-141. doi:10.1016/j.thromres.2024.01.004

Ouyang C, Huang L, Ye X, Ren M, Han Z. HDAC1 Promotes Myocardial Fibrosis in Diabetic Cardiomyopathy by Inhibiting BMP-7 Transcription Through Histone

Deacetylation. Exp Clin Endocrinol Diabetes. 2022;130(10):660-670. doi:10.1055/a-1780-8768

Ouyang S, Li Y, Wu X, Wang Y, Liu F, Zhang J, Qiu Y, Zhou Z, Wang Z, Xia W, et al. GPR4 signaling is essential for the promotion of acid-mediated angiogenic capacity of endothelial progenitor cells by activating STAT3/VEGFA pathway in patients with coronary artery disease. Stem Cell Res Ther. 2021;12(1):149. doi:10.1186/s13287-021-02221-z

Ovchinnikova OA, Folkersen L, Persson J, Lindeman JH, Ueland T, Aukrust P, Gavrisheva N, Shlyakhto E, Paulsson-Berne G, Hedin U, et al. The collagen cross-linking enzyme lysyl oxidase is associated with the healing of human atherosclerotic lesions. J Intern Med. 2014;276(5):525-536. doi:10.1111/joim.12228

Owens AW, Matulevicius S, Rohatgi A, Ayers CR, Das SR, Khera A, McGuire DK, de Lemos JA. Circulating lymphotoxin β receptor and atherosclerosis: observations from the Dallas Heart Study. Atherosclerosis. 2010;212(2):601-606. doi:10.1016/j.atherosclerosis.2010.06.003

Ozdemir AC, Wynn GM, Vester A, Weitzmann MN, Neigh GN, Srinivasan S, Rudd MK. GNB3 overexpression causes obesity and metabolic syndrome. PLoS One. 2017;12(12):e0188763. doi:10.1371/journal.pone.0188763

Ozmen F, Ozmen MM, Gelecek S, Bilgic İ, Moran M, Sahin TT. STEAP4 and HIF-1α gene expressions in visceral and subcutaneous adipose tissue of the morbidly obese patients. Mol Immunol. 2016;73:53-59. doi:10.1016/j.molimm.2016.03.008

Pacifici F, Arriga R, Sorice GP, Capuani B, Scioli MG, Pastore D, Donadel G, Bellia A, Caratelli S, Coppola A, et al. Peroxiredoxin 6, a novel player in the pathogenesis of diabetes. Diabetes. 2014;63(10):3210-3220. doi:10.2337/db14-0144

Page MM, Ellis KL, Chan DC, Pang J, Hooper AJ, Bell DA, Burnett JR, Moses EK, Watts GF. A variant in the fibronectin (FN1) gene, rs1250229-T, is associated with decreased risk of coronary artery disease in familial hypercholesterolaemia. J Clin Lipidol. 2022;16(4):525-529. doi:10.1016/j.jacl.2022.05.065

Palacín M, Rodriguez-Pascual F, Reguero JR, Rodríguez I, Avanzas P, Lozano I, Morís C, Alvarez V, Cannata-Andía JB, Lamas S, et al. Lack of association between endothelin-1 gene variants and myocardial infarction. J Atheroscler Thromb. 2009;16(4):388-395. doi:10.5551/jat.no1149

Palao T, Medzikovic L, Rippe C, Wanga S, Al-Mardini C, van Weert A, de Vos J, van der Wel NN, van Veen HA, van Bavel ET, et al. Thrombospondin-4 mediates cardiovascular remodelling in angiotensin II-induced hypertension. Cardiovasc Pathol. 2018;35:12-19. doi:10.1016/j.carpath.2018.03.003

Pan Q, Hui D, Hu C. A Variant of IL1B Is Associated with the Risk and Blood Lipid Levels of Myocardial Infarction in Eastern Chinese Individuals. Immunol Invest. 2022;51(5):1162-1169. doi:10.1080/08820139.2021.1914081

Pan X, Yang L, Wang S, Liu Y, Yue L, Chen S. Semaglutide ameliorates obesity-induced cardiac inflammation and oxidative stress mediated via reduction of neutrophil Cxcl2, S100a8, and S100a9 expression. Mol Cell Biochem. 2024;479(5):1133-1147. doi:10.1007/s11010-023-04784-2

Pan XY, Zhang ZW. MFGE8, ALB, APOB, APOE, SAA1, A2M, and C3 as Novel Biomarkers for Stress Cardiomyopathy. Cardiovasc Ther. 2020;2020:1615826. doi:10.1155/2020/1615826

Pang P, Si W, Wu H, Ju J, Liu K, Wang C, Jia Y, Diao H, Zeng L, Jiang W, et al. YTHDF2 Promotes Cardiac Ferroptosis via Degradation of SLC7A11 in Cardiac Ischemia-Reperfusion Injury. Antioxid Redox Signal. 2024;40(16-18):889-905. doi:10.1089/ars.2023.0291

Panigrahi T, Shivakumar S, Shetty R, D'souza S, Nelson EJR, Sethu S, Jeyabalan N, Ghosh A. Trehalose augments autophagy to mitigate stress induced inflammation in human corneal cells. Ocul Surf. 2019;17(4):699-713. doi:10.1016/j.jtos.2019.08.00

Panizo S, Carrillo-López N, Naves-Díaz M, Solache-Berrocal G, Martínez-Arias L, Rodrigues-Díez RR, Fernández-Vázquez A, Martínez-Salgado C, Ruiz-Ortega M, Dusso A, et al. Regulation of miR-29b and miR-30c by vitamin D receptor activators contributes to attenuate uraemia-induced cardiac fibrosis. Nephrol Dial Transplant. 2017;32(11):1831-1840. doi:10.1093/ndt/gfx060

Papathanassiu AE, Ko JH, Imprialou M, Bagnati M, Srivastava PK, Vu HA, Cucchi D, McAdoo SP, Ananieva EA, Mauro C, et al. BCAT1 controls metabolic reprogramming in activated human macrophages and is associated with inflammatory diseases. Nat Commun. 2017;8:16040. doi:10.1038/ncomms16040

Parikh D, Jayakumar S, Oliveira-Paula GH, Almonte V, Riascos-Bernal DF, Sibinga NES. Allograft inflammatory factor-1-like is a situational regulator of leptin levels, hyperphagia, and obesity. iScience. 2022;25(10):105058. doi:10.1016/j.isci.2022.105058

Park HS, Kim IJ, Kim EG, Ryu CS, Lee JY, Ko EJ, Park HW, Sung JH, Kim NK. A study of associations between CUBN, HNF1A, and LIPC gene polymorphisms and coronary artery disease. Sci Rep. 2020;10(1):16294. doi:10.1038/s41598-020-73048-6

Park S, Liu M, Kang S. Alcohol Intake Interacts with CDKAL1, HHEX, and OAS3 Genetic Variants, Associated with the Risk of Type 2 Diabetes by Lowering Insulin Secretion in Korean Adults. Alcohol Clin Exp Res. 2018;42(12):2326-2336. doi:10.1111/acer.13888

Parveen S, Cheah PHS, Worthington LPI, Smither RA, Munro ML, Bussey CT, Lamberts RR, Jones PP. Depressed HCN4 function in the type 2 diabetic sinoatrial node. Mol Cell Biochem. 2023;478(8):1825-1833. doi:10.1007/s11010-022-04635-6

Patel RS, Carter G, El Bassit G, Patel AA, Cooper DR, Murr M, Patel NA. Adipose-derived stem cells from lean and obese humans show depot specific differences in their stem cell markers, exosome contents and senescence: role of protein kinase C delta (PKCδ) in adipose stem cell niche. Stem Cell Investig. 2016;3:2. doi:10.3978/j.issn.2306-9759.2016.01.02

Paterek A, Sochanowicz B, Oknińska M, Śmigielski W, Kruszewski M, Mackiewicz U, Mączewski M, Leszek P. Ivabradine prevents deleterious effects of dopamine therapy in heart failure: No role for HCN4 overexpression. Biomed Pharmacother. 2021;136:111250. doi:10.1016/j.biopha.2021.111250

Pazos-Pérez A, Piñeiro-Ramil M, Franco-Trepat E, Alonso-Pérez A, Guillán-Fresco M, Crespo-Golmar A, López-Fagúndez M, Aranda JC, Bravo SB, Jorge-

Mora A, et al. The Hepatokine RBP4 Links Metabolic Diseases to Articular Inflammation. Antioxidants (Basel). 2024;13(1):124. doi:10.3390/antiox13010124

Pedersen-Bjergaard U, Agerholm-Larsen B, Pramming S, Hougaard P, Thorsteinsson B. Activity of angiotensin-converting enzyme and risk of severe hypoglycaemia in type 1 diabetes mellitus. Lancet. 2001;357(9264):1248-1253. doi:10.1016/S0140-6736(00)04405-6

Pencina MJ, D'Agostino RB, Zdrojewski T, Williams K, Thanassoulis G, Furberg CD, Peterson ED, Vasan RS, Sniderman AD. Apolipoprotein B improves risk assessment of future coronary heart disease in the Framingham Heart Study beyond LDL-C and non-HDL-C. Eur J Prev Cardiol. 2015;22(10):1321-1327. doi:10.1177/2047487315569411

Pendás AM, Folgueras AR, Llano E, Caterina J, Frerard F, Rodríguez F, Astudillo A, Noël A, Birkedal-Hansen H, López-Otín C. Diet-induced obesity and reduced skin cancer susceptibility in matrix metalloproteinase 19-deficient mice. Mol Cell Biol. 2004;24(12):5304-5313. doi:10.1128/MCB.24.12.5304-5313.2004

Peng D, Wang J, Zhang R, Jiang F, Tang S, Chen M, Yan J, Sun X, Wang S, Wang T, et al. Common variants in or near ZNRF1, COLEC12, SCYL1BP1 and API5 are associated with diabetic retinopathy in Chinese patients with type 2 diabetes. Diabetologia. 2015;58(6):1231-1238. doi:10.1007/s00125-015-3569-9

Peng H, Yu Y, Wang P, Yao Y, Wu X, Zheng Q, Wang J, Tian B, Wang Y, Ke T, et al. NINJ2 deficiency inhibits preadipocyte differentiation and promotes insulin resistance through regulating insulin signaling. Obesity (Silver Spring). 2023;31(1):123-138. doi:10.1002/oby.23580

Peng J, Xiang Y. Value analysis of CD69 combined with EGR1 in the diagnosis of coronary heart disease. Exp Ther Med. 2019;17(3):2047-2052. doi:10.3892/etm.2019.7175

Pepine CJ. The effects of angiotensin-converting enzyme inhibition on endothelial dysfunction: potential role in myocardial ischemia. Am J Cardiol. 1998;82(10A):23S-27S. doi:10.1016/s0002-9149(98)00805-4

Perdomo CM, Gómez-Ambrosi J, Becerril S, Valentí V, Moncada R, Fernández-Sáez EM, Méndez-Giménez L, Ezquerro S, Catalán V, Silva C, et al. Role of ANGPTL8 in NAFLD Improvement after Bariatric Surgery in Experimental and Human Obesity. Int J Mol Sci. 2021;22(23):12945. doi:10.3390/ijms222312945

Pérez-Díaz S, Koumaiha Z, Borok MJ, Aurade F, Pini M, Periou B, Rouault C, Baba-Amer Y, Clément K, Derumeaux G, et al. Obesity impairs skeletal muscle repair through NID-1 mediated extracellular matrix remodeling by mesenchymal progenitors. Matrix Biol. 2022;112:90-115. doi:10.1016/j.matbio.2022.08.006

Pérez-Gómez JM, Porcel-Pastrana F, De La Luz-Borrero M, Montero-Hidalgo AJ, Gómez-Gómez E, Herrera-Martínez AD, Guzmán-Ruiz R, Malagón MM, Gahete MD, Luque RM. LRP10, PGK1 and RPLP0: Best Reference Genes in Periprostatic Adipose Tissue under Obesity and Prostate Cancer Conditions. Int J Mol Sci. 2023;24(20):15140. doi:10.3390/ijms242015140

Perez-Sanchez C, Barbera Betancourt A, Lyons PA, Zhang Z, Suo C, Lee JC, McKinney EF, Modis LK, Ellson C, Smith KGC. et al. miR-374a-5p regulates inflammatory genes and monocyte function in patients with inflammatory bowel disease. J Exp Med. 2022;219(5):e20211366. doi:10.1084/jem.20211366

Pérez-Sánchez I, Romero-Puche AJ, García-Molina Sáez E, Sabater-Molina M, López-Ayala JM, Muñoz-Esparza C, López-Cuenca D, de la Morena G, Castro-García FJ, Gimeno-Blanes JR. Factors Influencing the Phenotypic Expression of Hypertrophic Cardiomyopathy in Genetic Carriers. Rev Esp Cardiol (Engl Ed). 2018;71(3):146-154. doi:10.1016/j.rec.2017.06.002

Petakh P, Kamyshna I, Kamyshnyi A. Gene expression of protein kinase AMP-activated catalytic subunit alpha 1 (PRKAA1), solute carrier family 2 member 1 (SLC2A1) and mechanistic target of rapamycin (MTOR) in metformin-treated type 2 diabetes patients with COVID-19: impact on inflammation markers. Inflammopharmacology. 2024;32(1):885-891. doi:10.1007/s10787-023-01341-7

Peters WR, MacMurry JP, Walker J, Giese RJ Jr, Comings DE. Phenylethanolamine N-methyltransferase G-148A genetic variant and weight loss in obese women. Obes Res. 2003;11(3):415-419. doi:10.1038/oby.2003.56

Phelan SA, Wang X, Wallbrandt P, Forsman-Semb K, Paigen B. Overexpression of Prdx6 reduces H2O2 but does not prevent diet-induced atherosclerosis in the aortic root. Free Radic Biol Med. 2003;35(9):1110-1120. doi:10.1016/s0891-5849(03)00462-3

Picarda E, Galbo PM Jr, Zong H, Rajan MR, Wallenius V, Zheng D, Börgeson E, Singh R, Pessin J, Zang X. The immune checkpoint B7-H3 (CD276) regulates adipocyte progenitor metabolism and obesity development. Sci Adv. 2022;8(17):eabm7012. doi:10.1126/sciadv.abm7012

Picke AK, Campbell GM, Blüher M, Krügel U, Schmidt FN, Tsourdi E, Winzer M, Rauner M, Vukicevic V, Busse B, et al. Thy-1 (CD90) promotes bone formation and protects against obesity. Sci Transl Med. 2018;10(453):eaao6806. doi:10.1126/scitranslmed.aao6806

Piroth M, Gorski DJ, Hundhausen C, Petz A, Gorressen S, Semmler D, Zabri H, Hartwig S, Lehr S, Kelm M, et al. Hyaluronan synthase 3 is protective after cardiac ischemia-reperfusion by preserving the T cell response. Matrix Biol. 2022;112:116-131. doi:10.1016/j.matbio.2022.08.008

Plaza-Díaz J, Robles-Sánchez C, Abadía-Molina F, Morón-Calvente V, Sáez-Lara MJ, Ruiz-Bravo A, Jiménez-Valera M, Gil Á, Gómez-Llorente C, Fontana L. Adamdec1, Ednrb and Ptgs1/Cox1, inflammation genes upregulated in the intestinal mucosa of obese rats, are downregulated by three probiotic strains. Sci Rep. 2017;7(1):1939. doi:10.1038/s41598-017-02203-3

Plewczynski D, Łaźniewski M, Augustyniak R, Ginalski K. Can we trust docking results? Evaluation of seven commonly used programs on PDBbind database. J Comput Chem. 2011;32(4):742-755. doi:10.1002/jcc.21643

Ploeger C, Schreck J, Huth T, Fraas A, Albrecht T, Charbel A, Ji J, Singer S, Breuhahn K, Pusch S, et al. STAT1 and STAT3 Exhibit a Crosstalk and Are Associated with Increased Inflammation in Hepatocellular Carcinoma. Cancers (Basel). 2022;14(5):1154. doi:10.3390/cancers14051154

Plovsing RR, Berg RM, Munthe-Fog L, Konge L, Iversen M, Møller K, Garred P. Alveolar recruitment of ficolin-3 in response to acute pulmonary inflammation in humans. Immunobiology. 2016;221(5):690-697. doi:10.1016/j.imbio.2015.11.015

Poels K, van Leent MMT, Reiche ME, Kusters PJH, Huveneers S, de Winther MPJ, Mulder WJM, Lutgens E, Seijkens TTP. Antibody-Mediated Inhibition of CTLA4 Aggravates Atherosclerotic Plaque Inflammation and Progression in Hyperlipidemic Mice. Cells. 2020;9(9):1987. doi:10.3390/cells9091987

Polat N, Yildiz A, Alan S, Toprak N. Association of pentraxin-3 with the severity of rheumatic mitral valve stenosis. Acta Cardiol. 2015;70(4):409-413. doi:10.1080/ac.70.4.3094649

Poloni G, Calore M, Rigato I, Marras E, Minervini G, Mazzotti E, Lorenzon A, Li Mura IEA, Telatin A, Zara I, et al. A targeted next-generation gene panel reveals a novel heterozygous nonsense variant in the TP63 gene in patients with arrhythmogenic cardiomyopathy. Heart Rhythm. 2019;16(5):773-780. doi:10.1016/j.hrthm.2018.11.015

Popineau L, Morzyglod L, Carré N, Caüzac M, Bossard P, Prip-Buus C, Lenoir V, Ragazzon B, Fauveau V, Robert L, et al. Novel Grb14-Mediated Cross Talk between Insulin and p62/Nrf2 Pathways Regulates Liver Lipogenesis and Selective Insulin Resistance. Mol Cell Biol. 2016;36(16):2168-2181. doi:10.1128/MCB.00170-16

Powell CB, Alabaster A, Armstrong MA, Stoller N, Raine-Bennett T. Risk of cardiovascular disease in women with BRCA1 and BRCA2 mutations. Gynecol Oncol. 2018;151(3):489-493. doi:10.1016/j.ygyno.2018.10.010

Prapiadou S, Živković L, Thorand B, George MJ, van der Laan SW, Malik R, Herder C, Koenig W, Ueland T, Kleveland O, Aukrust P, et al. Proteogenomic Data Integration Reveals CXCL10 as a Potentially Downstream Causal Mediator for IL-6 Signaling on Atherosclerosis. Circulation. 2024;149(9):669-683. doi:10.1161/CIRCULATIONAHA.123.064974

Pressler SJ, Jung M, Dorsey SG, Giordani B, Titler MG, Wierenga KL, Clark DG, Smith DG, Smith AB, Gradus-Pizlo I, et al. Atrial Fibrillation and Older Age Predict Serum Brain-Derived Neurotrophic Factor Levels Among Patients With Heart Failure. J Cardiovasc Nurs. 2024. doi:10.1097/JCN.0000000000001110

Prickett TCR, Lunt H, Warwick J, Heenan HF, Espiner EA. Urinary Amino-Terminal Pro-C-Type Natriuretic Peptide: A Novel Marker of Chronic Kidney

Disease in Diabetes. Clin Chem. 2019;65(10):1248-1257. doi:10.1373/clinchem.2019.306910

Prickett TCR, Troughton RW, Espiner EA. Effect of statin therapy on plasma C-type Natriuretic Peptides and Endothelin-1 in males with and without symptomatic coronary artery disease. Sci Rep. 2020;10(1):7927. doi:10.1038/s41598-020-64795-7

Prohászka Z, Munthe-Fog L, Ueland T, Gombos T, Yndestad A, Förhécz Z, Skjoedt MO, Pozsonyi Z, Gustavsen A, Jánoskuti L, et al. Association of ficolin-3 with severity and outcome of chronic heart failure. PLoS One. 2013;8(4):e60976. doi:10.1371/journal.pone.0060976

Ptaszynska-Kopczynska K, Marcinkiewicz-Siemion M, Lisowska A, Waszkiewicz E, Witkowski M, Jasiewicz M, Miklasz P, Jakim P, Galar B, Musial WJ, et al. Alterations of soluble TWEAK and CD163 concentrations in patients with chronic heart failure. Cytokine. 2016;80:7-12. doi:10.1016/j.cyto.2016.02.005

Pucci S, Mazzarelli P, Zonetti MJ, Fisco T, Bonanno E, Spagnoli LG, Mauriello A. CX3CR1 receptor polymorphisms, Th1 cell recruitment, and acute myocardial infarction outcome: looking for a link. Biomed Res Int. 2013;2013:451349. doi:10.1155/2013/451349

Puckelwartz MJ, Pesce LL, Dellefave-Castillo LM, Wheeler MT, Pottinger TD, Robinson AC, Kearns SD, Gacita AM, Schoppen ZJ, Pan W, et al. Genomic Context Differs Between Human Dilated Cardiomyopathy and Hypertrophic Cardiomyopathy. J Am Heart Assoc. 2021;10(7):e019944. doi:10.1161/JAHA.120.019944

Purushothaman KR, Purushothaman M, Turnbull IC, Adams DH, Anyanwu A, Krishnan P, Kini A, Sharma SK, O'Connor WN, Moreno PR. Association of altered collagen content and lysyl oxidase expression in degenerative mitral valve disease. Cardiovasc Pathol. 2017;29:11-18. doi:10.1016/j.carpath.2017.04.001

Puzianowska-Kuźnicka M. ESR1 in myocardial infarction. Clin Chim Acta. 2012;413(1-2):81-87. doi:10.1016/j.cca.2011.10.028

Qi H, Ren J, Ba L, Song C, Zhang Q, Cao Y, Shi P, Fu B, Liu Y, Sun H. MSTN Attenuates Cardiac Hypertrophy through Inhibition of Excessive Cardiac Autophagy by Blocking AMPK /mTOR and miR-128/PPARγ/NF-κB. Mol Ther Nucleic Acids. 2020;19:507-522. doi:10.1016/j.omtn.2019.12.003

Qi H, Ren J, E M, Zhang Q, Cao Y, Ba L, Song C, Shi P, Fu B, Sun H. MiR-103 inhibiting cardiac hypertrophy through inactivation of myocardial cell autophagy via targeting TRPV3 channel in rat hearts. J Cell Mol Med. 2019;23(3):1926-1939. doi:10.1111/jcmm.14095

Qi P, Zhai Q, Zhang X. RUNX1 facilitates heart failure progression through regulating TGF-β-induced cardiac remodeling. PeerJ. 2023;11:e16202. doi:10.7717/peerj.16202

Qiao L, Li SM, Liu JN, Duan HL, Jiang XF. Revealing the regulation of allergic asthma airway epithelial cell inflammation by STEAP4 targeting MIF through machine learning algorithms and single-cell sequencing analysis. Front Mol Biosci. 2024;11:1427352. doi:10.3389/fmolb.2024.1427352

Qiao Q, Zhao CM, Yang CX, Gu JN, Guo YH, Zhang M, Li RG, Qiu XB, Xu YJ, Yang YQ. Detection and functional characterization of a novel MEF2A variation responsible for familial dilated cardiomyopathy. Clin Chem Lab Med. 2020;59(5):955-963. doi:10.1515/cclm-2020-1318

Qin YW, Ye P, He JQ, Sheng L, Wang LY, Du J. Simvastatin inhibited cardiac hypertrophy and fibrosis in apolipoprotein E-deficient mice fed a "Western-style diet" by increasing PPAR α and γ expression and reducing TC, MMP-9, and Cat S levels. Acta Pharmacol Sin. 2010;31(10):1350-1358. doi:10.1038/aps.2010.109

Qiu CR, Fu Q, Sui J, Zhang Q, Wei P, Wu Y, Zhu K, Lu Y, Wan P. Analysis of Serum Endothelial Cell-Specific Molecule 1 (Endocan) Level in Type 2 Diabetes Mellitus With Acute ST-Segment Elevation Myocardial Infarction and its Correlation: A Pilot Study. Angiology. 2017;68(1):74-78. doi:10.1177/0003319716634581

Qiu J, Zhang Z, Hu Y, Guo Y, Liu C, Chen Y, Wang D, Su J, Wang S, Ni M, et al. Transferrin receptor levels and its rare variant are associated with human obesity. J Diabetes. 2024;16(1):e13467. doi:10.1111/1753-0407.13467

Qiu Y, Xu S, Chen X, Wu X, Zhou Z, Zhang J, Tu Q, Dong B, Liu Z, He J, et al. NAD+ exhaustion by CD38 upregulation contributes to blood pressure elevation and vascular damage in hypertension. Signal Transduct Target Ther. 2023;8(1):353. doi:10.1038/s41392-023-01577-3

Quintanilla M, Montero-Montero L, Renart J, Martín-Villar E. Podoplanin in Inflammation and Cancer. Int J Mol Sci. 2019;20(3):707. doi:10.3390/ijms20030707

Radu AD, Cojocaru C, Onciul S, Scarlatescu A, Zlibut A, Nastasa A, Dorobantu M. Cardiac Resynchronization Therapy and Hypertrophic Cardiomyopathy: A Comprehensive Review. Biomedicines. 2023;11(2):350. doi:10.3390/biomedicines11020350

Raffield LM, Lu AT, Szeto MD, Little A, Grinde KE, Shaw J, Auer PL, Cushman M, Horvath S, Irvin MR, et al. Coagulation factor VIII: Relationship to cardiovascular disease risk and whole genome sequence and epigenome-wide analysis in African Americans. J Thromb Haemost. 2020;18(6):1335-1347. doi:10.1111/jth.14741

Rafnsson A, Matic LP, Lengquist M, Mahdi A, Shemyakin A, Paulsson-Berne G, Hansson GK, Gabrielsen A, Hedin U, Yang J, et al. Endothelin-1 increases expression and activity of arginase 2 via ETB receptors and is co-expressed with arginase 2 in human atherosclerotic plaques. Atherosclerosis. 2020;292:215-223. doi:10.1016/j.atherosclerosis.2019.09.020

Rahm AK, Wieder T, Gramlich D, Müller ME, Wunsch MN, El Tahry FA, Heimberger T, Weis T, Most P, Katus HA, et al. HDAC2-dependent remodeling of KCa2.2 (KCNN2) and KCa2.3 (KCNN3) K+ channels in atrial fibrillation with concomitant heart failure. Life Sci. 2021;266:118892. doi:10.1016/j.lfs.2020.118892

Raljević D, Peršić V, Markova-Car E, Cindrić L, Miškulin R, Žuvić M, Kraljević Pavelić S. Study of vitamin D receptor gene polymorphisms in a cohort of myocardial infarction patients with coronary artery disease. BMC Cardiovasc Disord. 2021;21(1):188. doi:10.1186/s12872-021-01959-x

Ramirez GA, Rovere-Querini P, Blasi M, Sartorelli S, Di Chio MC, Baldini M, De Lorenzo R, Bozzolo EP, Leone R, Mantovani A, et al. PTX3 Intercepts Vascular Inflammation in Systemic Immune-Mediated Diseases. Front Immunol. 2019;10:1135. doi:10.3389/fimmu.2019.01135

Ranjbarvaziri S, Kooiker KB, Ellenberger M, Fajardo G, Zhao M, Vander Roest AS, Woldeyes RA, Koyano TT, Fong R, Ma N, et al. Altered Cardiac Energetics and Mitochondrial Dysfunction in Hypertrophic Cardiomyopathy. Circulation. 2021;144(21):1714-1731. doi:10.1161/CIRCULATIONAHA.121.053575

Rasmussen KL. Plasma levels of apolipoprotein E, APOE genotype and risk of dementia and ischemic heart disease: A review. Atherosclerosis. 2016;255:145-155. doi:10.1016/j.atherosclerosis.2016.10.037

Rau CD, Romay MC, Tuteryan M, Wang JJ, Santolini M, Ren S, Karma A, Weiss JN, Wang Y, Lusis AJ. Systems Genetics Approach Identifies Gene Pathways and Adamts2 as Drivers of Isoproterenol-Induced Cardiac Hypertrophy and Cardiomyopathy in Mice. Cell Syst. 2017;4(1):121-128.e4. doi:10.1016/j.cels.2016.10.016

Raut SK, Kumar A, Singh GB, Nahar U, Sharma V, Mittal A, Sharma R, Khullar M. miR-30c Mediates Upregulation of Cdc42 and Pak1 in Diabetic Cardiomyopathy. Cardiovasc Ther. 2015;33(3):89-97. doi:10.1111/1755-5922.12113

Redondo M, Watzke HH, Stucki B, Sulzer I, Biasiutti FD, Binder BR, Furlan M, Lämmle B, Wuillemin WA. Coagulation factors II, V, VII, and X, prothrombin gene 20210G-->A transition, and factor V Leiden in coronary artery disease: high factor V clotting activity is an independent risk factor for myocardial infarction. Arterioscler Thromb Vasc Biol. 1999;19(4):1020-1025. doi:10.1161/01.atv.19.4.1020

Reimand J, Kull M, Peterson H, Hansen J, Vilo J. g:Profiler--a web-based toolset for functional profiling of gene lists from large-scale experiments. Nucleic Acids Res. 2007;35(Web Server issue):W193-W200. doi:10.1093/nar/gkm226

Ren M, Ye X, Ouyang C, Da Q, Xue W, Chen P. JMJD2A mediates transcriptional activation of SFRP4 and regulates oxidative stress and mitochondrial dysfunction in heart failure. Pathol Int. 2024;74(4):210-221. doi:10.1111/pin.13413

Ren X, Geng M, Xu K, Lu C, Cheng Y, Kong L, Cai Y, Hou W, Lu Y, Aihaiti Y, et al. Quantitative Proteomic Analysis of Synovial Tissue Reveals That Upregulated OLFM4 Aggravates Inflammation in Rheumatoid Arthritis. J Proteome Res. 2021;20(10):4746-4757. doi:10.1021/acs.jproteome.1c00399

Renard M, Callewaert B, Malfait F, Campens L, Sharif S, del Campo M, Valenzuela I, Mcwilliam C, Coucke P, De Paepe A, et al. Thoracic aortic-aneurysm and dissection in association with significant mitral valve disease caused by mutations in TGFB2. Int J Cardiol. 2013;165(3):584-587. doi:10.1016/j.ijcard.2012.09.029

Riascos-Bernal DF, Sibinga NE. Neutrophil extracellular traps in cardiac hypertrophy: a KLF2 perspective. J Clin Invest. 2022;132(3):e156453. doi:10.1172/JCI156453

Richmond JM, Patel D, Watanabe T, Chen HW, Martyanov V, Werner G, Garg M, Haddadi NS, Refat MA, Mahmoud BH, et al. CXCL9 Links Skin Inflammation and Fibrosis through CXCR3-Dependent Upregulation of Col1a1 in Fibroblasts. J Invest Dermatol. 2023;143(7):1138-1146.e12. doi:10.1016/j.jid.2022.11.025

Ridker PM, Hennekens CH, Lindpaintner K, Stampfer MJ, Eisenberg PR, Miletich JP. Mutation in the gene coding for coagulation factor V and the risk of myocardial infarction, stroke, and venous thrombosis in apparently healthy men. N Engl J Med. 1995;332(14):912-917. doi:10.1056/NEJM199504063321403

Rinne P, Lyytikäinen LP, Raitoharju E, Kadiri JJ, Kholova I, Kähönen M, Lehtimäki T, Oksala N. Pro-opiomelanocortin and its Processing Enzymes Associate with Plaque Stability in Human Atherosclerosis - Tampere Vascular Study. Sci Rep. 2018;8(1):15078. doi:10.1038/s41598-018-33523-7

Ristagno G, Varpula T, Masson S, Greco M, Bottazzi B, Milani V, Aleksova A, Sinagra G, Assandri R, Tiainen M, et al. Elevations of inflammatory markers PTX3 and sST2 after resuscitation from cardiac arrest are associated with multiple

organ dysfunction syndrome and early death. Clin Chem Lab Med. 2015;53(11):1847-1857. doi:10.1515/cclm-2014-1271

Rixon C, Andreassen K, Shen X, Erusappan PM, Almaas VM, Palmero S, Dahl CP, Ueland T, Sjaastad I, Louch WE, et al. Lumican accumulates with fibrillar collagen in fibrosis in hypertrophic cardiomyopathy. ESC Heart Fail. 2023;10(2):858-871. doi:10.1002/ehf2.14234

Riyaphan J, Pham DC, Leong MK, Weng CF. In Silico Approaches to Identify Polyphenol Compounds as α-Glucosidase and α-Amylase Inhibitors against Type-II Diabetes. Biomolecules. 2021;11(12):1877. doi:10.3390/biom11121877

Rizvi S, Raza ST, Rahman Q, Mahdi F, Zaidi ZH, Zaidi A. Mutation in the beta3 subunit of Guanine nucleotide-binding protein (GNB3) gene is not associated with Type II diabetes mellitus risk: a case-control study of a North Indian population. Biomarkers. 2017;22(8):782-789. doi:10.1080/1354750X.2017.1340974

Robin X, Turck N, Hainard A, Tiberti N, Lisacek F, Sanchez JC, Müller M. pROC: an open-source package for R and S+ to analyze and compare ROC curves. BMC Bioinformatics 2011;12:77. doi:10.1186/1471-2105-12-77

Rong J, Pan H, He J, Zhang Y, Hu Y, Wang C, Fu Q, Fan W, Zou Q, Zhang L, et al. Long non-coding RNA KCNQ1OT1/microRNA-204-5p/LGALS3 axis regulates myocardial ischemia/reperfusion injury in mice. Cell Signal. 2020;66:109441. doi:10.1016/j.cellsig.2019.109441

Rowin EJ, Link MS, Maron MS, Maron BJ. Evolving Contemporary Management of Atrial Fibrillation in Hypertrophic Cardiomyopathy. Circulation. 2023;148(22):1797-1811. doi:10.1161/CIRCULATIONAHA.123.065037

Rowinska Z, Koeppel TA, Sanati M, Schelzig H, Jankowski J, Weber C, Zernecke A, Liehn EA. Role of the CX3C chemokine receptor CX3CR1 in the pathogenesis of atherosclerosis after aortic transplantation. PLoS One. 2017;12(2):e0170644. doi:10.1371/journal.pone.0170644

Ruan W, Li T, Lee J, Bang IH, Deng W, Ma X, Yoo SH, Kim B, Li J, Yuan X, et al. The BMAL1/HIF2A heterodimer modulates circadian variations of myocardial injury. Preprint. Res Sq. 2024;rs.3.rs-3938716. doi:10.21203/rs.3.rs-3938716/v1

Rui H, Zhao F, Yuhua L, Hong J. Suppression of SMOC2 alleviates myocardial fibrosis via the ILK/p38 pathway. Front Cardiovasc Med. 2023;9:951704. doi:10.3389/fcvm.2022.951704

Ruppert V, Meyer T, Struwe C, Petersen J, Perrot A, Posch MG, Ozcelik C, Richter A, Maisch B, Pankuweit S; German Heart Failure Network. Evidence for CTLA4 as a susceptibility gene for dilated cardiomyopathy. Eur J Hum Genet. 2010;18(6):694-699. doi:10.1038/ejhg.2010.3

Sabharwal R, Mason BN, Kuburas A, Abboud FM, Russo AF, Chapleau MW. Increased receptor activity-modifying protein 1 in the nervous system is sufficient to protect against autonomic dysregulation and hypertension. J Cereb Blood Flow Metab. 2019;39(4):690-703. doi:10.1177/0271678X17751352

Sadoshima J, Qiu Z, Morgan JP, Izumo S. Angiotensin II and other hypertrophic stimuli mediated by G protein-coupled receptors activate tyrosine kinase, mitogen-activated protein kinase, and 90-kD S6 kinase in cardiac myocytes. The critical role of Ca(2+)-dependent signaling. Circ Res. 1995;76(1):1-15. doi:10.1161/01.res.76.1.1

Safa A, Rashidinejad HR, Khalili M, Dabiri S, Nemati M, Mohammadi MM, Jafarzadeh A. Higher circulating levels of chemokines CXCL10, CCL20 and CCL22 in patients with ischemic heart disease. Cytokine. 2016;83:147-157. doi:10.1016/j.cyto.2016.04.006

Saito N, Furuhashi M, Koyama M, Higashiura Y, Akasaka H, Tanaka M, Moniwa N, Ohnishi H, Saitoh S, Ura N, et al. Elevated circulating FABP4 concentration predicts cardiovascular death in a general population: a 12-year prospective study. Sci Rep. 2021;11(1):4008. doi:10.1038/s41598-021-83494-5

Sakamoto K, Kadomatsu K. Midkine in the pathology of cancer, neural disease, and inflammation. Pathol Int. 2012;62(7):445-455. doi:10.1111/j.1440-1827.2012.02815.x

Sakamuri SSVP, Watts R, Takawale A, Wang X, Hernandez-Anzaldo S, Bahitham W, Fernandez-Patron C, Lehner R, Kassiri Z. Absence of Tissue Inhibitor of Metalloproteinase-4 (TIMP4) ameliorates high fat diet-induced obesity in mice due

to defective lipid absorption. Sci Rep. 2017;7(1):6210. doi:10.1038/s41598-017-05951-4

Sakata Y, Kamei CN, Nakagami H, Bronson R, Liao JK, Chin MT. Ventricular septal defect and cardiomyopathy in mice lacking the transcription factor CHF1/Hey2. Proc Natl Acad Sci U S A. 2002;99(25):16197-16202. doi:10.1073/pnas.252648999

Sanchez PKM, Khazaei M, Gatineau E, Geravandi S, Lupse B, Liu H, Dringen R, Wojtusciszyn A, Gilon P, Maedler K, et al. LDHA is enriched in human islet alpha cells and upregulated in type 2 diabetes. Biochem Biophys Res Commun. 2021;568:158-166. doi:10.1016/j.bbrc.2021.06.06

Sanders OD, Rajagopal JA, Rajagopal L. Menthol to Induce Non-shivering Thermogenesis via TRPM8/PKA Signaling for Treatment of Obesity. J Obes Metab Syndr. 2021;30(1):4-11. doi:10.7570/jomes20038

Sandrini L, Di Minno A, Amadio P, Ieraci A, Tremoli E, Barbieri SS. Association between Obesity and Circulating Brain-Derived Neurotrophic Factor (BDNF) Levels: Systematic Review of Literature and Meta-Analysis. Int J Mol Sci. 2018;19(8):2281. doi:10.3390/ijms19082281

Sandstedt M, Rotter Sopasakis V, Lundqvist A, Vukusic K, Oldfors A, Dellgren G, Sandstedt J, Hultén LM. Hypoxic cardiac fibroblasts from failing human hearts decrease cardiomyocyte beating frequency in an ALOX15 dependent manner. PLoS One. 2018;13(8):e0202693. doi:10.1371/journal.pone.0202693

Santos LOD, Bispo AVS, Barros JV, Laranjeira RSM, Pinto RDN, Silva JA, Duarte AR, Araújo J, Sandrin-Garcia P, Crovella S, et al. CTLA-4 gene polymorphisms are associated with obesity in Turner Syndrome. Genet Mol Biol. 2018;41(4):727-734. doi:10.1590/1678-4685-GMB-2017-0312

Santos-Zas I, Lemarié J, Zlatanova I, Cachanado M, Seghezzi JC, Benamer H, Goube P, Vandestienne M, Cohen R, Ezzo M, et al. Cytotoxic CD8+ T cells promote granzyme B-dependent adverse post-ischemic cardiac remodeling. Nat Commun. 2021;12(1):1483. doi:10.1038/s41467-021-21737-9

Sarutipaiboon I, Settasatian N, Komanasin N, Kukongwiriyapan U, Sawanyawisuth K, Intharaphet P, Senthong V, Settasatian C. Association of Genetic Variations in NRF2, NQO1, HMOX1, and MT with Severity of Coronary Artery Disease and Related Risk Factors. Cardiovasc Toxicol. 2020;20(2):176-189. doi:10.1007/s12012-019-09544-7

Sasaki D, Kotoh J, Watadani R, Matsumoto K. New animal models reveal that coenzyme Q2 (Coq2) and placenta-specific 8 (Plac8) are candidate genes for the onset of type 2 diabetes associated with obesity in rats. Mamm Genome. 2015;26(11-12):619-629. doi:10.1007/s00335-015-9597-4

Sato K, Meng F, Venter J, Giang T, Glaser S, Alpini G. The role of the secretin/secretin receptor axis in inflammatory cholangiocyte communication via extracellular vesicles. Sci Rep. 2017;7(1):11183. doi:10.1038/s41598-017-10694-3

Sawada Y, Sakamoto Y, Toh M, Ohara N, Hatanaka Y, Naka A, Kishimoto Y, Kondo K, Iida K. Milk-derived peptide Val-Pro-Pro (VPP) inhibits obesity-induced adipose inflammation via an angiotensin-converting enzyme (ACE) dependent cascade. Mol Nutr Food Res. 2015;59(12):2502-2510. doi:10.1002/mnfr.201500324

Sawicki MP. Knocking out answers to diabetes: role of SSTR5. J Surg Res. 2006;131(1):131-132. doi:10.1016/j.jss.2005.09.015

Sbrana S, Nunziata A, Storti S, Haxhiademi D, Mazzone A, Leone M, Solinas M, Del Sarto P. Differential modulatory effects of Propofol and Sevoflurane anesthesia on blood monocyte HLA-DR and CD163 expression during and after cardiac surgery with cardiopulmonary bypass: a preliminary randomized flow cytometry study. Perfusion. 2020;35(1):48-56. doi:10.1177/0267659119848295

Schädlich IS, Schnapauff O, Pöls L, Schrader J, Tolosa E, Rissiek B, Magnus T. Nt5e deficiency does not affect post-stroke inflammation and lesion size in a murine ischemia/reperfusion stroke model. iScience. 2022;25(6):104470. doi:10.1016/j.isci.2022.104470

Schaefer MH, Lopes TJ, Mah N, Shoemaker JE, Matsuoka Y, Fontaine JF, Louis-Jeune C, Eisfeld AJ, Neumann G, Perez-Iratxeta C, et al. Adding protein context to

the human protein-protein interaction network to reveal meaningful interactions. PLoS Comput Biol. 2013;9(1):e1002860. doi:10.1371/journal.pcbi.1002860

Schiffrin EL. Does Endothelin-1 Raise or Lower Blood Pressure in Humans?. Nephron. 2018;139(1):47-50. doi:10.1159/000487346

Schnatz PF, Nudy M, O'Sullivan DM, Jiang X, Cline JM, Kaplan JR, Clarkson TB, Appt SE. The quantification of vitamin D receptors in coronary arteries and their association with atherosclerosis. Maturitas. 2012;73(2):143-147. doi:10.1016/j.maturitas.2012.03.014

Schneider A, Suman A, Rossi L, Barmada MM, Beglinger C, Parvin S, Sattar S, Ali L, Khan AK, Gyr N, et al. SPINK1/PSTI mutations are associated with tropical pancreatitis and type II diabetes mellitus in Bangladesh. Gastroenterology. 2002;123(4):1026-1030. doi:10.1053/gast.2002.36059

Schories C, Martus P, Guan T, Henes JK, Witte A, Müller K, Geisler T, Chatterjee M, Gawaz M, Rath D. Platelet versus plasma CXCL14, coronary artery disease, and clinical outcomes. Res Pract Thromb Haemost. 2023;7(4):100165. doi:10.1016/j.rpth.2023.100165

Schramm C, Fine DM, Edwards MA, Reeb AN, Krenz M. The PTPN11 loss-of-function mutation Q510E-Shp2 causes hypertrophic cardiomyopathy by dysregulating mTOR signaling. Am J Physiol Heart Circ Physiol. 2012;302(1):H231-H243. doi:10.1152/ajpheart.00665.2011

Schreieck J, Dostal S, von Beckerath N, Wacker A, Flory M, Weyerbrock S, Koch W, Schömig A, Schmitt C. C825T polymorphism of the G-protein beta3 subunit gene and atrial fibrillation: association of the TT genotype with a reduced risk for atrial fibrillation. Am Heart J. 2004;148(3):545-550. doi:10.1016/j.ahj.2004.03.024

Schubert K, Polte T, Bönisch U, Schader S, Holtappels R, Hildebrandt G, Lehmann J, Simon JC, Anderegg U, Saalbach A. Thy-1 (CD90) regulates the extravasation of leukocytes during inflammation. Eur J Immunol. 2011;41(3):645-656. doi:10.1002/eji.201041117

Schupp M, Lefterova MI, Janke J, Leitner K, Cristancho AG, Mullican SE, Qatanani M, Szwergold N, Steger DJ, Curtin JC, et al. Retinol saturase promotes

adipogenesis and is downregulated in obesity. Suh, Moojin. Proc Natl Acad Sci U S A. 2009;106(4):1105-1110. doi:10.1073/pnas.0812065106

Schwarz A, Kinscherf R, Bonaterra GA. Role of the Stress- and Inflammation-Induced Cytokine GDF-15 in Cardiovascular Diseases: From Basic Research to Clinical Relevance. Rev Cardiovasc Med. 2023;24(3):81. doi:10.31083/j.rcm2403081

Sciacqua A, Presta I, Perticone M, Tassone EJ, Andreozzi F, Quitadamo MC, Sangiuolo FC, Sesti G, Perticone F. 3'-UTR OLR1/LOX-1 gene polymorphism and endothelial dysfunction: molecular and vascular data in never-treated hypertensive patients. Intern Emerg Med. 2014;9(3):273-281. doi:10.1007/s11739-012-0857-y

Seidman CE, Seidman JG. Identifying sarcomere gene mutations in hypertrophic cardiomyopathy: a personal history. Circ Res. 2011;108(6):743-750. doi:10.1161/CIRCRESAHA.110.223834

Seiler C, Jenni R, Krayenbuehl HP. Intraventricular blood flow during isovolumetric relaxation and diastole in hypertrophic cardiomyopathy. J Am Soc Echocardiogr. 1991;4(3):247-257. doi:10.1016/s0894-7317(14)80024-2

Sekar D, Dillmann C, Sirait-Fischer E, Fink AF, Zivkovic A, Baum N, Strack E, Klatt S, Zukunft S, Wallner S, et al. Phosphatidylserine Synthase PTDSS1 Shapes the Tumor Lipidome to Maintain Tumor-Promoting Inflammation. Cancer Res. 2022;82(8):1617-1632. doi:10.1158/0008-5472.CAN-20-3870

Sellier AB, Seiler-Mußler S, Emrich IE, Böhm M, Fliser D, Zawada AM, Heine GH. FGFR4 and Klotho Polymorphisms Are Not Associated with Cardiovascular Outcomes in Chronic Kidney Disease. Am J Nephrol. 2021;52(10-11):808-816. doi:10.1159/000519274

Senagolage MD, Sommars MA, Ramachandran K, Futtner CR, Omura Y, Allred AL, Wang J, Yang C, Procissi D, Evans RM, et al. Loss of Transcriptional Repression by BCL6 Confers Insulin Sensitivity in the Setting of Obesity. Cell Rep. 2018;25(12):3283-3298.e6. doi:10.1016/j.celrep.2018.11.074

Seuffert F, Weidner D, Baum W, Schett G, Stock M. Upper zone of growth plate and cartilage matrix associated protein protects cartilage during inflammatory arthritis. Arthritis Res Ther. 2018;20(1):88. doi:10.1186/s13075-018-1583-2

Shahgoli VK, Dubik M, Pilecki B, Skallerup S, Schmidt SG, Detlefsen S, Sorensen GL, Holmskov U, Baradaran B, Moeller JB. Expression of FIBCD1 by intestinal epithelial cells alleviates inflammation-driven tumorigenesis in a mouse model of colorectal cancer. Front Oncol. 2023;13:1280891. doi:10.3389/fonc.2023.1280891

Shan T, Li X, Xie W, Wang S, Gao Y, Zheng Y, Su G, Li Y, Zhao Z. Rap1GAP exacerbates myocardial infarction by regulating the AMPK/SIRT1/NF-κB signaling pathway. Cell Signal. 2024;117:111080. doi:10.1016/j.cellsig.2024.111080

Shang AQ, Yu CJ, Bi X, Jiang WW, Zhao ML, Sun Y, Guan H, Zhang ZR. Blocking CTLA-4 promotes pressure overload-induced heart failure via activating Th17 cells. FASEB J. 2024;38(15):e23851. doi:10.1096/fj.202400384R

Shannon P, Markiel A, Ozier O, Baliga NS, Wang JT, Ramage D, Amin N, Schwikowski B, Ideker T Cytoscape: a software environment for integrated models of biomolecular interaction networks. Genome Res 2003;13(11):2498-2504. doi:10.1101/gr.1239303

Shao A, Shi J, Liang Z, Pan L, Zhu W, Liu S, Xu J, Guo Y, Cheng Y, Qiao Y. Meta-analysis of the association between Apolipoprotein E polymorphism and risks of myocardial infarction. BMC Cardiovasc Disord. 2022;22(1):126. doi:10.1186/s12872-022-02566-0

Shao X, Wu B, Chen P, Hua F, Cheng L, Li F, Zhan Y, Liu C, Ji L, Min Z, et al. Circulating CX3CR1+CD163+ M2 monocytes markedly elevated and correlated with cardiac markers in patients with acute myocardial infarction. Ann Transl Med. 2020;8(9):578. doi:10.21037/atm-20-383

Sharma N, Drobinski P, Kayed A, Chen Z, Kjelgaard-Petersen CF, Gantzel T, Karsdal MA, Michaelis M, Ladel C, Bay-Jensen AC, et al. Inflammation and joint destruction may be linked to the generation of cartilage metabolites of ADAMTS-5 through activation of toll-like receptors. Osteoarthritis Cartilage. 2020;28(5):658-668. doi:10.1016/j.joca.2019.11.002

Sharma UC, Pokharel S, van Brakel TJ, van Berlo JH, Cleutjens JP, Schroen B, André S, Crijns HJ, Gabius HJ, Maessen J,et al. Galectin-3 marks activated macrophages in failure-prone hypertrophied hearts and contributes to cardiac dysfunction. Circulation. 2004;110(19):3121-3128. doi:10.1161/01.CIR.0000147181.65298.4D

Sharples AP, Al-Shanti N, Hughes DC, Lewis MP, Stewart CE. The role of insulin-like-growth factor binding protein 2 (IGFBP2) and phosphatase and tensin homologue (PTEN) in the regulation of myoblast differentiation and hypertrophy. Growth Horm IGF Res. 2013;23(3):53-61. doi:10.1016/j.ghir.2013.03.004

Shen J, Song R, Ye Y, Wu X, Chow WH, Zhao H. HIF3A DNA methylation, obesity and weight gain, and breast cancer risk among Mexican American women. Obes Res Clin Pract. 2020;14(6):548-553. doi:10.1016/j.orcp.2020.10.001

Shen JF, Fan ZB, Wu CW, Qi GX, Cao QY, Xu F. Sacubitril Valsartan Enhances Cardiac Function and Alleviates Myocardial Infarction in Rats through a SUV39H1/SPP1 Axis. Oxid Med Cell Longev. 2022;2022:5009289. doi:10.1155/2022/5009289

Shen Y, Cheng F, Sharma M, Merkulova Y, Raithatha SA, Parkinson LG, Zhao H, Westendorf K, Bohunek L, Bozin T, et al. Granzyme B Deficiency Protects against Angiotensin II-Induced Cardiac Fibrosis. Am J Pathol. 2016;186(1):87-100. doi:10.1016/j.ajpath.2015.09.010

Sheng M, Lin Y, Xu D, Tian Y, Zhan Y, Li C, Farmer DG, Kupiec-Weglinski JW, Ke B. CD47-Mediated Hedgehog/SMO/GLI1 Signaling Promotes Mesenchymal Stem Cell Immunomodulation in Mouse Liver Inflammation. Hepatology. 2021;74(3):1560-1577. doi:10.1002/hep.31831

Shi H, Yu Y, Li D, Zhu K, Cheng X, Ma T, Tao Z, Hong Y, Liu Z, Zhou S, et al. TNIP3 protects against pathological cardiac hypertrophy by stabilizing STAT1. Cell Death Dis. 2024;15(6):450. doi:10.1038/s41419-024-06805-4

Shi Y, Zhao L, Wang J, Liu X, Bai Y, Cong H, Li X. Empagliflozin protects against heart failure with preserved ejection fraction partly by inhibiting the senescence-associated STAT1-STING axis. Cardiovasc Diabetol. 2024;23(1):269. doi:10.1186/s12933-024-02366-0

Shima N, Yamamura A, Fujiwara M, Amano T, Matsumoto K, Sekine T, Okano H, Kondo R, Suzuki Y, Yamamura H. Up-regulated expression of two-pore domain K+ channels, KCNK1 and KCNK2, is involved in the proliferation and migration of pulmonary arterial smooth muscle cells in pulmonary arterial hypertension. Front Cardiovasc Med. 2024;11:1343804. doi:10.3389/fcvm.2024.1343804

Shimizu T, Suzuki S, Sato A, Nakamura Y, Ikeda K, Saitoh S, Misaka S, Shishido T, Kubota I, Takeishi Y. et al. Cardio-protective effects of pentraxin 3 produced from bone marrow-derived cells against ischemia/reperfusion injury. J Mol Cell Cardiol. 2015;89(Pt B):306-313. doi:10.1016/j.yjmcc.2015.10.013

Shnayder NA, Petrova MM, Moskaleva PV, Shesternya PA, Pozhilenkova EA, Nasyrova RF. The Role of Single-Nucleotide Variants of NOS1, NOS2, and NOS3 Genes in the Comorbidity of Arterial Hypertension and Tension-Type Headache. Molecules. 2021;26(6):1556. doi:10.3390/molecules26061556

Shobeiri P, Behnoush AH, Khalaji A, Teixeira AL, Rezaei N. Peripheral Levels of the Brain-Derived Neurotrophic Factor in Coronary Artery Disease: A Systematic Review and Meta-Analysis. J Tehran Heart Cent. 2023;18(4):244-255. doi:10.18502/jthc.v18i4.14823

Shukla PC, Singh KK, Quan A, Al-Omran M, Teoh H, Lovren F, Cao L, Rovira II, Pan Y, Brezden-Masley C, et al. BRCA1 is an essential regulator of heart function and survival following myocardial infarction. Nat Commun. 2011;2:593. doi:10.1038/ncomms1601

Shukla SK, Liu W, Sikder K, Addya S, Sarkar A, Wei Y, Rafiq K. HMGCS2 is a key ketogenic enzyme potentially involved in type 1 diabetes with high cardiovascular risk. Sci Rep. 2017;7(1):4590. doi:10.1038/s41598-017-04469-z

Shuvalova YA, Khasanova ZB, Kaminnaya VI, Samoilova EV, Korotaeva AA, Rubanovich AV, Kaminnyi AI. The association of PLA2G2A single nucleotide polymorphisms with type IIa secretory phospholipase A2 level but not its activity in patients with stable coronary heart disease. Gene. 2015;564(1):29-34. doi:10.1016/j.gene.2015.03.030

Siddiqui JA, Pothuraju R, Khan P, Sharma G, Muniyan S, Seshacharyulu P, Jain M, Nasser MW, Batra SK. Pathophysiological role of growth differentiation factor 15 (GDF15) in obesity, cancer, and cachexia. Cytokine Growth Factor Rev. 2022;64:71-83. doi:10.1016/j.cytogfr.2021.11.002

Sidibeh CO, Pereira MJ, Abalo XM, J Boersma G, Skrtic S, Lundkvist P, Katsogiannos P, Hausch F, Castillejo-López C, Eriksson JW. FKBP5 expression in human adipose tissue: potential role in glucose and lipid metabolism, adipogenesis and type 2 diabetes. Endocrine. 2018;62(1):116-128. doi:10.1007/s12020-018-1674-5

Sidore C, Orrù V, Cocco E, Steri M, Inshaw JR, Pitzalis M, Mulas A, McGurnaghan S, Frau J, Porcu E, et al. PRF1 mutation alters immune system activation, inflammation, and risk of autoimmunity. Mult Scler. 2021;27(9):1332-1340. doi:10.1177/1352458520963937

Simino J, Sung YJ, Kume R, Schwander K, Rao DC. Gene-alcohol interactions identify several novel blood pressure loci including a promising locus near SLC16A9. Front Genet. 2013;4:277. doi:10.3389/fgene.2013.00277

Simpson RU. Selective knockout of the vitamin d receptor in the heart results in cardiac hypertrophy: is the heart a drugable target for vitamin D receptor agonists?. Circulation. 2011;124(17):1808-1810. doi:10.1161/CIRCULATIONAHA.111.061234

Singh K, Prabhakaran D. Apolipoprotein B - An ideal biomarker for atherosclerosis?. Indian Heart J. 2024;76 Suppl 1(Suppl 1):S121-S129. doi:10.1016/j.ihj.2023.12.001

Singh NK, Kotla S, Dyukova E, Traylor JG Jr, Orr AW, Chernoff J, Marion TN, Rao GN. Disruption of p21-activated kinase 1 gene diminishes atherosclerosis in apolipoprotein E-deficient mice. Nat Commun. 2015;6:7450. doi:10.1038/ncomms8450

Singh S, McDonough CW, Gong Y, Alghamdi WA, Arwood MJ, Bargal SA, Dumeny L, Li WY, Mehanna M, Stockard B, et al. Genome Wide Association Study Identifies the HMGCS2 Locus to be Associated With Chlorthalidone

Induced Glucose Increase in Hypertensive Patients. J Am Heart Assoc. 2018;7(6):e007339. doi:10.1161/JAHA.117.007339

Singla B, Lin HP, Chen A, Ahn W, Ghoshal P, Cherian-Shaw M, White J, Stansfield BK, Csányi G. Role of R-spondin 2 in arterial lymphangiogenesis and atherosclerosis. Cardiovasc Res. 2021;117(6):1489-1509. doi:10.1093/cvr/cvaa244

Siontis KC, Geske JB, Ong K, Nishimura RA, Ommen SR, Gersh BJ. Atrial fibrillation in hypertrophic cardiomyopathy: prevalence, clinical correlations, and mortality in a large high-risk population. J Am Heart Assoc. 2014;3(3):e001002. doi:10.1161/JAHA.114.001002

Siranart N, Laohasurayotin K, Phanthong T, Sowalertrat W, Ariyachaipanich A, Chokesuwattanaskul R. Proenkephalin as a Novel Prognostic Marker in Heart Failure Patients: A Systematic Review and Meta-Analysis. Int J Mol Sci. 2023;24(5):4887. doi:10.3390/ijms24054887

Sivakumar P, Gupta S, Sarkar S, Sen S. Upregulation of lysyl oxidase and MMPs during cardiac remodeling in human dilated cardiomyopathy. Mol Cell Biochem. 2008;307(1-2):159-167. doi:10.1007/s11010-007-9595-2

Sivaraman V, Hausenloy DJ, Kolvekar S, Hayward M, Yap J, Lawrence D, Di Salvo C, Yellon DM. The divergent roles of protein kinase C epsilon and delta in simulated ischaemia-reperfusion injury in human myocardium. J Mol Cell Cardiol. 2009;46(5):758-764. doi:10.1016/j.yjmcc.2009.02.013

Skjøt-Arkil H, Clausen RE, Rasmussen LM, Wang W, Wang Y, Zheng Q, Mickley H, Saaby L, Diederichsen AC, Lambrechtsen J, et al. Acute Myocardial Infarction and Pulmonary Diseases Result in Two Different Degradation Profiles of Elastin as Quantified by Two Novel ELISAs. PLoS One. 2013;8(6):e60936. doi:10.1371/journal.pone.0060936

Smoljan I, Detel D, Buljevic S, Erjavec I, Marić I. Therapeutic Potential of BMP7 in the Treatment of Osteoporosis Caused by the Interaction between Inflammation and Corticosteroids in Inflammatory Bowel Disease. Biomedicines. 2023;11(8):2161. doi:10.3390/biomedicines11082161

Snider JC, Riley LA, Mallory NT, Bersi MR, Umbarkar P, Gautam R, Zhang Q, Mahadevan-Jansen A, Hatzopoulos AK, Maroteaux L, et al. Targeting 5-HT2B Receptor Signaling Prevents Border Zone Expansion and Improves Microstructural Remodeling After Myocardial Infarction. Circulation. 2021;143(13):1317-1330. doi:10.1161/CIRCULATIONAHA.120.051517

Sökmen E, Uçar C, Sivri S, Çelik M, Güçlü K. Relationship of growth differentiation factor-15 with aortic stiffness in essential hypertension. Future Sci OA. 2019;5(7):FSO406. doi:10.2144/fsoa-2019-0029

Soman A, Asha Nair S. Unfolding the cascade of SERPINA3: Inflammation to cancer. Biochim Biophys Acta Rev Cancer. 2022;1877(5):188760. doi:10.1016/j.bbcan.2022.188760

Sommer J, Ehnis H, Seitz T, Schneider J, Wild AB, Moceri S, Buechler C, Bozec A, Weber GF, Merkel S, et al. Four-and-a-Half LIM-Domain Protein 2 (FHL2) Induces Neuropeptide Y (NPY) in Macrophages in Visceral Adipose Tissue and Promotes Diet-Induced Obesity. Int J Mol Sci. 2023;24(19):14943. doi:10.3390/ijms241914943

Song J, Chen Y, Chen Y, Wang S, Dong Z, Liu X, Li X, Zhang Z, Sun L, Zhong J. Ferrostatin-1 Blunts Right Ventricular Hypertrophy and Dysfunction in Pulmonary Arterial Hypertension by Suppressing the HMOX1/GSH Signaling. J Cardiovasc Transl Res. 2024;17(1):183-196. doi:10.1007/s12265-023-10423-4

Song NJ, Lee A, Yasmeen R, Shen Q, Yang K, Kumar SB, Muhanna D, Arnipalli S, Noria SF, Needleman BJ, et al. Epiregulin as an Alternative Ligand for Leptin Receptor Alleviates Glucose Intolerance without Change in Obesity. Cells. 2022;11(3):425. doi:10.3390/cells11030425

Song T, Yang J, Yao Y, Li H, Chen Y, Zhang J, Huang C. Spironolactone diminishes spontaneous ventricular premature beats by reducing HCN4 protein expression in rats with myocardial infarction. Mol Med Rep. 2011;4(3):569-573. doi:10.3892/mmr.2011.455

Song YJ, Kim A, Kim GT, Yu HY, Lee ES, Park MJ, Kim YJ, Shim SM, Park TS. Inhibition of lactate dehydrogenase A suppresses inflammatory response in RAW

264.7 macrophages. Mol Med Rep. 2019;19(1):629-637. doi:10.3892/mmr.2018.9678

Sonnenschein K, Fiedler J, de Gonzalo-Calvo D, Xiao K, Pfanne A, Just A, Zwadlo C, Soltani S, Bavendiek U, Kraft T, et al. Blood-based protein profiling identifies serum protein c-KIT as a novel biomarker for hypertrophic cardiomyopathy. Sci Rep. 2021;11(1):1755. doi:10.1038/s41598-020-80868-z

Sreenivasan J, Kaul R, Khan MS, Ranka S, Demmer RT, Yuzefpolskaya M, Aronow WS, Warraich HJ, Pan S, Panza JA, et al. eft Ventricular Assist Device Implantation in Hypertrophic and Restrictive Cardiomyopathy: A Systematic Review. ASAIO J. 2021;67(3):239-244. doi:10.1097/MAT.0000000000001238

Stanchev S, Gaydarski L, Dimitrova IN, Kotov G, Landzhov B, Kirkov V, Iliev A. Renal structural changes and apelin receptor expression in spontaneously hypertensive rats: implications for hypertension-induced kidney injury. Folia Morphol (Warsz). 2024. doi:10.5603/fm.100637

Stark K, Esslinger UB, Reinhard W, Petrov G, Winkler T, Komajda M, Isnard R, Charron P, Villard E, Cambien F, et al. Genetic association study identifies HSPB7 as a risk gene for idiopathic dilated cardiomyopathy. PLoS Genet. 2010;6(10):e1001167. doi:10.1371/journal.pgen.1001167

Stiebel-Kalish H, Rubarth K, Shouchane-Blum K, Tiosano A, Lotan I, Hellmann MA, Wilf-Yarkoni A, Bialer O, Flanagan EP, Pittock SJ, et al. Obesity is associated with myelin oligodendrocyte glycoprotein antibody-associated disease in acute optic neuritis. Sci Rep. 2022;12(1):21312. doi:10.1038/s41598-022-21592-8

Straub RH. TRPV1, TRPA1, and TRPM8 channels in inflammation, energy redirection, and water retention: role in chronic inflammatory diseases with an evolutionary perspective. J Mol Med (Berl). 2014;92(9):925-937. doi:10.1007/s00109-014-1175-9

Streff H, Bi W, Colón AG, Adesina AM, Miyake CY, Lalani SR. Amish nemaline myopathy and dilated cardiomyopathy caused by a homozygous contiguous gene deletion of TNNT1 and TNNI3 in a Mennonite child. Eur J Med Genet. 2019;62(11):103567. doi:10.1016/j.ejmg.2018.11.001

Strieder-Barboza C, Flesher CG, Geletka LM, Eichler T, Akinleye O, Ky A, Ehlers AP, Lumeng CN, O'Rourke RW. Lumican modulates adipocyte function in obesity-associated type 2 diabetes. Adipocyte. 2022;11(1):665-675. doi:10.1080/21623945.2022.2154112

Su SA, Yang D, Wu Y, Xie Y, Zhu W, Cai Z, Shen J, Fu Z, Wang Y, Jia L, et al. EphrinB2 Regulates Cardiac Fibrosis Through Modulating the Interaction of Stat3 and TGF-β/Smad3 Signaling. Circ Res. 2017;121(6):617-627. doi:10.1161/CIRCRESAHA.117.311045

Su T, Huang C, Yang C, Jiang T, Su J, Chen M, Fatima S, Gong R, Hu X, Bian Z, et al. Apigenin inhibits STAT3/CD36 signaling axis and reduces visceral obesity. Pharmacol Res. 2020;152:104586. doi:10.1016/j.phrs.2019.104586

Su YH, Wu YZ, Ann DK, Chen JL, Kuo CY. Obesity promotes radioresistance through SERPINE1-mediated aggressiveness and DNA repair of triple-negative breast cancer. Cell Death Dis. 2023;14(1):53. doi:10.1038/s41419-023-05576-8

Subramanian A, Tamayo P, Mootha VK, Mukherjee S, Ebert BL, Gillette MA, Paulovich A, Pomeroy SL, Golub TR, Lander ES,et al. Gene set enrichment analysis: a knowledge-based approach for interpreting genome-wide expression profiles. Proc Natl Acad Sci U S A. 2005;102(43):15545-15550. doi:10.1073/pnas.0506580102

Subramanian M, Sravani V, Krishna SP, Bijjam S, Sunehra C, Yalagudri S, Saggu DK, Narasimhan C.Efficacy of SGLT2 Inhibitors in Patients With Diabetes and Nonobstructive Hypertrophic Cardiomyopathy. Am J Cardiol. 2023;188:80-86. doi:10.1016/j.amjcard.2022.10.054

Suchacki KJ, Morton NM, Vary C, Huesa C, Yadav MC, Thomas BJ, Turban S, Bunger L, Ball D, Barrios-Llerena ME, et al. PHOSPHO1 is a skeletal regulator of insulin resistance and obesity. BMC Biol. 2020;18(1):149. doi:10.1186/s12915-020-00880-7

Suginobe H, Ishida H, Ishii Y, Ueda K, Yoshihara C, Ueyama A, Wang R, Tsuru H, Hashimoto K, Hirose M, et al. Isogenic pairs of induced-pluripotent stem-derived endothelial cells identify DYRK1A/PPARG/EGR1 pathway is responsible

for Down syndrome-associated pulmonary hypertension. Hum Mol Genet. 2023;33(1):78-90. doi:10.1093/hmg/ddad162

Sugiyama H, Nakamura K, Morita H, Akagi S, Tani Y, Katayama Y, Nishii N, Miyoshi T, Nagase S, Kohno K, et al. Circulating KCNH2 current-activating factor in patients with heart failure and ventricular tachyarrhythmia. PLoS One. 2011;6(5):e19897. doi:10.1371/journal.pone.0019897

Sugiyama M, Kikuchi A, Misu H, Igawa H, Ashihara M, Kushima Y, Honda K, Suzuki Y, Kawabe Y, Kaneko S, et al. Inhibin βE (INHBE) is a possible insulin resistance-associated hepatokine identified by comprehensive gene expression analysis in human liver biopsy samples. PLoS One. 2018;13(3):e0194798. doi:10.1371/journal.pone.0194798

Sullivan PM, Mezdour H, Aratani Y, Knouff C, Najib J, Reddick RL, Quarfordt SH, Maeda N. Targeted replacement of the mouse apolipoprotein E gene with the common human APOE3 allele enhances diet-induced hypercholesterolemia and atherosclerosis. J Biol Chem. 1997;272(29):17972-17980. doi:10.1074/jbc.272.29.17972

Sumi MP, Guru SA, Mir R, Masroor M, Bhat MA, Girish MP, Saxena A. Clinical Importance of Estrogen Receptor 1 (ESR1) Gene Polymorphisms and Their Expression Patterns in Coronary Artery Disease Patients: A Study from India. Indian J Clin Biochem. 2019;34(2):133-142. doi:10.1007/s12291-019-00827-y

Sun F, Chen G, Yang Y, Lei M. Fatty acid-binding protein 4 silencing protects against lipopolysaccharide-induced cardiomyocyte hypertrophy and apoptosis by inhibiting the Toll-like receptor 4-nuclear factor-κB pathway. J Int Med Res. 2021;49(3):300060521998233. doi:10.1177/0300060521998233

Sun H, Fang F, Li K, Zhang H, Zhang M, Zhang L, Li J, Qin Y, Wei Y. Circulating ESM-1 levels are correlated with the presence of coronary artery disease in patients with obstructive sleep apnea. Respir Res. 2019;20(1):188. doi:10.1186/s12931-019-1143-6

Sun J, Wang Y, Du Y, Zhang W, Liu Z, Bai J, Cui G, Du Z. Involvement of the JNK/HO□1/FTH1 signaling pathway in nanoplastic□induced inflammation and

ferroptosis of BV2 microglia cells. Int J Mol Med. 2023;52(1):61. doi:10.3892/ijmm.2023.5264

Sun L, Sun M, Ma K, Liu J. Let-7d-5p suppresses inflammatory response in neonatal rats with necrotizing enterocolitis via LGALS3-mediated TLR4/NF-κB signaling pathway. Am J Physiol Cell Physiol. 2020;319(6):C967-C979. doi:10.1152/ajpcell.00571.2019

Sun M, Wang W, Min L, Chen C, Li Q, Weng W. Secreted frizzled-related protein 5 (SFRP5) protects ATDC5 cells against LPS-induced inflammation and apoptosis via inhibiting Wnt5a/JNK pathway. J Orthop Surg Res. 2021;16(1):129. doi:10.1186/s13018-021-02260-5

Sun Y, Zhang XX, Huang S, Pan H, Gai YZ, Zhou YQ, Zhu L, Nie HZ, Li DX. Diet-Induced Obesity Promotes Liver Metastasis of Pancreatic Ductal Adenocarcinoma via CX3CL1/CX3CR1 Axis. J Immunol Res. 2022;2022:5665964. doi:10.1155/2022/5665964

Sung HH, Choo SH, Ko M, Kang SJ, Chae MR, Kam SC, Han DH, So I, Lee SW. Increased expression of TRPC4 channels associated with erectile dysfunction in diabetes. Andrology. 2014;2(4):550-558. doi:10.1111/j.2047-2927.2014.00214.x

Sure VN, Katakam PV. Janus face of thrombospondin-4: impairs small artery vasodilation but protects against cardiac hypertrophy and aortic aneurysm formation. Am J Physiol Heart Circ Physiol. 2016;310(11):H1383-H1384. doi:10.1152/ajpheart.00273.2016

Suwazono Y, Kobayashi E, Uetani M, Miura K, Morikawa Y, Ishizaki M, Kido T, Nakagawa H, Nogawa K. G-protein beta 3 subunit polymorphism C1429T and low-density lipoprotein receptor-related protein 5 polymorphism A1330V are risk factors for hypercholesterolemia in Japanese males--a prospective study over 5 years. Metabolism. 2006;55(6):751-757. doi:10.1016/j.metabol.2006.01.011

Suzuki Y, Okabayashi K, Hasegawa H, Tsuruta M, Seishima R, Tokuda T, Kitagawa Y. Role of EphB2/ephrin-B1 signalling in the development and progression of obesity-associated colorectal cancer. Oncol Lett. 2022;24(3):316. doi:10.3892/ol.2022.13436

Sydorchuk A, Sydorchuk L, Gutnitska A, Vasyuk V, Tkachuk O, Dzhuryak V, Myshkovskii Y, Kyfiak P, Sydorchuk R, Iftoda O. The role of NOS3 (rs2070744) and GNB3 (rs5443) genes' polymorphisms in endothelial dysfunction pathway and carotid intima-media thickness in hypertensive patients. Gen Physiol Biophys. 2023;42(2):179-190. doi:10.4149/gpb_2022060

Szabó E, Kulin A, Mózner O, Korányi L, Literáti-Nagy B, Vitai M, Cserepes J, Sarkadi B, Várady G. Potential role of the ABCG2-Q141K polymorphism in type 2 diabetes. PLoS One. 2021;16(12):e0260957. doi:10.1371/journal.pone.0260957

Szöllősi AG, Vasas N, Angyal Á, Kistamás K, Nánási PP, Mihály J, Béke G, Herczeg-Lisztes E, Szegedi A, Kawada N, et al. Activation of TRPV3 Regulates Inflammatory Actions of Human Epidermal Keratinocytes. J Invest Dermatol. 2018;138(2):365-374. doi:10.1016/j.jid.2017.07.852

Tabassum R, Mahajan A, Dwivedi OP, Chauhan G, Spurgeon CJ, Kumar MV, Ghosh S, Madhu SV, Mathur SK, Chandak GR, et al. Common variants of SLAMF1 and ITLN1 on 1q21 are associated with type 2 diabetes in Indian population. J Hum Genet. 2012;57(3):184-190. doi:10.1038/jhg.2011.150

Takahashi Y, Yamazaki K, Kamatani Y, Kubo M, Matsuda K, Asai S. A genome-wide association study identifies a novel candidate locus at the DLGAP1 gene with susceptibility to resistant hypertension in the Japanese population. Sci Rep. 2021;11(1):19497. doi:10.1038/s41598-021-98144-z

Takawale A, Fan D, Basu R, Shen M, Parajuli N, Wang W, Wang X, Oudit GY, Kassiri Z. Myocardial recovery from ischemia-reperfusion is compromised in the absence of tissue inhibitor of metalloproteinase 4. Circ Heart Fail. 2014;7(4):652-662. doi:10.1161/CIRCHEARTFAILURE.114.001113

Takenaka H, Horiba M, Ishiguro H, Sumida A, Hojo M, Usui A, Akita T, Sakuma S, Ueda Y, Kodama I, et al. Midkine prevents ventricular remodeling and improves long-term survival after myocardial infarction. Am J Physiol Heart Circ Physiol. 2009;296(2):H462-H469. doi:10.1152/ajpheart.00733.2008

Tan L, Lu J, Zhang C, Meng L, Zhu Q. The proatherosclerotic function of BCAT1 in atherosclerosis development of aged-apolipoprotein E-deficient mice. Biochem Biophys Res Commun. 2022;631:93-101. doi:10.1016/j.bbrc.2022.09.041

Tan T, Tu L, Yu Y, He M, Zhou X, Yang L. Mechanisms by which silencing long-stranded noncoding RNA KCNQ1OT1 alleviates myocardial ischemia/reperfusion injury (MI/RI)-induced cardiac injury via miR-377-3p/HMOX1. BMC Cardiovasc Disord. 2024;24(1):19. doi:10.1186/s12872-023-03693-y

Tang H, Gupta A, Morrisroe SA, Bao C, Schwantes-An TH, Gupta G, Liang S, Sun Y, Chu A, Luo A, et al. Deficiency of the Deubiquitinase UCHL1 Attenuates Pulmonary Arterial Hypertension. Circulation. 2024;150(4):302-316. doi:10.1161/CIRCULATIONAHA.123.065304

Tang L, Yu X, Zheng Y, Zhou N. Inhibiting SLC26A4 reverses cardiac hypertrophy in H9C2 cells and in rats. PeerJ. 2020;8:e8253. doi:10.7717/peerj.8253

Tang M, Zhang Y, Zhang R, Zhang Y, Zheng J, Wang D, Wang X, Yan J, Hu C. GPSM1 in POMC neurons impairs brown adipose tissue thermogenesis and provokes diet-induced obesity. Mol Metab. 2024;79:101839. doi:10.1016/j.molmet.2023.101839

Tao R, Fan Q, Zhang H, Xie H, Lu L, Gu G, Wang F, Xi R, Hu J, Chen Q, et al. Prognostic Significance of Interleukin-34 (IL-34) in Patients With Chronic Heart Failure With or Without Renal Insufficiency. J Am Heart Assoc. 2017;6(4):e004911. doi:10.1161/JAHA.116.004911

Tarazón E, Roselló-Lletí E, Ortega A, Molina-Navarro MM, Sánchez-Lázaro I, Lago F, González-Juanatey JR, Rivera M, Portolés M. Differential gene expression of C-type natriuretic peptide and its related molecules in dilated and ischemic cardiomyopathy. A new option for the management of heart failure. Int J Cardiol. 2014;174(3):e84-e86. doi:10.1016/j.ijcard.2014.04.037

Taylor MR, Slavov D, Humphrey K, Zhao L, Cockroft J, Zhu X, Lavori P, Bristow MR, Mestroni L, Lazzeroni LC. Pharmacogenetic effect of an endothelin-1 haplotype on response to bucindolol therapy in chronic heart failure. Pharmacogenet Genomics. 2009;19(1):35-43. doi:10.1097/FPC.0b013e328317cc57

Teekakirikul P, Zhu W, Huang HC, Fung E. Hypertrophic Cardiomyopathy: An Overview of Genetics and Management. Biomolecules. 2019;9(12):878. doi:10.3390/biom9120878

Thanarajasingam U, Jensen MA, Dorschner JM, Wampler Muskardin T, Ghodke-Puranik Y, Purmalek M, Eliopoulos E, Zervou MI, Goulielmos GN, Howard M, et al. Brief Report: A Novel ELANE Mutation Associated With Inflammatory Arthritis, Defective NETosis, and Recurrent Parvovirus Infection. Arthritis Rheumatol. 2017;69(12):2396-2401. doi:10.1002/art.40314

Thomas PD. The Gene Ontology and the Meaning of Biological Function. Methods Mol Biol. 2017;1446:15□24. doi:10.1007/978-1-4939-3743-1_2

Tian N, Liu Q, Li Y, Tong L, Lu Y, Zhu Y, Zhang P, Chen H, Hu L, Meng J, et al. Transketolase Deficiency in Adipose Tissues Protects Mice From Diet-Induced Obesity by Promoting Lipolysis. Diabetes. 2020;69(7):1355-1367. doi:10.2337/db19-1087

Tian W, Chen C, Lei X, Zhao J, Liang J. CASTp 3.0: computed atlas of surface topography of proteins. Nucleic Acids Res. 2018;46(W1):W363-W367. doi:10.1093/nar/gky473

Tian Z, Gao H, Xia W, Lou Z. S1PR3 suppresses the inflammatory response and extracellular matrix degradation in human nucleus pulposus cells. Exp Ther Med. 2024;27(6):265. doi:10.3892/etm.2024.12553

Timmer SA, Knaapen P. Coronary microvascular function, myocardial metabolism, and energetics in hypertrophic cardiomyopathy: insights from positron emission tomography. Eur Heart J Cardiovasc Imaging. 2013;14(2):95-101. doi:10.1093/ehjci/jes242

Tolppanen AM, Kolehmainen M, Pulkkinen L, Uusitupa M. Tenomodulin gene and obesity-related phenotypes. Ann Med. 2010;42(4):265-275. doi:10.3109/07853891003801123

Tomaszewski M, Małkowska P, Sierawska O, Hrynkiewicz R, Mroczek E, Darocha S, Hymos A, Błaszczak P, Grywalska E, Niedźwiedzka-Rystwej P. CTLA-4 Expression Is a Promising Biomarker of Idiopathic Pulmonary Arterial

Hypertension and Allows Differentiation of the Type of Pulmonary Hypertension. Int J Mol Sci. 2022;23(24):15910. doi:10.3390/ijms232415910

Tong S, Ji Q, Du Y, Zhu X, Zhu C, Zhou Y. Sfrp5/Wnt Pathway: A Protective Regulatory System in Atherosclerotic Cardiovascular Disease. J Interferon Cytokine Res. 2019;39(8):472-482. doi:10.1089/jir.2018.0154

Tourdias T, Mori N, Dragonu I, Cassagno N, Boiziau C, Aussudre J, Brochet B, Moonen C, Petry KG, Dousset V. Differential aquaporin 4 expression during edema build-up and resolution phases of brain inflammation. J Neuroinflammation. 2011;8:143. doi:10.1186/1742-2094-8-143

Tower-Rader A, Betancor J, Lever HM, Desai MY. A Comprehensive Review of Stress Testing in Hypertrophic Cardiomyopathy: Assessment of Functional Capacity, Identification of Prognostic Indicators, and Detection of Coronary Artery Disease. J Am Soc Echocardiogr. 2017;30(9):829-844. doi:10.1016/j.echo.2017.05.017

Trabetti E, Biscuola M, Cavallari U, Malerba G, Girelli D, Olivieri O, Martinelli N, Corrocher R, Pignatti PF. On the association of the oxidised LDL receptor 1 (OLR1) gene in patients with acute myocardial infarction or coronary artery disease. Eur J Hum Genet. 2006;14(1):127-130. doi:10.1038/sj.ejhg.5201513

Tran DC, Le LHG, Thai TT, Van Hoang S, Do MD, Truong BQ. Effect of AGTR1 A1166C genetic polymorphism on coronary artery lesions and mortality in patients with acute myocardial infarction. PLoS One. 2024;19(4):e0300273. doi:10.1371/journal.pone.0300273

Tripathi R, Sullivan RD, Fan TM, Houng AK, Mehta RM, Reed GL, Gladysheva IP. Cardiac-Specific Overexpression of Catalytically Inactive Corin Reduces Edema, Contractile Dysfunction, and Death in Mice with Dilated Cardiomyopathy. Int J Mol Sci. 2019;21(1):203. doi:10.3390/ijms21010203

Trivedi CM, Cappola TP, Margulies KB, Epstein JA. Homeodomain only protein x is down-regulated in human heart failure. J Mol Cell Cardiol. 2011;50(6):1056-1058. doi:10.1016/j.yjmcc.2011.02.015

Trombetta M, Bonetti S, Boselli M, Turrini F, Malerba G, Trabetti E, Pignatti P, Bonora E, Bonadonna RC. CACNA1E variants affect beta cell function in patients with newly diagnosed type 2 diabetes. the Verona newly diagnosed type 2 diabetes study (VNDS) 3. PLoS One. 2012;7(3):e32755. doi:10.1371/journal.pone.0032755

Tsai CT, Hsieh CS, Chang SN, Chuang EY, Ueng KC, Tsai CF, Lin TH, Wu CK, Lee JK, Lin LY, et al. Genome-wide screening identifies a KCNIP1 copy number variant as a genetic predictor for atrial fibrillation. Nat Commun. 2016;7:10190. doi:10.1038/ncomms10190

Tsai CT, Lin JL, Lai LP, Lin CS, Huang SK. Membrane translocation of small GTPase Rac1 and activation of STAT1 and STAT3 in pacing-induced sustained atrial fibrillation. Heart Rhythm. 2008;5(9):1285-1293. doi:10.1016/j.hrthm.2008.05.012

Tsekmekidou X, Tsetsos F, Koufakis T, Karras SN, Georgitsi M, Papanas N, Papazoglou D, Roumeliotis A, Panagoutsos S, Thodis E, et al. ssociation between CUBN gene variants, type 2 diabetes and vitamin D concentrations in an elderly Greek population. J Steroid Biochem Mol Biol. 2020;198:105549. doi:10.1016/j.jsbmb.2019.105549

Tseng V, Collum SD, Allawzi A, Crotty K, Yeligar S, Trammell A, Ryan Smith M, Kang BY, Sutliff RL, Ingram JL, et al. 3'UTR shortening of HAS2 promotes hyaluronan hyper-synthesis and bioenergetic dysfunction in pulmonary hypertension. Matrix Biol. 2022;111:53-75. doi:10.1016/j.matbio.2022.06.001

Tsutsui M, Hirase R, Miyamura S, Nagayasu K, Nakagawa T, Mori Y, Shirakawa H, Kaneko S. TRPM2 Exacerbates Central Nervous System Inflammation in Experimental Autoimmune Encephalomyelitis by Increasing Production of CXCL2 Chemokines. J Neurosci. 2018;38(39):8484-8495. doi:10.1523/JNEUROSCI.2203-17.2018

Tudurachi BS, Zăvoi A, Leonte A, □ăpoi L, Ureche C, Bîrgoan SG, Chiuariu T, Anghel L, Radu R, Sascău RA, et al. Update on MYBPC3 Gene Mutation in Hypertrophic Cardiomyopathy. Int J Mol Sci. 2023;24(13):10510. doi:10.3390/ijms241310510

Turner CT, Lim D, Granville DJ. Granzyme B in skin inflammation and disease. Matrix Biol. 2019;75-76:126-140. doi:10.1016/j.matbio.2017.12.005

Ueda K, Adachi Y, Liu P, Fukuma N, Takimoto E. Regulatory Actions of Estrogen Receptor Signaling in the Cardiovascular System. Front Endocrinol (Lausanne). 2020;10:909. doi: 10.3389/fendo.2019.00909

Ungaro F, Tacconi C, Massimino L, Corsetto PA, Correale C, Fonteyne P, Piontini A, Garzarelli V, Calcaterra F, Della Bella S, et al. MFSD2A Promotes Endothelial Generation of Inflammation-Resolving Lipid Mediators and Reduces Colitis in Mice. Gastroenterology. 2017;153(5):1363-1377.e6. doi:10.1053/j.gastro.2017.07.048

UniProt Consortium. UniProt: the Universal Protein Knowledgebase in 2023. Nucleic Acids Res. 2023;51(D1):D523-D531. doi:10.1093/nar/gkac1052

Urbonaviciene G, Martin-Ventura JL, Lindholt JS, Urbonavicius S, Moreno JA, Egido J, Blanco-Colio LM. Impact of soluble TWEAK and CD163/TWEAK ratio on long-term cardiovascular mortality in patients with peripheral arterial disease. Atherosclerosis. 2011;219(2):892-899. doi:10.1016/j.atherosclerosis.2011.09.016

Vadasz Z, Balbir Gurman A, Meroni P, Farge D, Levi Y, Ingegnoli F, Braun-Moscovici Y, Rosner I, Slobodin G, Rozenbaum M, et al. Lysyl oxidase-a possible role in systemic sclerosis-associated pulmonary hypertension: a multicentre study. Rheumatology (Oxford). 2019;58(9):1547-1555. doi:10.1093/rheumatology/kez035

Valdivia CR, Ueda K, Ackerman MJ, Makielski JC. GPD1L links redox state to cardiac excitability by PKC-dependent phosphorylation of the sodium channel SCN5A. Am J Physiol Heart Circ Physiol. 2009;297(4):H1446-H1452. doi:10.1152/ajpheart.00513.2009

Valls-Lacalle L, Puertas-Umbert L, Varona S, Martínez-González J, Rodríguez C, Rodríguez-Sinovas A. Human Lysyl Oxidase Over-Expression Enhances Baseline Cardiac Oxidative Stress but Does Not Aggravate ROS Generation or Infarct Size Following Myocardial Ischemia-Reperfusion. Antioxidants (Basel). 2021;11(1):75. doi:10.3390/antiox11010075

van Bommel MHD, de Jong MA, Steenbeek MP, Bots ML, van Westerop LLM, Hopman MTE, Hoogerbrugge N, de Hullu JA, Maas AHEM. No signs of subclinical atherosclerosis after risk-reducing salpingo-oophorectomy in BRCA1/2 mutation carriers. J Cardiol. 2021;77(6):570-575. doi:10.1016/j.jjcc.2020.11.005

van de Pol V, Vos M, DeRuiter MC, Goumans MJ, de Vries CJM, Kurakula K. LIM-only protein FHL2 attenuates inflammation in vascular smooth muscle cells through inhibition of the NFκB pathway. Vascul Pharmacol. 2020;125-126:106634. doi:10.1016/j.vph.2019.106634

van der Zee PM, Biró E, Ko Y, de Winter RJ, Hack CE, Sturk A, Nieuwland R. P-selectin- and CD63-exposing platelet microparticles reflect platelet activation in peripheral arterial disease and myocardial infarction. Clin Chem. 2006;52(4):657-664. doi:10.1373/clinchem.2005.057414

van Hateren KJ, Landman GW, Arnold JF, Joosten H, Groenier KH, Navis GJ, Sparwasser A, Bakker SJ, Bilo HJ, Kleefstra N. Serum Proenkephalin A Levels and Mortality After Long-Term Follow-Up in Patients with Type 2 Diabetes Mellitus (ZODIAC-32). PLoS One. 2015;10(7):e0133065. doi:10.1371/journal.pone.0133065

Vanhaverbeke M, Vausort M, Veltman D, Zhang L, Wu M, Laenen G, Gillijns H, Moreau Y, Bartunek J, Van De Werf F, et al. Peripheral Blood RNA Levels of QSOX1 and PLBD1 Are New Independent Predictors of Left Ventricular Dysfunction After Acute Myocardial Infarction. Circ Genom Precis Med. 2019;12(12):e002656. doi:10.1161/CIRCGEN.119.002656

Varastehpour A, Radaelli T, Minium J, Ortega H, Herrera E, Catalano P, Hauguel-de Mouzon S. Activation of phospholipase A2 is associated with generation of placental lipid signals and fetal obesity. J Clin Endocrinol Metab. 2006;91(1):248-255. doi:10.1210/jc.2005-0873

Varga TV, Hallmans G, Hu FB, Renström F, Franks PW. Smoking status, snus use, and variation at the CHRNA5-CHRNA3-CHRNB4 locus in relation to obesity: the GLACIER study. Am J Epidemiol. 2013;178(1):31-37. doi:10.1093/aje/kws413

Vargas LA, Alvarez BV. Carbonic anhydrase XIV in the normal and hypertrophic myocardium. J Mol Cell Cardiol. 2012;52(3):741-752. doi:10.1016/j.yjmcc.2011.12.008

Varma PK, Neema PK. Hypertrophic cardiomyopathy: part 1 - introduction, pathology and pathophysiology. Ann Card Anaesth. 2014;17(2):118-124. doi:10.4103/0971-9784.129841

Varney MD, Valdes AM, Carlson JA, Noble JA, Tait BD, Bonella P, Lavant E, Fear AL, Louey A, Moonsamy P, et al. HLA DPA1, DPB1 alleles and haplotypes contribute to the risk associated with type 1 diabetes: analysis of the type 1 diabetes genetics consortium families. Diabetes. 2010;59(8):2055-2062. doi:10.2337/db09-0680

Velíšková J, Marra C, Liu Y, Shekhar A, Park DS, Iatckova V, Xie Y, Fishman GI, Velíšek L, Goldfarb M. Early onset epilepsy and sudden unexpected death in epilepsy with cardiac arrhythmia in mice carrying the early infantile epileptic encephalopathy 47 gain-of-function FHF1(FGF12) missense mutation. Epilepsia. 2021;62(7):1546-1558. doi:10.1111/epi.16916

Veluthakal R, Chepurny OG, Leech CA, Schwede F, Holz GG, Thurmond DC. Restoration of Glucose-Stimulated Cdc42-Pak1 Activation and Insulin Secretion by a Selective Epac Activator in Type 2 Diabetic Human Islets. Diabetes. 2018;67(10):1999-2011. doi:10.2337/db17-1174

Vera-Zambrano A, Lago-Docampo M, Gallego N, Franco-Gonzalez JF, Morales-Cano D, Cruz-Utrilla A, Villegas-Esguevillas M, Fernández-Malavé E, Escribano-Subías P, Tenorio-Castaño JA, et al. Novel Loss-of-Function KCNA5 Variants in Pulmonary Arterial Hypertension. Am J Respir Cell Mol Biol. 2023;69(2):147-158. doi:10.1165/rcmb.2022-0245OC

Verzola D, Milanesi S, Bertolotto M, Garibaldi S, Villaggio B, Brunelli C, Balbi M, Ameri P, Montecucco F, Palombo D, et al. Myostatin mediates abdominal aortic atherosclerosis progression by inducing vascular smooth muscle cell dysfunction and monocyte recruitment. Sci Rep. 2017;7:46362. doi:10.1038/srep4636

Verzola D, Milanesi S, Viazzi F, Ansaldo F, Saio M, Garibaldi S, Carta A, Costigliolo F, Salvidio G, Barisione C, et al. Enhanced myostatin expression and signalling promote tubulointerstitial inflammation in diabetic nephropathy. Sci Rep. 2020;10(1):6343. doi:10.1038/s41598-020-62875-2

Vilela VR, Samson N, Nachbar R, Perazza LR, Lachance G, Rokatoarivelo V, Centano-Baez C, Zancan P, Sola-Penna M, Bellmann K, et al. Adipocyte-specific Nos2 deletion improves insulin resistance and dyslipidemia through brown fat activation in diet-induced obese mice. Mol Metab. 2022;57:101437. doi:10.1016/j.molmet.2022.101437

Vimaleswaran KS, Franks PW, Brage S, Grontved A, Wareham NJ, Ekelund U, Loos RJ. Lack of association between PCK1 polymorphisms and obesity, physical activity, and fitness in European Youth Heart Study (EYHS). Obesity (Silver Spring). 2010;18(10):1975-1980. doi:10.1038/oby.2010.13

Viola HM, Richworth C, Solomon T, Chin IL, Szappanos HC, Sundararaj S, Shishmarev D, Casarotto MG, Choi YS, Hool LC. A maladaptive feedback mechanism between the extracellular matrix and cytoskeleton contributes to hypertrophic cardiomyopathy pathophysiology. Commun Biol. 2023;6(1):4. doi:10.1038/s42003-022-04278-9

Vlachou F, Varela A, Stathopoulou K, Ntatsoulis K, Synolaki E, Pratsinis H, Kletsas D, Sideras P, Davos CH, Capetanaki Y, et al. Galectin-3 interferes with tissue repair and promotes cardiac dysfunction and comorbidities in a genetic heart failure model. Cell Mol Life Sci. 2022;79(5):250. doi:10.1007/s00018-022-04266-6

von Beckerath N, Schusterschitz Y, Koch W, Griesser K, Mehilli J, Gorchakova O, Schömig A, Kastrati A. G protein beta 3 subunit 825T allele carriage and risk of coronary artery disease. Atherosclerosis. 2003;167(1):135-139. doi:10.1016/s0021-9150(02)00422-7

Wada K, Misaka T, Yokokawa T, Kimishima Y, Kaneshiro T, Oikawa M, Yoshihisa A, Takeishi Y. Blood-Based Epigenetic Markers of FKBP5 Gene Methylation in Patients With Dilated Cardiomyopathy. J Am Heart Assoc. 2021;10(21):e021101. doi:10.1161/JAHA.121.021101

Wågsäter D, Björk H, Zhu C, Björkegren J, Valen G, Hamsten A, Eriksson P. ADAMTS-4 and -8 are inflammatory regulated enzymes expressed in macrophage-rich areas of human atherosclerotic plaques. Atherosclerosis. 2008;196(2):514-522. doi:10.1016/j.atherosclerosis.2007.05.018

Walker JA, Sulciner ML, Nowicki KD, Miller AD, Burdo TH, Williams KC. Elevated numbers of CD163+ macrophages in hearts of simian immunodeficiency virus-infected monkeys correlate with cardiac pathology and fibrosis. AIDS Res Hum Retroviruses. 2014;30(7):685-694. doi:10.1089/AID.2013.0268

Wang B, Xu Y, Huang Y, Shao S, Xu D, Zhang Y, Pang L, Nan Z, Ye Q, Wang Y, et al. miR-210-5p Promotes Pulmonary Hypertension by Blocking ATP2A2. Cardiovasc Drugs Ther. 2024. doi:10.1007/s10557-024-07568-y

Wang BY, Hang JY, Zhong Y, Tan SJ. Association of genetic polymorphisms of SAA1 (rs12218) with myocardial infarction in a Chinese population. Genet Mol Res. 2014;13(2):3693-3696. doi:10.4238/2014.May.9.13

Wang C, Li X, Zhang W, Liu W, Lv Z, Gui R, Li M, Li Y, Sun X, Liu P, et al. ETNPPL impairs autophagy through regulation of the ARG2-ROS signaling axis, contributing to palmitic acid-induced hepatic insulin resistance. Free Radic Biol Med. 2023;199:126-140. doi:10.1016/j.freeradbiomed.2023.02.017

Wang C, Yin S, Wang Q, Jiang M, Li S, Zhen W, Duan Y, Gu H. miR-409-3p Regulated by GATA2 Promotes Cardiac Fibrosis through Targeting Gpd1. Oxid Med Cell Longev. 2022;2022:8922246. doi:10.1155/2022/8922246

Wang C, Zhou J, Wang S, Liu Y, Long K, Sun T, Zhi W, Yang Y, Zhang H, Zhao Y, et al. Guanxining injection alleviates fibrosis in heart failure mice and regulates SLC7A11/GPX4 axis. J Ethnopharmacol. 2023;310:116367. doi:10.1016/j.jep.2023.116367

Wang CC, Shang BB, Yang CW, Liu YF, Li XD, Wang SY. MicroRNA-325 alleviates myocardial fibrosis after myocardial infarction via downregulating GLI1. Eur Rev Med Pharmacol Sci. 2018;22(16):5339-5346. doi:10.26355/eurrev_201808_15735

Wang D, Gladysheva IP, Sullivan RD, Fan TM, Mehta RM, Tripathi R, Sun Y, Reed GL. Increases in plasma corin levels following experimental myocardial infarction reflect the severity of ischemic injury. PLoS One. 2018;13(9):e0202571. doi:10.1371/journal.pone.0202571

Wang F, Liu Y, Liao H, Xue Y, Zhan X, Fang X, Liang Y, Wei W, Rao F, Zhang Q, et al. Genetic Variants on SCN5A, KCNQ1, and KCNH2 in Patients with Ventricular Arrhythmias during Acute Myocardial Infarction in a Chinese Population. Cardiology. 2020;145(1):38-45. doi:10.1159/000502833

Wang G, van Driel BJ, Liao G, O'Keeffe MS, Halibozek PJ, Flipse J, Yigit B, Azcutia V, Luscinskas FW, Wang N, et al. Migration of myeloid cells during inflammation is differentially regulated by the cell surface receptors Slamf1 and Slamf8. PLoS One. 2015;10(3):e0121968. doi:10.1371/journal.pone.0121968

Wang H, Cao J, Su JB, Wang XQ, Wang X, Zhang DM, Wang XH. Serum fatty acid-binding protein 4 levels and responses of pancreatic islet β-cells and α-cells in patients with type 2 diabetes. Diabetol Metab Syndr. 2021;13(1):70. doi:10.1186/s13098-021-00690-z

Wang H, Li Z, Wang J, Sun K, Cui Q, Song L, Zou Y, Wang X, Liu X, Hui R, et al. Mutations in NEXN, a Z-disc gene, are associated with hypertrophic cardiomyopathy. Am J Hum Genet. 2010;87(5):687-693. doi:10.1016/j.ajhg.2010.10.002

Wang H, Wang C, Song X, Liu H, Zhang Y, Jiang P. Association of FKBP5 polymorphisms with patient susceptibility to coronary artery disease comorbid with depression. PeerJ. 2020;8:e9286. doi:10.7717/peerj.9286

Wang HW, Lin CP, Chiu JH, Chow KC, Kuo KT, Lin CS, Wang LS. Reversal of inflammation-associated dihydrodiol dehydrogenases (AKR1C1 and AKR1C2) overexpression and drug resistance in nonsmall cell lung cancer cells by wogonin and chrysin. Int J Cancer. 2007;120(9):2019-2027. doi:10.1002/ijc.22402

Wang J, Cai L, Huang G, Wang C, Zhang Z, Xu J. CENPA and BRCA1 are potential biomarkers associated with immune infiltration in heart failure and pan-cancer. Heliyon. 2024;10(7):e28786. doi:10.1016/j.heliyon.2024.e28786

Wang J, Sjöberg S, Tang TT, Oörni K, Wu W, Liu C, Secco B, Tia V, Sukhova GK, Fernandes C, et al. Cathepsin G activity lowers plasma LDL and reduces atherosclerosis. Biochim Biophys Acta. 2014;1842(11):2174-2183. doi:10.1016/j.bbadis.2014.07.026

Wang J, Wei T, Zhang W, Chu Y, Zhang D, Zhang M, Hu J, Ji Z, Hao Q. Inhibition of miR-194-5p avoids DUSP9 downregulation thus limiting sepsis-induced cardiomyopathy. Sci Rep. 2024;14(1):20313. doi:10.1038/s41598-024-71166-z

Wang J, Yang Y, Liu J, Qiu J, Zhang D, Ou M, Kang Y, Zhu T, Zhou C. Loss of sodium leak channel (NALCN) in the ventral dentate gyrus impairs neuronal activity of the glutamatergic neurons for inflammation-induced depression in male mice. Brain Behav Immun. 2023;110:13-29. doi:10.1016/j.bbi.2023.02.013

Wang JY, Zhang YJ, Li H, Hu XL, Li MP, Song PY, Ma QL, Peng LM, Chen XP. CRISPLD1 rs12115090 polymorphisms alters antiplatelet potency of clopidogrel in coronary artery disease patients in Chinese Han. Gene. 2018;678:226-232. doi:10.1016/j.gene.2018.08.027

Wang K, Meng X, Guo Z. Elastin Structure, Synthesis, Regulatory Mechanism and Relationship With Cardiovascular Diseases. Front Cell Dev Biol. 2021;9:596702. doi:10.3389/fcell.2021.596702

Wang K, Zhao J, Guo Z. Interaction of KCNA5, CX43, and CX40 proteins in the atrial muscle of patients with atrial fibrillation. Cell Biol Int. 2022;46(11):1834-1840. doi:10.1002/cbin.11864

Wang K, Zhou LY, Liu F, Lin L, Ju J, Tian PC, Liu CY, Li XM, Chen XZ, Wang T, et al. PIWI-Interacting RNA HAAPIR Regulates Cardiomyocyte Death After Myocardial Infarction by Promoting NAT10-Mediated ac4 C Acetylation of Tfec mRNA. Adv Sci (Weinh). 2022;9(8):e2106058. doi:10.1002/advs.202106058

Wang K, Zhou M, Zhang Y, Du Y, Li P, Guan C, Huang Z. IRX2 activated by jumonji domain-containing protein 2A is crucial for cardiac hypertrophy and dysfunction in response to the hypertrophic stimuli. Int J Cardiol. 2023;371:332-344. doi:10.1016/j.ijcard.2022.09.070

Wang KS, Zuo L, Pan Y, Xie C, Luo X. Genetic variants in the CPNE5 gene are associated with alcohol dependence and obesity in Caucasian populations. J Psychiatr Res. 2015;71:1-7. doi:10.1016/j.jpsychires.2015.09.008

Wang L, Dueker N, Beecham A, Blanton SH, Sacco RL, Rundek T. Targeted sequencing of linkage region in Dominican families implicates PRIMA1 and the SPATA7-PTPN21-ZC3H14-EML5-TTC8 locus in carotid-intima media thickness and atherosclerotic events. Sci Rep. 2019;9(1):11621. doi:10.1038/s41598-019-48186-1

Wang L, Li Z, Tan Y, Li Q, Yang H, Wang P, Lu J, Liu P. PARP1 interacts with STAT3 and retains active phosphorylated-STAT3 in nucleus during pathological myocardial hypertrophy. Mol Cell Endocrinol. 2018;474:137-150. doi:10.1016/j.mce.2018.02.020

Wang LF, Li Q, Wen K, Zhao QH, Zhang YT, Zhao JL, Ding Q, Guan XH, Xiao YF, Deng KY, et al. CD38 Deficiency Alleviates Diabetic Cardiomyopathy by Coordinately Inhibiting Pyroptosis and Apoptosis. Int J Mol Sci. 2023;24(21):16008. doi:10.3390/ijms242116008

Wang M, Gu M, Li Z, Lian X, Shen H, Dai Z, Zhang Z, Liu X. TNFRSF11B polymorphisms predict poor outcome after large artery atherosclerosis stroke. Gene. 2020;743:144617. doi:10.1016/j.gene.2020.144617

Wang M, Lee-Kim VS, Atri DS, Elowe NH, Yu J, Garvie CW, Won HH, Hadaya JE, MacDonald BT, Trindade K, et al. Rare, Damaging DNA Variants in CORIN and Risk of Coronary Artery Disease: Insights From Functional Genomics and Large-Scale Sequencing Analyses. Circ Genom Precis Med. 2021;14(5):e003399. doi:10.1161/CIRCGEN.121.003399

Wang P, Mao B, Luo W, Wei B, Jiang W, Liu D, Song L, Ji G, Yang Z, Lai YQ, et al. The alteration of Hippo/YAP signaling in the development of hypertrophic cardiomyopathy. Basic Res Cardiol. 2014;109(5):435. doi:10.1007/s00395-014-0435-8

Wang P, Qin W, Wang P, Huang Y, Liu Y, Zhang R, Li S, Yang Q, Wang X, Chen F, et al. Genomic Variants in NEURL, GJA1 and CUX2 Significantly Increase

Genetic Susceptibility to Atrial Fibrillation. Sci Rep. 2018;8(1):3297. doi:10.1038/s41598-018-21611-7

Wang Q, Li H, Lu H, Wang S, Li Y, Zhang Z, Han J, Yang Z, Yang Y, Hong Y. SAA1 exacerbates pancreatic β-cell dysfunction through activation of NF-κB signaling in high-fat diet-induced type 2 diabetes mice. Mol Cell Endocrinol. 2023;576:112043. doi:10.1016/j.mce.2023.112043

Wang Q, Wang H, Tian H, Niu S, Xu R. A Prospective Case-Control Study Examining the Relationship Between Frailty and Serum Myostatin in Older Persons with Chronic Heart Failure. Risk Manag Healthc Policy. 2023;16:1343-1349. doi:10.2147/RMHP.S412725

Wang R, Wang Y, Lin WK, Zhang Y, Liu W, Huang K, Terrar DA, Solaro RJ, Wang X, Ke Y, et al. Inhibition of angiotensin II-induced cardiac hypertrophy and associated ventricular arrhythmias by a p21 activated kinase 1 bioactive peptide. PLoS One. 2014;9(7):e101974. doi:10.1371/journal.pone.0101974

Wang S, Cao N. Uncovering potential differentially expressed miRNAs and targeted mRNAs in myocardial infarction based on integrating analysis. Mol Med Rep. 2020;22(5):4383-4395. doi:10.3892/mmr.2020.11517

Wang S, Chen Y, Wu C, Wang Y, Lin W, Bu R. Trehalose Alleviates Myocardial Ischemia/Reperfusion Injury by Inhibiting NLRP3-Mediated Pyroptosis. Appl Biochem Biotechnol. 2024;196(3):1194-1210. doi:10.1007/s12010-023-04613-8

Wang T, Sun H, Zhang M, Shen P, Li Y. B3GNT7 regulates mucin O-glycosylation to alleviate colonic inflammation. BMC Gastroenterol. 2024;24(1):202. doi:10.1186/s12876-024-03287-8

Wang T, Wu S, Ibrahim IAA, Fan L. Cardioprotective Role of Swertiamarin, a Plant Glycoside Against Experimentally Induced Myocardial Infarction via Antioxidant and Anti-inflammatory Functions. Appl BiochemBiotechnol. 2023;195(9):5394-5408. doi:10.1007/s12010-022-04094-1

Wang TT, Yu LL, Zheng JM, Han XY, Jin BY, Hua CJ, Chen YS, Shang SS, Liang YZ, Wang JR. Berberine Inhibits Ferroptosis and Stabilizes Atherosclerotic

Plaque through NRF2/SLC7A11/GPX4 Pathway. Chin J Integr Med. 2024. doi:10.1007/s11655-024-3666-z

Wang W, Liao X, Fukuda K, Knappe S, Wu F, Dries DL, Qin J, Wu Q. Corin variant associated with hypertension and cardiac hypertrophy exhibits impaired zymogen activation and natriuretic peptide processing activity. Circ Res. 2008;103(5):502-508. doi:10.1161/CIRCRESAHA.108.177352

Wang W, Ye J, Xu L, Mo DG, Chen C, Li T, Yao HC. The effects of IGF-1 and IGFBP-2 treatments on the atherosclerosis in the aorta and the coronary arteries of the high cholesterol diet-fed rabbits. Int Immunopharmacol. 2024;127:111409. doi:10.1016/j.intimp.2023.111409

Wang W, Yu K, Zhao SY, Mo DG, Liu JH, Han LJ, Li T, Yao HC. The impact of circulating IGF-1 and IGFBP-2 on cardiovascular prognosis in patients with acute coronary syndrome. Front Cardiovasc Med. 2023;10:1126093. doi:10.3389/fcvm.2023.1126093

Wang X, Adams LD, Pabón LM, Mahoney WM Jr, Beaudry D, Gunaje J, Geary RL, Deblois D, Schwartz SM. RGS5, RGS4, and RGS2 expression and aortic contractibility are dynamically co-regulated during aortic banding-induced hypertrophy. J Mol Cell Cardiol. 2008;44(3):539-550. doi:10.1016/j.yjmcc.2007.11.01

Wang X, Chen W, Zhang J, Khan A, Li L, Huang F, Qiu Z, Wang L, Chen X. Critical Role of ADAMTS2 (A Disintegrin and Metalloproteinase With Thrombospondin Motifs 2) in Cardiac Hypertrophy Induced by Pressure Overload. Hypertension. 2017;69(6):1060-1069. doi:10.1161/HYPERTENSIONAHA.116.08581

Wang X, Guan Z, Tang W, Wang X, Xu C, Shan E, Wang W, Gao Y. PAX5/ITGAX Contributed to the Progression of Atherosclerosis by Regulation of B Differentiation via TNF-α Signaling Pathway. DNA Cell Biol. 2023;42(2):97-104. doi:10.1089/dna.2022.0461

Wang X, Li H, Zhang A, Zhang Y, Li Z, Wang X, Gao M, Zhang Y, Hou Y. Diversity among differentially expressed genes in atrial appendages of atrial

fibrillation: The role and mechanism of SPP1 in atrial fibrosis. Int J Biochem Cell Biol. 2021;141:106074. doi:10.1016/j.biocel.2021.106074

Wang X, Liu W, Sun CL, Armenian SH, Hakonarson H, Hageman L, Ding Y, Landier W, Blanco JG, Chen L, et al. Hyaluronan synthase 3 variant and anthracycline-related cardiomyopathy: a report from the children's oncology group. J Clin Oncol. 2014;32(7):647-653. doi:10.1200/JCO.2013.50.3557

Wang X, Song J, Yuan Y, Li L, Abu-Taha I, Heijman J, Sun L, Dobrev S, Kamler M, Xie L, et al. Downregulation of FKBP5 Promotes Atrial Arrhythmogenesis. Circ Res. 2023;133(1):e1-e16. doi:10.1161/CIRCRESAHA.122.322213

Wang X, Song R, Li Z. Salviolone protects against high glucose-induced proliferation, oxidative stress, inflammation, and fibrosis of human renal mesangial cells by upregulating membrane metalloendopeptidase expression. Chem Biol Drug Des. 2023;101(4):819-828. doi:10.1111/cbdd.14183

Wang X, Yuan X, Su Y, Hu J, Ji Q, Fu S, Li R, Hu L, Dai C. Targeting Purinergic Receptor P2RX1 Modulates Intestinal Microbiota and Alleviates Inflammation in Colitis. Front Immunol. 2021;12:696766. doi:10.3389/fimmu.2021.696766

Wang XH, Zhang ZZ, Ou Y, Ning ZH, Yang JY, Huang H, Tang HF, Jiang ZS, Hu HJ. High-Salt Diet Inhibits the Expression of Bmal1 and Promotes Atrial Fibrosis and Vulnerability to Atrial Fibrillation in Dahl Salt-Sensitive Rats. Am J Hypertens. 2024;37(9):726-733. doi:10.1093/ajh/hpae069

Wang Y, Chen L, Zhang M, Li X, Yang X, Huang T, Ban Y, Li Y, Li Q, Zheng Y, et al. Exercise-induced endothelial Mecp2 lactylation suppresses atherosclerosis via the Ereg/MAPK signalling pathway. Atherosclerosis. 2023;375:45-58. doi:10.1016/j.atherosclerosis.2023.05.009

Wang Y, Huang J, Zhang F, Shen K, Qiu B. Knock-down of IGFBP2 ameliorates lung fibrosis and inflammation in rats with severe pneumonia through STAT3 pathway. Growth Factors. 2023;41(4):210-220. doi:10.1080/08977194.2023.2259497

Wang Y, Liu W, Xiao Y, Yuan H, Wang F, Jiang P, Luo Z. Association of Apelin and Apelin Receptor Polymorphisms With the Risk of Comorbid Depression and

Anxiety in Coronary Heart Disease Patients. Front Genet. 2020;11:893. doi:10.3389/fgene.2020.00893

Wang Y, Ping LF, Bai FY, Zhang XH, Li GH. Hmgcs2 is the hub gene in diabetic cardiomyopathy and is negatively regulated by Hmgcs2, promoting high glucose-induced cardiomyocyte injury. Immun Inflamm Dis. 2024;12(3):e1191. doi:10.1002/iid3.1191

Wang Y, Wu X. SMOC1 silencing suppresses the angiotensin II-induced myocardial fibrosis of mouse myocardial fibroblasts via affecting the BMP2/Smad pathway. Oncol Lett. 2018;16(3):2903-2910. doi:10.3892/ol.2018.8989

Wang Y, Wu Z, Luo H, Peng J, Raelson J, Ehret GB, Munroe PB, Stoyanova E, Qin Z, Cloutier G, et al. The role of GRIP1 and ephrin B3 in blood pressure control and vascular smooth muscle cell contractility. Sci Rep. 2016;6:38976. doi:10.1038/srep38976

Wang Y, Zhang Y, Li J, Li C, Zhao R, Shen C, Liu W, Rong J, Wang Z, Ge J, et al. Hypoxia Induces M2 Macrophages to Express VSIG4 and Mediate Cardiac Fibrosis After Myocardial Infarction. Theranostics. 2023;13(7):2192-2209. doi:10.7150/thno.78736

Wang YY, Morimoto S, Du CK, Lu QW, Zhan DY, Tsutsumi T, Ide T, Miwa Y, Takahashi-Yanaga F, Sasaguri T. Up-regulation of type 2 iodothyronine deiodinase in dilated cardiomyopathy. Cardiovasc Res. 2010;87(4):636-646. doi:10.1093/cvr/cvq133

Wang Z, Qiu Z, Hua S, Yang W, Chen Y, Huang F, Fan Y, Tong L, Xu T, Tong X, et al. Nuclear Tkt promotes ischemic heart failure via the cleaved Parp1/Aif axis. Basic Res Cardiol. 2022;117(1):18. doi:10.1007/s00395-022-00925-8

Wang Z, Ye D, Ye J, Wang M, Liu J, Jiang H, Xu Y, Zhang J, Chen J, Wan J. ADAMTS-5 Decreases in Coronary Arteries and Plasma from Patients with Coronary Artery Disease. Dis Markers. 2019;2019:6129748. doi:10.1155/2019/6129748

Warth A, Eckle T, Köhler D, Faigle M, Zug S, Klingel K, Eltzschig HK, Wolburg H. Upregulation of the water channel aquaporin-4 as a potential cause of

postischemic cell swelling in a murine model of myocardial infarction. Cardiology. 2007;107(4):402-410. doi:10.1159/000099060

Watanabe M, Horie H, Kurata Y, Inoue Y, Notsu T, Wakimizu T, Adachi M, Yamamoto K, Morikawa K, Kuwabara M, et al. Esm1 and Stc1 as Angiogenic Factors Responsible for Protective Actions of Adipose-Derived Stem Cell Sheets on Chronic Heart Failure After Rat Myocardial Infarction. Circ J. 2021;85(5):657-666. doi:10.1253/circj.CJ-20-0877

Waterhouse A, Bertoni M, Bienert S, Studer G, Tauriello G, Gumienny R, Heer FT, de Beer TAP, Rempfer C, Bordoli L et al SWISS-MODEL: homology modelling of protein structures and complexes. Nucleic Acids Res. 2018;46(W1):W296-W303. doi:10.1093/nar/gky427

Webb RJ, Mazidi M, Lip GYH, Kengne AP, Banach M, Davies IG. The role of adiposity, diet and inflammation on the discordance between LDL-C and apolipoprotein B. Nutr Metab Cardiovasc Dis. 2022;32(3):605-615. doi:10.1016/j.numecd.2021.12.004

Wei Y, Zhu M, Corbalán-Campos J, Heyll K, Weber C, Schober A. Regulation of Csf1r and Bcl6 in macrophages mediates the stage-specific effects of microRNA-155 on atherosclerosis. Arterioscler Thromb Vasc Biol. 2015;35(4):796-803. doi:10.1161/ATVBAHA.114.304723

Wei Z, Peterson JM, Lei X, Cebotaru L, Wolfgang MJ, Baldeviano GC, Wong GW. C1q/TNF-related protein-12 (CTRP12), a novel adipokine that improves insulin sensitivity and glycemic control in mouse models of obesity and diabetes. J Biol Chem. 2012;287(13):10301-10315. doi:10.1074/jbc.M111.303651

Wei-qing H, Qing-nuan K, Lin X, Cheng-hao G, Qi-yi Z. Expression of hyperpolarization-activated cyclic nucleotide-gated cation channel (HCN4) is increased in hypertrophic cardiomyopathy. Cardiovasc Pathol. 2011;20(2):110-113. doi:10.1016/j.carpath.2010.01.007

Weir RA, Clements S, Steedman T, Dargie HJ, McMurray JJ, Squire IB, Ng LL. Plasma TIMP-4 predicts left ventricular remodeling after acute myocardial infarction. J Card Fail. 2011;17(6):465-471. doi:10.1016/j.cardfail.2011.02.002

Weisheit CK, Kleiner JL, Rodrigo MB, Niepmann ST, Zimmer S, Duerr GD, Coburn M, Kurts C, Frede S, Eichhorn L. CX3CR1 is a prerequisite for the development of cardiac hypertrophy and left ventricular dysfunction in mice upon transverse aortic constriction. PLoS One. 2021;16(1):e0243788. doi:10.1371/journal.pone.0243788

Wen G, An W, Chen J, Maguire EM, Chen Q, Yang F, Pearce SWA, Kyriakides M, Zhang L, Ye S, et al. Genetic and Pharmacologic Inhibition of the Neutrophil Elastase Inhibits Experimental Atherosclerosis. J Am Heart Assoc. 2018;7(4):e008187.doi:10.1161/JAHA.117.008187

Wen G, Wessel J, Zhou W, Ehret GB, Rao F, Stridsberg M, Mahata SK, Gent PM, Das M, et al. An ancestral variant of Secretogranin II confers regulation by PHOX2 transcription factors and association with hypertension. Hum Mol Genet. 2007;16(14):1752-1764. doi:10.1093/hmg/ddm123

Westaway SK, Reinier K, Huertas-Vazquez A, Evanado A, Teodorescu C, Navarro J, Sinner MF, Gunson K, Jui J, Spooner P, et al. Common variants in CASQ2, GPD1L, and NOS1AP are significantly associated with risk of sudden death in patients with coronary artery disease. Circ Cardiovasc Genet. 2011;4(4):397-402. doi:10.1161/CIRCGENETICS.111.959916

Westermann D, Becher PM, Lindner D, Savvatis K, Xia Y, Fröhlich M, Hoffmann S, Schultheiss HP, Tschöpe C. Selective PDE5A inhibition with sildenafil rescues left ventricular dysfunction, inflammatory immune response and cardiac remodeling in angiotensin II-induced heart failure in vivo. Basic Res Cardiol. 2012;107(6):308. doi:10.1007/s00395-012-0308-y

Wetzl V, Tiede SL, Faerber L, Weissmann N, Schermuly RT, Ghofrani HA, Gall H. Plasma MMP2/TIMP4 Ratio at Follow-up Assessment Predicts Disease Progression of Idiopathic Pulmonary Arterial Hypertension. Lung. 2017;195(4):489-496. doi:10.1007/s00408-017-0014-5

Wheeler MT, Jacoby D, Elliott PM, Saberi S, Hegde SM, Lakdawala NK, Myers J, Sehnert AJ, Edelberg JM, Li W, et al. Effect of beta-blocker therapy on the response to mavacamten in patients with symptomatic obstructive hypertrophic cardiomyopathy. Eur J Heart Fail. 2023;25(2):260-270. doi:10.1002/ejhf.2737

Willmer T, Oosthuizen A, Dias S, Mendham AE, Goedecke JH, Pheiffer C. A pilot investigation of genetic and epigenetic variation of FKBP5 and response to exercise intervention in African women with obesity. Sci Rep. 2022;12(1):11771. doi:10.1038/s41598-022-15678-6

Witte A, Chatterjee M, Lang F, Gawaz M. Platelets as a Novel Source of Pro-Inflammatory Chemokine CXCL14. Cell Physiol Biochem. 2017;41(4):1684-1696. doi:10.1159/000471821

Wu D, Hu Q, Wang Y, Jin M, Tao Z, Wan J. Identification of HMOX1 as a Critical Ferroptosis-Related Gene in Atherosclerosis. Front Cardiovasc Med. 2022;9:833642. doi:10.3389/fcvm.2022.833642

Wu D, Wang S, Wang F, Zhang Q, Zhang Z, Li X. Lactate dehydrogenase A (LDHA)-mediated lactate generation promotes pulmonary vascular remodeling in pulmonary hypertension. J Transl Med. 2024;22(1):738. doi:10.1186/s12967-024-05543-7

Wu G, Tan J, Li J, Sun X, Du L, Tao S. miRNA-145-5p induces apoptosis after ischemia-reperfusion by targeting dual specificity phosphatase 6. J Cell Physiol. 2019;234(9):16281-16289. doi:10.1002/jcp.28291

Wu HH, Du JM, Liu P, Meng FL, Li YY, Li WJ, Wang SX, Du NL, Zheng Y, Zhang L, et al. LDHA contributes to nicotine induced cardiac fibrosis through autophagy flux impairment. Int Immunopharmacol. 2024;136:112338. doi:10.1016/j.intimp.2024.112338

Wu J, Cao J, Fan Y, Li C, Hu X. Comprehensive analysis of miRNA-mRNA regulatory network and potential drugs in chronic chagasic cardiomyopathy across human and mouse. BMC Med Genomics. 2021;14(1):283. doi:10.1186/s12920-021-01134-3

Wu J, Chen S, Wu P, Wang Y, Qi X, Zhang R, Liu Z, Wang D, Cheng Y. Cathepsin B/HSP70 complex induced by Ilexsaponin I suppresses NLRP3 inflammasome activation in myocardial ischemia/reperfusion injury. Phytomedicine. 2022;105:154358. doi:10.1016/j.phymed.2022.154358

Wu JJ, Jin J, Li YH, Wang C, Bai J, Jiang QJ, He TX, Nie SJ, Li DJ, Qu LF. LncRNA FGF7-5 and lncRNA GLRX3 together inhibits the formation of carotid plaque via regulating the miR-2681-5p/ERCC4 axis in atherosclerosis. Cell Cycle. 2023;22(2):165-182. doi:10.1080/15384101.2022.2110446

Wu L, Gao L, Zhang D, Yao R, Huang Z, Du B, Wang Z, Xiao L, Li P, Li Y, et al. C1QTNF1 attenuates angiotensin II-induced cardiac hypertrophy via activation of the AMPKa pathway. Free Radic Biol Med. 2018;121:215-230. doi:10.1016/j.freeradbiomed.2018.05.004

Wu P, Li Y, Cai M, Ye B, Geng B, Li F, Zhu H, Liu J, Wang X. Ubiquitin Carboxyl-Terminal Hydrolase L1 of Cardiomyocytes Promotes Macroautophagy and Proteostasis and Protects Against Post-myocardial Infarction Cardiac Remodeling and Heart Failure. Front Cardiovasc Med. 2022;9:866901. doi:10.3389/fcvm.2022.866901

Wu PB, Zhang Y, Nie G, Huang X, Yu YJ, Yin AN, Zhou R, He CP, Wang P. Association between genetic variants in ZNF365 and inflammatory bowel disease risk in Caucasians: a meta-analysis and trial sequential analysis. Expert Rev Clin Immunol. 2021;17(8):915-921. doi:10.1080/1744666X.2021.1939012

Wu PY, Lai SY, Su YT, Yang KC, Chau YP, Don MJ, Lu KH, Shy HT, Lai SM, Kung HN. β-Lapachone, an NQO1 activator, alleviates diabetic cardiomyopathy by regulating antioxidant ability and mitochondrial function. Phytomedicine. 2022;104:154255. doi:10.1016/j.phymed.2022.154255

Wu QQ, Xu M, Yuan Y, Li FF, Yang Z, Liu Y, Zhou MQ, Bian ZY, Deng W, Gao L, et al. Cathepsin B deficiency attenuates cardiac remodeling in response to pressure overload via TNF-α/ASK1/JNK pathway. Am J Physiol Heart Circ Physiol. 2015;308(9):H1143-H1154. doi:10.1152/ajpheart.00601.2014

Wu T, Wang Y, Shi W, Zhang BQ, Raelson J, Yao YM, Wu HD, Xu ZX, Marois-Blanchet FC, Ledoux J, et al. A Variant in the Nicotinic Acetylcholine Receptor Alpha 3 Subunit Gene Is Associated With Hypertension Risks in Hypogonadic Patients. Front Genet. 2020;11:539862. doi:10.3389/fgene.2020.539862

Wu T, Wu S, Li L, Xiang J, Wang N, Chen W, Zhang J. The impact of ABCB1, CYP3A4/5 and ABCG2 gene polymorphisms on rivaroxaban trough

concentrations and bleeding events in patients with non-valvular atrial fibrillation. Hum Genomics. 2023;17(1):59. doi:10.1186/s40246-023-00506-3

Wu W, Tang J, Bao W, Feng Q, Zheng J, Hong M, Guo S, Zhu Y, Huang S, Zhao M, et al. Thiols-rich peptide from water buffalo horn keratin alleviates oxidative stress and inflammation through co-regulating Nrf2/Hmox-1 and NF-κB signaling pathway. Free Radic Biol Med. 2024;223:131-143. doi:10.1016/j.freeradbiomed.2024.07.023

Wu X, Xin R, Zhang Y, Yang C, Sun F, Wang Y, Zheng F.Xuebijing improves inflammation and pyroptosis of acute lung injury by up-regulating miR-181d-5p-mediated SPP1 inactivation. Clinics (Sao Paulo). 2024;79:100336. doi:10.1016/j.clinsp.2024.100336

Wu X, Yuan C, Pan J, Zhou Y, Pan X, Kang J, Ren L, Gong L, Li Y. CXCL9, IL2RB, and SPP1, potential diagnostic biomarkers in the co-morbidity pattern of atherosclerosis and non-alcoholic steatohepatitis. Sci Rep. 2024;14(1):16364. doi:10.1038/s41598-024-66287-4

Wu X, Zhang N, Yu J, Liang M, Xu H, Hu J, Lin S, Qiu J, Lin C, Liu W, et al. The underlying mechanism of transcription factor IRF1, PRDM1, and ZNF263 involved in the regulation of NPPB rs3753581 on pulse pressure hypertension. Gene. 2023;878:147580. doi:10.1016/j.gene.2023.147580

Wu X, Zhang W. TRIM11 expression levels was downregulated and prevents ferroptosis of cardiomyocyte by Dusp6 in acute myocardial infarction. Anticancer Drugs. 2024;35(8):720-731. doi:10.1097/CAD.0000000000001614

Wu YT, Wu YT, Huang TC, Su FC, Jou IM, Wu CC. Sequential inflammation model for Achilles tendinopathy by elastin degradation with treadmill exercise. J Orthop Translat. 2020;23:113-121. doi:10.1016/j.jot.2020.03.004

Wu Z, Geng J, Bai Y, Qi Y, Chang C, Jiao Y, Guo Z. miR-125b-5p alleviates the damage of myocardial infarction by inhibiting the NFAT2 to reduce F2RL2 expression. Regen Med. 2023;18(7):543-559. doi:10.2217/rme-2022-0150

Wu Z, Liu Q, Cao Z, Li H, Zhou Y, Zhang P. Icariin decreases cell proliferation and inflammation of rheumatoid arthritis-fibroblast like synoviocytes via

GAREM1/MAPK signaling pathway. Immunopharmacol Immunotoxicol. 2024;46(1):86-92. doi:10.1080/08923973.2023.2253990

Wuest SJ, Horn T, Marti-Jaun J, Kühn H, Hersberger M. Association of polymorphisms in the ALOX15B gene with coronary artery disease. Clin Biochem. 2014;47(6):349-355. doi:10.1016/j.clinbiochem.2013.12.013

Xi R, Fan Q, Yan X, Zhang H, Xie H, Gu G, Xu Y, Wang F, Tao R. Increased Serum Interleukin-34 Levels Are Related to the Presence and Severity of Cardiac Dysfunction in Patients With Ischemic Cardiomyopathy. Front Physiol. 2018;9:904. doi:10.3389/fphys.2018.00904

Xia W, Zhu Z, Xiang S, Yang Y. Ginsenoside Rg5 promotes wound healing in diabetes by reducing the negative regulation of SLC7A11 on the efferocytosis of dendritic cells. J Ginseng Res. 2023;47(6):784-794. doi:10.1016/j.jgr.2023.06.006

Xiao S, Wang XB, Yang Y, Wang Q. Diagnostic role of SPP1 and collagen IV in a rat model of type 2 diabetes mellitus with MASLD. Sci Rep. 2024;14(1):13943. doi:10.1038/s41598-024-64857-0

Xiao S, Zhou Y, Wu Q, Liu Q, Chen M, Zhang T, Zhu H, Liu J, Yin T, Pan D. FCER1G and PTGS2 Serve as Potential Diagnostic Biomarkers of Acute Myocardial Infarction Based on Integrated Bioinformatics Analyses. DNA Cell Biol. 2021;40(8):1064-1075. doi:10.1089/dna.2020.6447

Xiao Y, Ni L, Shi H, Yang K, Yang J, Zhao J, Liu J, Luo P. SAA1 deficiency alleviates cardiac remodeling by inhibiting NF-κB/p38/JNK and TGFβ/Smad pathways. FASEB J. 2023;37(5):e22911. doi:10.1096/fj.202201506R

Xie M, Tang Q, Nie J, Zhang C, Zhou X, Yu S, Sun J, Cheng X, Dong N, Hu Y, et al. BMAL1-Downregulation Aggravates Porphyromonas Gingivalis-Induced Atherosclerosis by Encouraging Oxidative Stress. Circ Res. 2020;126(6):e15-e29. doi:10.1161/CIRCRESAHA.119.31550

Xie X, Yuan Y, Huang Y, Hong X, Hong S, Chen G, Chen Y, Lin Y, Lu W, Fu W, et al. Effects of COL1A1 and SYTL2 on inflammatory cell infiltration and poor extracellular matrix remodeling of the vascular wall in thoracic aortic aneurysm. Chin Med J (Engl). 2024;137(9):1105-1114. doi:10.1097/CM9.0000000000002808

Xie Y, Li Y, Chen J, Ding H, Zhang X. Early growth response-1: Key mediators of cell death and novel targets for cardiovascular disease therapy. Front Cardiovasc Med. 2023;10:1162662. doi:10.3389/fcvm.2023.1162662

Xie Z, Shen Y, Huang S, Shen W, Liu J. Abnormal ADAMTS2 and VSIG4 in Serum of HF Patients and their Relationship with CRP, UA, and HCY. Clin Lab. 2022;68(5):10.7754/Clin.Lab.2021.210811. doi:10.7754/Clin.Lab.2021.210811

Xing S, Pan N, Xu W, Zhang J, Li J, Dang C, Liu G, Pei Z, Zeng J. EphrinB2 activation enhances angiogenesis, reduces amyloid-β deposits and secondary damage in thalamus at the early stage after cortical infarction in hypertensive rats. J Cereb Blood Flow Metab. 2019;39(9):1776-1789. doi:10.1177/0271678X18769188

Xiong F, Mao R, Zhao R, Zhang L, Tan K, Liu C, Wang S, Xu M, Li Y, Zhang T. Plasma Exosomal S1PR5 and CARNS1 as Potential Non-invasive Screening Biomarkers of Coronary Heart Disease. Front Cardiovasc Med. 2022;9:845673. doi:10.3389/fcvm.2022.845673

Xiong G, Wu Z, Yi J, Fu L, Yang Z, Hsieh C, Yin M, Zeng X, Wu C, Lu A, et al. ADMETlab 2.0: an integrated online platform for accurate and comprehensive predictions of ADMET properties. Nucleic Acids Res. 2021;49(W1):W5-W14. doi:10.1093/nar/gkab255

Xiong J, Zhou R, Deng X. PRDX6 alleviated heart failure by inhibiting doxorubicin-induced ferroptosis through the JAK2/STAT1 pathway inactivation. In Vitro Cell Dev Biol Anim. 2024;60(4):354-364. doi:10.1007/s11626-024-00889-0

Xiong YS, Zhou YH, Rong GH, Wu WL, Liang Y, Yang ZX, Geng HL, Zhong RQ. Siglec-1 on monocytes is a potential risk marker for monitoring disease severity in coronary artery disease. Clin Biochem. 2009;42(10-11):1057-1063. doi:10.1016/j.clinbiochem.2009.02.026

Xu F, Chen Y, Tillman KA, Cui Y, Williams RW, Bhattacharya SK, Lu L, Sun Y. Characterizing modifier genes of cardiac fibrosis phenotype in hypertrophic cardiomyopathy. Int J Cardiol. 2021;330:135-141. doi:10.1016/j.ijcard.2021.01.047

Xu F, Zhu J, Chen Y, He K, Guo J, Bai S, Zhao R, Du J, Shen B. Physical interaction of tropomyosin 3 and STIM1 regulates vascular smooth muscle contractility and contributes to hypertension. Biomed Pharmacother. 2021;134:111126. doi:10.1016/j.biopha.2020.111126

Xu H, Wei Z, Chen B, Wang J, Weng H, Li J, Yang X, Zhao S. Granzyme B. Granzyme B PET imaging inflammation and remodeling in myocardial infarction. Eur J Nucl Med Mol Imaging. 2024;51(4):991-1001. doi:10.1007/s00259-023-06521-9

Xu L, Su Y, Yang X, Bai X, Wang Y, Zhuo C, Meng Z. Gramine protects against pressure overload-induced pathological cardiac hypertrophy through Runx1-TGFBR1 signaling. Phytomedicine. 2023;114:154779. doi:10.1016/j.phymed.2023.154779

Xu LJ, Wang HN, Zhou H, Li SY, Li F, Miao Y, Lei B, Sun XH, Gao F, Wang Z. EphA4/ephrinA3 reverse signaling induced Müller cell gliosis and production of pro-inflammatory cytokines in experimental glaucoma. Brain Res. 2023;1801:148204. doi:10.1016/j.brainres.2022.148204

Xu R, Bi Y, He X, Zhang Y, Zhao X. Kidney-tonifying blood-activating decoction delays ventricular remodeling in rats with chronic heart failure by regulating gut microbiota and metabolites and p38 mitogen-activated protein kinase/p65 nuclear factor kappa-B/aquaporin-4 signaling pathway. J Ethnopharmacol. 2024;330:118110. doi:10.1016/j.jep.2024.118110

Xu T, Xu L, Meng P, Ma X, Yang X, Zhou Y, Feng M. Angptl7 promotes insulin resistance and type 2 diabetes mellitus by multiple mechanisms including SOCS3-mediated IRS1 degradation. FASEB J. 2020;34(10):13548-13560. doi:10.1096/fj.202000246RR

Xu W, Barrientos T, Mao L, Rockman HA, Sauve AA, Andrews NC. Lethal Cardiomyopathy in Mice Lacking Transferrin Receptor in the Heart. Cell Rep. 2015;13(3):533-545. doi:10.1016/j.celrep.2015.09.023

Xu Y, Hu T, Ding H, Yuan Y, Chen R. miR-485-5p alleviates obstructive sleep apnea syndrome with hypertension by inhibiting PI3K/AKT signaling pathway via

downregulating HIF3A expression. Sleep Breath. 2023;27(1):109-119. doi:10.1007/s11325-022-02580-8

Xu Y, Hu Y, Geng Y, Zhao N, Jia C, Song H, Bai W, Guo C, Wang L, Ni Y, et al. Pentraxin 3 depletion (PTX3 KD) inhibited myocardial fibrosis in heart failure after myocardial infarction. Aging (Albany NY). 2022;14(9):4036-4049. doi:10.18632/aging.204070

Xu Y, Shi W, Song R, Long W, Guo H, Yuan S, Zhang T. Divergent patterns of genic copy number variation in KCNIP1 gene reveal risk locus of type 2 diabetes in Chinese population. Endocr J. 2018;65(5):537-545. doi:10.1507/endocrj.EJ17-0496

Xue L, Sun J, Liu J, Hu C, Wu D, Nie C, Zhang K, Wang Y, Zhao L, Li X, et al.Maternal secretin ameliorates obesity by promoting white adipose tissue browning in offspring. EMBO Rep. 2022;23(7):e54132. doi:10.15252/embr.202154132

Yakar Tülüce S, Tülüce K, Çil Z, Emren SV, Akyıldız Zİ, Ergene O. Galectin-3 levels in patients with hypertrophic cardiomyopathy and its relationship with left ventricular mass index and function. Anatol J Cardiol. 2016;16(5):344-348. doi:10.5152/AnatolJCardiol.2015.6191

Yalım Z, Onrat ST, Dural IE, Onrat E. Could Aneurysm and Atherosclerosis-Associated MicroRNAs (miR 24-1-5p, miR 34a-5p, miR 126-5p, miR 143-5p, miR 145-5p) Also Be Associated with Coronary Artery Ectasia?. Genet Test Mol Biomarkers. 2023;27(9):290-298. doi:10.1089/gtmb.2023.0002

Yamada Y, Sakuma J, Takeuchi I, Yasukochi Y, Kato K, Oguri M, Fujimaki T, Horibe H, Muramatsu M, Sawabe M, et al. Identification of STXBP2 as a novel susceptibility locus for myocardial infarction in Japanese individuals by an exome-wide association study. Oncotarget. 2017;8(20):33527-33535. doi:10.18632/oncotarget.16536

Yan J, Zhang Y, Yu H, Zong Y, Wang D, Zheng J, Jin L, Yu X, Liu C, Zhang Y, et al. GPSM1 impairs metabolic homeostasis by controlling a pro-inflammatory pathway in macrophages. Nat Commun. 2022;13(1):7260. doi:10.1038/s41467-022-34998-9

Yan Y, Du X, Dou X, Li J, Zhang W, Yang S, Meng W, Tian G. Effects of Ninjurin 2 polymorphisms on susceptibility to coronary heart disease. Cell Cycle. 2024;23(3):328-337. doi:10.1080/15384101.2024.2330225

Yanagisawa A, Suzuki K, Kimura A, Ito Y, Hamajima N, Inoue T. Possible protective effect of serum beta-carotene levels on the association between interleukin-1B C-31T polymorphism and hypertension in a Japanese population. Clin Nutr. 2009;28(2):198-202. doi:10.1016/j.clnu.2009.01.020

Yang C, Guo W, He R, Meng X, Fu J, Lu Y. Dietary capsaicin attenuates cardiac injury after myocardial infarction in type 2 diabetic mice by inhibiting ferroptosis through activation of TRPV1 and Nrf2/HMOX1 pathway. Int Immunopharmacol. 2024;140:112852. doi:10.1016/j.intimp.2024.112852

Yang C, Liu YH, Zheng HK. Identification of TFRC as a biomarker for pulmonary arterial hypertension based on bioinformatics and experimental verification. Respir Res. 2024;25(1):296. doi:10.1186/s12931-024-02928-6

Yang D, Jin C, Ma H, Huang M, Shi GP, Wang J, Xiang M. EphrinB2/EphB4 pathway in postnatal angiogenesis: a potential therapeutic target for ischemic cardiovascular disease. Angiogenesis. 2016;19(3):297-309. doi:10.1007/s10456-016-9514-9

Yang H, Graham LC, Reagan AM, Grabowska WA, Schott WH, Howell GR. Transcriptome profiling of brain myeloid cells revealed activation of Itgal, Trem1, and Spp1 in western diet-induced obesity. J Neuroinflammation. 2019;16(1):169. doi:10.1186/s12974-019-1527-z

Yang J, Griffiths M, Nies MK, Brandal S, Damico R, Vaidya D, Tao X, Simpson CE, Kolb TM, Mathai SC, et al. Insulin-like growth factor binding protein-2: a new circulating indicator of pulmonary arterial hypertension severity and survival. BMC Med. 2020;18(1):268. doi:10.1186/s12916-020-01734-3

Yang J, Liu H, Cao Q, Zhong W. Characteristics of CXCL2 expression in coronary atherosclerosis and negative regulation by microRNA-421. J Int Med Res. 2020;48(2):300060519896150. doi:10.1177/0300060519896150

Yang L, Lin Y, Wang C, Fan P. circSnd1 promotes atherosclerosis progression through the miR-485-3p/Olr1 signaling pathway. Heliyon. 2023;9(6):e17366. doi:10.1016/j.heliyon.2023.e17366

Yang Q, Langston JC, Tang Y, Kiani MF, Kilpatrick LE. The Role of Tyrosine Phosphorylation of Protein Kinase C Delta in Infection and Inflammation. Int J Mol Sci. 2019;20(6):1498. doi:10.3390/ijms20061498

Yang WY, Meng X, Wang YR, Wang QQ, He X, Sun XY, Cheng N, Zhang L. PRDX6 alleviates lipopolysaccharide-induced inflammation and ferroptosis in periodontitis. Acta Odontol Scand. 2022;80(7):535-546. doi:10.1080/00016357.2022.2047780

Yang XT, Wang ZJ. CD177 Expression and Inflammation Grade in Helicobacter pylori-Infected Wild-Type and CD177-/- C57BL/6 Mice. Anal Cell Pathol (Amst). 2019;2019:9506863. doi:10.1155/2019/9506863

Yang Y, Wang J, Tian Y, Li M, Xu S, Zhang L, Luo X, Tan Y, Liang H, Chen M. Equisetin protects from atherosclerosis in vivo by binding to STAT3 and inhibiting its activity. Pharmacol Res. 2024;206:107289. doi:10.1016/j.phrs.2024.107289

Yang Z, Zhou J, Wang H, Chen X, Sun Y, Jiang C, Liang P. Generation of a human induced pluripotent stem cell line from a hypertrophic cardiomyopathy patient carrying MYH6/c.611G>A mutation. Stem Cell Res. 2024. doi:10.1016/j.scr.2024.103533

Yao J, Ma R, Wang C, Zhao G. LncRNA-HOTAIR Inhibits H9c2 Apoptosis After Acute Myocardial Infarction via miR-206/FN1 Axis. Biochem Genet. 2022;60(5):1781-1792. doi:10.1007/s10528-022-10185-9

Yao Z, Hu W, Yin S, Huang Z, Zhu Q, Chen J, Zang Y, Dong L, Zhang J. 3,3'-Diindolymethane ameliorates adriamycin-induced cardiac fibrosis via activation of a BRCA1-dependent anti-oxidant pathway. Pharmacol Res. 2013;70(1):139-146. doi:10.1016/j.phrs.2013.01.006

Yarbrough WM, Baicu C, Mukherjee R, Van Laer A, Rivers WT, McKinney RA, Prescott CB, Stroud RE, Freels PD, Zellars KN, et al. Cardiac-restricted overexpression or deletion of tissue inhibitor of matrix metalloproteinase-4:

differential effects on left ventricular structure and function following pressure overload-induced hypertrophy. Am J Physiol Heart Circ Physiol. 2014;307(5):H752-H761. doi:10.1152/ajpheart.00063.2014

Ye M, Liu Y, Wang H, Tian N, Li W, He W, Lin H, Fan R, Li C, Liu D, et al. Serum apolipoprotein B is inversely associated with eccentric left ventricular hypertrophy in peritoneal dialysis patients. Int Urol Nephrol. 2018;50(1):155-165. doi:10.1007/s11255-017-1737-1

Ye Q, Liu Q, Ma X, Bai S, Chen P, Zhao Y, Bai C, Liu Y, Liu K, Xin M, et al. MicroRNA-146b-5p promotes atrial fibrosis in atrial fibrillation by repressing TIMP4. J Cell Mol Med. 2021;25(22):10543-10553. doi:10.1111/jcmm.16985

Yeh KH, Hsu LA, Juang JJ, Chiang FT, Teng MS, Tzeng IS, Wu S, Lin JF, Ko YL. Circulating serum amyloid A levels but not SAA1 variants predict long-term outcomes of angiographically confirmed coronary artery disease. Tzu Chi Med J. 2022;34(4):423-433. doi:10.4103/tcmj.tcmj_219_21

Yeo Y, Yi ES, Kim JM, Jo EK, Seo S, Kim RI, Kim KL, Sung JH, Park SG, Suh W. FGF12 (Fibroblast Growth Factor 12) Inhibits Vascular Smooth Muscle Cell Remodeling in Pulmonary Arterial Hypertension. Hypertension. 2020;76(6):1778-1786. doi:10.1161/HYPERTENSIONAHA.120.15068

Yi G, Liang M, Li M, Fang X, Liu J, Lai Y, Chen J, Yao W, Feng X, Hu L, et al. A large lung gene expression study identifying IL1B as a novel player in airway inflammation in COPD airway epithelial cells. Inflamm Res. 2018;67(6):539-551. doi:10.1007/s00011-018-1145-8

Yildirim Z, Kojic A, Yan CD, Wu MA, Vagelos R, Wu JC. Generation of two induced pluripotent stem cell lines from dilated cardiomyopathy patients caused by heterozygous mutations in the HCN4 gene. Stem Cell Res. 2022;65:102951. doi:10.1016/j.scr.2022.102951

Yin C, Vrieze AM, Rosoga M, Akingbasote J, Pawlak EN, Jacob RA, Hu J, Sharma N, Dikeakos JD, Barra L, et al. Efferocytic Defects in Early Atherosclerosis Are Driven by GATA2 Overexpression in Macrophages. Front Immunol. 2020;11:594136.doi:10.3389/fimmu.2020.594136

Ying X, Qian Y, Jiang Y, Jiang Z, Song Z, Zhao C. Association of the apolipoprotein B/apolipoprotein A-I ratio and low-density lipoprotein cholesterol with insulin resistance in a Chinese population with abdominal obesity. Acta Diabetol. 2012;49(6):465-472. doi:10.1007/s00592-012-0419-9

Yip HK, Wang PW, Chang LT, Youssef AA, Sheu JJ, Lee FY, Wu CJ. Cytotoxic T lymphocyte antigen 4 gene polymorphism associated with ST-segment elevation acute myocardial infarction. Circ J. 2007;71(8):1213-1218. doi:10.1253/circj.71.1213

Yokoyama A, Mizukami T, Matsui T, Yokoyama T, Kimura M, Matsushita S, Higuchi S, Maruyama K. Genetic polymorphisms of alcohol dehydrogenase-1B and aldehyde dehydrogenase-2 and liver cirrhosis, chronic calcific pancreatitis, diabetes mellitus, and hypertension among Japanese alcoholic men. Alcohol Clin Exp Res. 2013;37(8):1391-1401. doi:10.1111/acer.12108

Yokoyama M, Yagyu H, Hu Y, Seo T, Hirata K, Homma S, Goldberg IJ. Apolipoprotein B production reduces lipotoxic cardiomyopathy: studies in heart-specific lipoprotein lipase transgenic mouse. J Biol Chem. 2004;279(6):4204-4211. doi:10.1074/jbc.M311995200

Yoon PO, Lee MA, Cha H, Jeong MH, Kim J, Jang SP, Choi BY, Jeong D, Yang DK, Hajjar RJ, et al. The opposing effects of CCN2 and CCN5 on the development of cardiac hypertrophy and fibrosis. J Mol Cell Cardiol. 2010;49(2):294-303. doi:10.1016/j.yjmcc.2010.04.010

Yu FX, Ke JJ, Fu Y, Liao B, Shi YK. Protective effects of adenosine in rabbit sinoatrial node ischemia-reperfusion model in vivo: control of arrhythmia by hyperpolarization-activated cyclic nucleotide-gated (HCN)4 channels. Mol Biol Rep. 2011;38(3):1723-1731. doi:10.1007/s11033-010-0286-9

Yu GI, Song DK, Shin DH. Associations of IL1RAP and IL1RL1 gene polymorphisms with obesity and inflammation mediators. Inflamm Res. 2020;69(2):191-202. doi:10.1007/s00011-019-01307-y

Yu L, Ren L, Dong L. BMAL1 plays a critical role in the protection against cardiac hypertrophy through autophagy in vitro. BMC Cardiovasc Disord. 2022;22(1):381. doi:10.1186/s12872-022-02822-3

Yu M, Georges A, Tucker NR, Kyryachenko S, Toomer K, Schott JJ, Delling FN, Fernandez-Friera L, Solis J, Ellinor PT, et al. Genome-Wide Association Study-Driven Gene-Set Analyses, Genetic, and Functional Follow-Up Suggest GLIS1 as a Susceptibility Gene for Mitral Valve Prolapse. Circ Genom Precis Med. 2019;12(5):e002497. doi:10.1161/CIRCGEN.119.002497

Yu M, Wen N, Wenzhong Z, Yuanchang X, Xiaoming D, Yongjin L. Effect of repeated ischaemic preconditioning on TLR4 and proinflammatory cytokines TNF-α and IL-1β in myocardial ischaemia-reperfusion injury in a rat model. Arch Med Sci. 2010;6(6):843-847. doi:10.5114/aoms.2010.19289

Yu M, Xiang F, Beyer RP, Farin FM, Bammler TK, Chin MT. Transcription Factor CHF1/Hey2 Regulates Specific Pathways in Serum Stimulated Primary Cardiac Myocytes: Implications for Cardiac Hypertrophy. Curr Genomics. 2010;11(4):287-296. doi:10.2174/138920210791233117

Yu S, Chen J, Quan M, Li L, Li Y, Gao Y. CD63 negatively regulates hepatocellular carcinoma development through suppression of inflammatory cytokine-induced STAT3 activation. J Cell Mol Med. 2021;25(2):1024-1034. doi:10.1111/jcmm.16167

Yu W, Gao H, Hu T, Tan X, Liu Y, Liu H, He S, Chen Z, Guo S, Huang J. Insulin-like growth factor binding protein 2: a core biomarker of left ventricular dysfunction in dilated cardiomyopathy. Hereditas. 2023;160(1):36. doi:10.1186/s41065-023-00298-5

Yu Z, Liu Z, Jiao L, Zhang S, Nie L, Wang Y, Zhou L, Wang Y, Liu Z, Liu Z, et al. Bmal1 knockdown in the left stellate ganglion inhibits neural activity and prevents ventricular arrhythmias after myocardial ischemia. Front Cardiovasc Med. 2022;9:937608. doi:10.3389/fcvm.2022.937608

Yuan J, Fu X. MicroRNA-21 mediates the protective role of emulsified isoflurane against myocardial ischemia/reperfusion injury in mice by targeting SPP1. Cell Signal. 2021;86:110086. doi:10.1016/j.cellsig.2021.110086

Yuan Y, Meng L, Zhou Y, Lu N. Genetic polymorphism of angiotensin-converting enzyme and hypertrophic cardiomyopathy risk: A systematic review and meta-

analysis. Medicine (Baltimore). 2017;96(48):e8639. doi:10.1097/MD.0000000000008639

Zaki N, Efimov D, Berengueres J. Protein complex detection using interaction reliability assessment and weighted clustering coefficient. BMC Bioinformatics. 2013;14:163. doi:10.1186/1471-2105-14

Zanetti M, Zenti M, Barazzoni R, Zardi F, Semolic A, Messa MG, Mearelli F, Russi G, Fonda M, Scarano L, et al. HELP LDL apheresis reduces plasma pentraxin 3 in familial hypercholesterolemia. PLoS One. 2014;9(7):e101290. doi:10.1371/journal.pone.0101290

Zaromytidou M, Savvatis K. The weight of obesity in hypertrophic cardiomyopathy. Clin Med (Lond). 2023;23(4):357-363. doi:10.7861/clinmed.2023-0194

Zaw AM, Sekar R, Mak SOK, Law HKW, Chow BKC. Loss of secretin results in systemic and pulmonary hypertension with cardiopulmonary pathologies in mice. Sci Rep. 2019;9(1):14211. doi:10.1038/s41598-019-50634-x

Zaytouni T, Tsai PY, Hitchcock DS, DuBois CD, Freinkman E, Lin L, Morales-Oyarvide V, Lenehan PJ, Wolpin BM, Mino-Kenudson M, et al. Critical role for arginase 2 in obesity-associated pancreatic cancer. Nat Commun. 2017;8(1):242. doi:10.1038/s41467-017-00331-y

Zeglinski MR, Granville DJ. Granzymes in cardiovascular injury and disease. Cell Signal. 2020;76:109804. doi:10.1016/j.cellsig.2020.109804

Zeng F, Zhang M, Xu Y, Xu H. ARMS2 interference leads to decrease of proinflammatory mediators. Graefes Arch Clin Exp Ophthalmol. 2013;251(11):2539-2544. doi:10.1007/s00417-013-2442-0

Zeng L, Gu N, Chen J, Jin G, Zheng Y. IRX1 hypermethylation promotes heart failure by inhibiting CXCL14 expression. Cell Cycle. 2019;18(23):3251-3262. doi:10.1080/15384101.2019.1673099

Zeng M, Wei X, He YL, Chen JX, Lin WT. TFAP2C inhibits cell autophagy to alleviate myocardial ischemia/reperfusion injury by regulating miR-23a-5p/SFRP5/Wnt5a axis. FASEB J. 2023;37(6):e22959. doi:10.1096/fj.202201962R

Zeng M, Xie Z, Zhang J, Li S, Wu Y, Yan X. Arctigenin Attenuates Vascular Inflammation Induced by High Salt through TMEM16A/ESM1/VCAM-1 Pathway. Biomedicines. 2022;10(11):2760. doi:10.3390/biomedicines10112760

Zeng W, Cao Y, Jiang W, Kang G, Huang J, Xie S. Knockdown of Sfrp4 attenuates apoptosis to protect against myocardial ischemia/reperfusion injury. J Pharmacol Sci. 2019;140(1):14-19. doi:10.1016/j.jphs. 04.0032019.

Zeng X, Liu G, Peng W, He J, Cai C, Xiong W, Chen S, Yang M, Dong Z. Combined deficiency of SLAMF8 and SLAMF9 prevents endotoxin-induced liver inflammation by downregulating TLR4 expression on macrophages. Cell Mol Immunol. 2020;17(2):153-162. doi:10.1038/s41423-018-0191-z

Zeng Y, Jiang Y, Huang Z, Li K, Zhou Y. Association between AGTR1 (c.1166 A>C) Polymorphisms and Kidney Injury in Hypertension. Front Biosci (Landmark Ed). 2023;28(7):146. doi:10.31083/j.fbl2807146

Zha Y, Li Y, Ge Z, Wang J, Jiao Y, Zhang J, Zhang S. ADAMTS8 Promotes Cardiac Fibrosis Partly Through Activating EGFR Dependent Pathway. Front Cardiovasc Med. 2022;9:797137. doi:10.3389/fcvm.2022.797137

Zhan C, Chen H, Zhang Z, Shao Y, Xu B, Hua R, Yao Q, Liu W, Shen Q. BMAL1 deletion protects against obesity and non-alcoholic fatty liver disease induced by a high-fat diet. Int J Obes (Lond). 2024;48(4):469-476. doi:10.1038/s41366-023-01435-w

Zhang C, He X, Zhao J, Cao Y, Liu J, Liang W, Zhou Y, Wang C, Xue R, Dong Y, et al. Angiopoietin-Like Protein 7 and Short-Term Mortality in Acute Heart Failure. Cardiorenal Med. 2020;10(2):116-124. doi:10.1159/000504879

Zhang D, Ding Y, Wang X, Xin W, Du W, Chen W, Zhang X, Li P. Effects of ABCG2 and SLCO1B1 gene variants on inflammation markers in patients with hypercholesterolemia and diabetes mellitus treated with rosuvastatin. Eur J Clin Pharmacol. 2020;76(7):939-946. doi:10.1007/s00228-020-02882-4

Zhang D, Xu C, Zhang J, Zeng R, Qi Q, Xu J, Pan Y, Liu X, Shi S, Zhang J, et al. Plasma TNFRSF11B as a New Predictive Inflammatory Marker of Sepsis-ARDS

with Endothelial Dysfunction. J Proteome Res. 2023;22(11):3640-3651. doi:10.1021/acs.jproteome.3c00576

Zhang J, Cen L, Zhang X, Tang C, Chen Y, Zhang Y, Yu M, Lu C, Li M, et al. MPST deficiency promotes intestinal epithelial cell apoptosis and aggravates inflammatory bowel disease via AKT. Redox Biol. 2022;56:102469. doi:10.1016/j.redox.2022.102469

Zhang J, Chen Y, Yan L, Zhang X, Zheng X, Qi J, Yang F, Li J. EphA3 deficiency in the hypothalamus promotes high-fat diet-induced obesity in mice. J Biomed Res. 2022;37(3):179-193. doi:10.7555/JBR.36.20220168

Zhang J, Kong X, Yang HJ, Zhang W, Chen M, Chen X. Ninjurin 2 Modulates Tumorigenesis, Inflammation, and Metabolism via Pyroptosis. Am J Pathol. 2024;194(5):849-860. doi:10.1016/j.ajpath.2024.01.013

Zhang J, Sun W, Yan W, Kong X, Shen T, Laubach K, Chen M, Chen X. TP73 Isoform-specific disruption reveals a critical role of TAp73beta in growth suppression and inflammatory response. Cell Death Dis. 2023;14(1):14. doi:10.1038/s41419-022-05529-7

Zhang J, Wei X, Zhang W, Wang F, Li Q. MiR-326 targets MDK to regulate the progression of cardiac hypertrophy through blocking JAK/STAT and MAPK signaling pathways. Eur J Pharmacol. 2020;872:172941. doi:10.1016/j.ejphar.2020.172941

Zhang J, Xu Y, Wei C, Yin Z, Pan W, Zhao M, Ding W, Xu S, Liu J, Yu J, et al. Macrophage neogenin deficiency exacerbates myocardial remodeling and inflammation after acute myocardial infarction through JAK1-STAT1 signaling. Cell Mol Life Sci. 2023;80(11):324. doi:10.1007/s00018-023-04974-7

Zhang J, Yang Z, Liang Z, Wang M, Hu C, Chang C, Shi L, Ji Q, Liu L. Secreted frizzled-related protein 4 exerts anti-atherosclerotic effects by reducing inflammation and oxidative stress. Eur J Pharmacol. 2022;923:174901. doi:10.1016/j.ejphar.2022.174901

Zhang J, Zhang Y, Sun T, Guo F, Huang S, Chandalia M, Abate N, Fan D, Xin HB, et al. Dietary obesity-induced Egr-1 in adipocytes facilitates energy storage via suppression of FOXC2. Sci Rep. 2013;3:1476. doi:10.1038/srep01476

Zhang JW, Liu TF, Chen XH, Liang WY, Feng XR, Wang L, Fu SW, McCaffrey TA, Liu ML. Validation of aspirin response-related transcripts in patients with coronary artery disease and preliminary investigation on CMTM5 function. Gene. 2017;624:56-65. doi:10.1016/j.gene.2017.04.041

Zhang K, Rao F, Rana BK, Gayen JR, Calegari F, King A, Rosa P, Huttner WB, Stridsberg M, Mahata M, et al. Autonomic function in hypertension; role of genetic variation at the catecholamine storage vesicle protein chromogranin B. Circ Cardiovasc Genet. 2009;2(1):46-56. doi:10.1161/CIRCGENETICS.108.785659

Zhang KZ, Shen XY, Wang M, Wang L, Sun HX, Li XZ, Huang JJ, Li XQ, Wu C, Zhao C, et al. Retinol-Binding Protein 4 Promotes Cardiac Injury After Myocardial Infarction Via Inducing Cardiomyocyte Pyroptosis Through an Interaction With NLRP3. J Am Heart Assoc. 2021;10(22):e022011. doi:10.1161/JAHA.121.022011

Zhang L, Li M, Wang Z, Sun P, Wei S, Zhang C, Wu H, Bai H. Cardiovascular Risk After SARS-CoV-2 Infection Is Mediated by IL18/IL18R1/HIF-1 Signaling Pathway Axis. Front Immunol. 2022;12:780804. doi:10.3389/fimmu.2021.780804

Zhang L, Wu Q, Huang Y, Zheng J, Guo S, He L. Formononetin ameliorates airway inflammation by suppressing ESR1/NLRP3/Caspase-1 signaling in asthma. Biomed Pharmacother. 2023;168:115799. doi:10.1016/j.biopha.2023.115799

Zhang L, Xu S, Zhou N, Shen J, Huang J, Sun D. The signal axis GATA2-EDN1-AGT induced hypertension from obstructive sleep apnea-hypopnea syndrome with the clinical and animal study. Cell Mol Biol (Noisy-le-grand). 2022;67(4):91-96. doi:10.14715/cmb/2021.67.4.10

Zhang M, Zhu Y, Zhu J, Xie Y, Wu R, Zhong J, Qiu Z, Jiang L. circ_0086296 induced atherosclerotic lesions via the IFIT1/STAT1 feedback loop by sponging miR-576-3p. Cell Mol Biol Lett. 2022;27(1):80. doi:10.1186/s11658-022-00372-2

Zhang R, Xu X, Chen X, Hao C, Ji Z, Zuo P, Yang M, Ma G, Li Y. Upregulation of key genes Eln and Tgfb3 were associated with the severity of cardiac hypertrophy. BMC Genomics. 2022;23(1):592. doi:10.1186/s12864-022-08778-0

Zhang SS, Larrabee L, Chang AH, Desai S, Sloan L, Wang X, Wu Y, Parvez N, Amaratunga K, Hartman AC, et al. Discovery of RXFP2 genetic association in resistant hypertensive men and RXFP2 antagonists for the treatment of resistant hypertension. Sci Rep. 2024;14(1):13209. doi:10.1038/s41598-024-62804-7

Zhang W, Man Y, Chen Z. microRNA-148a in Exosomes Derived from Bone Marrow Mesenchymal Stem Cells Alleviates Cardiomyocyte Apoptosis in Atrial Fibrillation by Inhibiting SMOC2. Mol Biotechnol. 2022;64(10):1076-1087. doi:10.1007/s12033-022-00487-z

Zhang X, He T, Wu Z, Wang Y, Liu H, Zhang B, Yang S, Wang D, Huang C, Duan J, et al. The role of CD38 in inflammation-induced depression-like behavior and the antidepressant effect of (R)-ketamine. Brain Behav Immun. 2024;115:64-79. doi:10.1016/j.bbi.2023.09.026

Zhang X, Heo GS, Li A, Lahad D, Detering L, Tao J, Gao X, Zhang X, Luehmann H, Sultan D, et al. Development of a CD163-Targeted PET Radiotracer That Images Resident Macrophages in Atherosclerosis. J Nucl Med. 2024;65(5):775-780. doi:10.2967/jnumed.123.266910

Zhang X, Hou X, Xu C, Cheng S, Ni X, Shi Y, Yao Y, Chen L, Hu MG, Xia D. Kaempferol regulates the thermogenic function of adipocytes in high-fat-diet-induced obesity via the CDK6/RUNX1/UCP1 signaling pathway. Food Funct. 2023;14(18):8201-8216. doi:10.1039/d3fo00613a

Zhang X, Hu C, Zhang N, Wei WY, Li LL, Wu HM, Ma ZG, Tang QZ. Matrine attenuates pathological cardiac fibrosis via RPS5/p38 in mice. Acta Pharmacol Sin. 2021;42(4):573-584. doi:10.1038/s41401-020-0473-8

Zhang X, Li L, Zhang Q, Wei Q, Lin J, Jia J, Zhang J, Yan T, Lv Y, Jiang X, et al. CD38 Causes Autophagic Flux Inhibition and Cardiac Dysfunction Through a Transcriptional Inhibition Pathway Under Hypoxia/Ischemia Conditions. Front Cell Dev Biol. 2020;8:191. doi:10.3389/fcell.2020.00191

Zhang X, Lv H, Mei J, Ji B, Huang S, Li X. The Potential Role of R4 Regulators of G Protein Signaling (RGS) Proteins in Type 2 Diabetes Mellitus. Cells. 2022;11(23):3897. doi:10.3390/cells11233897

Zhang X, Qin Q, Lv X, Wang Y, Luo F, Xue L. Natural emodin reduces myocardial ischemia/reperfusion injury by modulating the RUNX1/miR□142□3p/DRD2 pathway and attenuating inflammation. Exp Ther Med. 2022;24(6):745. doi:10.3892/etm.2022.11681

Zhang X, Qiu J, Huang F, Shan K, Zhang C. Type 2 Diabetes Mellitus Makes Corneal Endothelial Cells Vulnerable to Ultraviolet A-Induced Oxidative Damage Via Decreased DJ-1/Nrf2/NQO1 Pathway. Invest Ophthalmol Vis Sci. 2022;63(12):25. doi:10.1167/iovs.63.12.25

Zhang X, Zheng C, Gao Z, Chen H, Li K, Wang L, Zheng Y, Li C, Zhang H, Gong M, Zhang H, et al. SLC7A11/xCT Prevents Cardiac Hypertrophy by Inhibiting Ferroptosis. Cardiovasc Drugs Ther. 2022;36(3):437-447. doi:10.1007/s10557-021-07220-z

Zhang Y, Lin C, Chen R, Luo L, Huang J, Liu H, Chen W, Xu J, Yu H, Ding Y. Association analysis of SOCS3, JAK2 and STAT3 gene polymorphisms and genetic susceptibility to type 2 diabetes mellitus in Chinese population. Diabetol Metab Syndr. 2022;14(1):4.. doi:10.1186/s13098-021-00774-w

Zhang Y, Zhang N, Zou Y, Song C, Cao K, Wu B, You S, Lu S, Wang D, Xu J, et al. Deacetylation of Septin4 by SIRT2 (Silent Mating Type Information Regulation 2 Homolog-2) Mitigates Damaging of Hypertensive Nephropathy. Circ Res. 2023;132(5):601-624. doi:10.1161/CIRCRESAHA.122.321591

Zhang YL, Li PB, Han X, Zhang B, Li HH. Blockage of Fibronectin 1 Ameliorates Myocardial Ischemia/Reperfusion Injury in Association with Activation of AMP-LKB1-AMPK Signaling Pathway. Oxid Med Cell Longev. 2022;2022:6196173. doi:10.1155/2022/6196173

Zhang Z, Ni G, Xu G, Xu J, Liu X. A Novel Functional Polymorphism in the NINJ2 Promoter Predicts Risk of Large Artery Atherosclerotic Stroke. Mol Neurobiol. 2016;53(10):7178-7183. doi:10.1007/s12035-015-9619-y

Zhang ZZ, Wang G, Yin SH, Yu XH. C1q Tumor Necrosis Factor-Related Protein 1: A Promising Therapeutic Target for Atherosclerosis. J Cardiovasc Pharmacol. 2022;79(3):273-280. doi:10.1097/FJC.0000000000001186

Zhang ZZ, Wang G, Yin SH, Yu XH. Midkine: A multifaceted driver of atherosclerosis. Clin Chim Acta. 2021;521:251-257. doi:10.1016/j.cca.2021.07.024

Zhao C, Zha Y, Wu X, Chen L, Shi J, Cui L. The quantification of ADAMTS4 and 8 expression and selection of reference genes for quantitative real-time PCR analysis in myocardial infarction. Biomed Pharmacother. 2011;65(8):555-559. doi:10.1016/j.biopha.2010.12.002

Zhao C, Zou T, Tang R, Zhu C. Placenta-specific 8 (PLAC8) mediates inflammation and mobility of the hPDLCs via MEK/ERK signaling pathway. Int Immunopharmacol. 2022;103:108459. doi:10.1016/j.intimp.2021.108459

Zhao F, Bai Y, Xiang X, Pang X. The role of fibromodulin in inflammatory responses and diseases associated with inflammation. Front Immunol. 2023;14:1191787. doi:10.3389/fimmu.2023.1191787

Zhao K, Xiao L, Zhao M, Ji C. Lichen extracts regulate the expression of BMP7 via miR-194-5p targeting to decrease the risk atrial fibrillation. Int J Clin Exp Pathol. 2017;10(8):9092-9103.

Zhao L, Lai Y, Jiao H, Huang J. Nerve growth factor receptor limits inflammation to promote remodeling and repair of osteoarthritic joints. Nat Commun. 2024;15(1):3225. doi:10.1038/s41467-024-47633-6

Zhao L, Zheng M, Guo Z, Li K, Liu Y, Chen M, Yang X. Circulating Serpina3 levels predict the major adverse cardiac events in patients with myocardial infarction. Int J Cardiol. 2020;300:34-38. doi:10.1016/j.ijcard.2019.08.034

Zhao M, Shen Z, Zheng Z, Xu Y, Zhang J, Liu J, Peng S, Wan J, Qin JJ, Wang M. Cardiomyocyte LGR6 alleviates ferroptosis in diabetic cardiomyopathy via regulating mitochondrial biogenesis. Metabolism. 2024. doi:10.1016/j.metabol.2024.155979

Zhao T, Ma Y, Zhang Z, Xian J, Geng X, Wang F, Huang J, Yang Z, Luo Y, Lin Y. Young and early-onset dilated cardiomyopathy with malignant ventricular

arrhythmia and sudden cardiac death induced by the heterozygous LDB3, MYH6, and SYNE1 missense mutations. Ann Noninvasive Electrocardiol. 2021;26(4):e12840. doi:10.1111/anec.12840

Zhao T, Wang Z, Chi Y, Ni C, Zheng X. TFEC contributes to cardiac hypertrophy by inhibiting AMPK/mTOR signaling. Exp Ther Med. 2021;22(5):1271. doi:10.3892/etm.2021.10706

Zhao X, Li Y, Yan Y, Ma X, Guo C. Methylation of CpG sites in C1QTNF1 (C1q and tumor necrosis factor related protein 1) differs by gender in acute coronary syndrome in Han population: a case-control study. Genes Genomics. 2020;42(6):681-689. doi:10.1007/s13258-020-00936-6

Zhao X, Zhu L, Yin Q, Xu Z, Jia Q, Yang R, He K. F2RL3 Methylation in the Peripheral Blood as a Potential Marker for the Detection of Coronary Heart Disease: A Case-Control Study. Front Genet. 2022;13:833923. doi:10.3389/fgene.2022.833923

Zhao Y, Liang B, Sheng S, Wang C, Jin B, Zhang X, Cheng Y, Shen C, Zheng F. AIM2 inflammasome regulated by the IFN-γ/JAK2/STAT1 pathway promotes activation and pyroptosis of monocytes in Coronary Artery Disease. Immun Inflamm Dis. 2024;12(6):e1317. doi:10.1002/iid3.1317

Zhao Y, Liu K, Yin D, Lin Z. Angiopoietin-Like 7 Contributes to Angiotensin II-Induced Proliferation, Inflammation and Apoptosis in Vascular Smooth Muscle Cells. Pharmacology. 2019;104(5-6):226-234. doi:10.1159/000501296

Zhao Z, Fu Y, Lian H, Liu Y, Liu J, Sun L, Zhang Y. Correlation between the serum FABP4, ANGPTL3, and ANGPTL4 levels and coronary artery disease. Clin Cardiol. 2024;47(3):e24246. doi:10.1002/clc.24246

Zhao ZH, Luo J, Li HX, Wang SH, Li XM. SOX2-mediated inhibition of miR-223 contributes to STIM1 activation in phenylephrine-induced hypertrophic cardiomyocytes. Mol Cell Biochem. 2018;443(1-2):47-56. doi:10.1007/s11010-017-3209-4

Zhen J, Sheng X, Chen T, Yu H. Histone acetyltransferase Kat2a regulates ferroptosis via enhancing Tfrc and Hmox1 expression in diabetic cardiomyopathy. Cell Death Dis. 2024;15(6):406. doi:10.1038/s41419-024-06771-x

Zheng B, Cao LS, Zeng QT, Wang X, Li DZ, Liao YH. Inhibition of NOS2 ameliorates cardiac remodeling, improves heart function after myocardial infarction in rats. Basic Res Cardiol. 2004;99(4):264-271. doi:10.1007/s00395-004-0470-y

Zheng S, Tan W, Li X, Wang L, Zhu C, Pyle WG, Chen J, Wu J, Ren X, Chen H, et al. Apelin receptor inhibition in ischemia-reperfused mouse hearts protected by endogenous n-3 polyunsaturated fatty acids. Front Pharmacol. 2023;14:1145413. doi:10.3389/fphar.2023.1145413

Zheng T, Ge B, Liu H, Chen B, Qin L, Xiao L, Song J. Triglyceride-mediated influence of serum angiopoietin-like protein 8 on subclinical atherosclerosis in type 2 diabetic patients: results from the GDMD study in China. Cardiovasc Diabetol. 2018;17(1):84. doi:10.1186/s12933-018-0687-y

Zhong W, Dong YJ, Hong C, Li YH, Xiao CX, Liu XH, Chang J. ASH2L upregulation contributes to diabetic endothelial dysfunction in mice through STEAP4-mediated copper uptake. Acta Pharmacol Sin. 2024;45(3):558-569. doi:10.1038/s41401-023-01174-8

Zhong X, Jiao H, Zhao D, Teng J. Association between serum apolipoprotein B and atrial fibrillation: a case-control study. Sci Rep. 2022;12(1):9597. doi:10.1038/s41598-022-13773-2

Zhong Y, Du G, Liu J, Li S, Lin J, Deng G, Wei J, Huang J. RUNX1 and CCL3 in Diabetes Mellitus-Related Coronary Artery Disease: A Bioinformatics Analysis. Int J Gen Med. 2022;15:955-963. doi:10.2147/IJGM.S350732

Zhong Y, Maruf A, Qu K, Milewska M, Wandzik I, Mou N, Cao Y, Wu W. Nanogels with covalently bound and releasable trehalose for autophagy stimulation in atherosclerosis. J Nanobiotechnology. 2023;21(1):472. doi:10.1186/s12951-023-02248-9

Zhou C, Chen Y, Kang W, Lv H, Fang Z, Yan F, Li L, Zhang W, Shi J. Mir-455-3p-1 represses FGF7 expression to inhibit pulmonary arterial hypertension through inhibiting the RAS/ERK signaling pathway. J Mol Cell Cardiol. 2019;130:23-35. doi:10.1016/j.yjmcc.2019.03.002

Zhou D, Ding T, Ni B, Jing Y, Liu S. Hydroxysafflor Yellow A mitigated myocardial ischemia/reperfusion injury by inhibiting the activation of the JAK2/STAT1 pathway. Int J Mol Med. 2019;44(2):405-416. doi:10.3892/ijmm.2019.4230

Zhou G, Lin L, Wang S, Dong M, Lu K, Zhang Y, Lin Z, Lin J, Wu W, Peng R, et al. Huanglian Jiedu Decoction enhances the stability of atherosclerotic plaques through SLC2A1-mediated efferocytosis. Int Immunopharmacol. 2024;140:112834. doi:10.1016/j.intimp.2024.112834

Zhou G, Soufan O, Ewald J, Hancock REW, Basu N, Xia J (2019) NetworkAnalyst 3.0: a visual analytics platform for comprehensive gene expression profiling and meta-analysis. Nucleic Acids Res 47:W234-W241. doi:10.1093/nar/gkz240

Zhou H, Che Y, Fu X, Wei H, Gao X, Chen Y, Zhang S. Interaction between tissue factor pathway inhibitor-2 gene polymorphisms and environmental factors associated with coronary atherosclerosis in a Chinese Han. J Thromb Thrombolysis. 2019;47(1):67-72. doi:10.1007/s11239-018-1755-6

Zhou J, Liu Y, Wei X, Yuan M, Zhang X, Qin L, Cui B, Li P, Zhang J, Feng Z, et al. Glycnsisitin A: A promising bicyclic peptide against heart failure that facilitates TFRC-mediated uptake of iron in cardiomyocytes. Acta Pharm Sin B. 2024;14(7):3125-3139. doi:10.1016/j.apsb.2024.02.026

Zhou M, Ou Y, Wu G, Li K, Peng J, Wang X, Che M, Gong H, Niu P, Liu Y, et al. Transcriptomic Analysis Reveals that Activating Transcription Factor 3/c-Jun/Lgals3 Axis Is Associated with Central Diabetes Insipidus after Hypothalamic Injury. Neuroendocrinology. 2022;112(9):874-893. doi:10.1159/000520865

Zhou Q, Hahn JK, Neupane B, Aidery P, Labeit S, Gawaz M, Gramlich M. Dysregulated IER3 Expression is Associated with Enhanced Apoptosis in Titin-

Based Dilated Cardiomyopathy. Int J Mol Sci. 2017;18(4):723. doi:10.3390/ijms18040723

Zhou S, Lu H, Zhang X, Shi X, Jiang S, Wang L, Lu Q. Paraben exposures and their interactions with ESR1/2 genetic polymorphisms on hypertension. Environ Res. 2022;213:113651. doi:10.1016/j.envres.2022.113651

Zhou W, Ye SD, Chen C, Wang W. Involvement of RBP4 in Diabetic Atherosclerosis and the Role of Vitamin D Intervention. J Diabetes Res. 2018;2018:7329861. doi:10.1155/2018/7329861

Zhou WP, Zhang H, Zhao YX, Liu GQ, Zhang JY. RNA interference of myocyte enhancer factor 2A accelerates atherosclerosis in apolipoprotein E-deficient mice. PLoS One. 2015;10(3):e0121823. doi:10.1371/journal.pone.0121823

Zhou Y, Wang JH, Han JP, Feng JY, Guo K, Du F, Chen WB, Li YZ. Dihydroartemisinin ameliorates chronic nonbacterial prostatitis and epithelial cellular inflammation by blocking the E2F7/HIF1α pathway. Inflamm Res. 2022;71(4):449-460. doi:10.1007/s00011-022-01544-8

Zhou YX, Zhang H, Peng C. Effects of Puerarin on the Prevention and Treatment of Cardiovascular Diseases. Front Pharmacol. 2021;12:771793. doi: 10.3389/fphar.2021.771793

Zhou YY, Sun JH, Wang L, Cheng YY. Genetic Polymorphism of NQO1 Influences Susceptibility to Coronary Heart Disease in a Chinese Population: A Cross-Sectional Study and Meta-Anaylsis. Pharmgenomics Pers Med. 2023;16:825-833. doi:10.2147/PGPM.S420874

Zhu B, Zhang R, Li C, Jiang L, Xiang M, Ye Z, Kita H, Melnick AM, Dent AL, Sun J. BCL6 modulates tissue neutrophil survival and exacerbates pulmonary inflammation following influenza virus infection. Proc Natl Acad Sci U S A. 2019;116(24):11888-11893. doi:10.1073/pnas.1902310116

Zhu L, Li Q, Qi D, Niu F, Li Q, Yang H, Gao C. Atherosclerosis-associated endothelial cell apoptosis by miRNA let7-b-mediated downregulation of HAS-2. J Cell Biochem. 2020;121(8-9):3961-3972. doi:10.1002/jcb.29537

Zhu M, Yan T, Zhu S, Weng F, Zhu K, Wang C, Guo C. Identification and verification of FN1, P4HA1 and CREBBP as potential biomarkers in human atrial fibrillation. Math Biosci Eng. 2023;20(4):6947-6965. doi:10.3934/mbe.2023300

Zhu W, Zhu W, Wang S, Liu S, Zhang H. UCHL1 deficiency upon HCMV infection induces vascular endothelial inflammatory injury mediated by mitochondrial iron overload. Free Radic Biol Med. 2024;211:96-113. doi:10.1016/j.freeradbiomed.2023.12.002

Zhuang L, Jia K, Chen C, Li Z, Zhao J, Hu J, Zhang H, Fan Q, Huang C, Xie H, et al. DYRK1B-STAT3 Drives Cardiac Hypertrophy and Heart Failure by Impairing Mitochondrial Bioenergetics. Circulation. 2022;145(11):829-846. doi:10.1161/CIRCULATIONAHA.121.055727

Zhuang L, Zong X, Yang Q, Fan Q, Tao R. Interleukin-34-NF-κB signaling aggravates myocardial ischemic/reperfusion injury by facilitating macrophage recruitment and polarization. EBioMedicine. 2023;95:104744. doi:10.1016/j.ebiom.2023.104744

Zhuo C, Jiang R, Lin X, Shao M. LncRNA H19 inhibits autophagy by epigenetically silencing of DIRAS3 in diabetic cardiomyopathy. Oncotarget. 2017;8(1):1429-1437. doi:10.18632/oncotarget.13637

Zolfaghari S, Kaasbøll OJ, Ahmed MS, Line FA, Hagelin EMV, Monsen VT, Attramadal H. Tissue distribution and transcriptional regulation of CCN5 in the heart after myocardial infarction. J Cell Commun Signal. 2022;16(3):377-395. doi:10.1007/s12079-021-00659-7

Zou J, Hao S. A potential research target for cardiac rehabilitation: brain-derived neurotrophic factor. Front Cardiovasc Med. 2024;11:1348645. Published 2024 Apr 19. doi:10.3389/fcvm.2024.1348645

Zuo B, Zhu S, Wang G, Li Z. Transcriptome analysis reveals ADAMTS15 is a potential inflammation-related gene in remote ischemic postconditioning. Front Cardiovasc Med. 2023;10:1089151. doi:10.3389/fcvm.2023.1089151

Tables

Table 1. Structural details of selected hypertrophic cardiomyopathyassociated targets used for molecular docking

Target gene	Topology of the genes in HCM	PDB ID	Resolution (Å)	Method of collection	Observed R-value	Cocrystal ligand
LGALS3	Up regulated	8IU1	1.97	X-ray diffraction	0.175	QB2
ESR1	Down regulated	1A52	2.80	X-ray diffraction	0.223	EST

Table 2 The statistical metrics for key differentially expressed genes (DEGs)

Gene Symbol	logFC	pValue	adj.P.Val	tvalue	Regulation	Gene Name
SAA1	6.031613	2.13E-10	1.68E-08	6.351559	Up	serum amyloid A1
FAM83B	4.969281	1.95E-05	0.000289	4.270947	Up	family with sequence similarity 83 member B
RNASE2	4.798281	2.26E-07	6.89E-06	5.17659	Up	ribonuclease A family member 2
C4orf54	4.538191	2.81E-11	2.89E-09	6.656158	Up	chromosome 4 open reading frame 54
SERPINA3	4.195281	4.19E-24	8.26E-21	10.12704	Up	serpin family A member 3
GAL	4.185174	0.001648	0.011064	3.147232	Up	galanin and GMAP prepropeptide
IL1RL1	4.180414	1.35E-14	3.56E-12	7.700874	Up	interleukin 1 receptor like 1
PTPRN	4.153073	0.002187	0.013764	3.063522	Up	protein tyrosine phosphatase receptor type N
MYH6	4.120238	1.40E-30	7.60E-27	11.49477	Up	myosin heavy chain 6
CACNA1E	4.096019	0.000246	0.002361	3.666371	Up	calcium voltage-gated channel subunit alpha1 E
CD177	4.009335	1.89E-05	0.000283	4.277493	Up	CD177 molecule
C5orf64	3.67539	1.43E-07	4.70E-06	5.261721	Up	chromosome 5 putative open reading frame 64
HOXA3	3.509383	1.85E-06	4.09E-05	4.769131	Up	homeobox A3
HOPX	3.456612	7.77E-09	3.76E-07	5.773391	Up	HOP homeobox
ALOX15B	3.450149	0.0002	0.001986	3.719364	Up	arachidonate 15-lipoxygenase type B
EREG	3.412855	2.77E-05	0.00039	4.191497	Up	epiregulin
LAD1	3.398614	6.99E-13	1.16E-10	7.179535	Up	ladinin 1
FCN3	3.396068	1.78E-47	3.85E-43	14.47368	Up	ficolin 3
KCNIP2	3.384064	1.04E-13	2.13E-11	7.435594	Up	potassium voltage-gated channel interacting protein 2
TUBA3E	3.372706	5.56E-15	1.65E-12	7.813598	Up	tubulin alpha 3e
C11orf87	3.331745	0.000898	0.006737	3.320598	Up	chromosome 11 open reading frame 87
VWA5B1	3.322015	0.002885	0.017172	2.979712	Up	von Willebrand factor A domain containing 5B1
SSTR5	3.295726	5.79E-10	3.92E-08	6.196053	Up	somatostatin receptor 5
GNMT	3.276271	1.18E-10	1.00E-08	6.441684	Up	glycine N-methyltransferase

DHRS7C	3.265833	2.65E-05	0.000376	4.201242	Up	dehydrogenase/reductase 7C
SFRP5	3.232748	2.96E-07	8.68E-06	5.126214	Up	secreted frizzled related protein 5
F5	3.180002	2.90E-08	1.19E-06	5.547488	Up	coagulation factor V
SCGN	3.177912	4.58E-13	8.08E-11	7.237135	Up	secretagogin, EF-hand calcium binding protein
TUBA3D	3.173975	9.68E-15	2.66E-12	7.74337	Up	tubulin alpha 3d
KCNK12	3.15564	2.13E-05	0.000312	4.251153	Up	potassium two pore domain channel subfamily K member 12
CHRDL2	3.055243	8.61E-07	2.16E-05	4.920902	Up	chordin like 2
PRSS46P	3.03459	0.003993	0.022108	2.878705	Up	serine protease 46, pseudogene
FIBCD1	3.023088	6.44E-06	0.000115	4.511252	Up	fibrinogen C domain containing 1
SLAMF1	2.976309	3.53E-06	7.02E-05	4.637009	Up	signaling lymphocytic activation molecule family member 1
SRARP	2.948856	2.28E-05	0.00033	4.235736	Up	steroid receptor associated and regulated protein
CHRNA4	2.945108	0.003704	0.020899	2.902298	Up	cholinergic receptor nicotinic alpha 4 subunit
IGSF23	2.938618	0.001862	0.012139	3.11139	Up	immunoglobulin superfamily member 23
CFAP95	2.850166	0.004287	0.023368	2.856206	Up	cilia and flagella associated protein 95
NPTX2	2.784862	1.74E-11	1.91E-09	6.726445	Up	neuronal pentraxin 2
FREM3	2.783224	0.002881	0.017164	2.980186	Up	FRAS1 related extracellular matrix 3
SERTM1	2.759568	2.95E-05	0.000411	4.176975	Up	serine rich and transmembrane domain containing 1
CORIN	2.758089	1.59E-06	3.63E-05	4.79956	Up	corin, serine peptidase
VWFP1	2.754115	0.000206	0.002036	3.711714	Up	von Willebrand factor pseudogene 1
CATSPERB	2.744954	0.000778	0.006013	3.360575	Up	cation channel sperm associated auxiliary subunit beta
LCN10	2.735136	5.73E-11	5.38E-09	6.550626	Up	lipocalin 10
TCF24	2.703249	4.20E-08	1.63E-06	5.482258	Up	transcription factor 24
VSTM2L	2.696383	6.12E-08	2.29E-06	5.415172	Up	V-set and transmembrane domain containing 2 like
SLCO4A1	2.669599	3.13E-07	9.09E-06	5.115195	Up	solute carrier organic anion transporter family member 4A1
MARCO	2.636418	0.00213	0.013513	3.071543	Up	macrophage receptor with collagenous structure
DNER	2.625999	0.000494	0.004189	3.4842	Up	delta/notch like EGF repeat containing
METTL7B	2.621637	1.21E-21	1.38E-18	9.557516	Up	methyltransferase like 7B
RAB39A	2.61413	0.00738	0.035813	2.679179	Up	RAB39A, member RAS oncogene family
SPINK1	2.61372	4.74E-05	0.000606	4.067848	Up	serine peptidase inhibitor Kazal type 1
MGST1	2.58199	1.56E-12	2.24E-10	7.069297	Up	microsomal glutathione S-transferase 1
CD163	2.579336	7.76E-07	1.98E-05	4.941246	Up	CD163 molecule
DHRS9	2.535486	3.23E-06	6.51E-05	4.655469	Up	dehydrogenase/reductase 9
RGR	2.529393	0.000226	0.002199	3.68834	Up	retinal G protein coupled receptor
LGI3	2.491519	8.98E-08	3.14E-06	5.34634	Up	leucine rich repeat LGI family member 3
FAM209B	2.453806	0.005707	0.029182	2.764161	Up	family with sequence similarity 209 member B
PLA2G2A	2.414458	4.19E-09	2.15E-07	5.876674	Up	phospholipase A2 group IIA
TSPEAR	2.407365	0.00671	0.033246	2.710896	Up	thrombospondin type laminin G domain and EAR repeats
HERC2P6	2.396583	0.000678	0.005384	3.398187	Up	HERC2 pseudogene 6
LRRN3	2.393736	4.63E-12	5.93E-10	6.916573	Up	leucine rich repeat neuronal 3
C1QL1	2.366777	5.35E-14	1.20E-11	7.523069	Up	complement C1q like 1
TFRC	2.364549	4.43E-19	3.20E-16	8.925597	Up	transferrin receptor

SCN1A	2.357664	0.000575	0.004714	3.44292	Up	sodium voltage-gated channel alpha subunit 1
CPNE4	2.355728	5.79E-12	7.05E-10	6.884698	Up	copine 4
CHDH	2.354191	5.13E-14	1.16E-11	7.528474	Up	choline dehydrogenase
AQP4	2.338792	0.000241	0.002322	3.671965	Up	aquaporin 4
STAC2	2.336075	0.001251	0.008879	3.227079	Up	SH3 and cysteine rich domain 2
CCN5	2.316564	1.29E-08	5.86E-07	5.687418	Up	cellular communication network factor 5
FER1L6	2.296165	1.61E-06	3.66E-05	4.797352	Up	fer-1 like family member 6
PCK1	2.293413	0.00613	0.030979	2.740763	Up	phosphoenolpyruvate carboxykinase 1
CYP4B1	2.292144	9.74E-06	0.000162	4.422873	Up	cytochrome P450 family 4 subfamily B member 1
PKHD1L1	2.25476	0.004295	0.023393	2.855616	Up	PKHD1 like 1
LMO1	2.236756	2.84E-05	0.000398	4.186313	Up	LIM domain only 1
ETNK2	2.218528	3.19E-07	9.21E-06	5.111714	Up	ethanolamine kinase 2
GMNC	2.215772	0.000474	0.004058	3.494925	Up	geminin coiled-coil domain containing
VDR	2.214893	6.04E-07	1.60E-05	4.990041	Up	vitamin D receptor
HOTAIRM1	2.213629	0.000721	0.005651	3.381503	Up	HOXA transcript antisense RNA, myeloid-specific 1
BEX5	2.207165	2.14E-09	1.21E-07	5.986586	Up	brain expressed X-linked 5
SERPINE1	2.204094	0.000237	0.002291	3.67617	Up	serpin family E member 1
ACVR1C	2.203855	0.004589	0.024635	2.834533	Up	activin A receptor type 1C
AZGP1	2.186441	2.54E-08	1.05E-06	5.570279	Up	alpha-2-glycoprotein 1, zinc-binding
CHST9	2.182094	0.00011	0.001217	3.867736	Up	carbohydrate sulfotransferase 9
KCNK13	2.133648	0.004945	0.026113	2.810601	Up	potassium two pore domain channel subfamily K member 13
RPL32P18	2.126084	0.004111	0.022625	2.869482	Up	ribosomal protein L32 pseudogene 18
RPSAP15	2.112454	3.06E-05	0.000423	4.168666	Up	ribosomal protein SA pseudogene 15
AOX1	2.085457	3.02E-05	0.000417	4.17225	Up	aldehyde oxidase 1
VSIG4	2.075866	8.44E-07	2.12E-05	4.924826	Up	V-set and immunoglobulin domain containing 4
TOGARAM2	2.064907	1.97E-06	4.31E-05	4.75623	Up	TOG array regulator of axonemal microtubules 2
KCNK3	2.061094	0.000232	0.002254	3.680895	Up	potassium two pore domain channel subfamily K member 3
CAMSAP3	2.058358	3.56E-06	7.04E-05	4.635555	Up	calmodulin regulated spectrin associated protein family member 3
GALNT15	2.05654	1.80E-07	5.74E-06	5.21883	Up	polypeptide N-acetylgalactosaminyltransferase 15
FGF12	2.0558	2.15E-05	0.000315	4.24866	Up	fibroblast growth factor 12
AGBL4	2.034061	0.001544	0.010496	3.166241	Up	AGBL carboxypeptidase 4
ELANE	2.033617	5.82E-05	0.000715	4.020024	Up	elastase, neutrophil expressed
CYP4Z2P	2.020532	0.000492	0.004178	3.485125	Up	cytochrome P450 family 4 subfamily Z member 2, pseudogene
GRB14	2.010488	4.47E-14	1.03E-11	7.54662	Up	growth factor receptor bound protein 14
SPOCK1	1.995971	5.51E-13	9.40E-11	7.212127	Up	SPARC (osteonectin), cwcv and kazal like domains proteoglycan 1
FREM2	1.989507	0.000113	0.001241	3.861473	Up	FRAS1 related extracellular matrix 2
RHBDL3	1.989046	4.66E-07	1.28E-05	5.039858	Up	rhomboid like 3
RPLP0P6	1.986754	2.83E-07	8.37E-06	5.134191	Up	ribosomal protein lateral stalk subunit P0 pseudogene 6
HRCT1	1.98584	3.63E-10	2.67E-08	6.269122	Up	histidine rich carboxyl terminus 1
SMTNL2	1.98551	1.40E-11	1.58E-09	6.757964	Up	smoothelin like 2
SGPP2	1.982841	5.97E-06	0.000108	4.527278	Up	sphingosine-1-phosphate phosphatase 2

SVOP	1.979575	0.001764	0.011655	3.127318	Up	SV2 related protein
ART1	1.96356	0.002438	0.015021	3.030955	Up	ADP-ribosyltransferase 1
LCN6	1.93873	4.73E-05	0.000604	4.068736	Up	lipocalin 6
CA14	1.924287	4.87E-07	1.33E-05	5.031417	Up	carbonic anhydrase 14
HS3ST2	1.922263	2.53E-05	0.000361	4.211721	Up	heparan sulfate-glucosamine 3-sulfotransferase 2
TMIGD3	1.902402	3.38E-06	6.76E-05	4.646078	Up	transmembrane and immunoglobulin domain containing 3
FKBP5	1.901118	4.08E-12	5.33E-10	6.934417	Up	FKBP prolyl isomerase 5
SLC38A4	1.893644	0.000521	0.004344	3.469704	Up	solute carrier family 38 member 4
ADAM11	1.891191	0.000146	0.001536	3.797347	Up	ADAM metallopeptidase domain 11
RPSAP19	1.886048	0.000125	0.00135	3.835333	Up	ribosomal protein SA pseudogene 19
RPP38-DT	1.881637	0.002616	0.015905	3.009611	Up	RPP38 divergent transcript
MFSD2A	1.87639	0.000124	0.001335	3.838767	Up	major facilitator superfamily domain containing 2A
SYN2	1.87252	1.16E-10	9.90E-09	6.445008	Up	synapsin II
LCN15	1.864478	0.010978	0.048132	2.543393	Up	lipocalin 15
RBP4	1.859611	0.003464	0.0198	2.923271	Up	retinol binding protein 4
BLM	1.840844	5.74E-07	1.53E-05	4.999611	Up	BLM RecQ like helicase
EXPH5	1.83947	9.39E-06	0.000157	4.430751	Up	exophilin 5
ADH1B	1.8341	2.16E-05	0.000317	4.247487	Up	alcohol dehydrogenase 1B (class I), beta polypeptide
CDHR3	1.830924	2.20E-05	0.000321	4.243662	Up	cadherin related family member 3
TOX-DT	1.818291	0.00427	0.023283	2.857511	Up	TOX divergent transcript
RPL21P75	1.812596	0.000343	0.003106	3.580104	Up	ribosomal protein L21 pseudogene 75
HMGCS2	1.806869	0.004875	0.025832	2.81515	Up	3-hydroxy-3-methylglutaryl-CoA synthase 2
CFAP77	1.802833	5.31E-13	9.17E-11	7.217048	Up	cilia and flagella associated protein 77
NSG1	1.798957	2.12E-07	6.50E-06	5.188255	Up	neuronal vesicle trafficking associated 1
HOGA1	1.787234	1.88E-10	1.51E-08	6.370605	Up	4-hydroxy-2-oxoglutarate aldolase 1
CPNE5	1.785599	0.00012	0.001304	3.845404	Up	copine 5
SLC66A1L	1.784132	1.36E-05	0.000215	4.349609	Up	solute carrier family 66 member 1 like
MELTF	1.761017	0.000166	0.001703	3.766101	Up	melanotransferrin
SERPINA5	1.752584	4.11E-06	7.96E-05	4.605762	Up	serpin family A member 5
CENPM	1.747165	0.00505	0.026532	2.803806	Up	centromere protein M
MOG	1.746616	0.001201	0.008579	3.238605	Up	myelin oligodendrocyte glycoprotein
PHACTR3	1.739966	8.93E-09	4.26E-07	5.749978	Up	phosphatase and actin regulator 3
C3	1.738464	0.000104	0.001165	3.881342	Up	complement C3
SMOC1	1.731692	0.001156	0.008319	3.249611	Up	SPARC related modular calcium binding 1
FGFR4	1.730972	3.92E-05	0.000522	4.111986	Up	fibroblast growth factor receptor 4
TENT5B	1.723607	6.57E-07	1.71E-05	4.973586	Up	terminal nucleotidyltransferase 5B
ITLN1	1.723243	0.004945	0.026113	2.810576	Up	intelectin 1
TMEM52	1.714257	5.20E-05	0.000652	4.046544	Up	transmembrane protein 52
XRCC4	1.711157	7.09E-06	0.000125	4.490822	Up	X-ray repair cross complementing 4
VIT	1.705363	3.63E-09	1.90E-07	5.90033	Up	vitrin
IL18R1	1.702701	5.12E-12	6.49E-10	6.902136	Up	interleukin 18 receptor 1
HOXB4	1.699565	0.000393	0.003474	3.545069	Up	homeobox B4

RTN4RL1	1.697085	1.50E-09	8.91E-08	6.043944	Up	reticulon 4 receptor like 1
CHI3L2	1.686869	0.005644	0.028933	2.767789	Up	chitinase 3 like 2
RPS7P11	1.683155	0.000945	0.007037	3.306483	Up	ribosomal protein S7 pseudogene 11
SUSD4	1.675462	6.28E-07	1.65E-05	4.98242	Up	sushi domain containing 4
TRPC4	1.673984	4.69E-07	1.29E-05	5.038718	Up	transient receptor potential cation channel subfamily C member 4
TIMP4	1.66936	9.16E-13	1.41E-10	7.142555	Up	TIMP metallopeptidase inhibitor 4
LYVE1	1.668893	0.003164	0.018463	2.951387	Up	lymphatic vessel endothelial hyaluronan receptor 1
GRIP1	1.663007	4.18E-05	0.000551	4.097207	Up	glutamate receptor interacting protein 1
FAM81A	1.650419	3.46E-06	6.90E-05	4.641533	Up	family with sequence similarity 81 member A
IL20RA	1.648921	0.000109	0.00121	3.869482	Up	interleukin 20 receptor subunit alpha
RNF157	1.643614	4.04E-09	2.10E-07	5.882667	Up	ring finger protein 157
ELN	1.641958	2.19E-06	4.69E-05	4.73492	Up	elastin
PTDSS1	1.63835	3.63E-15	1.19E-12	7.86706	Up	phosphatidylserine synthase 1
C1orf105	1.630831	3.60E-06	7.10E-05	4.632948	Up	chromosome 1 open reading frame 105
HCRTR1	1.6267	7.58E-05	0.000894	3.957173	Up	hypocretin receptor 1
MEI4	1.626425	0.000846	0.006422	3.337132	Up	meiotic double-stranded break formation protein 4
AQP7P2	1.623511	3.60E-06	7.10E-05	4.633281	Up	aquaporin 7 pseudogene 2
TRIM16L	1.613155	1.09E-10	9.47E-09	6.453605	Up	tripartite motif containing 16 like
PLA2G4F	1.609339	5.19E-05	0.000652	4.046998	Up	phospholipase A2 group IVF
QSOX1	1.605862	5.02E-17	2.31E-14	8.386309	Up	quiescin sulfhydryl oxidase 1
TUBB4B	1.600347	6.94E-10	4.62E-08	6.167423	Up	tubulin beta 4B class IVb
ELAPOR1	1.593174	0.001152	0.008299	3.250388	Up	endosome-lysosome associated apoptosis and autophagy regulator 1
LGR6	1.591446	6.86E-06	0.000122	4.498057	Up	leucine rich repeat containing G protein-coupled receptor 6
NALF2	1.578852	0.005585	0.028723	2.771179	Up	NALCN channel auxiliary factor 2
ETNPPL	1.55998	0.000416	0.003648	3.52951	Up	ethanolamine-phosphate phospho-lyase
OPN4	1.541755	5.88E-06	0.000107	4.530618	Up	opsin 4
LRMDA	1.534761	3.08E-18	1.82E-15	8.708553	Up	leucine rich melanocyte differentiation associated
SOX2	1.533322	0.007561	0.036518	2.67107	Up	SRY-box transcription factor 2
PEBP4	1.532286	1.17E-11	1.33E-09	6.783862	Up	phosphatidylethanolamine binding protein 4
SHC4	1.529956	9.49E-06	0.000159	4.428562	Up	SHC adaptor protein 4
SNX22	1.525498	4.06E-09	2.10E-07	5.881619	Up	sorting nexin 22
SLPI	1.522099	0.011038	0.048315	2.541503	Up	secretory leukocyte peptidase inhibitor
TDRD9	1.515953	3.21E-05	0.00044	4.157847	Up	tudor domain containing 9
SPATA17	1.515858	0.002332	0.014486	3.044359	Up	spermatogenesis associated 17
RPL17P6	1.512249	0.001399	0.009691	3.19487	Up	ribosomal protein L17 pseudogene 6
KIF26B	1.502642	8.13E-06	0.00014	4.461654	Up	kinesin family member 26B
CPM	1.500298	3.34E-07	9.57E-06	5.103399	Up	carboxypeptidase M
TWIST2	1.498116	8.99E-06	0.000152	4.440057	Up	twist family bHLH transcription factor 2
TC2N	1.492669	4.79E-05	0.000611	4.065515	Up	tandem C2 domains, nuclear
NPPC	1.490897	0.003386	0.019466	2.93037	Up	natriuretic peptide C
FAM222A	1.489774	1.46E-09	8.75E-08	6.048962	Up	family with sequence similarity 222 member A
ITPKA	1.47904	4.44E-06	8.45E-05	4.589828	Up	inositol-trisphosphate 3-kinase A

RPL17P7	1.478262	0.000699	0.005517	3.389982	Up	ribosomal protein L17 pseudogene 7
PITX3	1.477826	0.001651	0.01108	3.14674	Up	paired like homeodomain 3
TUBA1C	1.469249	1.09E-08	5.07E-07	5.715972	Up	tubulin alpha 1c
PLP2	1.458759	3.53E-12	4.63E-10	6.954951	Up	proteolipid protein 2
EIF4EBP1	1.449352	6.78E-19	4.74E-16	8.878408	Up	eukaryotic translation initiation factor 4E binding protein 1
ADAMTS2	1.439063	8.74E-06	0.000148	4.446312	Up	ADAM metallopeptidase with thrombospondin type 1 motif 2
TUBB4A	1.435769	0.000194	0.001944	3.726333	Up	tubulin beta 4A class IVa
CHST7	1.434918	9.88E-11	8.70E-09	6.468814	Up	carbohydrate sulfotransferase 7
SPP1	1.43243	0.001553	0.010547	3.164652	Up	secreted phosphoprotein 1
GOLGA7B	1.430581	0.002337	0.014508	3.043735	Up	golgin A7 family member B
CHL1	1.426267	1.14E-06	2.74E-05	4.865155	Up	cell adhesion molecule L1 like
CD109	1.4197	3.02E-12	4.04E-10	6.976662	Up	CD109 molecule
HOOK1	1.41943	8.21E-06	0.000141	4.459537	Up	hook microtubule tethering protein 1
S1PR3	1.419048	4.51E-15	1.42E-12	7.840012	Up	sphingosine-1-phosphate receptor 3
TUBA1B	1.417921	3.17E-09	1.68E-07	5.922605	Up	tubulin alpha 1b
RPL3P4	1.413749	0.004254	0.023227	2.858679	Up	ribosomal protein L3 pseudogene 4
C1QB	1.412486	5.63E-05	0.000695	4.027896	Up	complement C1q B chain
SBK3	1.407809	5.77E-06	0.000105	4.534672	Up	SH3 domain binding kinase family member 3
TOX	1.403341	0.00603	0.030537	2.746165	Up	thymocyte selection associated high mobility group box
PRODH	1.401838	1.08E-06	2.62E-05	4.876221	Up	proline dehydrogenase 1
BMP7	1.393887	0.002671	0.016181	3.003262	Up	bone morphogenetic protein 7
NECTIN1	1.391515	4.01E-15	1.28E-12	7.854709	Up	nectin cell adhesion molecule 1
B3GNT7	1.389318	1.95E-07	6.06E-06	5.20426	Up	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 7
BEAN1	1.387958	2.40E-07	7.27E-06	5.165117	Up	brain expressed associated with NEDD4 1
NUDT4B	1.382654	0.001907	0.01239	3.10428	Up	nudix hydrolase 4B
RPS3AP5	1.381306	0.005146	0.026928	2.797773	Up	RPS3A pseudogene 5
UBXN10	1.37313	0.000314	0.002888	3.603763	Up	UBX domain protein 10
PNMT	1.372447	2.49E-09	1.38E-07	5.962366	Up	phenylethanolamine N-methyltransferase
CPAMD8	1.369517	2.24E-13	4.26E-11	7.333651	Up	C3 and PZP like alpha-2-macroglobulin domain containing 8
RPL18AP3	1.369129	0.000558	0.004588	3.451358	Up	ribosomal protein L18a pseudogene 3
SLC7A11	1.368236	0.010985	0.048151	2.543185	Up	solute carrier family 7 member 11
TGFA	1.367493	0.000948	0.007054	3.305611	Up	transforming growth factor alpha
KCNA7	1.364725	0.00639	0.032069	2.727064	Up	potassium voltage-gated channel subfamily A member 7
TMEM132B	1.362351	0.001091	0.007934	3.265897	Up	transmembrane protein 132B
KCNK2	1.359505	0.008815	0.040872	2.61914	Up	potassium two pore domain channel subfamily K member 2
PPP1R1A	1.352253	9.19E-14	1.90E-11	7.452092	Up	protein phosphatase 1 regulatory inhibitor subunit 1A
PRIMA1	1.351041	8.39E-10	5.41E-08	6.137349	Up	proline rich membrane anchor 1
CHAC2	1.340836	4.77E-06	8.97E-05	4.574465	Up	ChaC glutathione specific gamma-glutamylcyclotransferase 2
RPL36AP37	1.338159	0.00221	0.01388	3.060472	Up	ribosomal protein L36a pseudogene 37
ADGRD1	1.335981	2.59E-15	9.05E-13	7.909311	Up	adhesion G protein-coupled receptor D1
MYOT	1.322671	0.001174	0.008418	3.245228	Up	myotilin

FAM83F	1.321399	0.000459	0.003957	3.50374	Up	family with sequence similarity 83 member F
C1QL3	1.321367	0.002232	0.013986	3.057515	Up	complement C1q like 3
SHISA4	1.320009	7.26E-11	6.62E-09	6.515113	Up	shisa family member 4
MS4A4A	1.319705	0.000254	0.002418	3.65851	Up	membrane spanning 4-domains A4A
LDHA	1.319198	1.75E-14	4.26E-12	7.667693	Up	lactate dehydrogenase A
FTH1P2	1.314132	0.000213	0.002098	3.702674	Up	ferritin heavy chain 1 pseudogene 2
TIGD3	1.31189	0.006823	0.033711	2.705378	Up	tigger transposable element derived 3
POM121L9P	1.310379	0.000491	0.004173	3.485638	Up	POM121 transmembrane nucleoporin like 9, pseudogene
SBK2	1.306647	0.000882	0.006631	3.325717	Up	SH3 domain binding kinase family member 2
PARVB	1.299971	4.06E-18	2.26E-15	8.677024	Up	parvin beta
TFEC	1.290984	0.003987	0.022087	2.879178	Up	transcription factor EC
CFD	1.290434	0.001032	0.007574	3.281788	Up	complement factor D
RPL21P16	1.270344	9.10E-05	0.00104	3.91353	Up	ribosomal protein L21 pseudogene 16
MLXIPL	1.266584	0.011385	0.049444	2.530661	Up	MLX interacting protein like
INSYN1	1.265971	5.33E-13	9.17E-11	7.216608	Up	inhibitory synaptic factor 1
AGTR1	1.258908	6.28E-05	0.000763	4.002152	Up	angiotensin II receptor type 1
PTX3	1.256277	0.002341	0.01453	3.043203	Up	pentraxin 3
SEPTIN4	1.249344	2.05E-14	4.93E-12	7.647556	Up	septin 4
HMOX2	1.249238	2.96E-24	7.14E-21	10.16091	Up	heme oxygenase 2
PLEKHH1	1.241406	3.44E-15	1.15E-12	7.873793	Up	pleckstrin homology, MyTH4 and FERM domain containing H1
RPL7P1	1.235145	0.005675	0.029042	2.765985	Up	ribosomal protein L7 pseudogene 1
EPHB2	1.23419	0.00136	0.009458	3.202918	Up	EPH receptor B2
GPD1L	1.232928	2.72E-20	2.26E-17	9.229634	Up	glycerol-3-phosphate dehydrogenase 1 like
DIRAS3	1.230333	6.12E-05	0.000746	4.008307	Up	DIRAS family GTPase 3
CACNA2D3	1.22902	3.49E-06	6.94E-05	4.639829	Up	calcium voltage-gated channel auxiliary subunit alpha2delta 3
DPY19L2P2	1.225901	3.08E-06	6.26E-05	4.665498	Up	DPY19L2 pseudogene 2
ALDH1L1	1.225133	5.71E-10	3.89E-08	6.198363	Up	aldehyde dehydrogenase 1 family member L1
CLIC3	1.224084	0.001764	0.011655	3.127297	Up	chloride intracellular channel 3
ZNF703	1.218854	1.66E-06	3.74E-05	4.791401	Up	zinc finger protein 703
CSDC2	1.2118	1.59E-14	3.96E-12	7.680143	Up	cold shock domain containing C2
DIRAS1	1.21122	5.17E-16	2.00E-13	8.10746	Up	DIRAS family GTPase 1
ZNG1E	1.211123	3.79E-07	1.08E-05	5.079399	Up	Zn regulated GTPase metalloprotein activator 1E
SLC2A1	1.209496	1.16E-08	5.38E-07	5.705373	Up	solute carrier family 2 member 1
ITGA7	1.209088	1.68E-11	1.85E-09	6.731784	Up	integrin subunit alpha 7
NALCN	1.209044	2.41E-10	1.86E-08	6.33278	Up	sodium leak channel, non-selective
SOX2-OT	1.205553	0.00815	0.038565	2.645775	Up	SOX2 overlapping transcript
SLC44A3	1.202879	6.51E-07	1.70E-05	4.975584	Up	solute carrier family 44 member 3
ATP2A2	1.198046	2.98E-10	2.25E-08	6.299574	Up	ATPase sarcoplasmic/endoplasmic reticulum Ca2+ transporting 2
GSTM3	1.191904	1.49E-09	8.87E-08	6.045888	Up	glutathione S-transferase mu 3
TENT5C	1.189239	2.06E-09	1.18E-07	5.992639	Up	terminal nucleotidyltransferase 5C
TGM2	1.185645	5.09E-07	1.38E-05	5.022934	Up	transglutaminase 2
FHL2	1.185418	9.96E-09	4.72E-07	5.731397	Up	four and a half LIM domains 2

RPLP0	1.181906	3.61E-13	6.41E-11	7.269473	Up	ribosomal protein lateral stalk subunit P0
RPS27AP16	1.17739	0.00281	0.01686	2.987836	Up	RPS27A pseudogene 16
CD38	1.172194	0.000242	0.002335	3.670346	Up	CD38 molecule
FAM78B	1.169715	1.09E-07	3.67E-06	5.311728	Up	family with sequence similarity 78 member B
SLC7A1	1.166618	6.00E-07	1.59E-05	4.991196	Up	solute carrier family 7 member 1
SIRPB2	1.16641	0.008251	0.038947	2.641626	Up	signal regulatory protein beta 2
MEGF9	1.163082	2.15E-09	1.21E-07	5.985764	Up	multiple EGF like domains 9
WNK3	1.159488	0.000164	0.001691	3.768555	Up	WNK lysine deficient protein kinase 3
RPL27AP6	1.158505	0.003534	0.020133	2.917006	Up	ribosomal protein L27a pseudogene 6
KLHL3	1.153267	1.87E-16	7.82E-14	8.229829	Up	kelch like family member 3
GRIN2A	1.146594	0.003412	0.019589	2.92799	Up	glutamate ionotropic receptor NMDA type subunit 2A
FGF7	1.145308	6.17E-09	3.04E-07	5.812029	Up	fibroblast growth factor 7
FN1	1.143925	0.001799	0.011823	3.121478	Up	fibronectin 1
PCARE	1.143335	0.000323	0.002952	3.596493	Up	photoreceptor cilium actin regulator
SERINC2	1.14253	9.22E-05	0.001052	3.910156	Up	serine incorporator 2
SMYD1	1.141773	3.58E-20	2.88E-17	9.19986	Up	SET and MYND domain containing 1
ART5	1.139887	0.003215	0.018711	2.946434	Up	ADP-ribosyltransferase 5
MARVELD2	1.138619	0.000119	0.001293	3.848363	Up	MARVEL domain containing 2
EPN3	1.137555	1.50E-06	3.45E-05	4.811194	Up	epsin 3
PRSS36	1.13463	8.07E-05	0.00094	3.942252	Up	serine protease 36
HAGHL	1.133864	2.45E-05	0.000351	4.219735	Up	hydroxyacylglutathione hydrolase like
RPL13AP25	1.13331	0.009892	0.04455	2.579581	Up	ribosomal protein L13a pseudogene 25
MATN3	1.133234	0.000255	0.002426	3.657502	Up	matrilin 3
ENTPD6	1.132651	1.09E-12	1.63E-10	7.119162	Up	ectonucleoside triphosphate diphosphohydrolase 6
OSR1	1.13203	0.000349	0.003143	3.57622	Up	odd-skipped related transcription factor 1
CMTM5	1.131771	0.000851	0.006444	3.335612	Up	CKLF like MARVEL transmembrane domain containing 5
PPP1R14B	1.12904	5.33E-07	1.44E-05	5.01393	Up	protein phosphatase 1 regulatory inhibitor subunit 14B
HCN4	1.127776	2.19E-05	0.000321	4.244177	Up	hyperpolarization activated cyclic nucleotide gated potassium channel 4
PRRG4	1.123978	0.002825	0.016926	2.98615	Up	proline rich and Gla domain 4
SLC4A3	1.120213	5.21E-18	2.75E-15	8.648687	Up	solute carrier family 4 member 3
LRRC7	1.118524	0.007755	0.037196	2.662571	Up	leucine rich repeat containing 7
STXBP2	1.11251	0.000429	0.003737	3.521722	Up	syntaxin binding protein 2
SLC5A1	1.109955	2.57E-07	7.68E-06	5.152881	Up	solute carrier family 5 member 1
RPL13AP5	1.109672	5.20E-05	0.000652	4.046556	Up	ribosomal protein L13a pseudogene 5
C1QA	1.104959	0.000125	0.00135	3.835175	Up	complement C1q A chain
MRO	1.104795	0.008506	0.039821	2.631305	Up	maestro
CRLF1	1.102263	0.001947	0.012603	3.09818	Up	cytokine receptor like factor 1
POMC	1.100485	0.002162	0.013648	3.067084	Up	proopiomelanocortin
APOB	1.100355	8.30E-08	2.95E-06	5.360571	Up	apolipoprotein B
TMEM178B	1.098754	2.40E-08	1.00E-06	5.580264	Up	transmembrane protein 178B
OLFM4	1.098597	0.006843	0.033781	2.704386	Up	olfactomedin 4
RPS15P4	1.098371	0.002499	0.015346	3.023443	Up	ribosomal protein S15 pseudogene 4

MYO7B	1.098014	2.59E-07	7.73E-06	5.151425	Up	myosin VIIB
TMEM26	1.097008	0.003543	0.020178	2.916229	Up	transmembrane protein 26
CHADL	1.096481	1.95E-06	4.27E-05	4.758547	Up	chondroadherin like
BMAL1	1.096161	0.000125	0.001346	3.836442	Up	basic helix-loop-helix ARNT like 1
HEY2	1.092581	4.13E-06	7.98E-05	4.604788	Up	hes related family bHLH transcription factor with YRPW motif 2
C1QC	1.088725	0.001456	0.009997	3.183325	Up	complement C1q C chain
RAP1GAP	1.087453	3.89E-07	1.10E-05	5.074213	Up	RAP1 GTPase activating protein
IGFBP2	1.087314	0.00067	0.005337	3.401769	Up	insulin like growth factor binding protein 2
SERF1A	1.085241	0.000866	0.006537	3.330766	Up	small EDRK-rich factor 1A
ANKRD2	1.084717	0.008452	0.039628	2.633472	Up	ankyrin repeat domain 2
NINJ2	1.083521	7.06E-05	0.000843	3.974187	Up	ninjurin 2
CHGB	1.082407	0.000154	0.0016	3.785001	Up	chromogranin B
MZT2A	1.081823	3.37E-08	1.34E-06	5.52093	Up	mitotic spindle organizing protein 2A
ARG2	1.077937	0.007269	0.035376	2.684263	Up	arginase 2
ORMDL2	1.076301	1.29E-07	4.27E-06	5.280896	Up	ORMDL sphingolipid biosynthesis regulator 2
S100A10	1.076148	1.02E-08	4.81E-07	5.726995	Up	S100 calcium binding protein A10
FCGR3A	1.076127	0.00255	0.01557	3.017393	Up	Fc gamma receptor IIIa
TMTC1	1.073139	8.28E-15	2.39E-12	7.763155	Up	transmembrane O-mannosyltransferase targeting cadherins 1
GPSM2	1.063368	0.000784	0.006048	3.358294	Up	G protein signaling modulator 2
GGH	1.061541	0.000593	0.004829	3.434894	Up	gamma-glutamyl hydrolase
LPCAT3	1.061072	6.23E-13	1.05E-10	7.195297	Up	lysophosphatidylcholine acyltransferase 3
IL15RA	1.060951	4.54E-05	0.000584	4.078377	Up	interleukin 15 receptor subunit alpha
REPS2	1.059318	0.001048	0.007675	3.27738	Up	RALBP1 associated Eps domain containing 2
MLF1	1.05351	4.29E-09	2.20E-07	5.872576	Up	myeloid leukemia factor 1
RORB	1.052267	0.000424	0.003709	3.524428	Up	RAR related orphan receptor B
CHPF	1.052013	2.50E-07	7.51E-06	5.158054	Up	chondroitin polymerizing factor
GPD1	1.050149	7.41E-05	0.000877	3.962715	Up	glycerol-3-phosphate dehydrogenase 1
FABP4	1.043675	5.24E-05	0.000656	4.04446	Up	fatty acid binding protein 4
AIF1L	1.041639	2.52E-14	5.94E-12	7.620837	Up	allograft inflammatory factor 1 like
PTGS1	1.041087	0.000484	0.004125	3.489678	Up	prostaglandin-endoperoxide synthase 1
BHMT2	1.038158	8.03E-05	0.000936	3.943548	Up	betaine--homocysteine S-methyltransferase 2
QRFPR	1.03293	0.003967	0.022011	2.880748	Up	pyroglutamylated RFamide peptide receptor
C1QTNF1	1.032803	1.79E-06	4.00E-05	4.775687	Up	C1q and TNF related 1
LMCD1	1.030855	3.82E-07	1.08E-05	5.077748	Up	LIM and cysteine rich domains 1
CASKIN1	1.030294	6.58E-06	0.000117	4.50697	Up	CASK interacting protein 1
LRRC73	1.022236	4.19E-05	0.000551	4.096888	Up	leucine rich repeat containing 73
HK3	1.020868	0.003316	0.019156	2.936838	Up	hexokinase 3
VGLL3	1.020075	0.000109	0.001208	3.870325	Up	vestigial like family member 3
SDK1	1.019941	0.000306	0.002827	3.610504	Up	sidekick cell adhesion molecule 1
TPO	1.019432	5.94E-06	0.000108	4.52863	Up	thyroid peroxidase
PPIL1	1.018639	3.22E-08	1.29E-06	5.528843	Up	peptidylprolyl isomerase like 1
LRP4	1.01809	8.82E-09	4.22E-07	5.751897	Up	LDL receptor related protein 4

PLEKHN1	1.016341	0.004033	0.022273	2.875558	Up	pleckstrin homology domain containing N1
NFXL1	1.009298	9.69E-05	0.001098	3.898277	Up	nuclear transcription factor, X-box binding like 1
LOX	1.009253	0.000343	0.003104	3.580584	Up	lysyl oxidase
ADAMTS5	1.008298	0.00761	0.036683	2.668882	Up	ADAM metallopeptidase with thrombospondin type 1 motif 5
CD63	1.006901	5.17E-10	3.63E-08	6.213778	Up	CD63 molecule
ADAMTS15	1.005903	9.34E-05	0.001065	3.907072	Up	ADAM metallopeptidase with thrombospondin type 1 motif 15
CES4A	1.005567	5.51E-07	1.48E-05	5.007697	Up	carboxylesterase 4A
RPSA	1.002379	3.31E-17	1.59E-14	8.435149	Up	ribosomal protein SA
TSPAN2	1.002265	0.000227	0.002206	3.687257	Up	tetraspanin 2
HMBS	1.00194	8.33E-08	2.96E-06	5.359936	Up	hydroxymethylbilane synthase
ECE2	1.001266	0.000939	0.006999	3.308094	Up	endothelin converting enzyme 2
HAS2	0.999359	0.00706	0.034578	2.693979	Up	hyaluronan synthase 2
DMPK	0.998563	1.02E-08	4.80E-07	5.727498	Up	DM1 protein kinase
ALDOC	0.998201	5.63E-12	6.94E-10	6.888681	Up	aldolase, fructose-bisphosphate C
RPL15P3	0.997813	0.003199	0.018635	2.947937	Up	ribosomal protein L15 pseudogene 3
NQO1	0.996485	1.36E-05	0.000215	4.349613	Up	NAD(P)H quinone dehydrogenase 1
KLHL31	0.994088	1.34E-12	1.94E-10	7.090551	Up	kelch like family member 31
STXBP6	0.991408	0.00022	0.002151	3.695079	Up	syntaxin binding protein 6
TMEM37	0.984351	0.00046	0.003965	3.503017	Up	transmembrane protein 37
SLC17A9	0.98239	0.001532	0.010428	3.168583	Up	solute carrier family 17 member 9
LAMB3	0.98046	2.50E-06	5.21E-05	4.708423	Up	laminin subunit beta 3
RGS9BP	0.979373	3.56E-05	0.00048	4.134215	Up	regulator of G protein signaling 9 binding protein
PROCR	0.97865	5.56E-07	1.49E-05	5.005796	Up	protein C receptor
BCAT1	0.978293	0.011136	0.048687	2.538395	Up	branched chain amino acid transaminase 1
PTGDR	0.978039	0.002081	0.013271	3.07841	Up	prostaglandin D2 receptor
SIGLEC1	0.97573	0.002692	0.016278	3.000931	Up	sialic acid binding Ig like lectin 1
ZNG1C	0.974481	0.005358	0.027846	2.784673	Up	Zn regulated GTPase metalloprotein activator 1C
CAMK1D	0.973523	0.000188	0.001894	3.734622	Up	calcium/calmodulin dependent protein kinase ID
DDN	0.972604	0.0005	0.004216	3.480607	Up	dendrin
RPS6KA2	0.972468	9.24E-11	8.21E-09	6.478861	Up	ribosomal protein S6 kinase A2
PPIP5K2	0.969162	1.26E-13	2.43E-11	7.41053	Up	diphosphoinositol pentakisphosphate kinase 2
SLC29A2	0.969079	1.66E-07	5.36E-06	5.23419	Up	solute carrier family 29 member 2
NMRAL1	0.969006	7.72E-05	0.000906	3.953031	Up	NmrA like redox sensor 1
RALGPS2	0.966538	7.79E-08	2.80E-06	5.371814	Up	Ral GEF with PH domain and SH3 binding motif 2
NGFR	0.960061	0.002514	0.015414	3.021686	Up	nerve growth factor receptor
RPS2	0.956895	2.35E-12	3.22E-10	7.011857	Up	ribosomal protein S2
CENPV	0.953979	1.71E-05	0.00026	4.300079	Up	centromere protein V
RPS3AP26	0.952969	0.009264	0.042507	2.602158	Up	RPS3A pseudogene 26
PSMD8	0.950822	1.75E-12	2.49E-10	7.053132	Up	proteasome 26S subunit, non-ATPase 8
PRDX6	0.950566	1.02E-18	6.89E-16	8.833171	Up	peroxiredoxin 6
EDN1	0.950283	0.003236	0.018789	2.944399	Up	endothelin 1
EBP	0.948459	2.56E-11	2.71E-09	6.66991	Up	EBP cholestenol delta-isomerase

DHCR24	0.948293	0.004586	0.024627	2.834793	Up	24-dehydrocholesterol reductase
PDPN	0.944024	8.37E-05	0.000968	3.933428	Up	podoplanin
AKR1C1	0.933987	0.000125	0.001349	3.835698	Up	aldo-keto reductase family 1 member C1
CCDC184	0.933487	0.000802	0.006152	3.352086	Up	coiled-coil domain containing 184
HSPB7	0.931877	1.08E-12	1.63E-10	7.119389	Up	heat shock protein family B (small) member 7
SLC25A34	0.931047	3.52E-05	0.000475	4.136694	Up	solute carrier family 25 member 34
RASSF7	0.930056	0.0005	0.004216	3.48068	Up	Ras association domain family member 7
MMP19	0.92655	0.000932	0.006946	3.310437	Up	matrix metallopeptidase 19
CTSB	0.925437	1.04E-23	1.73E-20	10.03797	Up	cathepsin B
GLRX2	0.924516	1.67E-06	3.77E-05	4.789786	Up	glutaredoxin 2
LRRC32	0.921878	2.97E-08	1.21E-06	5.543104	Up	leucine rich repeat containing 32
MYL3	0.921472	7.10E-13	1.17E-10	7.177425	Up	myosin light chain 3
SMCO4	0.919571	3.46E-11	3.44E-09	6.625366	Up	single-pass membrane protein with coiled-coil domains 4
ITGA11	0.919375	2.16E-06	4.65E-05	4.73767	Up	integrin subunit alpha 11
PRKCD	0.917729	9.41E-06	0.000157	4.430357	Up	protein kinase C delta
FCER1G	0.917263	0.000329	0.002999	3.591448	Up	Fc epsilon receptor Ig
RPL27	0.916013	1.28E-10	1.07E-08	6.42969	Up	ribosomal protein L27
EFL1	0.915911	5.35E-07	1.44E-05	5.01316	Up	elongation factor like GTPase 1
SLCO2A1	0.914237	1.88E-05	0.000282	4.2786	Up	solute carrier organic anion transporter family member 2A1
SLC6A6	0.914068	1.92E-05	0.000286	4.273802	Up	solute carrier family 6 member 6
SLC9A7	0.913523	0.000357	0.003211	3.570057	Up	solute carrier family 9 member A7
RAMP1	0.912441	2.63E-07	7.85E-06	5.14836	Up	receptor activity modifying protein 1
TIFA	0.907331	0.000617	0.004992	3.424241	Up	TRAF interacting protein with forkhead associated domain
TSKU	0.907142	3.71E-08	1.47E-06	5.504114	Up	tsukushi, small leucine rich proteoglycan
SASH3	0.906894	0.005187	0.027114	2.795157	Up	SAM and SH3 domain containing 3
LGALS3	0.906007	7.66E-10	5.00E-08	6.151733	Up	galectin 3
NSDHL	0.903134	1.19E-13	2.36E-11	7.418028	Up	NAD(P) dependent steroid dehydrogenase-like
STEAP4	0.901749	0.000127	0.001361	3.832772	Up	STEAP4 metalloreductase
RPS5	0.901556	1.11E-09	6.91E-08	6.092253	Up	ribosomal protein S5
ABCG4	0.899377	0.000241	0.002322	3.672119	Up	ATP binding cassette subfamily G member 4
VIPR1	0.899325	5.47E-05	0.000679	4.034777	Up	vasoactive intestinal peptide receptor 1
KCNH2	0.898831	5.33E-11	5.05E-09	6.561335	Up	potassium voltage-gated channel subfamily H member 2
C8orf88	0.897743	3.23E-07	9.30E-06	5.109543	Up	chromosome 8 open reading frame 88
GPSM1	0.897483	6.74E-13	1.12E-10	7.184681	Up	G protein signaling modulator 1
LPCAT4	0.892491	1.34E-06	3.12E-05	4.833832	Up	lysophosphatidylcholine acyltransferase 4
COMTD1	0.890247	3.76E-07	1.07E-05	5.080717	Up	catechol-O-methyltransferase domain containing 1
ANKRD37	0.88827	3.93E-05	0.000522	4.111719	Up	ankyrin repeat domain 37
NACAD	0.888089	0.00255	0.01557	3.01735	Up	NAC alpha domain containing
TUBA4A	0.885552	0.000567	0.004652	3.446919	Up	tubulin alpha 4a
EPB41L4B	0.885224	0.002067	0.013216	3.080452	Up	erythrocyte membrane protein band 4.1 like 4B
SLAMF8	0.884149	0.003872	0.021624	2.888428	Up	SLAM family member 8
ZDHHC23	0.884111	0.00036	0.003234	3.567794	Up	zinc finger DHHC-type palmitoyltransferase 23

KCNK1	0.882224	0.000994	0.007341	3.292139	Up	potassium two pore domain channel subfamily K member 1
FTH1	0.880517	2.72E-09	1.47E-07	5.947709	Up	ferritin heavy chain 1
GGT5	0.879595	4.46E-06	8.46E-05	4.588919	Up	gamma-glutamyltransferase 5
NID1	0.878325	3.41E-05	0.000462	4.144327	Up	nidogen 1
IMPA2	0.87685	1.44E-10	1.19E-08	6.41118	Up	inositol monophosphatase 2
CREB3L1	0.875323	1.01E-07	3.47E-06	5.324906	Up	cAMP responsive element binding protein 3 like 1
FRK	0.874037	5.76E-06	0.000105	4.535166	Up	fyn related Src family tyrosine kinase
F8	0.873081	9.95E-07	2.44E-05	4.892682	Up	coagulation factor VIII
SRRM3	0.872029	0.006155	0.03108	2.739386	Up	serine/arginine repetitive matrix 3
NOCT	0.871412	4.66E-07	1.28E-05	5.039942	Up	nocturnin
SNAI3	0.869649	0.001987	0.012804	3.09214	Up	snail family transcriptional repressor 3
HMOX1	0.869394	0.001014	0.007474	3.286495	Up	heme oxygenase 1
AKR1B1	0.868698	1.85E-05	0.000278	4.282764	Up	aldo-keto reductase family 1 member B
ZDHHC9	0.867612	1.29E-06	3.03E-05	4.84134	Up	zinc finger DHHC-type palmitoyltransferase 9
RPL6P27	0.865558	0.00444	0.023969	2.845103	Up	ribosomal protein L6 pseudogene 27
ACACB	0.862721	2.42E-19	1.88E-16	8.992222	Up	acetyl-CoA carboxylase beta
NUDT4	0.861292	7.95E-10	5.17E-08	6.145934	Up	nudix hydrolase 4
ALPL	0.861175	1.86E-07	5.87E-06	5.212504	Up	alkaline phosphatase, biomineralization associated
SLC25A19	0.861029	4.20E-07	1.18E-05	5.059868	Up	solute carrier family 25 member 19
SH3KBP1	0.860753	6.01E-06	0.000109	4.525954	Up	SH3 domain containing kinase binding protein 1
BCL6	0.860165	1.43E-11	1.60E-09	6.754946	Up	BCL6 transcription repressor
MPST	0.859653	5.21E-12	6.52E-10	6.899819	Up	mercaptopyruvate sulfurtransferase
GAREM1	0.857939	2.74E-09	1.47E-07	5.946406	Up	GRB2 associated regulator of MAPK1 subtype 1
PALLD	0.855494	1.79E-10	1.45E-08	6.378635	Up	palladin, cytoskeletal associated protein
CD276	0.851975	1.92E-07	6.00E-06	5.207066	Up	CD276 molecule
KIF24	0.850893	0.003482	0.019881	2.921673	Up	kinesin family member 24
NQO2	0.850874	0.001582	0.010699	3.159217	Up	N-ribosyldihydronicotinamide:quinone reductase 2
CABP1	0.847902	2.51E-05	0.000358	4.213805	Up	calcium binding protein 1
MCRIP2	0.847354	2.40E-08	1.00E-06	5.580226	Up	MAPK regulated corepressor interacting protein 2
FAM86DP	0.846945	0.00029	0.00271	3.62384	Up	family with sequence similarity 86 member D, pseudogene
HIF3A	0.845481	1.87E-06	4.12E-05	4.767027	Up	hypoxia inducible factor 3 subunit alpha
TUBG1	0.841452	2.98E-07	8.71E-06	5.124896	Up	tubulin gamma 1
NRAV	0.837301	8.06E-06	0.000139	4.463559	Up	negative regulator of antiviral response
RETSAT	0.835155	2.51E-08	1.04E-06	5.572753	Up	retinol saturase
RNASE6	0.833596	0.010755	0.047383	2.550565	Up	ribonuclease A family member k6
TKT	0.830832	2.24E-05	0.000326	4.239435	Up	transketolase
PMVK	0.830181	6.77E-12	8.15E-10	6.862402	Up	phosphomevalonate kinase
EPN1	0.828162	8.02E-10	5.21E-08	6.144462	Up	epsin 1
RFPL4A	-6.08612	6.11E-06	0.00011	-4.52272	Down	ret finger protein like 4A
EDN3	-5.81897	2.27E-09	1.27E-07	-5.9774	Down	endothelin 3
CST2	-5.75383	5.07E-08	1.93E-06	-5.44897	Down	cystatin SA
SEZ6L	-5.57904	7.11E-39	7.71E-35	-13.0414	Down	seizure related 6 homolog like

CUX2	-5.56999	8.47E-10	5.43E-08	-6.1358	Down	cut like homeobox 2
ESM1	-5.53143	1.29E-10	1.08E-08	-6.42835	Down	endothelial cell specific molecule 1
SIGLEC17P	-5.52859	1.48E-09	8.85E-08	-6.04672	Down	sialic acid binding Ig like lectin 17, pseudogene
GSG1L	-5.08812	8.54E-15	2.40E-12	-7.75928	Down	GSG1 like
VGLL2	-4.82825	2.64E-14	6.15E-12	-7.61497	Down	vestigial like family member 2
MSTN	-4.80687	3.20E-08	1.29E-06	-5.53016	Down	myostatin
LYPD1	-4.72384	1.12E-05	0.000181	-4.39289	Down	LY6/PLAUR domain containing 1
TNMD	-4.65997	2.90E-09	1.55E-07	-5.9374	Down	tenomodulin
IL31RA	-4.45949	1.93E-08	8.29E-07	-5.61815	Down	interleukin 31 receptor A
PRND	-4.24837	0.000294	0.00274	-3.62066	Down	prion like protein doppel
CA3	-4.24797	7.57E-10	4.97E-08	-6.15363	Down	carbonic anhydrase 3
RFPL4AL1	-4.06067	0.002819	0.016892	-2.98684	Down	ret finger protein like 4A like 1
HBA1	-3.93318	7.06E-05	0.000843	-3.97425	Down	hemoglobin subunit alpha 1
SFRP4	-3.90669	8.49E-25	2.63E-21	-10.2821	Down	secreted frizzled related protein 4
SHISA2	-3.88696	1.74E-09	1.01E-07	-6.02032	Down	shisa family member 2
COL22A1	-3.88282	6.44E-08	2.39E-06	-5.40611	Down	collagen type XXII alpha 1 chain
LAMP5	-3.88196	5.26E-05	0.000657	-4.04397	Down	lysosomal associated membrane protein family member 5
CYP21A2	-3.86616	6.67E-05	0.000804	-3.98787	Down	cytochrome P450 family 21 subfamily A member 2
CENPA	-3.78995	6.66E-08	2.46E-06	-5.40011	Down	centromere protein A
CXCL11	-3.77668	0.000238	0.002305	-3.67431	Down	C-X-C motif chemokine ligand 11
CBLN4	-3.75516	0.000492	0.004178	-3.48504	Down	cerebellin 4 precursor
CD1C	-3.74245	1.12E-07	3.74E-06	-5.30645	Down	CD1c molecule
IRX1	-3.67142	1.38E-24	3.75E-21	-10.2349	Down	iroquois homeobox 1
KCNK10	-3.64322	0.000246	0.002361	-3.66631	Down	potassium two pore domain channel subfamily K member 10
CYP4F3	-3.63956	0.000769	0.005958	-3.36384	Down	cytochrome P450 family 4 subfamily F member 3
TRPM8	-3.62602	0.010099	0.045275	-2.57243	Down	transient receptor potential cation channel subfamily M member 8
SYTL5	-3.60488	1.91E-10	1.52E-08	-6.3687	Down	synaptotagmin like 5
HBA2	-3.59683	1.49E-09	8.87E-08	-6.04504	Down	hemoglobin subunit alpha 2
ZSCAN4	-3.58877	0.000508	0.004267	-3.47649	Down	zinc finger and SCAN domain containing 4
CST1	-3.54945	0.003149	0.018407	-2.95282	Down	cystatin SN
PIPSL	-3.51637	1.35E-05	0.000213	-4.35172	Down	PIP5K1A and PSMD4 like (pseudogene)
P3H2	-3.50657	4.00E-15	1.28E-12	-7.85484	Down	prolyl 3-hydroxylase 2
L1TD1	-3.48386	0.001653	0.011091	-3.14636	Down	LINE1 type transposase domain containing 1
UCMA	-3.48194	0.001171	0.008408	-3.24585	Down	upper zone of growth plate and cartilage matrix associated
FOXA1	-3.45448	0.00224	0.014029	-3.05646	Down	forkhead box A1
IL22RA2	-3.4501	0.001113	0.008053	-3.26037	Down	interleukin 22 receptor subunit alpha 2
APOBEC3A	-3.4404	0.001068	0.007806	-3.27194	Down	apolipoprotein B mRNA editing enzyme catalytic subunit 3A
RSPO2	-3.4195	0.000263	0.002489	-3.64925	Down	R-spondin 2
ARMS2	-3.40932	0.000232	0.002247	-3.68188	Down	age-related maculopathy susceptibility 2
LEF1	-3.39897	5.91E-09	2.92E-07	-5.81916	Down	lymphoid enhancer binding factor 1
ALOX15	-3.39735	0.003337	0.019255	-2.93482	Down	arachidonate 15-lipoxygenase

KLHDC8A	-3.39219	0.000412	0.003618	-3.53199	Down	kelch domain containing 8A
CTLA4	-3.38635	0.001687	0.011269	-3.14042	Down	cytotoxic T-lymphocyte associated protein 4
SLITRK4	-3.37805	2.08E-12	2.93E-10	-7.02874	Down	SLIT and NTRK like family member 4
SLC4A8	-3.35749	4.88E-08	1.87E-06	-5.4555	Down	solute carrier family 4 member 8
MAP3K7CL	-3.33799	2.17E-12	3.03E-10	-7.02312	Down	MAP3K7 C-terminal like
TMEM114	-3.3051	0.00107	0.007816	-3.27147	Down	transmembrane protein 114
ZNF497	-3.28471	1.06E-06	2.57E-05	-4.88079	Down	zinc finger protein 497
MYH2	-3.26621	0.00069	0.005454	-3.39364	Down	myosin heavy chain 2
PCDH15	-3.23631	1.20E-08	5.52E-07	-5.70003	Down	protocadherin related 15
MATN4	-3.21706	0.005603	0.028785	-2.77014	Down	matrilin 4
FBN3	-3.20371	0.000762	0.005914	-3.36612	Down	fibrillin 3
PENK	-3.20157	1.42E-08	6.38E-07	-5.67074	Down	proenkephalin
OIT3	-3.18648	0.001047	0.007669	-3.27769	Down	oncoprotein induced transcript 3
FCGR3B	-3.18466	3.45E-05	0.000467	-4.14164	Down	Fc gamma receptor IIIb
IL1B	-3.15644	0.004337	0.023551	-2.85253	Down	interleukin 1 beta
PPP2R2B	-3.1265	5.41E-10	3.73E-08	-6.20685	Down	protein phosphatase 2 regulatory subunit Bbeta
FCER1A	-3.11477	1.80E-12	2.54E-10	-7.04952	Down	Fc epsilon receptor Ia
TINCR	-3.02355	0.002331	0.014486	-3.04444	Down	TINCR ubiquitin domain containing
HBB	-3.01782	4.64E-06	8.74E-05	-4.58031	Down	hemoglobin subunit beta
RXFP2	-3.00027	7.07E-05	0.000843	-3.97379	Down	relaxin family peptide receptor 2
SLC16A6	-2.99211	5.09E-06	9.45E-05	-4.56122	Down	solute carrier family 16 member 6
ANKRD18B	-2.9787	0.00653	0.0326	-2.71989	Down	ankyrin repeat domain 18B
ATP1A4	-2.97464	6.55E-08	2.43E-06	-5.40298	Down	ATPase Na+/K+ transporting subunit alpha 4
IRX2	-2.97222	2.20E-21	2.39E-18	-9.49489	Down	iroquois homeobox 2
AARSD1P1	-2.97018	0.002885	0.017172	-2.97972	Down	AARSD1 pseudogene 1
COL10A1	-2.95457	6.10E-07	1.61E-05	-4.98814	Down	collagen type X alpha 1 chain
FNDC1	-2.94983	9.88E-17	4.37E-14	-8.30623	Down	fibronectin type III domain containing 1
DPYSL5	-2.94034	0.004785	0.025452	-2.82118	Down	dihydropyrimidinase like 5
CDH8	-2.93542	3.82E-07	1.08E-05	-5.0777	Down	cadherin 8
DUXAP8	-2.92529	2.28E-08	9.60E-07	-5.58952	Down	double homeobox A pseudogene 8
SCUBE2	-2.91312	5.58E-23	8.07E-20	-9.87061	Down	signal peptide, CUB domain and EGF like domain containing 2
PCSK1N	-2.91045	8.48E-09	4.08E-07	-5.75856	Down	proprotein convertase subtilisin/kexin type 1 inhibitor
DLGAP1	-2.9102	3.34E-10	2.50E-08	-6.28233	Down	DLG associated protein 1
KCNJ15	-2.88108	0.007867	0.037565	-2.65773	Down	potassium inwardly rectifying channel subfamily J member 15
ECEL1	-2.87494	0.005376	0.027904	-2.7836	Down	endothelin converting enzyme like 1
CTSG	-2.86227	3.46E-06	6.90E-05	-4.64134	Down	cathepsin G
RPS4XP5	-2.86191	1.18E-05	0.000191	-4.38147	Down	ribosomal protein S4X pseudogene 5
AQP10	-2.84503	2.45E-06	5.15E-05	-4.71239	Down	aquaporin 10
MUC13	-2.84396	0.003438	0.019707	-2.92563	Down	mucin 13, cell surface associated
C2CD4D	-2.83404	0.000836	0.006351	-3.34073	Down	C2 calcium dependent domain containing 4D
CX3CR1	-2.83102	5.17E-10	3.63E-08	-6.21387	Down	C-X3-C motif chemokine receptor 1
CRACD	-2.81495	1.48E-07	4.84E-06	-5.25561	Down	capping protein inhibiting regulator of actin dynamics

HS3ST5	-2.80116	0.000915	0.006843	-3.31547	Down	heparan sulfate-glucosamine 3-sulfotransferase 5
TMEM262	-2.79837	0.007145	0.034919	-2.69003	Down	transmembrane protein 262
UNC80	-2.79241	1.25E-06	2.97E-05	-4.84703	Down	unc-80 homolog, NALCN channel complex subunit
DUXAP9	-2.78798	1.14E-06	2.74E-05	-4.86569	Down	double homeobox A pseudogene 9
SFTA1P	-2.77093	0.002232	0.013986	-3.05754	Down	surfactant associated 1, lncRNA
PLD4	-2.77083	4.28E-05	0.00056	-4.09205	Down	phospholipase D family member 4
TAS2R18P	-2.76001	0.001362	0.009463	-3.20265	Down	taste 2 receptor member 18 pseudogene
APCDD1L-DT	-2.75889	8.68E-05	0.000999	-3.92493	Down	APCDD1L divergent transcript
GZMM	-2.74069	0.006992	0.034342	-2.69725	Down	granzyme M
RHCG	-2.73901	7.18E-05	0.000853	-3.97033	Down	Rh family C glycoprotein
APCDD1L	-2.73757	3.29E-15	1.11E-12	-7.87949	Down	APC down-regulated 1 like
SUPT20HL2	-2.71694	0.008404	0.039459	-2.63541	Down	SUPT20H like 2
UGT8	-2.71408	0.011227	0.048973	-2.53555	Down	UDP glycosyltransferase 8
RASEF	-2.71297	5.46E-05	0.000679	-4.03484	Down	RAS and EF-hand domain containing
MTCO2P11	-2.70143	0.009939	0.044724	-2.57795	Down	MT-CO2 pseudogene 11
ITPRID1	-2.69273	0.005594	0.028754	-2.77068	Down	ITPR interacting domain containing 1
ANKRD34C	-2.67122	4.83E-15	1.47E-12	-7.83126	Down	ankyrin repeat domain 34C
WNT9A	-2.66476	1.23E-07	4.09E-06	-5.28946	Down	Wnt family member 9A
FRZB	-2.66108	1.91E-20	1.65E-17	-9.26745	Down	frizzled related protein
ATP1B4	-2.65405	1.37E-09	8.36E-08	-6.05903	Down	ATPase Na+/K+ transporting family member beta 4
TMEM30B	-2.61461	1.15E-12	1.73E-10	-7.11066	Down	transmembrane protein 30B
MKRN2OS	-2.60614	3.69E-06	7.26E-05	-4.62816	Down	MKRN2 opposite strand
FMN2	-2.60154	0.011006	0.048226	-2.5425	Down	formin 2
TM6SF2	-2.59953	0.004838	0.025678	-2.81763	Down	transmembrane 6 superfamily member 2
ZNF365	-2.59706	2.50E-09	1.38E-07	-5.9613	Down	zinc finger protein 365
STK4-DT	-2.59357	0.004025	0.022253	-2.87617	Down	STK4 divergent transcript
GZMB	-2.59298	0.003346	0.019292	-2.93399	Down	granzyme B
DOCK11P1	-2.56323	0.007399	0.035881	-2.67832	Down	dedicator of cytokinesis 11 pseudogene 1
CACNA1B	-2.56238	9.28E-08	3.23E-06	-5.34025	Down	calcium voltage-gated channel subunit alpha1 B
BCL2A1	-2.55969	0.005986	0.030365	-2.74853	Down	BCL2 related protein A1
HYAL4	-2.55492	0.011543	0.049923	-2.52581	Down	hyaluronidase 4
HLA-DRB6	-2.53952	0.005389	0.027961	-2.78279	Down	major histocompatibility complex, class II, DR beta 6 (pseudogene)
CMA1	-2.53309	0.003571	0.020307	-2.91375	Down	chymase 1
GNLY	-2.52776	5.74E-07	1.53E-05	-4.99987	Down	granulysin
E2F7	-2.51473	0.00724	0.035267	-2.68561	Down	E2F transcription factor 7
HCCAT5	-2.51024	0.010079	0.045196	-2.5731	Down	hepatocellular carcinoma associated transcript 5
IL6ST-DT	-2.50982	0.009757	0.044144	-2.58432	Down	IL6ST divergent transcript
CYTL1	-2.49129	3.38E-06	6.76E-05	-4.6463	Down	cytokine like 1
RGS4	-2.47243	3.34E-18	1.91E-15	-8.69914	Down	regulator of G protein signaling 4
MXRA5	-2.47011	3.93E-08	1.53E-06	-5.49408	Down	matrix remodeling associated 5
FMOD	-2.45729	1.09E-09	6.81E-08	-6.09513	Down	fibromodulin
THBS4	-2.45021	1.20E-13	2.37E-11	-7.41632	Down	thrombospondin 4

CRISPLD1	-2.44475	6.56E-14	1.39E-11	-7.49642	Down	cysteine rich secretory protein LCCL domain containing 1
SLC7A5P1	-2.44044	0.011106	0.048586	-2.53933	Down	solute carrier family 7 member 5 pseudogene 1
HSH2D	-2.4346	0.00559	0.028739	-2.77092	Down	hematopoietic SH2 domain containing
ATRNL1	-2.42686	1.02E-07	3.48E-06	-5.32359	Down	attractin like 1
LAMB4	-2.42586	0.005571	0.028662	-2.77202	Down	laminin subunit beta 4
COL9A1	-2.41734	1.01E-09	6.33E-08	-6.10827	Down	collagen type IX alpha 1 chain
DEGS2	-2.39719	0.007633	0.03675	-2.6679	Down	delta 4-desaturase, sphingolipid 2
PHF21B	-2.38857	2.48E-05	0.000354	-4.21669	Down	PHD finger protein 21B
XG	-2.38566	4.33E-08	1.67E-06	-5.477	Down	Xg glycoprotein (Xg blood group)
HDC	-2.38328	0.002285	0.014238	-3.0505	Down	histidine decarboxylase
ELFN2	-2.37429	0.006887	0.033926	-2.70227	Down	extracellular leucine rich repeat and fibronectin type III domain containing 2
F2RL2	-2.37276	5.66E-10	3.87E-08	-6.19958	Down	coagulation factor II thrombin receptor like 2
CXCL9	-2.36714	2.96E-07	8.68E-06	-5.12612	Down	C-X-C motif chemokine ligand 9
GDF6	-2.36071	7.63E-10	5.00E-08	-6.15245	Down	growth differentiation factor 6
IGFALS	-2.35613	0.000438	0.003805	-3.5163	Down	insulin like growth factor binding protein acid labile subunit
KIF5A	-2.34574	0.001438	0.009898	-3.18701	Down	kinesin family member 5A
GABRD	-2.34318	0.000712	0.005599	-3.38487	Down	gamma-aminobutyric acid type A receptor subunit delta
ENPP2	-2.335	4.36E-08	1.68E-06	-5.47568	Down	ectonucleotide pyrophosphatase/phosphodiesterase 2
GDF15	-2.31502	7.65E-08	2.75E-06	-5.37521	Down	growth differentiation factor 15
TGFB2	-2.31242	1.31E-16	5.68E-14	-8.27273	Down	transforming growth factor beta 2
MED12L	-2.30972	2.36E-10	1.83E-08	-6.33587	Down	mediator complex subunit 12L
IGSF1	-2.30639	7.56E-07	1.94E-05	-4.9463	Down	immunoglobulin superfamily member 1
LRRC9	-2.30007	0.007113	0.034795	-2.69152	Down	leucine rich repeat containing 9
C1QTNF3	-2.29553	2.32E-08	9.76E-07	-5.58636	Down	C1q and TNF related 3
FAM133A	-2.27467	0.000104	0.001166	-3.8808	Down	family with sequence similarity 133 member A
HCG20	-2.25055	0.000473	0.004052	-3.49583	Down	HLA complex group 20
COL17A1	-2.24285	0.000785	0.006052	-3.35788	Down	collagen type XVII alpha 1 chain
ODF3	-2.2393	0.005735	0.029307	-2.76254	Down	outer dense fiber of sperm tails 3
SCG5	-2.23254	0.009418	0.042998	-2.59648	Down	secretogranin V
CHRDL1	-2.23168	1.75E-07	5.62E-06	-5.22427	Down	chordin like 1
AEBP1	-2.22447	7.36E-12	8.81E-10	-6.85056	Down	AE binding protein 1
SYNPR	-2.21286	0.005472	0.028262	-2.77784	Down	synaptoporin
EDA2R	-2.2116	4.38E-06	8.36E-05	-4.59238	Down	ectodysplasin A2 receptor
CCDC63	-2.2071	4.39E-09	2.24E-07	-5.86896	Down	coiled-coil domain containing 63
LYPD2	-2.20064	0.00069	0.005454	-3.39363	Down	LY6/PLAUR domain containing 2
CAPN12	-2.19325	1.87E-05	0.000281	-4.27947	Down	calpain 12
SLC5A7	-2.18407	0.003921	0.021839	-2.88442	Down	solute carrier family 5 member 7
NALF1	-2.17655	9.77E-06	0.000162	-4.42226	Down	NALCN channel auxiliary factor 1
KIT	-2.16548	2.89E-13	5.32E-11	-7.2992	Down	KIT proto-oncogene, receptor tyrosine kinase
SV2C	-2.16317	0.002041	0.01309	-3.08417	Down	synaptic vesicle glycoprotein 2C
APLNR	-2.16156	2.06E-07	6.36E-06	-5.19353	Down	apelin receptor
CH25H	-2.15932	0.000573	0.004696	-3.44415	Down	cholesterol 25-hydroxylase

MCF2L2	-2.15848	1.13E-06	2.72E-05	-4.86736	Down	MCF.2 cell line derived transforming sequence-like 2
NELL2	-2.14059	0.006995	0.034345	-2.69706	Down	neural EGFL like 2
ANKRD24	-2.14048	5.27E-05	0.000658	-4.0432	Down	ankyrin repeat domain 24
ODAD2	-2.13575	0.000399	0.003522	-3.54074	Down	outer dynein arm docking complex subunit 2
TMEM163	-2.12774	4.65E-06	8.74E-05	-4.58001	Down	transmembrane protein 163
AKR7A3	-2.12635	0.001277	0.00903	-3.22115	Down	aldo-keto reductase family 7 member A3
FAT3	-2.12241	0.002811	0.01686	-2.98769	Down	FAT atypical cadherin 3
CERS1	-2.11356	0.000377	0.003356	-3.55591	Down	ceramide synthase 1
DUXAP10	-2.10055	0.001321	0.009265	-3.21144	Down	double homeobox A pseudogene 10
CXCL3	-2.09566	0.000229	0.00223	-3.68434	Down	C-X-C motif chemokine ligand 3
MYOC	-2.09045	1.77E-05	0.000268	-4.29226	Down	myocilin
PHB1P9	-2.07929	0.006579	0.032763	-2.71741	Down	PHB1 pseudogene 9
CXCL10	-2.07443	0.000302	0.002801	-3.61373	Down	C-X-C motif chemokine ligand 10
MME	-2.06139	1.22E-11	1.38E-09	-6.77822	Down	membrane metalloendopeptidase
BDNF	-2.05823	1.43E-08	6.40E-07	-5.66955	Down	brain derived neurotrophic factor
RIPOR2	-2.05701	1.80E-11	1.96E-09	-6.72111	Down	RHO family interacting cell polarization regulator 2
NGEF	-2.05378	0.003916	0.021824	-2.88488	Down	neuronal guanine nucleotide exchange factor
DBIL5P	-2.05223	0.000881	0.006624	-3.32611	Down	diazepam binding inhibitor-like 5, pseudogene
NR4A1AS	-2.03655	0.006884	0.033926	-2.7024	Down	NR4A1 antisense RNA
LAMC3	-2.02991	6.45E-06	0.000115	-4.51123	Down	laminin subunit gamma 3
EGR3	-2.0234	0.001794	0.011799	-3.12243	Down	early growth response 3
TSPAN10	-2.0188	0.001949	0.012611	-3.0979	Down	tetraspanin 10
C14orf132	-2.01582	8.69E-13	1.36E-10	-7.1498	Down	chromosome 14 open reading frame 132
CCDC62	-1.99899	0.000848	0.006434	-3.33651	Down	coiled-coil domain containing 62
PTGER3	-1.99827	2.35E-05	0.00034	-4.22875	Down	prostaglandin E receptor 3
CFAP92	-1.99623	0.003973	0.022037	-2.88026	Down	cilia and flagella associated protein 92 (putative)
LRRN1	-1.99182	0.008313	0.039113	-2.63909	Down	leucine rich repeat neuronal 1
SULF1	-1.98704	8.37E-14	1.76E-11	-7.46439	Down	sulfatase 1
LEFTY2	-1.97634	1.41E-07	4.65E-06	-5.26416	Down	left-right determination factor 2
PTN	-1.97623	1.09E-11	1.26E-09	-6.79383	Down	pleiotrophin
CACNB4	-1.97556	9.12E-05	0.001042	-3.91295	Down	calcium voltage-gated channel auxiliary subunit beta 4
LRRC55	-1.97183	6.31E-05	0.000766	-4.00087	Down	leucine rich repeat containing 55
CHD5	-1.95394	7.09E-05	0.000845	-3.97314	Down	chromodomain helicase DNA binding protein 5
LMX1A	-1.94888	0.004546	0.024459	-2.83755	Down	LIM homeobox transcription factor 1 alpha
OLR1	-1.94809	0.003801	0.021316	-2.89424	Down	oxidized low density lipoprotein receptor 1
MYCN	-1.94117	9.47E-05	0.001077	-3.90377	Down	MYCN proto-oncogene, bHLH transcription factor
SLC16A9	-1.94029	1.36E-16	5.78E-14	-8.26816	Down	solute carrier family 16 member 9
THY1	-1.94016	0.000502	0.004226	-3.47947	Down	Thy-1 cell surface antigen
CHRNA3	-1.93888	1.56E-06	3.56E-05	-4.80378	Down	cholinergic receptor nicotinic alpha 3 subunit
LOXHD1	-1.93501	1.18E-08	5.45E-07	-5.70283	Down	lipoxygenase homology PLAT domains 1
FATE1	-1.93408	0.001437	0.009898	-3.18711	Down	fetal and adult testis expressed 1
ABCG2	-1.93274	1.14E-10	9.77E-09	-6.44768	Down	ATP binding cassette subfamily G member 2 (Junior blood group)

NTNG2	-1.92239	3.67E-10	2.68E-08	-6.26748	Down	netrin G2
CXCL2	-1.91931	0.000362	0.003245	-3.56643	Down	C-X-C motif chemokine ligand 2
MMP25	-1.90316	0.000271	0.002553	-3.64195	Down	matrix metallopeptidase 25
MDK	-1.89822	9.34E-22	1.12E-18	-9.58401	Down	midkine
KIAA1549L	-1.89026	0.001342	0.009368	-3.20686	Down	KIAA1549 like
CATSPER1	-1.88726	0.000914	0.006841	-3.31563	Down	cation channel sperm associated 1
PALM3	-1.88587	9.83E-05	0.001111	-3.89485	Down	paralemmin 3
CCDC27	-1.87998	0.001315	0.009234	-3.21277	Down	coiled-coil domain containing 27
ANGPTL7	-1.86726	2.67E-08	1.10E-06	-5.56178	Down	angiopoietin like 7
IQCN	-1.85833	4.81E-10	3.42E-08	-6.22512	Down	IQ motif containing N
SP5	-1.85737	0.006355	0.031924	-2.72888	Down	Sp5 transcription factor
DNAH5	-1.84947	0.007085	0.034674	-2.69283	Down	dynein axonemal heavy chain 5
ASB18	-1.84755	3.53E-13	6.32E-11	-7.27259	Down	ankyrin repeat and SOCS box containing 18
RPL9P16	-1.83375	0.007491	0.036238	-2.67418	Down	ribosomal protein L9 pseudogene 16
TLL2	-1.83353	4.85E-14	1.11E-11	-7.53585	Down	tolloid like 2
RASSF10	-1.83297	0.000106	0.001181	-3.87681	Down	Ras association domain family member 10
PRSS8	-1.8269	0.005429	0.02813	-2.78044	Down	serine protease 8
PTCH2	-1.82443	2.91E-05	0.000407	-4.18003	Down	patched 2
TNFRSF11B	-1.82131	4.33E-11	4.17E-09	-6.59247	Down	TNF receptor superfamily member 11b
DIO2	-1.81759	5.88E-22	7.50E-19	-9.63162	Down	iodothyronine deiodinase 2
CEROX1	-1.81659	2.23E-10	1.75E-08	-6.34479	Down	cytoplasmic endogenous regulator of oxidative phosphorylation 1
PRSS35	-1.81634	0.000182	0.001838	-3.74346	Down	serine protease 35
PLEKHH2	-1.81491	1.07E-13	2.16E-11	-7.43216	Down	pleckstrin homology, MyTH4 and FERM domain containing H2
CYS1	-1.81286	8.90E-27	3.86E-23	-10.7124	Down	cystin 1
TAGLN3	-1.80646	0.01052	0.046693	-2.55825	Down	transgelin 3
PTPRR	-1.79996	8.65E-05	0.000997	-3.92569	Down	protein tyrosine phosphatase receptor type R
DNAAF3	-1.79833	2.66E-11	2.78E-09	-6.66454	Down	dynein axonemal assembly factor 3
PCDH17	-1.79354	3.06E-08	1.24E-06	-5.53817	Down	protocadherin 17
KLHL4	-1.79317	4.36E-08	1.68E-06	-5.47555	Down	kelch like family member 4
INHBA	-1.79264	1.41E-14	3.60E-12	-7.69542	Down	inhibin subunit beta A
PMAIP1	-1.7905	0.003407	0.019568	-2.92841	Down	phorbol-12-myristate-13-acetate-induced protein 1
COL14A1	-1.78358	7.72E-13	1.25E-10	-7.16599	Down	collagen type XIV alpha 1 chain
COL24A1	-1.77738	2.18E-06	4.67E-05	-4.73622	Down	collagen type XXIV alpha 1 chain
SYT17	-1.77529	8.98E-08	3.14E-06	-5.34619	Down	synaptotagmin 17
PRG4	-1.77474	1.01E-07	3.47E-06	-5.32461	Down	proteoglycan 4
CHRM3	-1.77434	0.003553	0.02022	-2.91533	Down	cholinergic receptor muscarinic 3
SMOC2	-1.77092	6.19E-14	1.33E-11	-7.50404	Down	SPARC related modular calcium binding 2
PLAC8	-1.76299	0.010898	0.047887	-2.54595	Down	placenta associated 8
GPR173	-1.76164	9.15E-13	1.41E-10	-7.14269	Down	G protein-coupled receptor 173
EFCC1	-1.75798	1.25E-18	8.23E-16	-8.80985	Down	EF-hand and coiled-coil domain containing 1
PHOSPHO1	-1.75375	6.52E-07	1.70E-05	-4.975	Down	phosphoethanolamine/phosphocholine phosphatase 1
GATM	-1.75104	1.66E-11	1.85E-09	-6.73306	Down	glycine amidinotransferase

NDP	-1.75011	0.000373	0.003331	-3.55837	Down	norrin cystine knot growth factor NDP
LYPD3	-1.74918	0.002402	0.014856	-3.03539	Down	LY6/PLAUR domain containing 3
MPIG6B	-1.74658	7.97E-06	0.000137	-4.46603	Down	megakaryocyte and platelet inhibitory receptor G6b
TTLL7	-1.74424	8.43E-15	2.40E-12	-7.76101	Down	tubulin tyrosine ligase like 7
EIF4EBP3	-1.73862	0.004056	0.02237	-2.87377	Down	eukaryotic translation initiation factor 4E binding protein 3
HTR2B	-1.73026	1.74E-05	0.000263	-4.29648	Down	5-hydroxytryptamine receptor 2B
UCHL1	-1.72923	9.65E-06	0.000161	-4.42476	Down	ubiquitin C-terminal hydrolase L1
LUM	-1.72714	6.51E-16	2.48E-13	-8.07929	Down	lumican
ARSJ	-1.72266	5.73E-08	2.16E-06	-5.42709	Down	arylsulfatase family member J
HNRNPH1P1	-1.72097	0.009472	0.04315	-2.59452	Down	heterogeneous nuclear ribonucleoprotein H1 pseudogene 1
MID1	-1.71622	1.41E-10	1.17E-08	-6.4145	Down	midline 1
CFAP251	-1.71099	2.62E-09	1.43E-07	-5.95377	Down	cilia and flagella associated protein 251
ANKLE1	-1.71053	0.006382	0.032035	-2.7275	Down	ankyrin repeat and LEM domain containing 1
SLC6A12	-1.70743	0.000772	0.005975	-3.36271	Down	solute carrier family 6 member 12
CREG2	-1.7072	0.001721	0.011437	-3.13465	Down	cellular repressor of E1A stimulated genes 2
MTUS1-DT	-1.70266	0.002272	0.014188	-3.05217	Down	MTUS1 divergent transcript
CSPG5	-1.69814	0.000304	0.002816	-3.61167	Down	chondroitin sulfate proteoglycan 5
GADL1	-1.69603	5.32E-06	9.81E-05	-4.55181	Down	glutamate decarboxylase like 1
IFI44L	-1.69463	1.13E-08	5.26E-07	-5.70945	Down	interferon induced protein 44 like
LRRC3B	-1.69378	0.010166	0.045512	-2.57012	Down	leucine rich repeat containing 3B
OPCML	-1.69359	5.62E-05	0.000695	-4.02812	Down	opioid binding protein/cell adhesion molecule like
IRX6	-1.68864	3.63E-11	3.57E-09	-6.61857	Down	iroquois homeobox 6
SELL	-1.68599	0.001064	0.007777	-3.27309	Down	selectin L
S1PR5	-1.68547	0.007911	0.037706	-2.65583	Down	sphingosine-1-phosphate receptor 5
CCDC168	-1.67966	6.56E-05	0.000792	-3.9918	Down	coiled-coil domain containing 168
METTL21EP	-1.67946	2.25E-08	9.49E-07	-5.59188	Down	methyltransferase like 21E, pseudogene
ITIH5	-1.67495	1.90E-32	1.37E-28	-11.8606	Down	inter-alpha-trypsin inhibitor heavy chain 5
B3GNT5	-1.67159	2.32E-10	1.81E-08	-6.33821	Down	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 5
RTL3	-1.66681	2.59E-05	0.000369	-4.20655	Down	retrotransposon Gag like 3
NXPH4	-1.66465	7.42E-07	1.91E-05	-4.95008	Down	neurexophilin 4
TP73	-1.65689	6.54E-05	0.000791	-3.99229	Down	tumor protein p73
RHBDL2	-1.65396	0.000742	0.005792	-3.37339	Down	rhomboid like 2
TRPV3	-1.65149	2.07E-06	4.48E-05	-4.74648	Down	transient receptor potential cation channel subfamily V member 3
SLC6A17	-1.64997	0.002246	0.014052	-3.05566	Down	solute carrier family 6 member 17
ECT2L	-1.64828	4.20E-06	8.05E-05	-4.60146	Down	epithelial cell transforming 2 like
PRF1	-1.64536	0.000367	0.003289	-3.56251	Down	perforin 1
PROS1	-1.64427	1.05E-20	9.87E-18	-9.33116	Down	protein S
FAM181B	-1.6414	3.94E-05	0.000523	-4.11108	Down	family with sequence similarity 181 member B
RFX8	-1.63571	0.003768	0.021159	-2.89697	Down	regulatory factor X8
C10orf67	-1.63283	6.90E-05	0.000826	-3.97984	Down	chromosome 10 open reading frame 67
CD7	-1.62592	0.009309	0.042632	-2.6005	Down	CD7 molecule
CRHBP	-1.62003	7.58E-07	1.94E-05	-4.94577	Down	corticotropin releasing hormone binding protein

SLC44A5	-1.61944	0.008639	0.040253	-2.62602	Down	solute carrier family 44 member 5
BRSK1	-1.618	8.19E-10	5.30E-08	-6.14117	Down	BR serine/threonine kinase 1
SLC24A5	-1.60402	0.003222	0.018742	-2.94568	Down	solute carrier family 24 member 5
PHLDA1	-1.59329	3.41E-09	1.80E-07	-5.91037	Down	pleckstrin homology like domain family A member 1
IPCEF1	-1.59282	2.78E-06	5.72E-05	-4.68664	Down	interaction protein for cytohesin exchange factors 1
ARID5A	-1.59249	2.40E-11	2.55E-09	-6.67909	Down	AT-rich interaction domain 5A
PRRX2	-1.59197	9.03E-06	0.000153	-4.43925	Down	paired related homeobox 2
HAUS7	-1.59073	0.000147	0.001542	-3.79586	Down	HAUS augmin like complex subunit 7
SLC22A7	-1.59053	0.004924	0.02605	-2.81198	Down	solute carrier family 22 member 7
YIPF7	-1.59033	0.009801	0.04427	-2.58277	Down	Yip1 domain family member 7
FREM1	-1.58947	6.12E-12	7.41E-10	-6.87679	Down	FRAS1 related extracellular matrix 1
SLC26A4	-1.58555	4.82E-07	1.32E-05	-5.0333	Down	solute carrier family 26 member 4
ESR1	-1.58555	6.67E-10	4.46E-08	-6.17376	Down	estrogen receptor 1
SAMD11	-1.58368	1.32E-06	3.09E-05	-4.83676	Down	sterile alpha motif domain containing 11
P2RY8	-1.58181	1.20E-15	4.41E-13	-8.00436	Down	P2Y receptor family member 8
ANKRD33B	-1.5746	1.50E-07	4.90E-06	-5.25286	Down	ankyrin repeat domain 33B
ZMYND15	-1.56869	0.004639	0.024847	-2.83109	Down	zinc finger MYND-type containing 15
MYL1	-1.56818	0.002005	0.012902	-3.08954	Down	myosin light chain 1
NOS2	-1.56717	0.001336	0.009332	-3.20811	Down	nitric oxide synthase 2
EPHX3	-1.56568	0.009698	0.04393	-2.58643	Down	epoxide hydrolase 3
CPXM2	-1.56566	2.84E-05	0.000398	-4.18631	Down	carboxypeptidase X, M14 family member 2
MYOZ1	-1.56414	8.37E-05	0.000968	-3.93352	Down	myozenin 1
SNCA	-1.56009	1.13E-11	1.30E-09	-6.78896	Down	synuclein alpha
CDHR5	-1.55895	1.14E-06	2.74E-05	-4.86505	Down	cadherin related family member 5
APOL4	-1.55836	6.86E-07	1.78E-05	-4.96526	Down	apolipoprotein L4
CXCL14	-1.55448	0.000319	0.002924	-3.59965	Down	C-X-C motif chemokine ligand 14
GZMA	-1.55144	0.008555	0.039964	-2.62935	Down	granzyme A
FOXI2	-1.55128	0.002803	0.01684	-2.9885	Down	forkhead box I2
TP63	-1.54935	3.57E-06	7.04E-05	-4.63508	Down	tumor protein p63
LRRC77P	-1.54742	4.01E-08	1.56E-06	-5.49056	Down	leucine rich repeat containing 77, pseudogene
KCNN3	-1.54203	6.45E-11	5.92E-09	-6.53291	Down	potassium calcium-activated channel subfamily N member 3
PLXDC1	-1.5404	4.27E-21	4.41E-18	-9.42571	Down	plexin domain containing 1
FSCN1	-1.53751	1.67E-14	4.11E-12	-7.67392	Down	fascin actin-bundling protein 1
TAC4	-1.53747	0.010288	0.045922	-2.566	Down	tachykinin precursor 4
SHANK2	-1.53095	0.002729	0.016491	-2.99671	Down	SH3 and multiple ankyrin repeat domains 2
CUBN	-1.52536	1.90E-05	0.000284	-4.27577	Down	cubilin
ENPP6	-1.52098	0.010521	0.046693	-2.55821	Down	ectonucleotide pyrophosphatase/phosphodiesterase 6
COL9A2	-1.51864	1.63E-06	3.69E-05	-4.79442	Down	collagen type IX alpha 2 chain
SEMA3D	-1.51514	0.000238	0.002304	-3.67449	Down	semaphorin 3D
CLIC6	-1.51495	7.63E-05	0.000897	-3.95577	Down	chloride intracellular channel 6
HAS3	-1.51252	8.53E-06	0.000146	-4.45153	Down	hyaluronan synthase 3
GABRE	-1.51238	1.40E-14	3.60E-12	-7.69647	Down	gamma-aminobutyric acid type A receptor subunit epsilon

GFRA3	-1.50943	0.001296	0.009141	-3.21689	Down	GDNF family receptor alpha 3
EPHA3	-1.5088	1.36E-14	3.56E-12	-7.69964	Down	EPH receptor A3
BRINP1	-1.50667	1.38E-06	3.22E-05	-4.82727	Down	BMP/retinoic acid inducible neural specific 1
COL8A2	-1.50558	3.64E-10	2.67E-08	-6.26873	Down	collagen type VIII alpha 2 chain
FAM216B	-1.5017	0.010594	0.046925	-2.55582	Down	family with sequence similarity 216 member B
EXOC3L4	-1.49629	0.009788	0.044239	-2.58322	Down	exocyst complex component 3 like 4
EXTL1	-1.4958	1.42E-09	8.62E-08	-6.0527	Down	exostosin like glycosyltransferase 1
DLEU2	-1.48588	1.20E-05	0.000193	-4.37796	Down	deleted in lymphocytic leukemia 2
PDE6A	-1.4837	3.22E-06	6.51E-05	-4.65596	Down	phosphodiesterase 6A
SYTL2	-1.48205	1.25E-13	2.43E-11	-7.4113	Down	synaptotagmin like 2
HSD17B14	-1.48189	6.84E-08	2.50E-06	-5.39539	Down	hydroxysteroid 17-beta dehydrogenase 14
LRRTM3	-1.47765	0.008089	0.038399	-2.64834	Down	leucine rich repeat transmembrane neuronal 3
TMEM45B	-1.47762	0.007825	0.037436	-2.65951	Down	transmembrane protein 45B
ACE	-1.4731	1.73E-07	5.58E-06	-5.22604	Down	angiotensin I converting enzyme
SLC9C1	-1.47254	7.34E-05	0.00087	-3.96501	Down	solute carrier family 9 member C1
OGDHL	-1.47099	0.003474	0.019849	-2.92233	Down	oxoglutarate dehydrogenase L
NT5E	-1.47026	4.40E-10	3.17E-08	-6.23918	Down	5'-nucleotidase ecto
PDE5A	-1.46609	4.15E-22	5.62E-19	-9.66743	Down	phosphodiesterase 5A
PTGFR	-1.46562	0.000137	0.001453	-3.8133	Down	prostaglandin F receptor
GLIS1	-1.4642	0.001922	0.012462	-3.10208	Down	GLIS family zinc finger 1
CACNA1C-AS4	-1.46312	0.000304	0.002811	-3.61218	Down	CACNA1C antisense RNA 4
GRIA3	-1.46008	0.001304	0.009187	-3.21508	Down	glutamate ionotropic receptor AMPA type subunit 3
SSPOP	-1.45895	3.82E-06	7.48E-05	-4.62102	Down	SCO-spondin, pseudogene
PLCE1	-1.45784	3.28E-12	4.33E-10	-6.96521	Down	phospholipase C epsilon 1
SCG2	-1.45495	0.003119	0.018261	-2.95578	Down	secretogranin II
AMPH	-1.4535	1.54E-08	6.80E-07	-5.65759	Down	amphiphysin
PAK1	-1.45013	9.13E-08	3.19E-06	-5.34328	Down	p21 (RAC1) activated kinase 1
KCNA5	-1.44658	8.54E-12	1.01E-09	-6.82911	Down	potassium voltage-gated channel subfamily A member 5
CAPN3	-1.44627	1.08E-05	0.000176	-4.40028	Down	calpain 3
GNB3	-1.44437	7.60E-08	2.74E-06	-5.37631	Down	G protein subunit beta 3
SOX8	-1.43922	2.05E-05	0.000302	-4.25946	Down	SRY-box transcription factor 8
APOE	-1.43161	0.000627	0.005059	-3.41961	Down	apolipoprotein E
SV2B	-1.43052	1.80E-06	4.01E-05	-4.77462	Down	synaptic vesicle glycoprotein 2B
SDSL	-1.42997	3.99E-16	1.57E-13	-8.13902	Down	serine dehydratase like
TMEM233	-1.42801	0.001266	0.008971	-3.22348	Down	transmembrane protein 233
MOXD1	-1.42647	2.48E-08	1.03E-06	-5.57494	Down	monooxygenase DBH like 1
GDF9	-1.42458	0.001954	0.012639	-3.09706	Down	growth differentiation factor 9
ADAMTS8	-1.4226	3.03E-06	6.17E-05	-4.66877	Down	ADAM metallopeptidase with thrombospondin type 1 motif 8
F2RL3	-1.42044	0.01049	0.046612	-2.55926	Down	F2R like thrombin or trypsin receptor 3
P2RX1	-1.40797	0.002581	0.015724	-3.01367	Down	purinergic receptor P2X 1
BCL6B	-1.40443	1.54E-08	6.80E-07	-5.65742	Down	BCL6B transcription repressor
F2R	-1.40364	1.95E-10	1.56E-08	-6.36491	Down	coagulation factor II thrombin receptor

SOX15	-1.40199	1.92E-07	6.00E-06	-5.20716	Down	SRY-box transcription factor 15
GUCA1C	-1.40145	0.011022	0.048254	-2.54201	Down	guanylate cyclase activator 1C
SETBP1-DT	-1.40135	0.000141	0.00149	-3.80624	Down	SETBP1 divergent transcript
ANKS1B	-1.39718	0.000183	0.001854	-3.74091	Down	ankyrin repeat and sterile alpha motif domain containing 1B
SV2A	-1.39678	8.15E-08	2.90E-06	-5.36388	Down	synaptic vesicle glycoprotein 2A
SEZ6L2	-1.39483	5.12E-06	9.51E-05	-4.55972	Down	seizure related 6 homolog like 2
IQCA1	-1.39455	0.001308	0.009204	-3.21428	Down	IQ motif containing with AAA domain 1
EGR2	-1.39417	0.000136	0.001446	-3.81474	Down	early growth response 2
SYT12	-1.38866	0.002916	0.0173	-2.97642	Down	synaptotagmin 12
RASL11B	-1.3879	2.25E-07	6.86E-06	-5.17768	Down	RAS like family 11 member B
COLEC12	-1.38753	2.24E-12	3.11E-10	-7.01842	Down	collectin subfamily member 12
FAM107B	-1.38688	8.10E-13	1.29E-10	-7.15947	Down	family with sequence similarity 107 member B
GLI1	-1.38443	0.00011	0.00122	-3.86639	Down	GLI family zinc finger 1
KIAA1755	-1.3831	3.75E-10	2.73E-08	-6.26401	Down	KIAA1755
SNCAIP	-1.38061	2.72E-06	5.63E-05	-4.69078	Down	synuclein alpha interacting protein
NRK	-1.38057	1.49E-08	6.62E-07	-5.66294	Down	Nik related kinase
SAMD12	-1.37912	3.54E-09	1.86E-07	-5.90419	Down	sterile alpha motif domain containing 12
SRRM4	-1.37811	1.85E-07	5.85E-06	-5.21358	Down	serine/arginine repetitive matrix 4
NTM	-1.37328	2.19E-06	4.69E-05	-4.73483	Down	neurotrimin
CACNG8	-1.37083	0.00628	0.031618	-2.73282	Down	calcium voltage-gated channel auxiliary subunit gamma 8
PRDM1	-1.36772	7.21E-06	0.000126	-4.48748	Down	PR/SET domain 1
PTPRH	-1.36528	5.71E-06	0.000104	-4.53697	Down	protein tyrosine phosphatase receptor type H
TNNT1	-1.36382	1.24E-12	1.82E-10	-7.10135	Down	troponin T1, slow skeletal type
CSPG4P13	-1.36315	5.70E-08	2.15E-06	-5.42794	Down	chondroitin sulfate proteoglycan 4 pseudogene 13
DCLK3	-1.36216	0.00213	0.013513	-3.07151	Down	doublecortin like kinase 3
MSH4	-1.3613	0.010965	0.048082	-2.54383	Down	mutS homolog 4
RPLP0P2	-1.35449	0.00171	0.011381	-3.13654	Down	ribosomal protein lateral stalk subunit P0 pseudogene 2
OAS3	-1.3536	4.90E-11	4.68E-09	-6.57383	Down	2'-5'-oligoadenylate synthetase 3
SCT	-1.35259	0.005881	0.029933	-2.75432	Down	secretin
SSC5D	-1.35241	2.25E-12	3.11E-10	-7.01809	Down	scavenger receptor cysteine rich family member with 5 domains
ANGPTL8	-1.35235	0.003603	0.020443	-2.91101	Down	angiopoietin like 8
NRIP3	-1.35169	3.10E-08	1.25E-06	-5.53585	Down	nuclear receptor interacting protein 3
C1QTNF12	-1.35165	0.000817	0.006244	-3.34681	Down	C1q and TNF related 12
HLA-DPA1	-1.35043	1.73E-09	1.01E-07	-6.02145	Down	major histocompatibility complex, class II, DP alpha 1
FCN1	-1.34983	0.002116	0.013442	-3.07339	Down	ficolin 1
DMC1	-1.34937	4.92E-06	9.19E-05	-4.56808	Down	DNA meiotic recombinase 1
APOLD1	-1.34638	0.006941	0.034147	-2.69967	Down	apolipoprotein L domain containing 1
HMCN2	-1.34618	2.51E-09	1.39E-07	-5.96055	Down	hemicentin 2
EGR1	-1.34558	0.001977	0.012753	-3.09369	Down	early growth response 1
CCDC13	-1.34266	0.003103	0.018203	-2.95735	Down	coiled-coil domain containing 13
QPCT	-1.33864	5.30E-05	0.00066	-4.0421	Down	glutaminyl-peptide cyclotransferase
MYO5B	-1.33625	1.12E-05	0.000182	-4.39205	Down	myosin VB

TFPI2	-1.33386	0.000598	0.004862	-3.43272	Down	tissue factor pathway inhibitor 2
MUC20	-1.33085	0.002154	0.013625	-3.0681	Down	mucin 20, cell surface associated
LSP1	-1.33079	1.67E-18	1.06E-15	-8.77761	Down	lymphocyte specific protein 1
ISLR	-1.32932	1.43E-14	3.60E-12	-7.69384	Down	immunoglobulin superfamily containing leucine rich repeat
CASP4LP	-1.32568	4.26E-05	0.000558	-4.09311	Down	caspase 4 like, pseudogene
PLPPR4	-1.32424	0.000822	0.00627	-3.34518	Down	phospholipid phosphatase related 4
ZNF541	-1.32309	7.86E-05	0.00092	-3.94852	Down	zinc finger protein 541
CRABP2	-1.3219	0.000447	0.003867	-3.51094	Down	cellular retinoic acid binding protein 2
ATCAY	-1.32126	0.002025	0.013001	-3.08648	Down	ATCAY kinesin light chain interacting caytaxin
PRR22	-1.31968	0.006208	0.031322	-2.7366	Down	proline rich 22
P2RX6	-1.3193	4.56E-05	0.000586	-4.07718	Down	purinergic receptor P2X 6
PSD	-1.31315	0.000373	0.003333	-3.55816	Down	pleckstrin and Sec7 domain containing
SLC1A7	-1.30464	0.000968	0.007175	-3.2997	Down	solute carrier family 1 member 7
DUSP6	-1.30463	4.15E-11	4.03E-09	-6.59872	Down	dual specificity phosphatase 6
SLC6A1	-1.29776	2.73E-09	1.47E-07	-5.94701	Down	solute carrier family 6 member 1
DKK2	-1.29423	0.003532	0.020128	-2.91717	Down	dickkopf WNT signaling pathway inhibitor 2
RAB39B	-1.29287	0.009304	0.042619	-2.60068	Down	RAB39B, member RAS oncogene family
IL34	-1.29173	1.08E-06	2.61E-05	-4.87712	Down	interleukin 34
TNFSF13B	-1.29043	0.00066	0.005275	-3.40581	Down	TNF superfamily member 13b
PRR16	-1.28945	8.28E-15	2.39E-12	-7.76316	Down	proline rich 16
ALMS1-IT1	-1.28494	0.005781	0.029491	-2.75995	Down	ALMS1 intronic transcript 1
BOC	-1.2768	8.55E-12	1.01E-09	-6.82893	Down	BOC cell adhesion associated, oncogene regulated
INHBE	-1.27612	0.007857	0.03753	-2.65815	Down	inhibin subunit beta E
IER3	-1.27428	9.84E-07	2.42E-05	-4.89478	Down	immediate early response 3
GPR27	-1.27393	1.34E-06	3.13E-05	-4.83326	Down	G protein-coupled receptor 27
GJC2	-1.27176	1.10E-07	3.72E-06	-5.30856	Down	gap junction protein gamma 2
MDGA1	-1.2713	2.68E-11	2.79E-09	-6.66331	Down	MAM domain containing glycosylphosphatidylinositol anchor 1
LCK	-1.2706	0.004089	0.022515	-2.87124	Down	LCK proto-oncogene, Src family tyrosine kinase
RUNX1	-1.27016	8.73E-07	2.18E-05	-4.91839	Down	RUNX family transcription factor 1
LTB	-1.26913	0.007803	0.037364	-2.66046	Down	lymphotoxin beta
ZC3H12B	-1.26901	3.56E-06	7.04E-05	-4.6358	Down	zinc finger CCCH-type containing 12B
NUP62CL	-1.2637	4.79E-05	0.000611	-4.06559	Down	nucleoporin 62 C-terminal like
RSAD2	-1.26293	4.92E-06	9.19E-05	-4.56836	Down	radical S-adenosyl methionine domain containing 2
NRXN2	-1.26176	0.000147	0.001544	-3.79546	Down	neurexin 2
REC8	-1.25896	3.31E-08	1.32E-06	-5.52402	Down	REC8 meiotic recombination protein
CYP11A1	-1.25322	0.000315	0.0029	-3.60239	Down	cytochrome P450 family 11 subfamily A member 1
TNFRSF4	-1.25287	0.000251	0.002402	-3.66084	Down	TNF receptor superfamily member 4
ACHE	-1.25085	4.88E-05	0.000619	-4.06124	Down	acetylcholinesterase (Cartwright blood group)
SCN8A	-1.25013	0.001178	0.008443	-3.24426	Down	sodium voltage-gated channel alpha subunit 8
KIF1A	-1.24594	0.006481	0.032436	-2.7224	Down	kinesin family member 1A
TREH	-1.24543	0.003648	0.020645	-2.90711	Down	trehalase
UNC13D	-1.24488	1.43E-05	0.000223	-4.33899	Down	unc-13 homolog D

CPEB1	-1.24447	0.009503	0.043222	-2.59339	Down	cytoplasmic polyadenylation element binding protein 1
KCNIP1	-1.24326	3.45E-05	0.000467	-4.14123	Down	potassium voltage-gated channel interacting protein 1
PICART1	-1.24198	0.003929	0.021862	-2.88377	Down	p53 inducible cancer associated RNA transcript 1
TPM3	-1.24075	0.004269	0.023283	-2.85754	Down	tropomyosin 3
TENM1	-1.23996	0.001112	0.008051	-3.26063	Down	teneurin transmembrane protein 1
SCARA3	-1.23987	5.35E-10	3.71E-08	-6.20844	Down	scavenger receptor class A member 3
MEST	-1.23709	2.10E-07	6.43E-06	-5.19065	Down	mesoderm specific transcript
STX1B	-1.23163	0.000902	0.006762	-3.31939	Down	syntaxin 1B
MYCBPAP	-1.22985	0.001407	0.009725	-3.19323	Down	MYCBP associated protein
MX2	-1.22635	1.33E-09	8.14E-08	-6.06419	Down	MX dynamin like GTPase 2
GABRP	-1.22572	0.007743	0.037185	-2.66308	Down	gamma-aminobutyric acid type A receptor subunit pi
COL12A1	-1.22564	4.75E-09	2.41E-07	-5.8558	Down	collagen type XII alpha 1 chain
C9orf131	-1.22552	0.001146	0.008257	-3.25204	Down	chromosome 9 open reading frame 131
ITGAX	-1.21952	0.006853	0.033812	-2.70393	Down	integrin subunit alpha X

Table 3 The enriched GO terms of the up and down regulated differentially expressed genes

GO ID	CATEGORY	GO Name	adjusted_p_value	negative_log10_of_adjusted_p_value	Gene Count	Gene
				Up regulated genes		
GO:0050896	BP	response to stimulus	8.83E-08	7.053914375	232	SAA1,FAM83B,RNASE2,SERPINA3,GAL,IL1RL1,PTPRN,MYH6,CD177,HOPX,ALOX15B,EREG,FCN3,KCNIP2,SSTR5,SFRP5,F5,CHRDL2,SLAMF1,SRARP,CHRNA4,MARCO,DNER,RAB39A,SPINK1,MGST1,CD163,RGR,PLA2G2A,TSPEAR,TFRC,SCN1A,CPNE4,AQP4,CCN5,FER1L6,PCK1,PKHD1L1,VDR,BEX5,SERPINE1,ACVR1C,AZGP1,AOX1,VSIG4,KCNK3,CAMSAP3,FGF12,AGBL4,ELANE,GRB14,TMIGD3,FKBP5,ADAM11,MFSD2A,RBP4,BLM,HMGCS2,NSG1,CPNE5,MOG,C3,FGFR4,ITLN1,XRCC4,IL18R1,RTN4RL1,SUSD4,TIMP4,LYVE1,GRIP1,IL20RA,HCRTR1,PLA2G4F,TUBB4B,ELAPOR1,LGR6,OPN4,SOX2,SHC4,SLPI,TWIST2,NPPC,ITPKA,PITX3,PLP2,EIF4EBP1,SPP1,CHL1,CD109,S1PR3,TUBA1B,PRODH,BMP7,NECTIN1,SLC7A11,TGFA,KCNK2,PPP1R1A,ADGRD1,FAM83F,SBK2,TFEC,CFD,MLXIPL,INSYN1,AGTR1,PTX3,SEPTIN4,HMOX2,EPHB2,GPD1L,DIRAS3,CLIC3,ZNF703,DIRAS1,SLC2A1,ITGA7,ATP2A2,GSTM3,TGM2,FHL2,CD38,WNK3,GRIN2A,FGF7,FN1,PCARE,ENTPD6,OSR1,CMTM5,PPP1R14B,HCN

						4,STXBP2,SLC5A1,C1QA,CRLF1,POMC,APOB,OLFM4,BMAL1,HEY2,C1QC,RAP1GAP,IGFBP2,CHGB,ARG2,S100A10,FCGR3A,GPSM2,LPCAT3,IL15RA,REPS2,MLF1,RORB,GPD1,FABP4,PTGS1,QRFPR,C1QTNF1,LMCD1,CASKIN1,SDK1,TPO,LRP4,PLEKHN1,LOX,ADAMTS5,CD63,TSPAN2,ECE2,HAS2,DMPK,NQO1,KLHL31,RGS9BP,PROCR,PTGDR,SIGLEC1,CAMK1D,RPS6KA2,RALGPS2,NGFR,PRDX6,EDN1,DHCR24,PDPN,AKR1C1,HSPB7,RASSF7,CTSB,GLRX2,LRRC32,ITGA11,PRKCD,FCER1G,RPL27,RAMP1,TIFA,TSKU,SASH3,LGALS3,NSDHL,ABCG4,VIPR1,KCNH2,EPB41L4B,SLAMF8,KCNK1,FTH1,GGT5,NID1,IMPA2,CREB3L1,FRK,F8,NOCT,HMOX1,AKR1B1,ZDHHC9,ACACB,NUDT4,ALPL,BCL6,MPST,GAREM1,CD276,CABP1,HIF3A,RNASE6,PMVK,EPN1
GO:0007275	BP	multicellular organism development	6.45987E-06	5.189776108	135	GAL,PTPRN,MYH6,HOXA3,HOPX,ALOX15B,EREG,KCNIP2,SFRP5,CHRDL2,DNER,LRRN3,C1QL1,TFRC,SCN1A,PCK1,ETNK2,VDR,SERPINE1,ACVR1C,CAMSAP3,FGF12,AGBL4,SPOCK1,FREM2,MFSD2A,RBP4,HMGCS2,CPNE5,SERPINA5,MOG,C3,SMOC1,FGFR4,XRCC4,VIT,HOXB4,RTN4RL1,TRPC4,GRIP1,RNF157,ELN,LGR6,OPN4,SOX2,KIF26B,NPPC,ITPKA,PITX3,ADAMTS2,SPP1,CHL1,CD109,S1PR3,TOX,BMP7,NECTIN1,CPAMD8,SLC7A11,TGFA,KCNK2,MYOT,C1QL3,AGTR1,PTX3,SEPTIN4,EPHB2,SLC2A1,ITGA7,GSTM3,TENT5C,TGM2,FHL2,CD38,KLHL3,GRIN2A,FGF7,FN1,PCARE,SMYD1,MATN3,OSR1,HCN4,C1QA,CRLF1,APOB,CHADL,BMAL1,HEY2,C1QC,RAP1GAP,NINJ2,ARG2,S100A10,IL15RA,RORB,SDK1,TPO,PPIL1,LRP4,LOX,ADAMTS5,TSPAN2,HAS2,LAMB3,PTGDR,CAMK1D,RPS6KA2,NGFR,EDN1,EBP,DHCR24,PDPN,HSPB7,SLC25A34,MMP19,MYL3,RAMP1,TSKU,SASH3,NSDHL,GPSM1,SLAMF8,NID1,CREB3L1,NOCT,HMOX1,AKR1B1,ACACB,ALPL,BCL6,MPST,PALLD,HIF3A,EPN1
GO:0071944	CC	cell periphery	2.36E-14	13.62695566	200	SERPINA3,IL1RL1,PTPRN,CACNA1E,CD177,ALOX15B,EREG,LAD1,FCN3,KCNIP2,SSTR5,F5,FIBCD1,SLAMF1,CHRNA4,IGSF23,CFAP95,FREM3,CORIN,CATSPERB,SLCO4A1,MARCO,DNER,RAB39A,MGST

						1,CD163,RGR,PLA2G2A,TSPEAR,LRRN3,TFRC,SCN1A,CPNE4,AQP4,STAC2,CCN5,PKHD1L1,SERPINE1,ACVR1C,AZGP1,KCNK13,KCNK3,ELANE,GRB14,FREM2,SVOP,ART1,CA14,TMIGD3,SLC38A4,ADAM11,MFSD2A,SYN2,ADH1B,CDHR3,NSG1,CPNE5,MELTF,SERPINA5,MOG,C3,SMOC1,FGFR4,ITLN1,VIT,IL18R1,RTN4RL1,TRPC4,TIMP4,LYVE1,GRIP1,IL20RA,ELN,HCRTR1,PLA2G4F,ELAPOR1,LGR6,NALF2,OPN4,SHC4,SLPI,CPM,PLP2,ADAMTS2,GOLGA7B,CHL1,CD109,S1PR3,BMP7,NECTIN1,CPAMD8,SLC7A11,TGFA,KCNA7,KCNK2,PRIMA1,ADGRD1,MYOT,MS4A4A,PARVB,AGTR1,PTX3,SEPTIN4,HMOX2,EPHB2,GPD1L,DIRAS3,CACNA2D3,DIRAS1,SLC2A1,ITGA7,NALCN,SLC44A3,ATP2A2,TGM2,CD38,SLC7A1,SIRPB2,MEGF9,GRIN2A,FN1,MARVELD2,EPN3,MATN3,ENTPD6,OSR1,HCN4,PRRG4,SLC4A3,LRRC7,STXBP2,SLC5A1,C1QA,CRLF1,APOB,OLFM4,CHADL,C1QC,IGFBP2,NINJ2,S100A10,FCGR3A,GPSM2,IL15RA,REPS2,AIF1L,QRFPR,C1QTNF1,SDK1,TPO,LRP4,PLEKHN1,LOX,ADAMTS5,CD63,ADAMTS15,RPSA,TSPAN2,ECE2,HAS2,DMPK,LAMB3,PROCR,PTGDR,SIGLEC1,DDN,SLC29A2,RALGPS2,NGFR,PDPN,MMP19,CTSB,LRRC32,ITGA11,PRKCD,FCER1G,SLCO2A1,SLC6A6,SLC9A7,RAMP1,LGALS3,STEAP4,ABCG4,VIPR1,KCNH2,GPSM1,EPB41L4B,KCNK1,GGT5,NID1,FRK,F8,ALPL,SH3KBP1,GAREM1,PALLD,CD276,CABP1,HIF3A,EPN1
GO:0016020	CC	membrane	3.58E-08	7.445873461	252	FAM83B,IL1RL1,PTPRN,CACNA1E,CD177,ALOX15B,EREG,FCN3,KCNIP2,C11ORF87,SSTR5,DHRS7C,F5,SCGN,KCNK12,FIBCD1,SLAMF1,CHRNA4,IGSF23,CFAP95,FREM3,SERTM1,CORIN,CATSPERB,SLCO4A1,MARCO,DNER,RAB39A,MGST1,CD163,DHRS9,RGR,FAM209B,PLA2G2A,TSPEAR,LRRN3,TFRC,SCN1A,CPNE4,CHDH,AQP4,STAC2,FER1L6,CYP4B1,PKHD1L1,SERPINE1,ACVR1C,AZGP1,CHST9,KCNK13,VSIG4,KCNK3,GALNT15,GRB14,FREM2,RHBDL3,HRCT1,SGPP2,SVOP,ART1,CA14,HS3ST2,TMIGD3,FKBP5,SLC38A4,ADAM11,MFSD2A,SYN2,ADH1B,CDHR3,NSG1,HOGA1,CPNE5,MELTF,SERPINA5,MOG,C3,FGFR4,ITLN1,T

						MEM52,IL18R1,RTN4RL1,SUSD4,TRPC4,LYVE1,GRIP1,IL20RA,PTDSS1,HCRTR1,PLA2G4F,QSOX1,ELAPOR1,LGR6,NALF2,OPN4,PEBP4,SHC4,SNX22,CPM,PLP2,CHST7,GOLGA7B,CHL1,CD109,HOOK1,S1PR3,C1QB,PRODH,NECTIN1,B3GNT7,BEAN1,CPAMD8,SLC7A11,TGFA,KCNA7,TMEM132B,KCNK2,PRIMA1,ADGRD1,MYOT,SHISA4,MS4A4A,LDHA,PARVB,AGTR1,SEPTIN4,HMOX2,EPHB2,GPD1L,DIRAS3,CACNA2D3,CLIC3,DIRAS1,SLC2A1,ITGA7,NALCN,SLC44A3,ATP2A2,TGM2,RPLP0,CD38,SLC7A1,SIRPB2,MEGF9,GRIN2A,FN1,SERINC2,MARVELD2,EPN3,ENTPD6,CMTM5,HCN4,PRRG4,SLC4A3,LRRC7,STXBP2,SLC5A1,CRLF1,APOB,TMEM178B,OLFM4,TMEM26,RAP1GAP,IGFBP2,NINJ2,ORMDL2,S100A10,FCGR3A,TMTC1,GPSM2,LPCAT3,IL15RA,REPS2,CHPF,AIF1L,PTGS1,QRFPR,C1QTNF1,SDK1,TPO,LRP4,PLEKHN1,NFXL1,CD63,RPSA,TSPAN2,ECE2,HAS2,DMPK,STXBP6,TMEM37,SLC17A9,RGS9BP,PROCR,PTGDR,SIGLEC1,DDN,SLC29A2,RALGPS2,NGFR,RPS2,CENPV,PRDX6,EBP,DHCR24,PDPN,SLC25A34,CTSB,LRRC32,SMCO4,ITGA11,PRKCD,FCER1G,RPL27,SLCO2A1,SLC6A6,SLC9A7,RAMP1,LGALS3,NSDHL,STEAP4,RPS5,ABCG4,VIPR1,KCNH2,GPSM1,LPCAT4,COMTD1,EPB41L4B,SLAMF8,ZDHHC23,KCNK1,FTH1,GGT5,CREB3L1,FRK,F8,HMOX1,ZDHHC9,ACACB,ALPL,SLC25A19,SH3KBP1,GAREM1,PALLD,CD276,CABP1,HIF3A,RETSAT,TKT,PMVK,EPN1
GO:0016491	MF	oxidoreductase activity	0.011001055	1.958565663	31	ALOX15B,DHRS7C,MGST1,DHRS9,CHDH,CYP4B1,AOX1,ADH1B,QSOX1,PRODH,LDHA,HMOX2,GPD1L,ALDH1L1,GPD1,PTGS1,TPO,LOX,NQO1,PRDX6,DHCR24,AKR1C1,GLRX2,NSDHL,STEAP4,FTH1,F8,HMOX1,AKR1B1,NQO2,RETSAT
GO:0005215	MF	transporter activity	0.023061571	1.637111108	43	CACNA1E,KCNIP2,KCNK12,CHRNA4,SLCO4A1,SCN1A,AQP4,AZGP1,KCNK13,KCNK3,SVOP,SLC38A4,MFSD2A,RBP4,TRPC4,NALF2,PLP2,SLC7A11,KCNA7,KCNK2,CACNA2D3,CLIC3,SLC2A1,NALCN,SLC44A3,ATP2A2,SLC7A1,GRIN2A,HCN4,SLC4A3,SLC5A1,APOB,FABP4,TMEM37,SLC17A9,SLC29A

						2,SLCO2A1,SLC6A6,SLC9A7,ABCG4,KCNH2,KCNK1,SLC25A19
				Down regulated genes		
GO:0032501	BP	multicellular organismal process	1.37E-18	17.86328493	241	EDN3,CST2,SEZ6L,CUX2,ESM1,MSTN,LYPD1,TNMD,IL31RA,SFRP4,CBLN4,CD1C,IRX1,KCNK10,TRPM8,CST1,UCMA,FOXA1,RSPO2,ARMS2,LEF1,ALOX15,CTLA4,SLITRK4,SLC4A8,MYH2,PCDH15,PENK,OIT3,IL1B,FCER1A,HBB,RXFP2,ATP1A4,IRX2,COL10A1,DPYSL5,SCUBE2,PCSK1N,ECEL1,CTSG,MUC13,CX3CR1,CRACD,HS3ST5,PLD4,UGT8,WNT9A,FRZB,FMN2,ZNF365,CMA1,E2F7,CYTL1,RGS4,THBS4,CRISPLD1,F2RL2,GDF6,KIF5A,ENPP2,GDF15,TGFB2,C1QTNF3,ODF3,CHRDL1,CCDC63,SLC5A7,KIT,APLNR,NELL2,ANKRD24,ODAD2,TMEM163,FAT3,MYOC,CXCL10,MME,BDNF,RIPOR2,NGEF,LAMC3,EGR3,CCDC62,PTGER3,LRRN1,SULF1,LEFTY2,PTN,CHD5,LMX1A,OLR1,THY1,CHRNA3,LOXHD1,ABCG2,NTNG2,MDK,CATSPER1,ANGPTL7,IQCN,SP5,DNAH5,TLL2,RASSF10,PTCH2,TNFRSF11B,DIO2,TAGLN3,PTPRR,DNAAF3,PCDH17,INHBA,PMAIP1,COL14A1,SYT17,CHRM3,SMOC2,PLAC8,GPR173,PHOSPHO1,GATM,NDP,MPIG6B,TTLL7,HTR2B,UCHL1,LUM,MID1,CSPG5,OPCML,IRX6,S1PR5,B3GNT5,TP73,TRPV3,SLC6A17,PRF1,PROS1,RFX8,CD7,CRHBP,BRSK1,ARID5A,FREM1,SLC26A4,ESR1,ZMYND15,MYL1,NOS2,MYOZ1,SNCA,TP63,PLXDC1,TAC4,SHANK2,CUBN,COL9A2,SEMA3D,GFRA3,EPHA3,BRINP1,COL8A2,EXTL1,PDE6A,LRRTM3,ACE,SLC9C1,NT5E,PDE5A,PTGFR,GLIS1,PLCE1,SCG2,PAK1,KCNA5,CAPN3,GNB3,SOX8,APOE,GDF9,F2RL3,P2RX1,BCL6B,F2R,SOX15,GUCA1C,SEZ6L2,EGR2,GLI1,KIAA1755,SRRM4,NTM,CACNG8,PRDM1,TNNT1,MSH4,OAS3,SCT,SSC5D,HLA-DPA1,FCN1,DMC1,APOLD1,HMCN2,EGR1,MYO5B,TFPI2,PLPPR4,ZNF541,CRABP2,ATCAY,P2RX6,PSD,SLC1A7,DUSP6,SLC6A1,DKK2,IL34,TNFSF13B,BOC,IER3,GJC2,MDGA1,LCK,RUNX1,LTB,RSAD2,NRXN2,REC8,TNFRSF4,ACHE,SCN8A,KIF1A,UNC13D,TPM3,TENM1,STX1B,MYCBPAP,COL12A1,ITGAX

GO:0007154	BP	cell communication	4.11E-10	9.386286619	192	RFPL4A,EDN3,SEZ6L,CUX2,ESM1,MSTN,LYPD1,IL31RA,RFPL4AL1,SFRP4,SHISA2,CXCL11,KCNK10,TRPM8,UCMA,FOXA1,IL22RA2,RSPO2,LEF1,ALOX15,CTLA4,SLC4A8,PENK,FCGR3B,IL1B,FCER1A,RXFP2,ATP1A4,DPYSL5,CDH8,SCUBE2,PCSK1N,DLGAP1,ECEL1,CTSG,CX3CR1,APCDD1L,WNT9A,FRZB,FMN2,GZMB,CACNA1B,BCL2A1,E2F7,CYTL1,RGS4,FMOD,THBS4,HSH2D,ATRNL1,F2RL2,CXCL9,GDF6,IGFALS,KIF5A,GABRD,GDF15,TGFB2,IGSF1,C1QTNF3,SCG5,CHRDL1,EDA2R,SLC5A7,KIT,SV2C,APLNR,CXCL3,MYOC,CXCL10,MME,BDNF,RIPOR2,NGEF,EGR3,PTGER3,SULF1,LEFTY2,PTN,CHD5,THY1,CHRNA3,NTNG2,CXCL2,MDK,PALM3,ASB18,RASSF10,PTCH2,TNFRSF11B,PTPRR,PCDH17,INHBA,PMAIP1,SYT17,CHRM3,SMOC2,GPR173,NDP,MPIG6B,HTR2B,UCHL1,MID1,CSPG5,S1PR5,NXPH4,TP73,PRF1,RFX8,CD7,CRHBP,BRSK1,FREM1,ESR1,NOS2,MYOZ1,SNCA,CXCL14,GZMA,TP63,TAC4,SHANK2,SEMA3D,GABRE,GFRA3,EPHA3,PDE6A,ACE,PDE5A,PTGFR,GRIA3,PLCE1,SCG2,AMPH,PAK1,KCNA5,CAPN3,GNB3,SOX8,APOE,SV2B,GDF9,F2RL3,P2RX1,F2R,GUCA1C,ANKS1B,SV2A,SEZ6L2,EGR2,SYT12,RASL11B,COLEC12,GLI1,SNCAIP,SAMD12,CACNG8,DCLK3,OAS3,SCT,ANGPTL8,C1QTNF12,FCN1,EGR1,MUC20,LSP1,PLPPR4,CRABP2,P2RX6,PSD,SLC1A7,DUSP6,SLC6A1,DKK2,RAB39B,IL34,TNFSF13B,INHBE,IER3,GPR27,GJC2,LCK,LTB,RSAD2,NRXN2,TNFRSF4,ACHE,SCN8A,TENM1,STX1B,MYCBPAP,ITGAX
GO:0005886	CC	plasma membrane	2.22E-13	12.65296711	182	GSG1L,LYPD1,IL31RA,PRND,LAMP5,CD1C,KCNK10,TRPM8,SYTL5,ALOX15,CTLA4,SLITRK4,SLC4A8,TMEM114,PCDH15,PENK,FCGR3B,FCER1A,RXFP2,SLC16A6,ATP1A4,CDH8,DLGAP1,KCNJ15,ECEL1,CTSG,AQP10,MUC13,CX3CR1,TMEM262,UNC80,RHCG,APCDD1L,UGT8,ATP1B4,TMEM30B,FMN2,GZMB,CACNA1B,RGS4,XG,F2RL2,CXCL9,GABRD,ENPP2,COL17A1,CHRDL1,EDA2R,LYPD2,SLC5A7,NALF1,KIT,SV2C,APLNR,ANKRD24,TMEM163,FAT3,CXCL10,MME,RIPOR2,PTGER3,SULF1,PTN,LRRC55,OLR1,SLC16A9,THY1,CHRNA3,ABCG2,NTNG2,MMP25,CATSP

						ER1,PALM3,PRSS8,PTCH2,TNFRSF11B,DIO2,PLEKHH2,CYS1,PTPRR,PCDH17,SYT17,CHRM3,GPR173,LYPD3,MPIG6B,HTR2B,UCHL1,SLC6A12,CSPG5,OPCML,SELL,S1PR5,RHBDL2,TRPV3,SLC6A17,PRF1,PROS1,CD7,SLC44A5,IPCEF1,HAUS7,SLC22A7,SLC26A4,ESR1,NOS2,SNCA,CDHR5,GZMA,KCNN3,PLXDC1,FSCN1,SHANK2,CUBN,ENPP6,CLIC6,HAS3,GABRE,GFRA3,EPHA3,PDE6A,SYTL2,LRRTM3,ACE,SLC9C1,NT5E,PTGFR,GRIA3,PLCE1,AMPH,PAK1,KCNA5,CAPN3,GNB3,APOE,SV2B,TMEM233,F2RL3,P2RX1,F2R,ANKS1B,SV2A,SEZ6L2,SYT12,COLEC12,KIAA1755,SNCAIP,SAMD12,NTM,CACNG8,PTPRH,OAS3,HLA-DPA1,FCN1,APOLD1,HMCN2,MUC20,LSP1,PLPPR4,P2RX6,PSD,SLC1A7,SLC6A1,RAB39B,TNFSF13B,BOC,GPR27,GJC2,MDGA1,LCK,LTB,NRXN2,TNFRSF4,ACHE,SCN8A,TREH,KCNIP1,TENM1,STX1B,MYCBPAP,GABRP,ITGAX
GO:0110165	CC	cellular anatomical entity	0.000389829	3.409125795	417	RFPL4A,EDN3,CST2,SEZ6L,CUX2,ESM1,GSG1L,VGLL2,MSTN,LYPD1,TNMD,IL31RA,PRND,CA3,RFPL4AL1,SFRP4,SHISA2,COL22A1,LAMP5,CYP21A2,CENPA,CXCL11,CBLN4,CD1C,IRX1,KCNK10,CYP4F3,TRPM8,SYTL5,ZSCAN4,CST1,P3H2,L1TD1,UCMA,FOXA1,IL22RA2,APOBEC3A,RSPO2,ARMS2,LEF1,ALOX15,CTLA4,SLITRK4,SLC4A8,MAP3K7CL,TMEM114,ZNF497,MYH2,PCDH15,MATN4,FBN3,PENK,OIT3,FCGR3B,IL1B,PPP2R2B,FCER1A,HBB,RXFP2,SLC16A6,ATP1A4,IRX2,COL10A1,FNDC1,DPYSL5,CDH8,SCUBE2,PCSK1N,DLGAP1,KCNJ15,ECEL1,CTSG,AQP10,MUC13,CX3CR1,CRACD,HS3ST5,TMEM262,UNC80,PLD4,GZMM,RHCG,APCDD1L,SUPT20HL2,UGT8,RASEF,ANKRD34C,WNT9A,FRZB,ATP1B4,TMEM30B,FMN2,TM6SF2,ZNF365,GZMB,CACNA1B,BCL2A1,HYAL4,CMA1,GNLY,E2F7,CYTL1,RGS4,MXRA5,FMOD,THBS4,CRISPLD1,HSH2D,ATRNL1,LAMB4,COL9A1,DEGS2,XG,HDC,F2RL2,CXCL9,GDF6,IGFALS,KIF5A,GABRD,ENPP2,GDF15,TGFB2,MED12L,IGSF1,LRRC9,C1QTNF3,COL17A1,ODF3,SCG5,CHRDL1,AEBP1,SYNPR,EDA2R,CCDC63,LYPD2,CAPN12,SLC5A7,NALF1,KIT,SV2C,APLNR,CH25H,MCF2L2,NELL2,ANKR

D24,ODAD2,TMEM163,AKR7A3,F
AT3,CERS1,CXCL3,MYOC,CXCL1
0,MME,BDNF,RIPOR2,NGEF,LAM
C3,EGR3,TSPAN10,C14ORF132,CC
DC62,PTGER3,LRRN1,SULF1,LEF
TY2,PTN,LRRC55,CHD5,LMX1A,
OLR1,MYCN,SLC16A9,THY1,CHR
NA3,LOXHD1,FATE1,ABCG2,NTN
G2,CXCL2,MMP25,MDK,KIAA154
9L,CATSPER1,PALM3,ANGPTL7,I
QCN,SP5,DNAH5,ASB18,TLL2,RA
SSF10,PRSS8,PTCH2,TNFRSF11B,
DIO2,PRSS35,PLEKHH2,CYS1,TA
GLN3,PTPRR,DNAAF3,PCDH17,K
LHL4,INHBA,PMAIP1,COL14A1,C
OL24A1,SYT17,PRG4,CHRM3,SM
OC2,PLAC8,GPR173,PHOSPHO1,G
ATM,NDP,LYPD3,MPIG6B,TTLL7,
EIF4EBP3,HTR2B,UCHL1,LUM,A
RSJ,MID1,CFAP251,ANKLE1,SLC6
A12,CREG2,CSPG5,GADL1,IFI44L,
LRRC3B,OPCML,IRX6,SELL,S1PR
5,CCDC168,ITIH5,B3GNT5,RTL3,
NXPH4,TP73,RHBDL2,TRPV3,SLC
6A17,PRF1,PROS1,RFX8,C10ORF6
7,CD7,CRHBP,SLC44A5,BRSK1,SL
C24A5,PHLDA1,IPCEF1,ARID5A,P
RRX2,HAUS7,SLC22A7,YIPF7,FR
EM1,SLC26A4,ESR1,SAMD11,ZM
YND15,MYL1,NOS2,EPHX3,CPX
M2,MYOZ1,SNCA,CDHR5,APOL4,
CXCL14,GZMA,FOXI2,TP63,KCN
N3,PLXDC1,FSCN1,TAC4,SHANK
2,CUBN,ENPP6,COL9A2,SEMA3D,
CLIC6,HAS3,GABRE,GFRA3,EPH
A3,BRINP1,COL8A2,EXOC3L4,EX
TL1,PDE6A,SYTL2,HSD17B14,LR
RTM3,TMEM45B,ACE,SLC9C1,OG
DHL,NT5E,PDE5A,PTGFR,GLIS1,
GRIA3,PLCE1,SCG2,AMPH,PAK1,
KCNA5,CAPN3,GNB3,SOX8,APOE
,SV2B,SDSL,TMEM233,MOXD1,G
DF9,ADAMTS8,F2RL3,P2RX1,BCL
6B,F2R,SOX15,GUCA1C,ANKS1B,
SV2A,SEZ6L2,IQCA1,EGR2,SYT12
,COLEC12,GLI1,KIAA1755,SNCAI
P,NRK,SAMD12,SRRM4,NTM,CA
CNG8,PRDM1,PTPRH,TNNT1,DCL
K3,MSH4,OAS3,SCT,SSC5D,ANGP
TL8,C1QTNF12,HLA-
DPA1,FCN1,DMC1,APOLD1,HMC
N2,EGR1,CCDC13,QPCT,MYO5B,
TFPI2,MUC20,LSP1,ISLR,PLPPR4,
ZNF541,CRABP2,ATCAY,P2RX6,P
SD,SLC1A7,DUSP6,SLC6A1,DKK2
,RAB39B,IL34,TNFSF13B,BOC,IN
HBE,IER3,GPR27,GJC2,MDGA1,L
CK,RUNX1,LTB,ZC3H12B,NUP62
CL,RSAD2,NRXN2,REC8,CYP11A
1,TNFRSF4,ACHE,SCN8A,KIF1A,T
REH,UNC13D,CPEB1,KCNIP1,TP

						M3,TENM1,SCARA3,MEST,STX1B,MYCBPAP,MX2,GABRP,COL12A1,ITGAX
GO:0005102	MF	signaling receptor binding	1.93E-07	6.713939136	68	EDN3,ESM1,MSTN,LYPD1,CXCL11,SYTL5,RSPO2,PENK,IL1B,PCSK1N,CTSG,CX3CR1,ITPRID1,WNT9A,CYTL1,THBS4,ATRNL1,F2RL2,CXCL9,GDF6,GDF15,TGFB2,IGSF1,CXCL3,MYOC,CXCL10,BDNF,LEFTY2,PTN,THY1,CXCL2,MDK,PTCH2,TNFRSF11B,INHBA,NDP,UCHL1,CSPG5,NXPH4,CXCL14,TAC4,SHANK2,SEMA3D,CLIC6,GFRA3,SYTL2,ACE,SCG2,KCNA5,APOE,GDF9,ADAMTS8,F2R,ANKS1B,RASL11B,SCT,ANGPTL8,C1QTNF12,FCN1,DKK2,IL34,TNFSF13B,INHBE,LCK,LTB,NRXN2,STX1B,ITGAX
GO:0098772	MF	molecular function regulator activity	0.002101883	2.677391414	69	EDN3,CST2,MSTN,LYPD1,CXCL11,CST1,LEF1,PENK,IL1B,PPP2R2B,PCSK1N,CTSG,WNT9A,RGS4,THBS4,F2RL2,CXCL9,GDF6,GDF15,TGFB2,IGSF1,SCG5,MCF2L2,CXCL3,CXCL10,BDNF,NGEF,LEFTY2,PTN,LRRC55,THY1,CXCL2,MDK,TNFRSF11B,INHBA,NDP,HTR2B,CSPG5,ITIH5,ECT2L,PROS1,ESR1,MYOZ1,SNCA,CXCL14,TAC4,SEMA3D,PLCE1,SCG2,CAPN3,APOE,GDF9,GUCA1C,RASL11B,KIAA1755,CACNG8,SCT,ANGPTL8,C1QTNF12,TFPI2,PSD,DKK2,IL34,TNFSF13B,INHBE,LCK,LTB,NRXN2,KCNIP

Table 4 The enriched pathway terms of the up and down regulated differentially expressed genes

Pathway ID	Pathway Name	adjusted_p_value	negative_log10_of_adjusted_p_value	Gene Count	Gene
			Up regulated genes		
REAC:R-HSA-1430728	Metabolism	0.000235364	3.62825969	84	CACNA1E,ALOX15B,GNMT,MGST1,PLA2G2A,CHDH,PCK1,CYP4B1,ETNK2,VDR,AOX1,SGPP2,CA14,HS3ST2,MFSD2A,RBP4,ADH1B,HMGCS2,HOGA1,LYVE1,PTDSS1,PLA2G4F,ETNPPL,ITPKA,CHST7,PRODH,B3GNT7,PNMT,CHAC2,LDHA,MLXIPL,HMOX2,GPD1L,

					ALDH1L1,SLC2A1,SLC44A3,GSTM3,FHL2,RPLP0,CD38,SERINC2,ENTPD6,POMC,APOB,BMAL1,ARG2,ORMDL2,LPCAT3,CHPF,GPD1,FABP4,PTGS1,BHMT2,HK3,TPO,RPSA,HMBS,HAS2,ALDOC,NQO1,BCAT1,PPIP5K2,NMRAL1,RPS2,PSMD8,EBP,DHCR24,AKR1C1,RPL27,NSDHL,RPS5,LPCAT4,GGT5,IMPA2,HMOX1,AKR1B1,ACACB,NUDT4,SLC25A19,MPST,NQO2,RETSAT,TKT,PMVK
REAC:R-HSA-5576891	Cardiac conduction	0.001413139	2.849815073	13	KCNIP2,KCNK12,CORIN,SCN1A,KCNK13,KCNK3,FGF12,NPPC,KCNK2,ATP2A2,DMPK,KCNH2,KCNK1
REAC:R-HSA-397014	Muscle contraction	0.006736679	2.171554137	15	MYH6,KCNIP2,KCNK12,CORIN,SCN1A,KCNK13,KCNK3,FGF12,NPPC,KCNK2,ATP2A2,DMPK,MYL3,KCNH2,KCNK1
REAC:R-HSA-6798695	Neutrophil degranulation	0.019351752	1.713279701	24	RNASE2,SERPINA3,CD177,MGST1,ELANE,C3,QSOX1,TUBB4B,SLPI,CFD,PTX3,HMOX2,OLFM4,GGH,HK3,CD63,ALDOC,PRDX6,CTSB,PRKCD,FCER1G,LGALS3,FTH1,FRK
REAC:R-HSA-112316	Neuronal System	0.023934563	1.620974495	21	CACNA1E,TUBA3E,TUBA3D,CHRNA4,KCNK13,KCNK3,SYN2,GRIP1,TUBB4B,TUBA1C,TUBB4A,TUBA1B,KCNA7,KCNK2,CACNA2D3,GRIN2A,HCN4,RPS6KA2,KCNH2,TUBA4A,KCNK1
REAC:R-HSA-556833	Metabolism of lipids	0.072411275	1.140193808	30	ALOX15B,PLA2G2A,CYP4B1,ETNK2,VDR,SGPP2,MFSD2A,HMGCS2,PTDSS1,PLA2G4F,ETNPPL,GPD1L,SLC44A3,FHL2,POMC,BMAL1,ORMDL2,LPCAT3,GPD1,FABP4,PTGS1,EBP,DHCR24,AKR1C1,NSDHL,LPCAT4,GGT5,AKR1B1,ACACB,PMVK
		Down regulated genes			
REAC:R-HSA-1474244	Extracellular matrix organization	4.18982E-05	4.377804489	24	COL22A1,P3H2,MATN4,FBN3,COL10A1,CTSG,CMA1,FMOD,COL9A1,TGFB2,COL17A1,CAPN12,LAMC3,MMP25,TLL2,COL14A1,COL24A1,LUM,COL9A2,COL8A2,CAPN3,ADAMTS8,COL12A1,ITGAX
REAC:R-HSA-500792	GPCR ligand	0.006878481	2.162507445	24	EDN3,CXCL11,PENK,RXFP2,CX3CR1,WNT9A,F2RL2,CXCL9

	binding				,APLNR,CXCL3,CXCL10,PTGER3,CXCL2,PTCH2,CHRM3,HTR2B,S1PR5,CRHBP,PTGFR,GNB3,F2RL3,F2R,SCT,PLPPR4
REAC:R-HSA-9006934	Signaling by Receptor Tyrosine Kinases	0.116865935	0.932312061	21	CMA1,THBS4,COL9A1,KIT,BDNF,LAMC3,EGR3,PTN,MYCN,MDK,COL24A1,ESR1,COL9A2,PAK1,APOE,EGR2,PRDM1,EGR1,MUC20,DUSP6,LCK
REAC:R-HSA-382551	Transport of small molecules	0.312352071	0.505355611	24	TRPM8,SLC4A8,HBB,ATP1A4,AQP10,UNC80,RHCG,SLC5A7,ABCG2,SLC6A12,TRPV3,SLC44A5,SLC24A5,SLC22A7,SLC26A4,CUBN,SLC9C1,GNB3,APOE,ANGPTL8,MYO5B,SLC1A7,SLC6A1,RUNX1
REAC:R-HSA-162582	Signal Transduction	0.312352071	0.505355611	70	EDN3,CENPA,CXCL11,FOXA1,RSPO2,LEF1,PENK,RXFP2,SCUBE2,MUC13,CX3CR1,WNT9A,ATP1B4,GZMB,CMA1,RGS4,THBS4,COL9A1,F2RL2,CXCL9,KIF5A,TGFB2,CHRDL1,KIT,APLNR,CXCL3,CXCL10,BDNF,NGEF,LAMC3,EGR3,PTGER3,PTN,MYCN,CXCL2,MDK,PTCH2,INHBA,COL24A1,CHRM3,HTR2B,S1PR5,CRHBP,ESR1,COL9A2,GFRA3,PDE6A,PDE5A,PTGFR,PAK1,GNB3,APOE,F2RL3,F2R,EGR2,GLI1,PRDM1,SCT,EGR1,MUC20,PLPPR4,CRABP2,DUSP6,DKK2,BOC,IER3,GPR27,LCK,RUNX1,TPM3
REAC:R-HSA-1280215	Cytokine Signaling in Immune system	0.312352071	0.505355611	24	IL31RA,IL22RA2,ALOX15,IL1B,CTSG,EDA2R,CXCL10,CXCL2,TNFRSF11B,MID1,NOS2,FSCN1,OAS3,HLA-DPA1,EGR1,DUSP6,IL34,TNFSF13B,LCK,LTB,RSAD2,TNFRSF4,MX2,ITGAX

Table 5 Topology table for up and down regulated genes

Regulation	Node	Degree	Betweenness	Stress	Closeness
Up	FN1	473	0.109116	2E+08	0.353245
Up	SOX2	365	0.067486	1.39E+08	0.335598
Up	TUBA4A	190	0.051172	31857448	0.338477
Up	RPS2	185	0.017276	9220676	0.352736
Up	TUBA1C	159	0.026635	11323556	0.368273
Up	RPLP0	135	0.011368	5958366	0.353606
Up	RPSA	127	0.010703	4989992	0.348574
Up	TFRC	119	0.023334	13206196	0.325219
Up	SH3KBP1	115	0.020202	15272296	0.312793

Up	FKBP5	114	0.024673	5207364	0.348905
Up	TUBG1	111	0.01699	14037244	0.323839
Up	FHL2	110	0.025894	5500746	0.352863
Up	LGALS3	105	0.037206	9288028	0.360636
Up	RPS5	104	0.004324	8076866	0.300174
Up	SLAMF1	93	0.02151	13052026	0.305176
Up	BCL6	87	0.016104	38882434	0.28111
Up	TUBB4B	83	0.009611	4892884	0.331211
Up	AGTR1	79	0.017946	13625904	0.298922
Up	RPL27	79	0.00269	4989026	0.296779
Up	CTSB	74	0.008072	8115280	0.303631
Up	PSMD8	67	0.011493	14491824	0.286494
Up	ATP2A2	66	0.01283	2892110	0.350988
Up	BLM	65	0.011026	4194338	0.338868
Up	PRKCD	65	0.009793	7186238	0.301652
Up	LDHA	63	0.009788	4456804	0.312743
Up	FTH1	61	0.0163	9590872	0.281702
Up	TKT	59	0.011703	3289292	0.316055
Up	COMTD1	58	0.01091	2782068	0.338536
Up	FGFR4	57	0.012763	5933936	0.296854
Up	SLC7A1	57	0.00955	7759190	0.278671
Up	MLF1	55	0.008756	6468492	0.287166
Up	TGM2	54	0.00675	3832120	0.304465
Up	TUBA1B	54	0.006453	2313722	0.352609
Up	VDR	50	0.003094	6670838	0.287082
Up	APOB	47	0.008005	8376134	0.28704
Up	VSIG4	44	0.008612	6686408	0.282596
Up	HMOX2	41	0.00664	5365262	0.285798
Up	S100A10	38	0.008222	1650734	0.332937
Up	CA14	38	0.005092	3736514	0.275872
Up	NGFR	36	0.006982	3780622	0.284099
Up	CMTM5	35	0.008279	14619696	0.260273
Up	BMP7	33	0.006033	1877220	0.276964
Up	HOOK1	33	0.005894	3437722	0.271163
Up	SLC2A1	32	0.005084	1174034	0.337758
Up	EPN1	31	0.006012	2893678	0.336482
Up	PRDX6	31	0.004018	2195578	0.337797
Up	EBP	31	0.00771	2319812	0.285589
Up	XRCC4	30	0.004505	4648986	0.272571
Up	GRIP1	29	0.006273	1116134	0.33095
Up	C3	29	0.006523	1748362	0.26456
Up	VIPR1	29	0.004782	4501030	0.270913
Up	RPS6KA2	28	0.003346	2787366	0.281486
Up	ZNF703	27	0.00574	3186288	0.279758
Up	PTPRN	27	0.003999	2599642	0.275445
Up	LRP4	26	0.00579	4196724	0.266963
Up	ITGA7	26	0.006226	1514106	0.282338
Up	CREB3L1	26	0.005421	6842918	0.257525
Up	CD109	26	0.004376	1446820	0.276742
Up	SERPINA5	25	0.005416	2316392	0.259652
Up	DHCR24	25	0.004356	1582028	0.335273
Up	HMOX1	24	0.004098	1062466	0.268807
Up	PALLD	23	0.00278	2890772	0.26946
Up	SCGN	23	0.00222	2783418	0.267925
Up	GGH	23	0.003317	1734178	0.277421
Up	CAMSAP3	23	0.003796	724928	0.329891
Up	LAMB3	23	0.002864	2744672	0.273459
Up	CENPV	22	0.0016	2181446	0.267681
Up	FAM83B	21	0.004065	855502	0.328417
Up	TSPAN2	21	0.002911	841734	0.276664
Up	RETSAT	20	0.005823	1206702	0.217301
Up	OLFM4	19	0.002721	2301970	0.257999
Up	LPCAT3	19	0.002441	856790	0.233876
Up	GRIN2A	18	0.002535	1487360	0.271551
Up	GSTM3	18	0.003353	2050812	0.315377
Up	LMO1	18	0.00188	2198674	0.260042
Up	SERPINA3	15	0.001793	1341152	0.250854
Up	SPP1	15	0.001261	1035292	0.266371
Up	QSOX1	15	0.003012	876874	0.275071
Up	PTX3	14	0.001544	296724	0.222079

Up	CD63	14	0.001771	454040	0.279439
Up	AZGP1	14	0.002473	516882	0.261733
Up	ALDOC	13	0.00214	775190	0.273268
Up	C1QB	13	0.001481	349616	0.291423
Up	CENPM	13	0.00215	1268210	0.232176
Up	C1QA	12	0.001147	273520	0.289828
Up	PPIL1	12	0.001228	953586	0.269683
Up	NSDHL	12	0.002668	931962	0.243345
Up	EIF4EBP1	11	0.001079	786496	0.245633
Up	EPB41L4B	11	8.48E-04	505270	0.261663
Up	IMPA2	11	0.002456	511818	0.265049
Up	TGFA	10	0.00206	953334	0.267925
Up	ITLN1	10	0.00138	607600	0.262247
Up	MGST1	9	7.89E-04	213342	0.277173
Up	PLEKHN1	9	0.001057	461348	0.260411
Up	SLC25A19	9	0.001733	567864	0.252926
Up	SLC7A11	8	3.26E-04	192724	0.265997
Up	INSYN1	8	0.001098	1061652	0.24508
Up	PTDSS1	8	0.002433	559240	0.327174
Up	NFXL1	7	3.61E-04	176314	0.241545
Up	NMRAL1	6	6.82E-04	316974	0.254514
Up	PLP2	6	3.64E-04	208280	0.201716
Up	ACACB	6	0.001026	231722	0.232304
Up	DIRAS3	6	0.001361	614158	0.242272
Up	AKR1B1	6	8.67E-04	350252	0.246158
Up	PCK1	6	0.001023	338526	0.259549
Up	FGF12	5	0.001051	717040	0.244784
Up	CRLF1	5	7.25E-04	192770	0.223345
Up	ZDHHC23	5	0.001021	1097504	0.180285
Up	CLIC3	5	0.001024	404550	0.229314
Up	FCER1G	4	0.001021	1301232	0.204502
Up	TENT5B	4	3.51E-04	94702	0.223864
Up	KCNK1	3	0	0	0.240193
Up	CHRNA4	3	6.80E-04	177662	0.228201
Up	LOX	3	1.47E-04	314464	0.275833
Up	CD177	3	3.41E-04	156616	0.246674
Up	MPST	3	1.73E-04	43716	0.238082
Up	AIF1L	3	3.08E-04	523656	0.320781
Up	C1QC	2	0	0	0.227521
Up	EPN3	2	4.90E-05	24322	0.254404
Up	SUSD4	2	9.57E-05	44366	0.256704
Up	C1QL1	2	4.16E-05	22008	0.226077
Up	NOCT	2	2.65E-05	9576	0.243456
Up	ZDHHC9	2	5.43E-05	42280	0.234595
Up	ELN	2	4.82E-04	181544	0.265684
Up	SMCO4	2	3.20E-06	1148	0.186077
Up	REPS2	1	0	0	0.251778
Up	HMBS	1	0	0	0.206188
Up	SDK1	1	0	0	0.265061
Up	GPD1L	1	0	0	0.223932
Up	FREM2	1	0	0	0.20518
Up	TUBB4A	1	0	0	0.223932
Up	RPLP0P6	1	0	0	0.237793
Up	RBP4	1	0	0	0.219796
Up	FCGR3A	1	0	0	0.24038
Up	CD38	1	0	0	0.24038
Up	KCNK3	1	0	0	0.249788
Up	DDN	1	0	0	0.238275
Up	ELANE	1	0	0	0.200553
Up	SHC4	1	0	0	0.228298
Up	EPHB2	1	0	0	0.219591
Up	ECE2	1	0	0	0.219664
Up	GPD1	1	0	0	0.222374
Up	SCN1A	1	0	0	0.196654
Up	CCDC184	1	0	0	0.235129
Up	NQO1	1	0	0	0.236349
Up	ADAMTS2	1	0	0	0.233829
Up	SMYD1	1	0	0	0.20349
Up	MZT2A	1	0	0	0.244631
Up	NID1	1	0	0	0.217454

Up	AKR1C1	1	0	0	0.261047
Up	FAM83F	1	0	0	0.230419
Up	TUBA3E	1	0	0	0.265002
Up	NACAD	1	0	0	0.23014
Up	HK3	1	0	0	0.217101
Up	ADAM11	1	0	0	0.199416
Up	CAMK1D	1	0	0	0.209323
Up	VGLL3	1	0	0	0.202007
Up	CPM	1	0	0	0.219796
Up	NINJ2	1	0	0	1
Up	CD276	1	0	0	0.224918
Up	PNMT	1	0	0	0.31193
Up	RASSF7	1	0	0	0.216135
Down	ESR1	1870	0.587746	6.06E+08	0.453305
Down	SNCA	152	0.028384	29984254	0.321395
Down	LCK	140	0.025956	37786260	0.31643
Down	PAK1	124	0.022263	7344224	0.360525
Down	APLNR	103	0.021058	18728968	0.298694
Down	MME	92	0.014314	26289176	0.299394
Down	PTN	83	0.015066	30315076	0.285951
Down	LYPD3	83	0.016511	11354608	0.294106
Down	TMEM30B	79	0.019648	8034502	0.290171
Down	KIT	78	0.012759	5349150	0.295823
Down	TPM3	78	0.016964	4732412	0.355145
Down	TP63	73	0.01026	6665850	0.312278
Down	PTPRR	68	0.005181	12706912	0.2892
Down	CHRM3	66	0.012005	6298970	0.307395
Down	PTGER3	63	0.009919	7717250	0.277933
Down	PPP2R2B	58	0.006908	17779292	0.283769
Down	CENPA	56	0.009147	18078458	0.276651
Down	RUNX1	54	0.008039	4243964	0.301823
Down	IQCN	52	0.01118	6561672	0.290042
Down	FOXI2	50	0.008496	8995428	0.27729
Down	TP73	47	0.007147	2794244	0.309482
Down	HAUS7	45	0.009874	4600502	0.280533
Down	TNFSF13B	44	0.006882	2305716	0.282135
Down	ISLR	43	0.008179	4354258	0.288533
Down	HBB	39	0.007697	4400028	0.287728
Down	MDK	38	0.004675	4525992	0.277867
Down	RASSF10	38	0.005534	5558018	0.275717
Down	APOE	37	0.005982	1520704	0.289756
Down	FOXA1	37	0.007923	1504684	0.329762
Down	UCHL1	37	0.003544	3457024	0.29477
Down	NT5E	37	0.007781	2437198	0.330968
Down	AMPH	36	0.005036	2073600	0.28204
Down	DUSP6	36	0.002327	4567326	0.28447
Down	GLI1	36	0.004917	5607508	0.277906
Down	MID1	35	0.008667	9261972	0.257965
Down	FATE1	35	0.008464	3280534	0.265528
Down	KCNA5	34	0.006666	4914932	0.271752
Down	COL14A1	34	0.005473	4954518	0.274724
Down	NELL2	34	0.008879	21199980	0.244733
Down	COLEC12	33	0.005923	2612196	0.287377
Down	CST1	33	0.007365	3245290	0.264727
Down	ENPP6	32	0.00448	6212680	0.260873
Down	SCARA3	32	0.005253	2452164	0.286285
Down	MYO5B	31	0.003969	3447796	0.27034
Down	EGR1	28	0.002804	4772834	0.272382
Down	KIF5A	27	0.005414	4625872	0.276469
Down	FSCN1	27	0.004427	1253374	0.305113
Down	GABRE	27	0.005457	2350010	0.259732
Down	LEF1	26	0.002478	1979092	0.275265
Down	P2RY8	25	0.002849	1315046	0.241149
Down	CATSPER1	25	0.005701	4329576	0.259721
Down	EPHA3	24	0.00493	2169906	0.281365
Down	ATP1B4	22	0.004574	1533138	0.260607
Down	UGT8	22	0.005283	1254082	0.283004
Down	TNNT1	21	0.00323	1407954	0.275704
Down	MED12L	21	0.001388	2429252	0.262188
Down	RAB39B	21	0.004034	3389366	0.262727

Down	PRDM1	20	0.001876	2288998	0.274301
Down	KIF1A	20	0.00528	1570854	0.329042
Down	CAPN3	19	0.002618	1884174	0.26107
Down	CHD5	19	8.17E-04	1303948	0.274647
Down	FAT3	19	0.003776	2357898	0.261547
Down	CPEB1	19	0.002605	2888188	0.256368
Down	LYPD1	19	0.003396	1385812	0.288533
Down	L1TD1	18	0.001788	3163346	0.254911
Down	SOX15	18	9.53E-04	2101480	0.257153
Down	GNB3	17	0.003936	1467014	0.241853
Down	QPCT	17	0.00147	1321274	0.271941
Down	GDF9	17	0.001887	959826	0.287222
Down	CTLA4	16	0.001925	478968	0.278591
Down	DPYSL5	16	0.002263	1645258	0.253986
Down	FMN2	16	0.004284	2094738	0.266988
Down	CST2	16	0.002433	1572406	0.247933
Down	FCGR3B	16	0.00239	1401182	0.27529
Down	SHANK2	15	0.00289	1349692	0.318125
Down	NOS2	15	0.001522	990244	0.275561
Down	FCN1	15	0.002371	785522	0.220712
Down	NGEF	15	0.002204	815484	0.268512
Down	OAS3	15	0.001036	1799246	0.259091
Down	MYCN	14	0.001515	1462590	0.269782
Down	COL8A2	14	0.003061	905588	0.286466
Down	GDF15	13	0.001439	431970	0.264334
Down	CTSG	13	0.002251	1851570	0.258135
Down	SFRP4	13	0.001516	1557424	0.255254
Down	CBLN4	13	0.001994	3439406	0.249078
Down	HSD17B14	13	0.00222	1544882	0.241307
Down	INHBE	12	0.002311	849116	0.273027
Down	MOXD1	12	5.38E-04	181788	0.246871
Down	ARID5A	12	0.00266	1286468	0.316942
Down	STX1B	11	0.001401	812102	0.257265
Down	CRABP2	11	0.001337	518600	0.246003
Down	PHLDA1	11	4.37E-04	258070	0.271953
Down	MYOC	9	0.001524	327962	0.284814
Down	MYOZ1	9	6.21E-04	406780	0.26462
Down	ECEL1	9	0.001398	792216	0.200635
Down	SYT17	8	0.001447	331592	0.232488
Down	PMAIP1	7	0.001718	1636374	0.198233
Down	OGDHL	7	0.001124	576564	0.255465
Down	THY1	7	4.94E-04	265200	0.256984
Down	CCDC13	7	0.001047	527720	0.24786
Down	FAM133A	7	0.001371	717144	0.253395
Down	PRF1	6	3.72E-04	107324	0.232774
Down	MYH2	6	5.71E-04	273698	0.258169
Down	PTPRH	5	3.56E-04	85552	0.278975
Down	SV2A	4	9.55E-05	66646	0.254404
Down	TSPAN10	4	0.001021	1532322	0.196267
Down	PIPSL	4	6.84E-04	821316	0.187508
Down	COL12A1	4	6.81E-04	3129376	0.209562
Down	IL1B	3	6.80E-04	325214	0.174111
Down	CXCL9	3	6.80E-04	333774	0.197129
Down	ATP1A4	3	1.88E-04	101716	0.238691
Down	PHOSPHO1	3	1	6	1
Down	P2RX6	3	6.80E-04	1359298	0.211302
Down	DLGAP1	2	2.82E-06	1266	0.248258
Down	SNCAIP	2	2.55E-04	157082	0.247131
Down	HLA-DPA1	2	6.31E-05	10974	0.230709
Down	ECT2L	2	0	0	0.312161
Down	PRSS8	2	2.81E-05	13536	0.314399
Down	BCL6B	1	0	0	0.219435
Down	ITGAX	1	0	0	0.209219
Down	GRIA3	1	0	0	0.248667
Down	GPR173	1	0	0	0.212103
Down	SEZ6L2	1	0	0	0.180811
Down	MUC20	1	0	0	0.252893
Down	IL31RA	1	0	0	0.265061
Down	CSPG5	1	0	0	0.223235
Down	CDHR5	1	0	0	0.178516

Down	PCDH17	1	0	0	0.224918
Down	PTGFR	1	0	0	0.23014
Down	DKK2	1	0	0	1
Down	SCT	1	0	0	0.213172
Down	HSH2D	1	0	0	0.228298
Down	IER3	1	0	0	0.260839
Down	GZMB	1	0	0	0.188827
Down	SYNPR	1	0	0	0.209824
Down	OIT3	1	0	0	0.158715
Down	CACNB4	1	0	0	0.222374
Down	PALM3	1	0	0	0.31193
Down	SCG5	1	0	0	0.23014
Down	MEST	1	0	0	0.31193
Down	S1PR5	1	0	0	0.237976
Down	E2F7	1	0	0	0.24038

Table 6 MiRNA - hub gene and TF – hub gene topology table

Regulation	Hub Genes	Degree	MicroRNA	Regulation	Hub Genes	Degree	TF
Up	FN1	439	hsa-mir-374a-5p	Up	SH3KBP1	20	PRRX2
Up	TFRC	422	hsa-miR-520d-5p	Up	FHL2	19	SRY
Up	FKBP5	305	hsa-miR-34a-5p	Up	FKBP5	17	USF2
Up	FHL2	291	hsa-mir-4646-5p	Up	TFRC	15	BRCA1
Up	RPLP0	232	hsa-mir-548aw	Up	FN1	14	STAT1
Up	TUBA1C	208	hsa-mir-603	Up	RPSA	10	PPARG
Up	TUBG1	170	hsa-miR-148a-3p	Up	SOX2	9	ARID3A
Up	SH3KBP1	159	hsa-miR-135b-5p	Up	TUBA4A	7	TFAP2C
Up	RPS2	141	hsa-mir-378a-3p	Up	TUBG1	6	NFIC
Up	RPS5	139	hsa-miR-182-3p	Up	RPLP0	6	FOXF2
Up	TUBA4A	105	hsa-mir-147a	Up	SLAMF1	6	YY1
Up	RPSA	98	hsa-miR-23a-3p	Up	TUBA1C	5	GATA3
Up	SOX2	96	hsa-miR-744-5p	Up	LGALS3	5	NFATC2
Up	SLAMF1	95	hsa-miR-106a-5p	Up	RPS5	5	RELA
Up	LGALS3	88	hsa-miR-4525	Up	RPS2	4	SOX17
Down	TPM3	456	hsa-miR-8052	Down	ESR1	26	STAT3
Down	ESR1	266	hsa-mir-302b-3p	Down	TP63	21	FOS
Down	CHRM3	226	hsa-miR-194-5p	Down	PTPRR	16	MEF2A
Down	TMEM30B	203	hsa-mir-548i	Down	TPM3	13	EN1
Down	PAK1	162	hsa-miR-524-5p	Down	SNCA	11	GATA2
Down	KIT	150	hsa-miR-23a-3p	Down	LCK	10	FOXL1
Down	PTPRR	127	hsa-mir-129-2-3p	Down	PTGER3	9	POU2F2
Down	MME	126	hsa-mir-181d-5p	Down	MME	9	NFYB
Down	LYPD3	115	hsa-mir-27a-3p	Down	KIT	8	FOXC1
Down	SNCA	84	hsa-miR-99b-5p	Down	PAK1	7	REL
Down	TP63	82	hsa-miR-1285-3p	Down	TMEM30B	7	PAX2
Down	PTN	66	hsa-miR-320b	Down	LYPD3	6	SRF
Down	APLNR	61	hsa-miR-146a-5p	Down	PTN	6	ELK4
Down	PTGER3	49	hsa-miR-5695	Down	APLNR	4	TP53
Down	LCK	37	hsa-miR-183-5p	Down	CHRM3	2	HOXA5

Table 7 Drug- hub gene topology table

Category	Gene	Degree	Drug
Up	CHRNA4	50	Succinylcholine
Up	GRIN2A	34	Memantine
Up	SCN1A	27	Phenacemide
Up	VDR	22	Lexacalcitol
Up	CA14	21	Zonisamide
Up	CTSB	14	3-Methylphenylalanine
Up	ELANE	13	Freselestat
Up	ELANE	13	Tiprelestat
Up	PRKCD	8	Dequalinium
Up	PRKCD	8	Delcasertib
Up	FTH1	8	Ferric pyrophosphate citrate
Up	SLC7A11	6	Thimerosal
Up	TGM2	5	Hexylresorcinol
Up	TGM2	5	Hexylresorcinol
Up	SERPINA5	5	Tifuvirtide
Up	PCK1	5	Phosphoenolpyruvate
Up	ATP2A2	5	Istaroxime
Up	EPHB2	4	Ulixertinib
Up	IMPA2	4	Lithium citrate
Up	CD38	3	Mezagitamab
Up	LGALS3	3	Lactose
Up	KCNK1	3	Quinidine
Up	COMTD1	3	Feruloyl Coenzyme A
Up	SLC7A1	3	Ornithine
Up	KCNK3	2	Doxapram
Up	EBP	2	Arylacenamide
Up	EBP	2	Arylacenamide
Up	CAMK1D	2	N-(5-METHYL-1H-PYRAZOL-3-YL)-2-PHENYLQUINAZOLIN-4-AMINE
Up	SLC2A1	2	Resveratrol
Up	RBP4	2	Tretinoin
Up	EPN1	2	1,4-Dioxane
Up	NID1	1	Urokinase
Down	CHRM3	94	Umeclidinium
Down	GABRE	76	Bromazepam
Down	NOS2	53	Dipyrithione
Down	KIT	28	Midostaurin
Down	LCK	26	Nintedanib
Down	HBB	20	Efaproxiral

Down	IL1B	18	Rilonacept
Down	MME	15	Sacubitrilat
Down	GRIA3	13	Talampanel
Down	PTGFR	13	Laropiprant
Down	KCNA5	9	Isavuconazole
Down	NT5E	9	Caffeine
Down	APOE	5	Zinc chloride
Down	S1PR5	5	Fingolimod
Down	SV2A	4	Brivaracetam
Down	QPCT	4	Varoglutamstat
Down	SNCA	3	Resveratrol
Down	CTLA4	3	Ipilimumab
Down	CTSG	3	Aloxistatin
Down	SFRP4	2	Cyclothiazide
Down	ATP1A4	2	Bisacodyl
Down	TNFSF13B	2	Belimumab
Down	P2RX6	1	Promethazine
Down	P2RY8	1	Promethazine
Down	PAK1	1	Fostamatinib

Table 8. Molecular dockinginteractions of screened phytoconstituents with LGALS3 (PDB ID: 8IU1)

Compound	LGALS3 gene (pdb id: 8IU1) Amino acid interactions, Active Chain is A, reference (cocrystallised) ligand is QB2				
	Affinity (kcal/mol)	**Hydrogen bonding interactions**	**pi-pi interactions**	**Hydrophobic interactions**	**Polar (electrostatic) interactions**
Puerarin	-6.807	GLU72, ARG50	TRP69	VAL34	HIS46, ARG50
Oleuropein	-6.423	ARG50, HIS46, ASN62, ASN67	TRP69	TRP69, HIS46	--
Swertiamerin	-6.039	ARG38, LYS64, ASP36, ARG32	--	HIS46, TRP69	--
Mangiferin	-6.017	GLU53, ARG32, HIS46, ASP36, LYS64	--	ARG32	ARG50, HIS46, TRP69
Cocrystallised ligand	-6.565	ASN62, ARG50, ASN48, HIS46, ARG32	TRP69, ARG50	VAL43, TRP69, HIS46	GLY70, GLU72

Table 9. Molecular docking interactions of screened phytoconstituents with ESR1 (PDB ID: 1A52)

Compound	ESR1 gene (pdb: 1A52) Amino acid interactions, Active Chain is B, reference ligand is Estradiol				
	Affinity (kcal/mol)	**Hydrogen bonding interactions**	**pi-pi interactions**	**Hydrophobic interactions**	**Polar (electrostatic) interactions**
Oleuropein	-7.745	GLY217, ASP47, LYS225, LEU221, HIS220, ALA46, ARG90	PHE100	LEU83, LEU87, ALA46	--
Puerarin	-6.559	GLU49, THR43, LYS225	LEU42	LEU221, ALA46	MET117, MET39, ASP47
Swertiamerin	-5.572	GLU49, LEU83, ARG90, PHE100	--	LEU80, ALA46, LEU83	MET39
Mangiferin	-4.144	MET117, THR43	--	LEU42, LEU221, ALA46	MET39
Cocrystallised ligand	-10.754	GLU49	PHE100	ILE120, MET84, LEU87, LEU83, ALA46	--

Table 10. Predicted drug-likeness and ADMET properties of screened phytoconstituents

Parameter	Swertiamarin	Puerarin	Oleuropein	Mangiferin
Molecular Weight (MW)	374.12	416.11	540.18	422.34
Topological Polar Surface Area (TPSA)	155.14	160.82	201.67	201.12
Hydrogen Bond Donors (HBD)	5	6	6	8
Hydrogen Bond Acceptors (HBA)	10	9	13	11
Rotatable Bonds	4	3	11	2
Lipinski	Accepted	Accepted	Rejected	Rejected
Log S (ESOL)	-2.013	-3.924	-1.443	-3.514
Log Po/w (XLOGP3)	-0.589	0.694	0.498	0.136
Human Intestinal Absorption (HIA)	0.926	0.841	0.908	0.956
Caco-2 Permeability	-6.051	-6.199	-5.677	-6.286
BBB Permeant	0.219	0.046	0.311	0.019

P-gp Substrate	0.075	0.967	0.99	0.988
CYP2C9 Inhibitor	0.004	0.056	0.061	0.022
CYP3A4 Inhibitor	0.016	0.068	0.198	0.02
hERG Inhibitor	0.083	0.041	0.097	0.105
Carcinogenicity	0.018	0.021	0.029	0.023

Table 11. Novel biomarkers for HCM

Regulation	Novel biomarkers
Up regulated genes	FAM83B, GAL, CHRDL2, SRARP, CHRNA4, MARCO, DNER, RAB39A, MGST1, RGR, TSPEAR, SCN1A, CPNE4, FER1L6, PKHD1L1, BEX5, AOX1, CAMSAP3, AGBL4, TMIGD3, ADAM11, BLM, NSG1, RTN4RL1, SUSD4, PLA2G4F, BB4B, TUELAPOR1, OPN4, SHC4, SLPI, ITPKA, PITX3, PLP2, CHL1, TUBA1B, NECTIN1, ADGRD1, FAM83F, SBK2, INSYN1, CLIC3, ZNF703, DIRAS1, WNK3, GRIN2A, PCARE, ENTPD6, PPP1R14B, SLC5A1, S100A10, GPSM2, REPS2, MLF1, RORB, QRFPR, CASKIN1, LRP4, PLEKHN1, TSPAN2, ECE2, KLHL31, RGS9BP, PTGDR, RPS6KA2, RALGPS2, RASSF7, LRRC32, ITGA11, RPL27, TIFA, SASH3, NSDHL, ABCG4, VIPR1, EPB41L4B, GGT5, IMPA2, CREB3L1, FRK, NOCT, ZDHHC9, NUDT4, ALPL, CABP1, CACNA1E, LAD1, IGSF23, CFAP95, FREM3, CATSPERB, LRRN3, STAC2, KCNK13, FREM2, SVOP, ART1, SLC38A4, MELTF, SERPINA5, VIT, ELAPOR1, NALF2, CPM, GOLGA7B, CPAMD8, KCNA7, MYOT, MS4A4A, PARVB, SLC44A3, SIRPB2, MEGF9, MARVELD2, EPN3, MATN3, PRRG4, SLC4A3, LRRC7, CHADL, DDN, SLC29A2, SLC9A7, DHRS9, ALDH1L1, NQO2, ETNK2, SGPP2, HS3ST2, HOGA1, CHST7, CHAC2, ORMDL2, CHPF, BHMT2, HMBS, ALDOC, PPIP5K2, PSMD8, EBP, LPCAT4,and SLC25A19
Down regulated genes	EDN3, CST2, SEZ6L, LYPD1, IL31RA, CBLN4, KCNK10, SLITRK4, SLC4A8, MYH2, PCDH15, OIT3, FCER1A, ATP1A4, COL10A1, DPYSL5, PCSK1N, ECEL1, MUC13, CRACD, HS3ST5, PLD4, UGT8, WNT9A, FMN2, KIF5A, ODF3, CHRDL1, CCDC63, SLC5A7, NELL2, ANKRD24, ODAD2, TMEM163, FAT3, RIPOR2, NGEF, LAMC3, CCDC62, PTGER3, CHD5, LMX1A, LOXHD1, NTNG2, CATSPER1, IQCN, SP5, DNAH5, TLL2, RASSF10, PTCH2, DNAAF3, INHBA, PMAIP1, COL14A1, SYT17, GPR173, GATM, NDP, MPIG6B, TTLL7, MID1, CSPG5, OPCML, IRX6, B3GNT5, SLC6A17, RFX8, CRHBP, BRSK1, ZMYND15, MYL1, PLXDC1, TAC4, SHANK2, COL9A2, SEMA3D, GFRA3, BRINP1, COL8A2, EXTL1, PDE6A, LRRTM3, SLC9C1, PTGFR, CAPN3, SOX15, GUCA1C, SEZ6L2, KIAA1755, SRRM4, NTM, MSH4, DMC1, APOLD1, HMCN2, MYO5B, PLPPR4, ZNF541, CRABP2, ATCAY, P2RX6, PSD, SLC1A7, SLC6A1, GJC2, MDGA1, NRXN2, REC8, ACHE, UNC13D, TENM1, STX1B, MYCBPAP, COL12A1, GSG1L, PRND, SYTL5, TMEM114, FCGR3B, SLC16A6, CDH8, AQP10, TMEM262, UNC80, APCDD1L, ATP1B4, CACNA1B, XG, GABRD, COL17A1, LYPD2, NALF1, SV2C, LRRC55, PLEKHH2, CYS1, LYPD3, SLC6A12, RHBDL2, SLC44A5, IPCEF1, HAUS7, SLC22A7, CDHR5, ENPP6, CLIC6, GABRE, AMPH, SV2B, TMEM233, ANKS1B, SYT12, SNCAIP, SAMD12, MUC20, RAB39B, GABRP, ITPRID1, NXPH4, RASL11B, COL22A1, P3H2, MATN4, FBN3, COL9A1, CAPN12, COL24A1 and TUBA1C

Figures

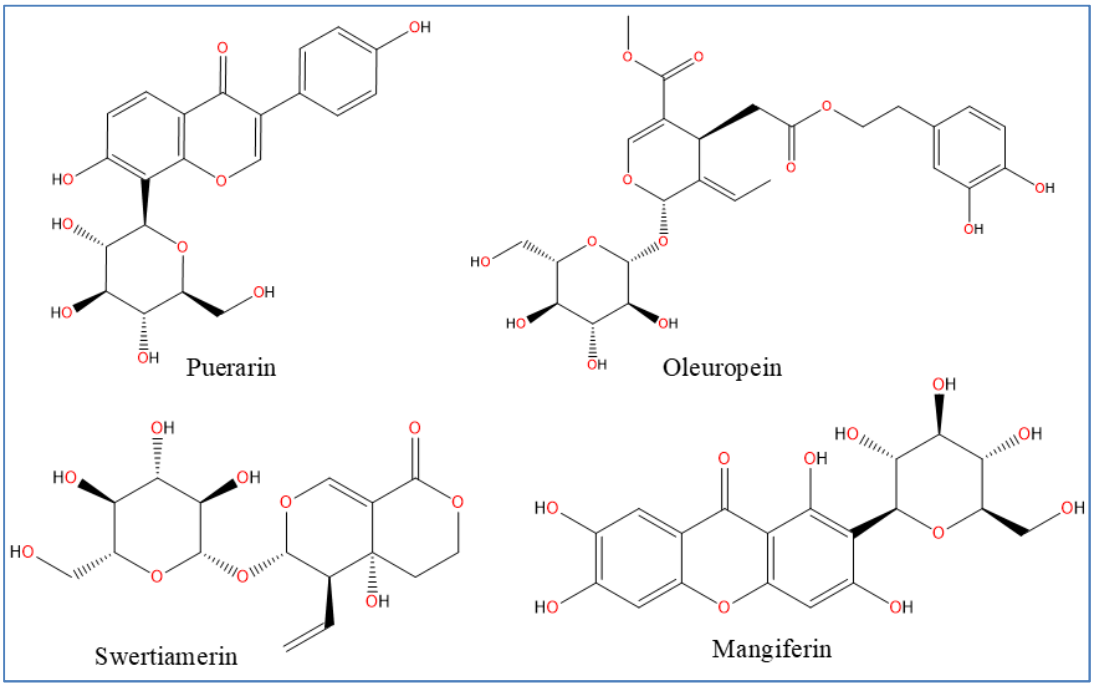


Fig. 1. Chemical structures of the screened phytoconstituentsPuerarin, Oleuropein, Swertiamarin, and Mangiferinwere chosen for structure-based screening against hypertrophic cardiomyopathy-associated targets (LGALS3 and ESR1).

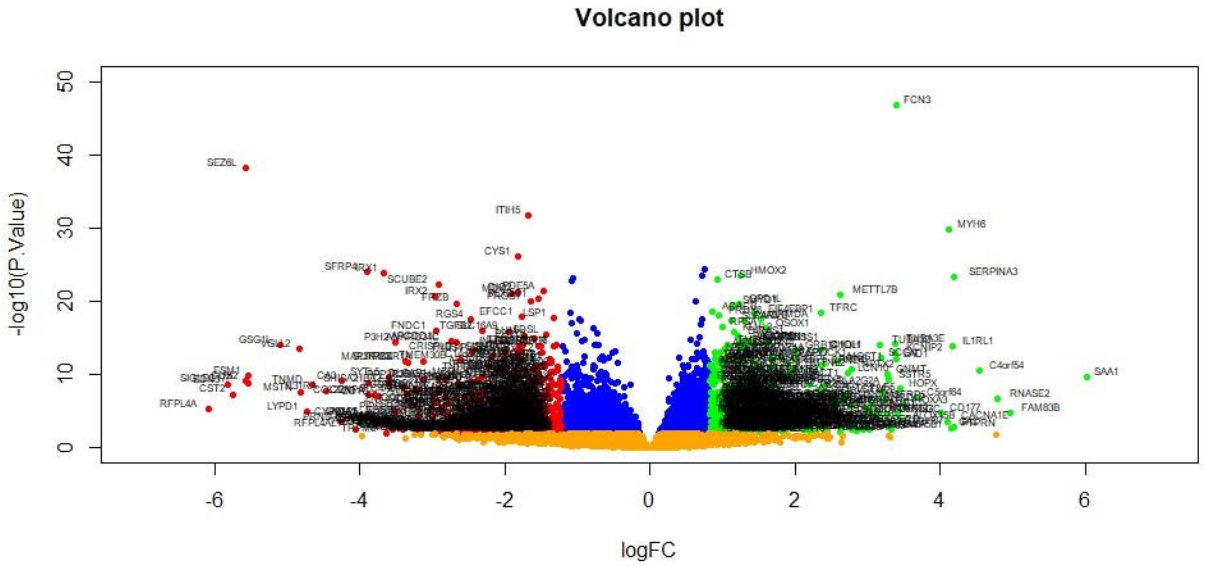


Fig. 2. Volcano plot of differentially expressed genes. Genes with a significant change of more than two-fold were selected. Green dot represented up regulated significant genes and red dot represented down regulated significant genes.

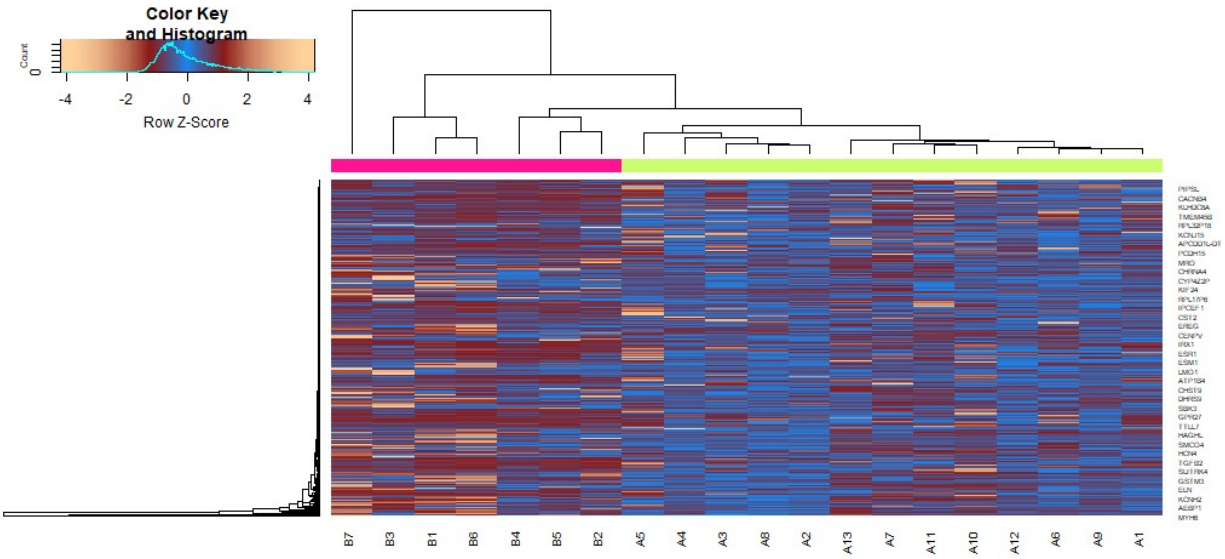
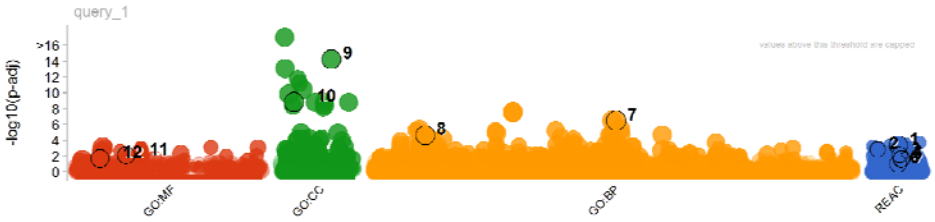


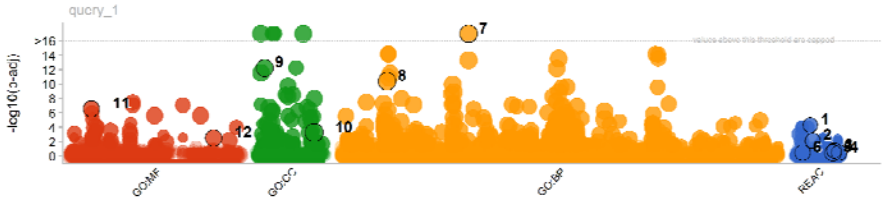
Fig. 3. Heat map of differentially expressed genes. Legend on the top left indicate log fold change of genes. (A1 – A106 = HD samples; B1 – B46 = Normal control samples)



id	source	term_id	term_name	term_size	p_value
1	REAC	REAC:R-HSA-1430728	Metabolism	2100	3.8e-04
2	REAC	REAC:R-HSA-5576891	Cardiac conduction	130	1.5e-03
3	REAC	REAC:R-HSA-397014	Muscle contraction	203	7.1e-03
4	REAC	REAC:R-HSA-6798695	Neutrophil degranulation	476	2.1e-02
5	REAC	REAC:R-HSA-112316	Neuronal System	399	2.5e-02
6	REAC	REAC:R-HSA-556833	Metabolism of lipids	747	9.3e-02
7	GO:BP	GO:0050896	response to stimulus	8999	3.2e-07
8	GO:BP	GO:0007275	multicellular organism development	4727	2.2e-05
9	GO:CC	GO:0071944	cell periphery	6347	5.6e-15
10	GO:CC	GO:0016020	membrane	9953	1.5e-09
11	GO:MF	GO:0016491	oxidoreductase activity	759	7.8e-03
12	GO:MF	GO:0005215	transporter activity	1351	2.1e-02

g:Profiler (biit.cs.ut.ee/gprofiler)

Fig. 4. GO and REACTOME pathway enrichment analysis for up regulated genes. $p < 0.05$. Abbreviations: BP, biological process; CC, cell component; MF, molecular function. GO, Gene Ontology; REAC, REACTOME. The size of the circle represents the number of genes involved, and the abscissa represents the frequency of the genes involved in the term total genes.



id	source	term_id	term_name	term_size	p_value
1	REAC	REAC:R-HSA-1474244	Extracellular matrix organization	298	4.8e-05
2	REAC	REAC:R-HSA-500792	GPCR ligand binding	460	7.3e-03
3	REAC	REAC:R-HSA-9006934	Signaling by Receptor Tyrosine Kinases	516	1.5e-01
4	REAC	REAC:R-HSA-382551	Transport of small molecules	729	3.4e-01
5	REAC	REAC:R-HSA-162582	Signal Transduction	2558	3.4e-01
6	REAC	REAC:R-HSA-1280215	Cytokine Signaling in Immune system	780	3.4e-01
7	GO:BP	GO:0032501	multicellular organismal process	7322	3.3e-19
8	GO:BP	GO:0007154	cell communication	6540	4.0e-11
9	GO:CC	GO:0005886	plasma membrane	5866	5.7e-13
10	GO:CC	GO:0110165	cellular anatomical structure	21620	5.7e-04
11	GO:MF	GO:0005102	signaling receptor binding	1521	2.6e-07
12	GO:MF	GO:0098772	molecular function regulator activity	2195	3.1e-03

g:Profiler (biit.cs.ut.ee/gprofiler)

Fig. 5. GO and REACTOME pathway enrichment analysis for down regulated genes. $p < 0.05$. Abbreviations: BP, biological process; CC, cell component; MF, molecular function. GO, Gene Ontology; REAC, REACTOME. The size of the circle represents the number of genes involved, and the abscissa represents the frequency of the genes involved in the term total genes.

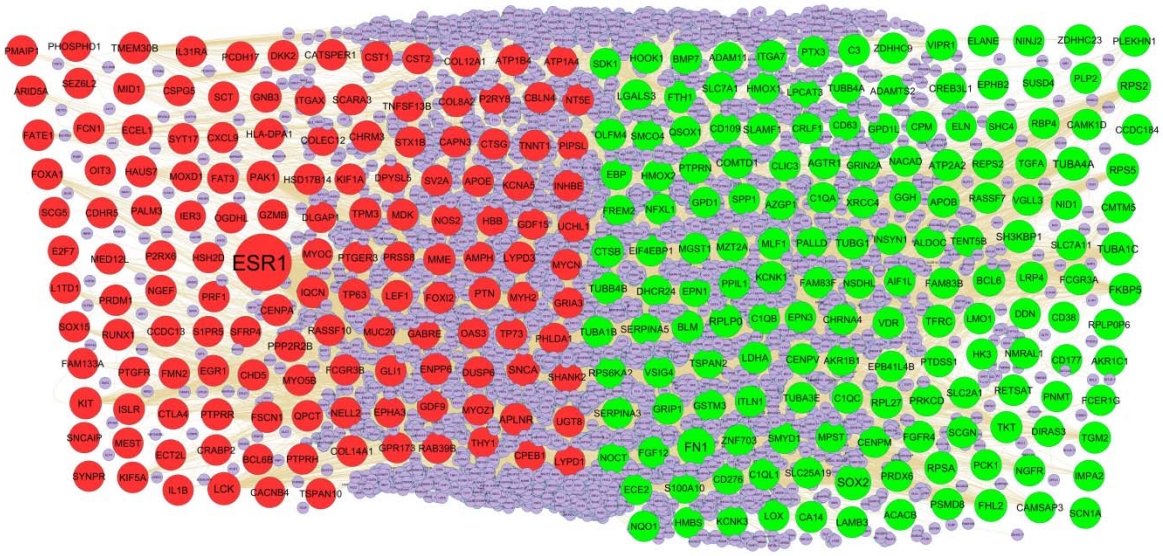


Fig. 6. PPI network of DEGs. Up regulated genes are marked in parrot green; down regulated genes are marked in red.

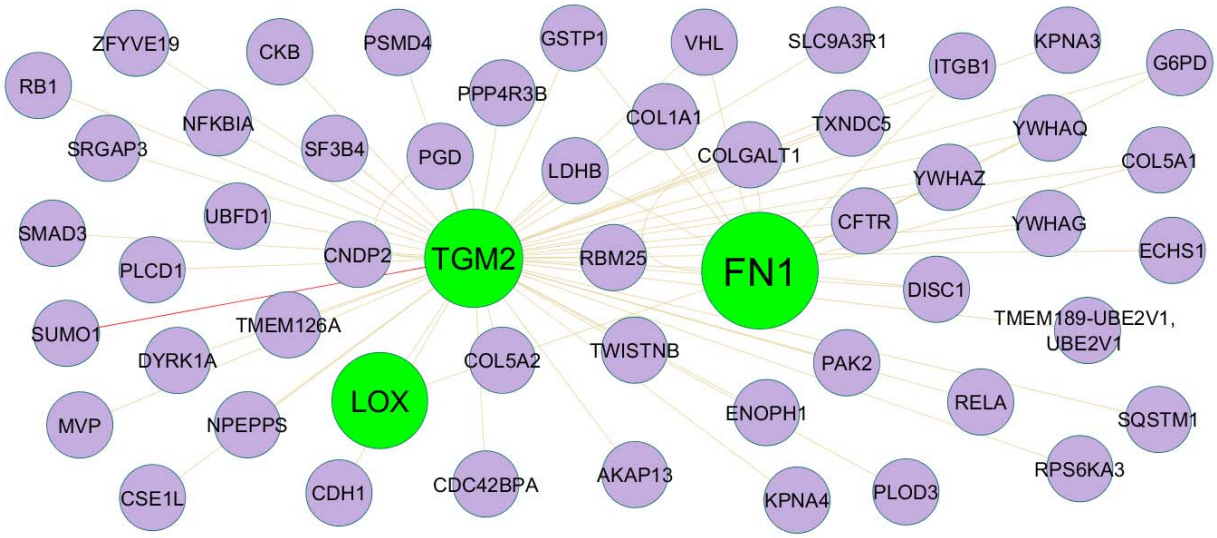
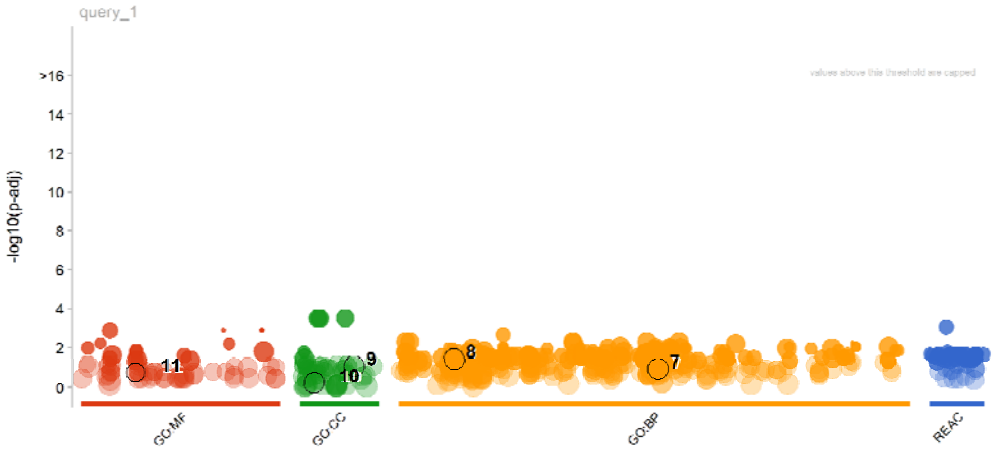


Fig. 7. Modules 1 was isolated form PPI of up regulated genes. Module 1 has 53 nodes and 66 edges for up regulated genes. Up regulated genes are marked in green



id	source	term_id	term_name	term_size	p_value
7	GO:BP	GO:0050896	response to stimulus	8999	1.1e-01
8	GO:BP	GO:0007275	multicellular organism development	4727	3.7e-02
9	GO:CC	GO:0071944	cell periphery	6347	8.1e-02
10	GO:CC	GO:0016020	membrane	9953	5.7e-01
11	GO:MF	GO:0016491	oxidoreductase activity	759	1.8e-01

g:Profiler (biit.cs.ut.ee/gprofiler)

Fig. 8. Enrichment analysis for module 1. The size of the circle represents the number of genes involved, and the abscissa represents the freqency of the genes involved in the term total genes.

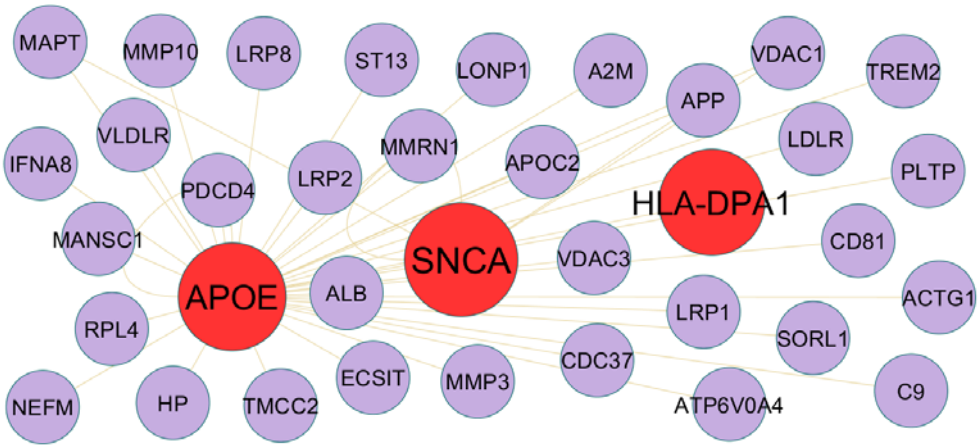
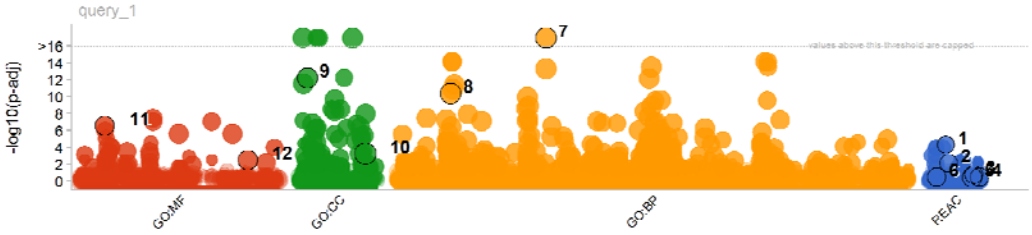


Fig. 9. Module 2 was isolated form PPI of up regulated genes. Module 2 has 36 nodes and 40 edges for down regulated genes. Down regulated genes are marked in red



id	source	term_id	term_name	term_size	p_value
1	REAC	REAC:R-HSA-1474244	Extracellular matrix organization	298	4.8e-05
2	REAC	REAC:R-HSA-500792	GPCR ligand binding	460	7.3e-03
3	REAC	REAC:R-HSA-9006934	Signaling by Receptor Tyrosine Kinases	516	1.5e-01
4	REAC	REAC:R-HSA-382551	Transport of small molecules	729	3.4e-01
5	REAC	REAC:R-HSA-162582	Signal Transduction	2558	3.4e-01
6	REAC	REAC:R-HSA-1280215	Cytokine Signaling in Immune system	780	3.4e-01
7	GO:BP	GO:0032501	multicellular organismal process	7322	3.3e-19
8	GO:BP	GO:0007154	cell communication	6540	4.0e-11
9	GO:CC	GO:0005886	plasma membrane	5866	5.7e-13
10	GO:CC	GO:0110165	cellular anatomical structure	21620	5.7e-04
11	GO:MF	GO:0005102	signaling receptor binding	1521	2.6e-07
12	GO:MF	GO:0098772	molecular function regulator activity	2195	3.1e-03

g:Profiler (biit.cs.ut.ee/gprofiler)

Fig. 10. Enrichment analysis for module 2. The size of the circle represents the number of genes involved, and the abscissa represents the frequency of the genes involved in the term total genes.

Fig. 11. Hub gene - miRNA regulatory network. The light gray color diamond nodes represent the key miRNAs; up regulated genes are marked in green; down regulated genes are marked in red.

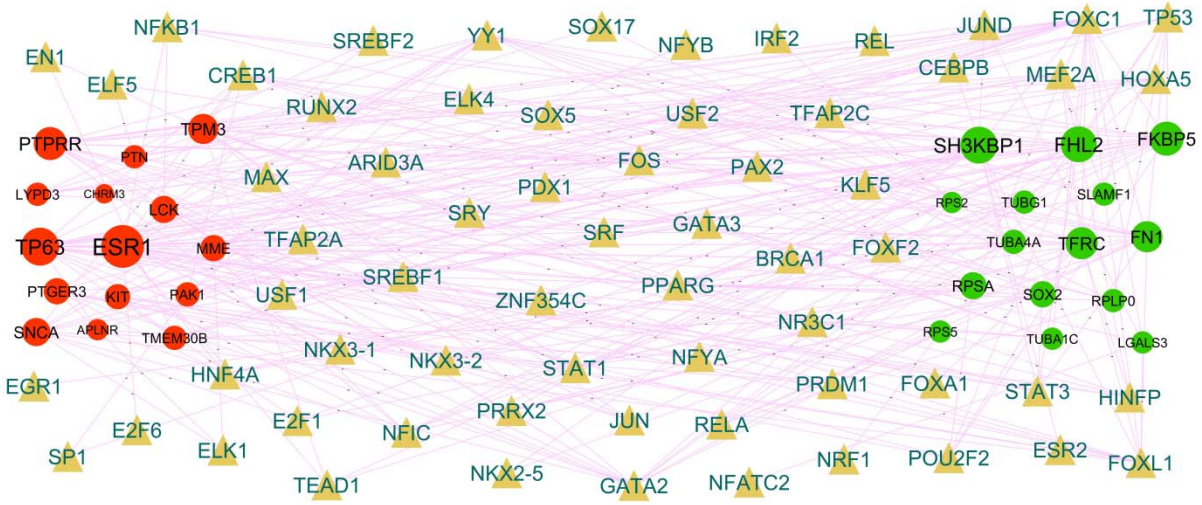
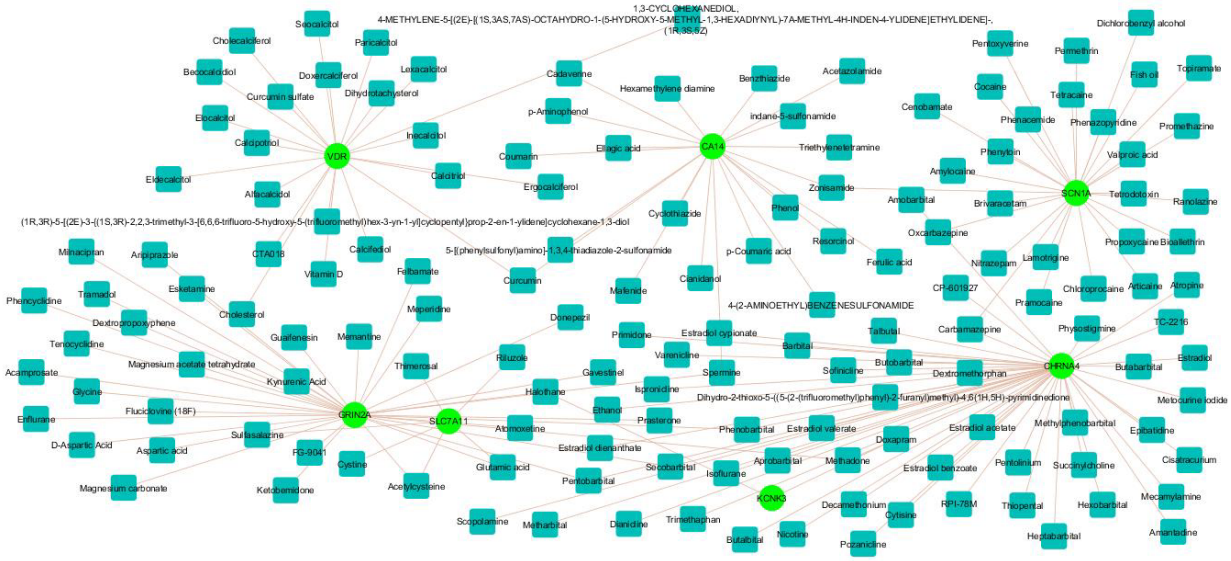
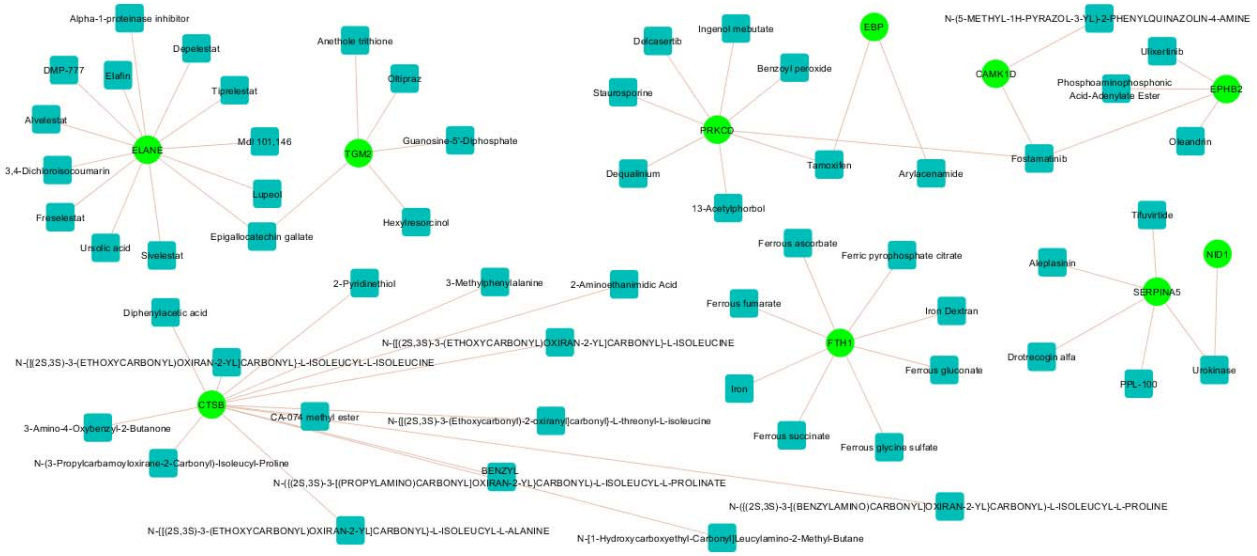


Fig. 12. Hub gene - TF regulatory network. The goldenrod color triangle nodes represent the key TFs; up regulated genes are marked in dark green; down regulated genes are marked in dark red.

A


1,3-CYCLOHEXANEDIOL, 4-METHYLENE-5-[(2E)-[(1S,3AS,7AS)-OCTAHYDRO-1-(5-HYDROXY-5-METHYL-1,3-HEXADIYNYL)-7A-METHYL-4H-INDEN-4-YLIDENE]ETHYLIDENE]-, (1R,3S,6Z)
Seocalcitol
Paricalcitol
Cholecalciferol
Becocalcidiol
Doxercalciferol
Lexacalcitol
Curcumin sulfate
Dihydrotachysterol
Elocalcitol
Calcipotriol
Inecalcitol
VDR
Calcitriol
Eldecalcitol
Alfacalcidol
Ergocalciferol
(1R,3R)-5-[(2E)-3-[(1S,3R)-2,2,3-trimethyl-3-[6,6,6-trifluoro-5-hydroxy-5-(trifluoromethyl)hex-3-yn-1-yl]cyclopentyl]prop-2-en-1-ylidene]cyclohexane-1,3-diol
Calcifediol
Vitamin D
Felbamate
Minaciplan
Aripiprazole
CTA018
Tramadol
Esketamine
Phencyclidine
Cholesterol
Dextropropoxyphene
Meperidine
Tenocyclidine
Guaifenesin
Memantine
Magnesium acetate tetrahydrate
Acamprosate
Kynurenic Acid
Thimerosal
Glycine
Flucticovine (18F)
Riluzole
Eflornine
GRIN2A
SLC7A11
D-Aspartic Acid
Sulfasalazine
Aspartic acid
FG-3041
Cystine
Magnesium carbonate
Ketobemidone
Acetylcysteine
Cadaverine
Hexamethylene diamine
Benzthiazide
Acetazolamide
p-Aminophenol
indane-5-sulfonamide
Coumarin
Ellagic acid
CA14
Triethylenetetramine
Zonisamide
Cyclothiazide
Phenol
5-[(phenylsulfonyl)amino]-1,3,4-thiadiazole-2-sulfonamide
Resorcinol
p-Coumaric acid
Curcumin
Clenbuterol
Ferulic acid
Maleate
4-(2-AMINOETHYL)BENZENESULFONAMIDE
Donepezil
Primidone
Estradiol cypionate
Barbital
Talbutal
Carbamazepine
Vitamicine
Spermine
Butobarbital
Gavestinel
Isopronidine
Dihydro-2-thioxo-5-((5-(2-(trifluoromethyl)phenyl)-2-furanyl)methyl)-4,6(1H,5H)-pyrimidinedione
Halothane
Ethanol
Atomoxetine
Progesterone
Phenobarbital
Estradiol valerate
Estradiol acetate
Doxapram
Estradiol dienanthate
Gluamic acid
Secobarbital
Isoflurane
Aprobarbital
Methadone
Estradiol benzoate
Pentobarbital
KCNK3
Scopolamine
Methabrbital
Dianidine
Trimethaphan
Butalbital
Nicotine
Decamethonium
Cytisine
Pcranicline
RPI-78M
Thiopental
Hexobarbital
Heptabarbital
Mecamylamine
Amantadine
Dichlorobenzyl alcohol
Pentoxyverine
Permethrin
Fish oil
Topiramate
Cocaine
Tetracaine
Cenobamate
Phenacemide
Phenazopyridine
Promethazine
Phenytoin
Valproic acid
Amylocaine
SCN1A
Amobarbital
Brivaracetam
Tetrodotoxin
Ranolazine
Oxcarbazepine
Propoxycaine
Bioallethrin
Nitrazepam
Lamotrigine
CP-601927
Chloroprocaine
Articaine
Atropine
Pramocaine
Physostigmine
TC-2216
Butobarbital
Estradiol
CHRNA4
Dextromethorphan
Meto-curine iodide
Methylphenobarbital
Epitaldine
Succinylcholine
Pentolinium
Cisatracurium
Thiopental
Hexobarbital
Mecamylamine
Heptabarbital
Amantadine

B


Alpha-1-proteinase inhibitor
Depelestat
DMP-777
Elafin
Tipelestat
Alvelestat
ELANE
Mdl 101,146
3,4-Dichloroisocoumarin
Lupeol
Freselestat
Epigallocatechin gallate
Ursolic acid
Sivelestat
Anethole trithione
Ottipraz
TGM2
Guanosine-5'-Diphosphate
Hexylresorcinol
2-Pyridinethiol
3-Methylphenylalanine
2-Aminoethanimidic Acid
Diphenylacetic acid
N-[[(2S,3S)-3-(ETHOXYCARBONYL)OXIRAN-2-YL]CARBONYL]-L-ISOLEUCYL-L-ISOLEUCINE
N-[[(2S,3S)-3-(ETHOXYCARBONYL)OXIRAN-2-YL]CARBONYL]-L-ISOLEUCINE
CTSB
CA-074 methyl ester
N-[[(2S,3S)-3-(Ethoxycarbonyl)-2-oxiranyl]carbonyl]-L-threonyl-L-isoleucine
3-Amino-4-Oxybenzyl-2-Butanone
N-(3-Propylcarbamoyloxirane-2-Carbonyl)-Isoleucyl-Proline
BENZYL
N-[((2S,3S)-3-[(PROPYLAMINO)CARBONYL]OXIRAN-2-YL)CARBONYL]-L-ISOLEUCYL-L-PROLINATE
N-[[(2S,3S)-3-(ETHOXYCARBONYL)OXIRAN-2-YL]CARBONYL]-L-ISOLEUCYL-L-ALANINE
N-[1-Hydroxycarboxyethyl-Carbonyl]Leucylamino-2-Methyl-Butane
Delcasertib
Ingenol mebutate
EBP
Benzoyl peroxide
Staurosporine
PRKCD
Tamoxifen
Arylacetanamide
Delquelimum
13-Acetylphorbol
N-(5-METHYL-1H-PYRAZOL-3-YL)-2-PHENYLQUINAZOLIN-4-AMINE
Ulixertinib
CAMK1D
Phosphoaminophosphonic Acid-Adenylate Ester
EPHB2
Fostamatinib
Oleandrin
Tifuvirtide
Ferrous ascorbate
Ferric pyrophosphate citrate
Aleplasinin
NID1
SERPINA5
Ferrous fumarate
Iron Dextran
FTH1
Ferrous gluconate
Drotrecogin alfa
Urokinase
PPL-100
Iron
Ferrous succinate
Ferrous glycine sulfate
N-[((2S,3S)-3-[(BENZYLAMINO)CARBONYL]OXIRAN-2-YL)CARBONYL]-L-ISOLEUCYL-L-PROLINE

C

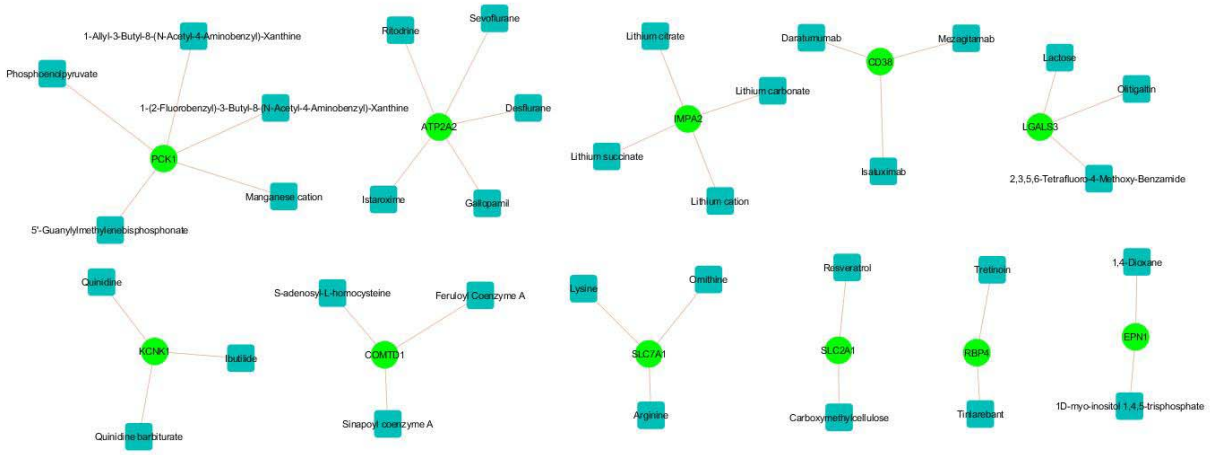
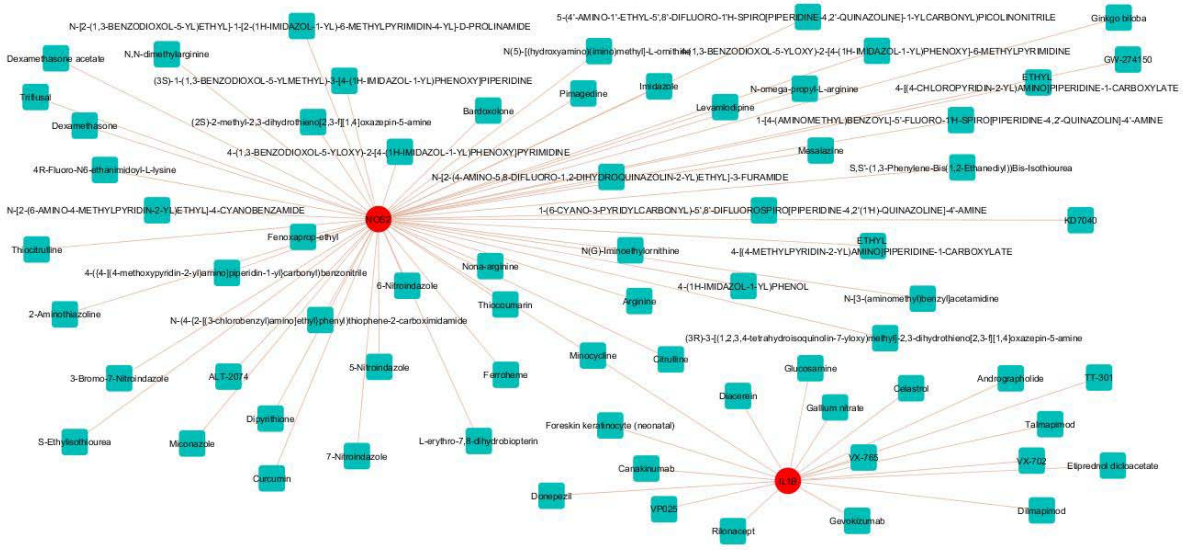
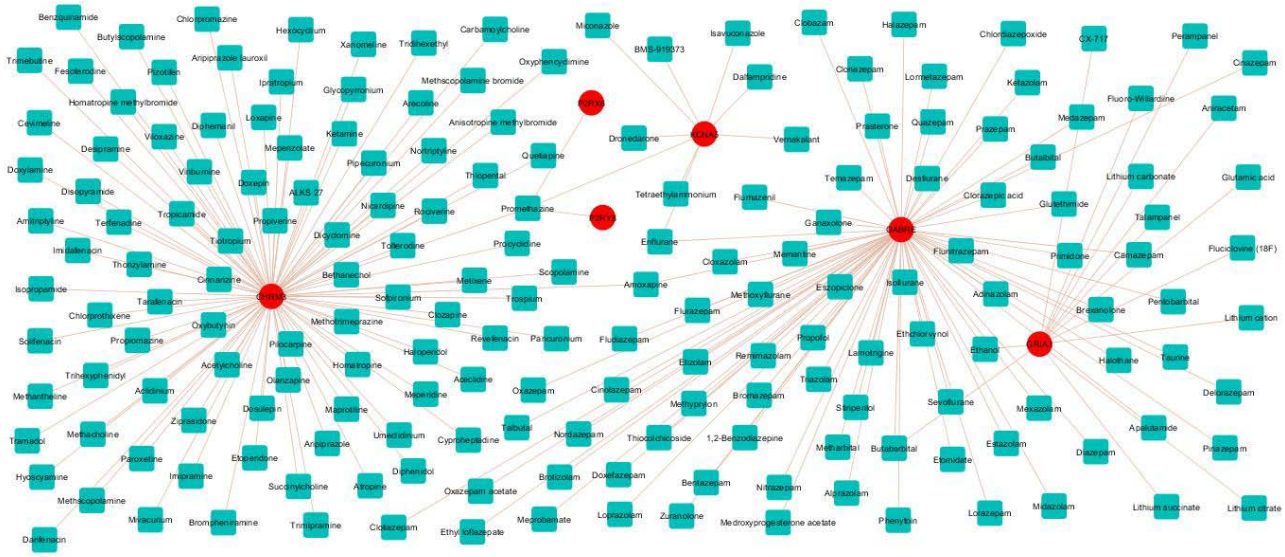


Fig. 13. Three drug-hub gene interaction networks include 1) Network A 2) Network B 3) Network C 4) Network D. The blue rectangle nodes represent the drug molecule; up regulated genes are marked in green

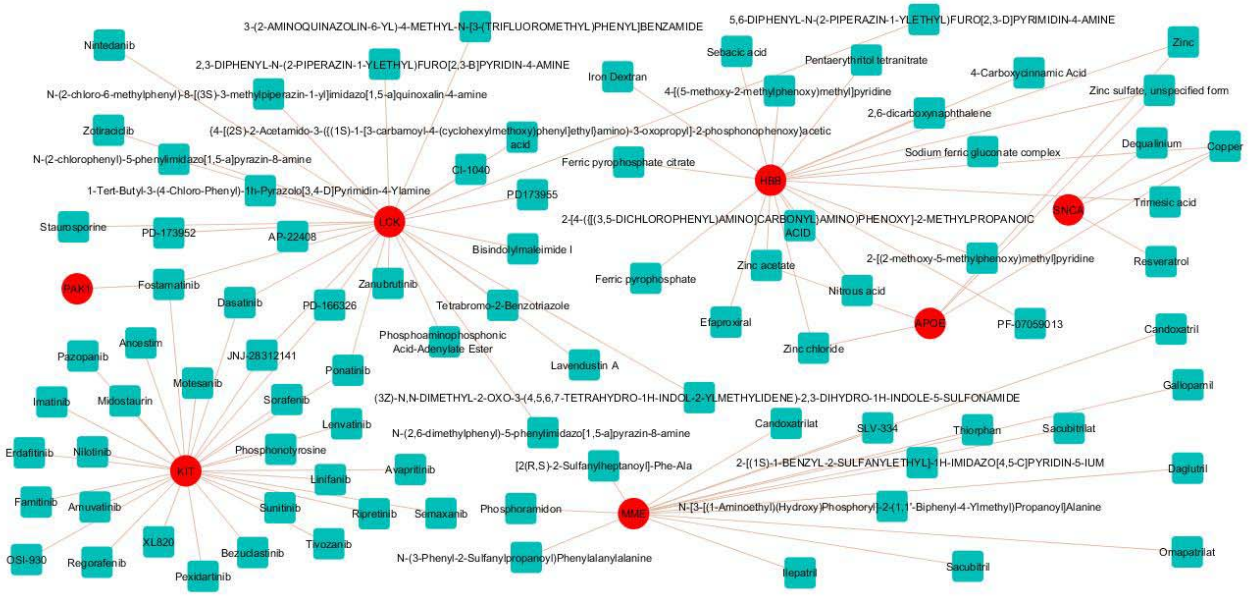
A



B


Benzquinamide
Butylscopolamine
Chlorpromazine
Hexocyclium
Aripiprazole lauroxil
Xanomeline
Tridhexethyl
Carbamylcholine
Miconazole
BMS-919373
Isavuconazole
Clobazam
Halazepam
Chlordiazepoxide
CX-717
Perampanel
Trimebutine
Fesoterodine
Pizotifen
Ipratropium
Glycopyrronium
Methscopolamine bromide
Oxyphencyclimine
Dafampridine
Clonazepam
Lormetazepam
Ketazolam
Cinnazepam
Homatropine methylbromide
Lixapine
Aclidinium
Anisotropine methylbromide
Prasterone
Quazepam
Prazepam
Metazepam
Fluoro-Wilardine
Aniracetam
Cevimeline
Diphenanil
Viloxazine
Mepenzolate
Ketamine
Nortriptyline
Quetiapine
Dronedarone
Venlafaxine
Butalbital
Desipramine
Pipecuronium
Thiopental
Doxylamine
Vinburnine
Doxepin
ALKS 27
Tetraethylammonium
Flumazenil
Temazepam
Desflurane
Clorazepic acid
Glutethimide
Lithium carbonate
Glutamic acid
Disopyramide
Nicardipine
Rivoxetine
Promethazine
Amitriptyline
Terfenadine
Tropicamide
Propiverine
Tiotropium
Dicyclomine
Tolterodine
Propyridine
Ganaxolone
Talampanel
Imidafenacin
Thonzylamine
Cinnarizine
Bethanechol
Methixene
Scopolamine
Etiflurane
Clorazolam
Memantine
Flunitrazepam
Pinacidone
Camazepam
Flucloxine (18F)
Isopropamide
Sopiprium
Trospium
Amoxapine
Etizopicline
Isoflurane
Adinazolam
Chlorprothixene
Tanaflenacin
Oxybutynin
Clozapine
Methotrimeprazine
Flurazepam
Methoxyflurane
Brexanolone
Pentobarbital
Lithium citrate
Sorifenacin
Propiomazine
Pilocarpine
Revefenacin
Pancuronium
Fludiazepam
Propofol
Ethchlorvynol
Lamotrigine
Ethanol
Halothane
Taurine
Trihexyphenidyl
Acetylcholine
Haloperidol
Homatropine
Etizolam
Remimazolam
Acridinium
Olanzapine
Apacidine
Oxazepam
Cinolazepam
Thiazolam
Methantheline
Mepenzolate
Methylprylon
Bromazepam
Stiripentol
Sevoflurane
Mexazolam
Deprazepam
Desipramine
Ziprasidone
Maprotiline
Tiaprofenic acid
Methacholine
Umeclidinium
Cyproheptadine
Tiabutol
Nordiazepam
Thiocolchicoside
1,2-Benzodiazepine
Metharbital
Butabarbital
Estazolam
Apalutamide
Diazepam
Pinazepam
Paroxetine
Etoperidone
Imipramine
Diphenidol
Hyoscyamine
Succinylcholine
Atropine
Bretazolam
Doxefazepam
Bentazepam
Nitrazepam
Alprazolam
Methscopolamine
Oxazepam acetate
Mivacurium
Brompheniramine
Trimipramine
Clotiazepam
Ethylloflazepate
Meprobamate
Lorpiazolam
Zuranolone
Medroxyprogesterone acetate
Phenytoin
Lorazepam
Mitazolam
Lithium succinate
Lithium citrate
Darifenacin
CHRM3
CHRM1
CHRM2
GABRA1
GABRB2
GABRG2
GABRA5
GABRA2
GABRA3
GABRA6
GABRB3
GABRG3
GABRA4
GABRB1
GABRG1
GABRD
GABRE
GABRP
GABRQ
GABRR1
GABRR2
GABRR3

C


3-(2-AMINOQUINAZOLIN-6-YL)-4-METHYL-N-[3-(TRIFLUOROMETHYL)PHENYL]BENZAMIDE
5,6-DIPHENYL-N-(2-PIPERAZIN-1-YLETHYL)FURO[2,3-D]PYRIMIDIN-4-AMINE
Nintedanib
2,3-DIPHENYL-N-(2-PIPERAZIN-1-YLETHYL)FURO[2,3-B]PYRIDIN-4-AMINE
Sebacic acid
Pentaerythritol tetranitrate
Zinc
Iron Dextran
4-Carboxycinnamic Acid
N-(2-chloro-6-methylphenyl)-8-[(3S)-3-methylpiperazin-1-yl]imidazo[1,5-a]quinoxalin-4-amine
4-[(5-methoxy-2-methylphenoxy)methyl]pyridine
Zinc sulfate, unspecified form
2,6-dicarboxynaphthalene
Zotracidib
{4-[(2S)-2-Acetamido-3-(((1S)-1-[3-carbamoyl-4-(cyclohexylmethoxy)phenyl]ethyl)amino)-3-oxopropyl]-2-phosphonophenoxy}acetic acid
Sodium ferric gluconate complex
Dequalinium
Copper
N-(2-chlorophenyl)-5-phenylimidazo[1,5-a]pyrazin-8-amine
CI-1040
Ferric pyrophosphate citrate
HRR
1-Tert-Butyl-3-(4-Chloro-Phenyl)-1H-Pyrazolo[3,4-D]Pyrimidin-4-Ylamine
PD173955
SNCA
Trimesic acid
Staurosporine
PD-173952
AP-22408
LCK
2-[4-([(3,5-DICHLOROPHENYL)AMINO]CARBONYL)AMINO)PHENOXY]-2-METHYLPROPANOIC ACID
Bisindolylmaleimide I
2-[(2-methoxy-5-methylphenoxy)methyl]pyridine
Resveratrol
Zinc acetate
Ferric pyrophosphate
PAK1
Fostamatinib
Zanubrutinib
Nitrous acid
Dasatinib
PD-166326
Tetrabromo-2-Benzotriazole
Efaproxiral
APOB
PF-07059013
Candoxatril
Phosphoaminophosphonic Acid-Adenylate Ester
Zinc chloride
Anoestim
Pazopanib
JNJ-28312141
Lavendustin A
Ponatinib
Motesanib
Gallopamil
Imatinib
Midostaurin
Sorafenib
(3Z)-N,N-DIMETHYL-2-OXO-3-(4,5,6,7-TETRAHYDRO-1H-INDOL-2-YLMETHYLIDENE)-2,3-DIHYDRO-1H-INDOLE-5-SULFONAMIDE
Lenvatinib
Candoxatrilat
SLV-334
Thiorphan
Sacubitrilat
N-(2,6-dimethylphenyl)-5-phenylimidazo[1,5-a]pyrazin-8-amine
Erdafitinib
Nilotinib
Phosphonotyrosine
KIT
[2(R,S)-2-Sulfanylheptanoyl]-Phe-Ala
2-[(1S)-1-BENZYL-2-SULFANYLETHYL]-1H-IMIDAZO[4,5-C]PYRIDIN-5-IUM
Daglutril
Linifanib
Avapritinib
Famitinib
Amuvatinib
Sunitinib
Ripretinib
Semaxanib
Phosphoramidon
MMP2
N-[3-[(1-Aminoethyl)(Hydroxy)Phosphoryl]-2-(1,1'-Biphenyl-4-Ylmethyl)Propanoyl]Alanine
XL820
Tivozanib
Omapatrilat
OSI-930
Regorafenib
Bezuclastinib
N-(3-Phenyl-2-Sulfanylpropanoyl)Phenylalanylalanine
Pexidartinib
Ilepatril
Sacubitril

D

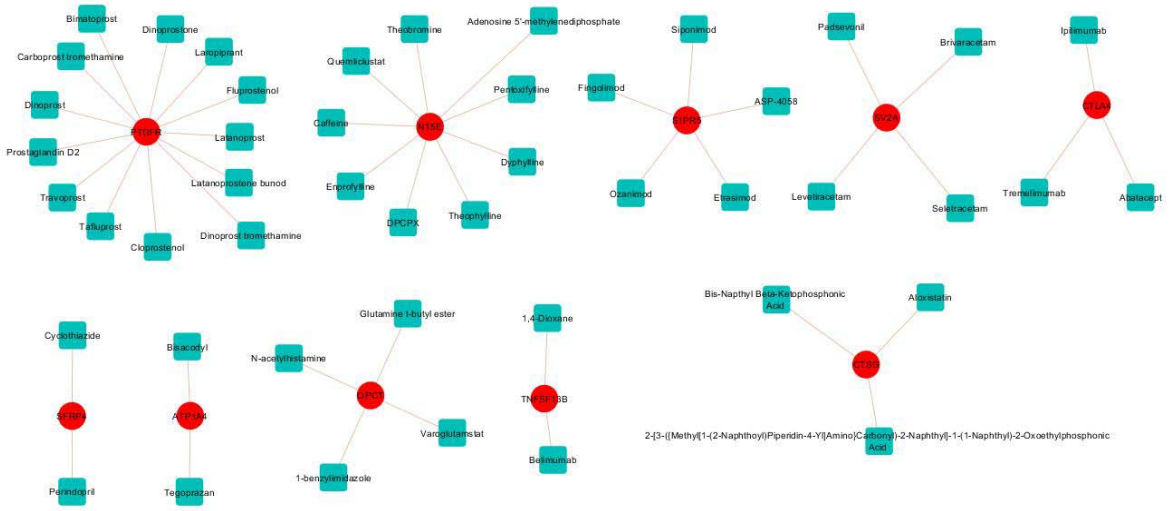


Fig. 14. Four drug-hub gene interaction networks include 1) Network A 2) Network B 3) Network C 4) Network D. The blue rectangle nodes represent the drug molecule; down regulated genes are marked in red

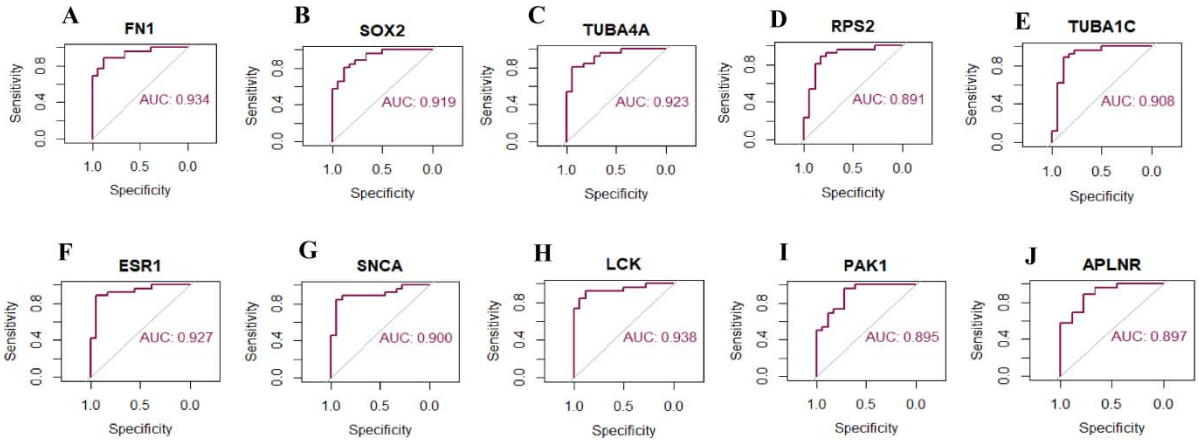


Fig. 15. ROC curve analyses of hub genes. A) FN1 B) SOX2 C) TUBA4A D) RPS2 E) TUBA1C F) ESR1G) SNCA H) LCK I) PAK1 J) APLNR

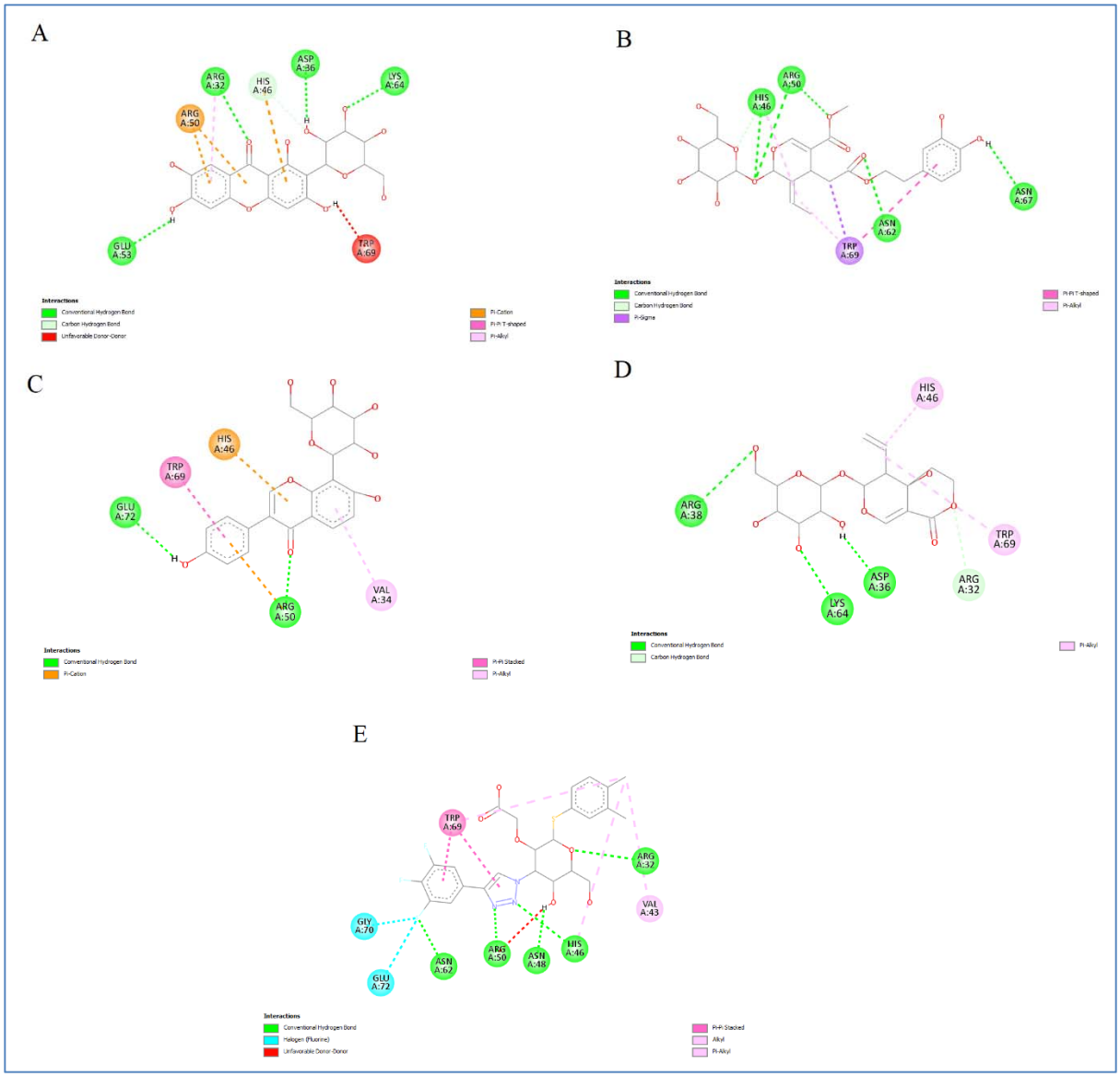


Fig. 16 Two-dimensional interaction maps of docked phytoconstituents within the LGALS3 binding pocket (PDB ID: 8IU1). A. Mangiferin, B. Oleuropein, C. Puerarin, D. Swertiamerin and E. cocrystallised ligand (QB2).

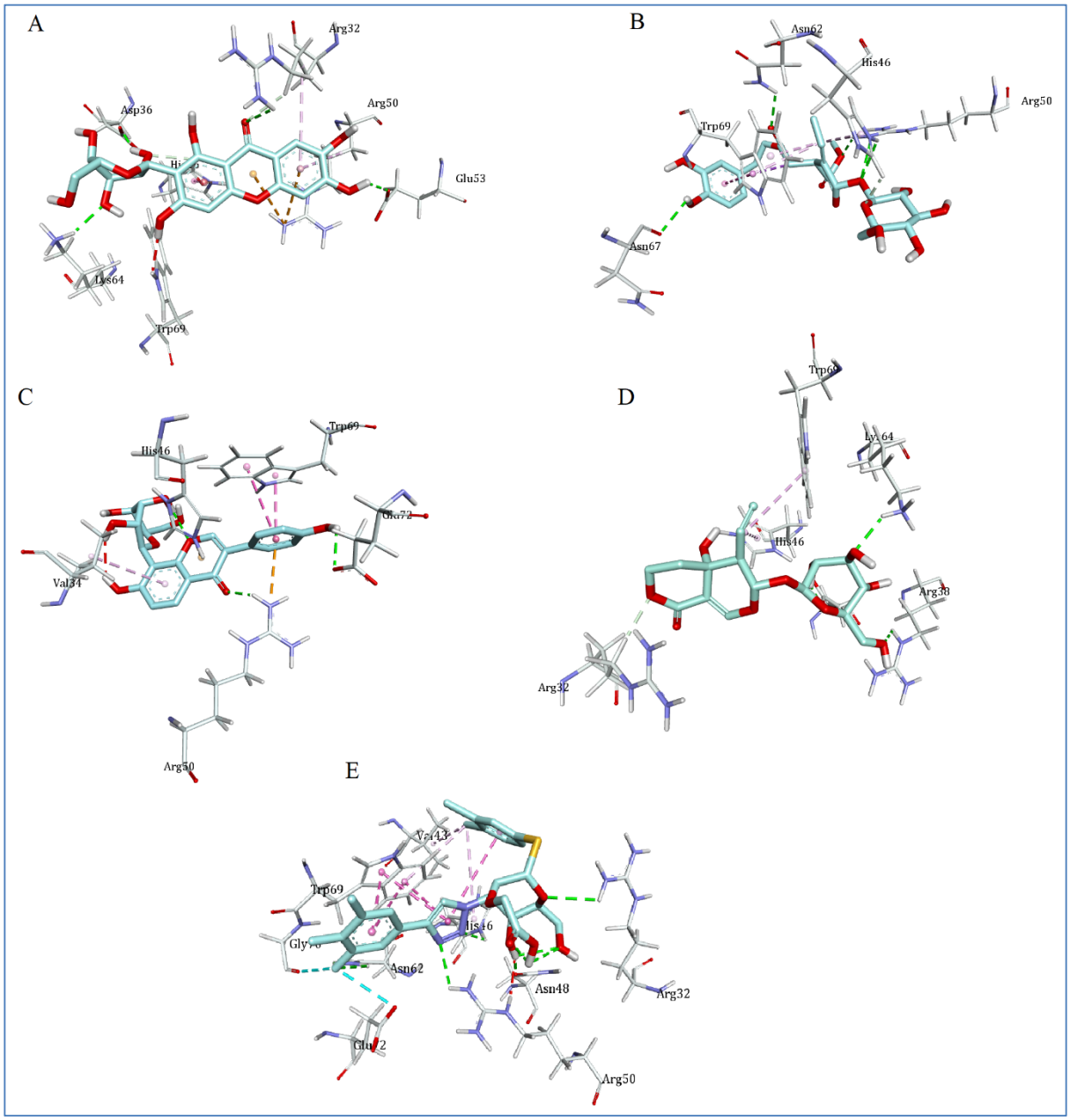


Fig. 17. Three-dimensional binding conformations of screened phytoconstituents at the LGALS3 active site (PDB ID: 8IU1). A. Mangiferin, B. Oleuropein, C. Puerarin, D. Swertiamerin and E. cocrystallised ligand (QB2).

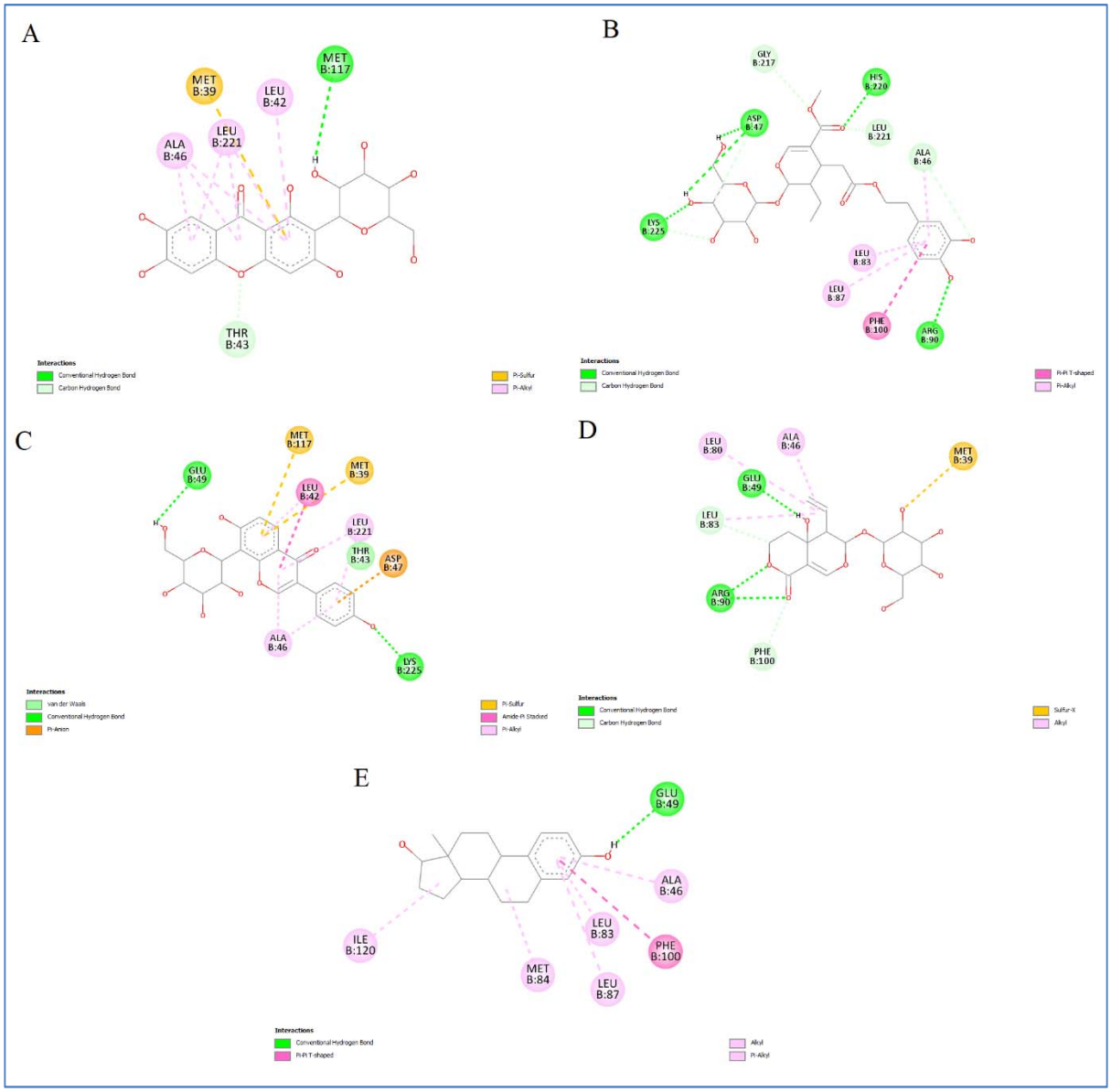


Fig. 18. Two-dimensional interaction maps of docked phytoconstituents within the ESR1 binding pocket (PDB ID: 1A52). A. Mangiferin, B. Oleuropein, C. Puerarin, D. Swertiamerin and E. cocrystallised ligand (Estradiol).

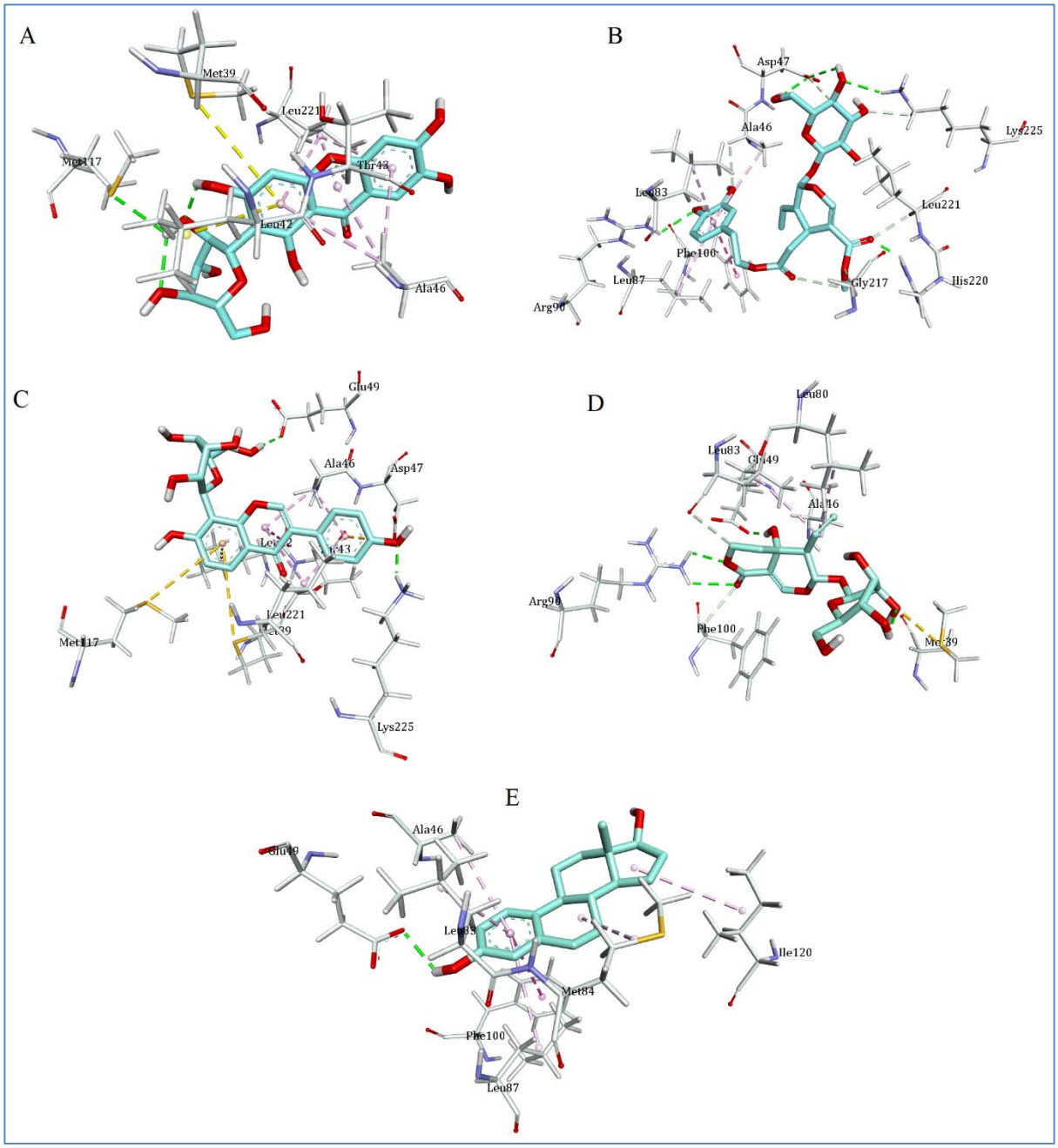


Fig. 19. Three-dimensional binding conformations of screened phytoconstituents at the LGALS3 active site (PDB ID: 1A52). A. Mangiferin, B. Oleuropein, C. Puerarin, D. Swertiamerin and E. cocrystallised ligand (Estradiol).