

Table S2. Pathways enriched by synthetic lethal partners of DDR genes

Pathway id	Pathway	DAISY	MDSLP-CR	MDSLP-shf	CGI
KEGG:00310	Lysine degradation	0.046			
KEGG:00970	Aminoacyl-tRNA biosynthesis		0.001		
KEGG:01522	Endocrine resistance	0.014			
KEGG:03010	Ribosome		0.000		
KEGG:03013	RNA transport	0.001			
KEGG:03015	mRNA surveillance pathway	0.000			
KEGG:03022	Basal transcription factors	0.038			
KEGG:03040	Spliceosome	0.000		0.000	0.001
KEGG:04010	MAPK signaling pathway				0.045
KEGG:04068	FoxO signaling pathway	0.020			
KEGG:04110	Cell cycle	0.000		0.012	
KEGG:04114	Oocyte meiosis	0.005			
KEGG:04141	Protein processing in endoplasmic reticulum				0.002
KEGG:04144	Endocytosis				0.000
KEGG:04213	Longevity regulating pathway - multiple species				0.000
KEGG:04218	Cellular senescence	0.000			
KEGG:04612	Antigen processing and presentation				0.000
KEGG:04714	Thermogenesis		0.003		
KEGG:04914	Progesterone-mediated oocyte maturation	0.000			
KEGG:04915	Estrogen signaling pathway				0.001
KEGG:04932	Non-alcoholic fatty liver disease		0.009		
KEGG:05020	Prion disease				0.030
KEGG:05134	Legionellosis				0.000
KEGG:05145	Toxoplasmosis				0.000
KEGG:05161	Hepatitis B	0.000			
KEGG:05162	Measles				0.001
KEGG:05166	Human T-cell leukemia virus 1 infection	0.000		0.002	
KEGG:05167	Kaposi sarcoma-associated herpesvirus infection	0.024			
KEGG:05169	Epstein-Barr virus infection	0.002			
KEGG:05170	Human immunodeficiency virus 1 infection	0.013			
KEGG:05203	Viral carcinogenesis	0.018			
KEGG:05211	Renal cell carcinoma	0.005			
KEGG:05215	Prostate cancer	0.000			
KEGG:05220	Chronic myeloid leukemia	0.004			
KEGG:05222	Small cell lung cancer	0.035			
KEGG:05223	Non-small cell lung cancer	0.040			
KEGG:05417	Lipid and atherosclerosis				0.008
REAC:R-HSA	E2F-enabled inhibition of pre-replication complex f	0.048			
REAC:R-HSA	E2F mediated regulation of DNA replication	0.002			
REAC:R-HSA	Transcription of E2F targets under negative contro	0.046			
REAC:R-HSA	Transcription of E2F targets under negative contro	0.012			
REAC:R-HSA	Amplification of signal from the kinetochores	0.000			
REAC:R-HSA	Amplification of signal from unattached kinetocho	0.000			
REAC:R-HSA	The citric acid (TCA) cycle and respiratory electron transport		0.000		

REAC:R-HSA	G0 and Early G1	0.000			
REAC:R-HSA	Polo-like kinase mediated events	0.000			
REAC:R-HSA	Transport of Mature mRNA derived from an Intron	0.000			
REAC:R-HSA	Respiratory electron transport, ATP synthesis by chemiosmotic		0.001		
REAC:R-HSA	Cell Cycle	0.000			0.002
REAC:R-HSA	APC/C-mediated degradation of cell cycle proteins	0.012			
REAC:R-HSA	Activation of ATR in response to replication stress	0.001			
REAC:R-HSA	Unwinding of DNA	0.001			
REAC:R-HSA	RHO GTPase Effectors	0.003			
REAC:R-HSA	Generic Transcription Pathway	0.000			
REAC:R-HSA	Separation of Sister Chromatids	0.000			
REAC:R-HSA	Resolution of Sister Chromatid Cohesion	0.000			
REAC:R-HSA	Mitotic Metaphase and Anaphase	0.000			
REAC:R-HSA	SUMOylation	0.002			
REAC:R-HSA	SUMO E3 ligases SUMOylate target proteins	0.003			
REAC:R-HSA	PKMTs methylate histone lysines	0.050			
REAC:R-HSA	HDMs demethylate histones				0.000
REAC:R-HSA	Chromatin modifying enzymes	0.000			0.003
REAC:R-HSA	Regulation of HSF1-mediated heat shock response				0.000
REAC:R-HSA	HSP90 chaperone cycle for steroid hormone receptors (SHR				0.001
REAC:R-HSA	Cellular response to heat stress				0.000
REAC:R-HSA	Attenuation phase				0.000
REAC:R-HSA	HSF1-dependent transactivation				0.000
REAC:R-HSA	Transcriptional Regulation by TP53	0.000	0.001		
REAC:R-HSA	tRNA Aminoacylation		0.008		
REAC:R-HSA	Mitochondrial tRNA aminoacylation		0.000		
REAC:R-HSA	Mitotic G2-G2/M phases	0.000			
REAC:R-HSA	Regulation of mitotic cell cycle	0.012			
REAC:R-HSA	Mitotic G1 phase and G1/S transition	0.000			
REAC:R-HSA	Chromatin organization	0.000			0.003
REAC:R-HSA	Mitochondrial translation initiation		0.000		
REAC:R-HSA	Mitochondrial translation		0.000		
REAC:R-HSA	Mitochondrial translation elongation		0.000		
REAC:R-HSA	Mitochondrial translation termination		0.000		
REAC:R-HSA	TP53 Regulates Metabolic Genes		0.000		
REAC:R-HSA	Regulation of TP53 Activity	0.000			
REAC:R-HSA	RHO GTPases Activate Formins	0.000			
REAC:R-HSA	HDR through Single Strand Annealing (SSA			0.045	
REAC:R-HSA	Respiratory electron transport		0.000		
REAC:R-HSA	TP53 Regulates Transcription of Cell Cycle Genes	0.000			
REAC:R-HSA	Regulation of TP53 Activity through Acetylation	0.029			
REAC:R-HSA	PTEN Regulation	0.006			
REAC:R-HSA	CDC6 association with the ORC:origin complex	0.000			
REAC:R-HSA	Assembly of the pre-replicative complex	0.000			
REAC:R-HSA	Mitotic Prometaphase	0.000			

REAC:R-HSA	Mitotic Anaphase	0.000			
REAC:R-HSA	Mitotic Telophase/Cytokinesis	0.002			
REAC:R-HSA	M Phase	0.000			
REAC:R-HSA	Orc1 removal from chromatin	0.001			
REAC:R-HSA	Activation of the pre-replicative complex	0.000			
REAC:R-HSA	DNA Replication Pre-Initiation	0.000			
REAC:R-HSA	Switching of origins to a post-replicative state	0.000			
REAC:R-HSA	DNA strand elongation	0.000			
REAC:R-HSA	Cyclin E associated events during G1/S transition	0.021			
REAC:R-HSA	G1/S-Specific Transcription	0.000			
REAC:R-HSA	G1/S Transition	0.000			
REAC:R-HSA	Synthesis of DNA	0.000			
REAC:R-HSA	S Phase	0.000			
REAC:R-HSA	G2/M Transition	0.000			
REAC:R-HSA	Cell Cycle, Mitotic	0.000			
REAC:R-HSA	DNA Replication	0.000			
REAC:R-HSA	G2/M Checkpoints				0.014
REAC:R-HSA	Mitotic Spindle Checkpoint	0.000			
REAC:R-HSA	Cell Cycle Checkpoints	0.000		0.034	0.037
REAC:R-HSA	Cyclin A:Cdk2-associated events at S phase entry	0.029			
REAC:R-HSA	mRNA Splicing - Major Pathway	0.000		0.000	
REAC:R-HSA	mRNA Splicing - Minor Pathway			0.001	
REAC:R-HSA	mRNA Splicing	0.000		0.000	
REAC:R-HSA	mRNA 3'-end processing	0.000			
REAC:R-HSA	Transport of Mature Transcript to Cytoplasm	0.000			
REAC:R-HSA	Processing of Capped Intron-Containing Pre-mRN	0.000		0.000	
REAC:R-HSA	Translation		0.000		
REAC:R-HSA	RNA Polymerase II Transcription Termination	0.000			
REAC:R-HSA	RNA Polymerase II Transcription	0.000			
REAC:R-HSA	Chromosome Maintenance	0.007			
REAC:R-HSA	Gene expression (Transcription	0.000			
REAC:R-HSA	ESR-mediated signaling	0.037			
REAC:R-HSA	Metabolism of RNA	0.000		0.000	
REAC:R-HSA	EML4 and NUDC in mitotic spindle formation	0.000			
REAC:R-HSA	Aberrant regulation of mitotic G1/S transition in car	0.020			
REAC:R-HSA	Defective binding of RB1 mutants to E2F1,(E2F2,	0.020			
REAC:R-HSA	Diseases of mitotic cell cycle	0.039			
REAC:R-HSA	Aberrant regulation of mitotic cell cycle due to RB1	0.024			