Table-1: Published dopaminergic neuronal models.

S.No.	Model	Ion channels	Pumps and exchangers (Ionic balance)	Synaptic currents	Reference(s)
1.	Two-compartment – soma and dendrite	Soma: $I_{K,DR}$, I_{Na} Dendrite: I_L	Dendrite: I_{NaKP} (sodium)	Dendrite: I_{NMDA}	(Li et al., 1996)
2.	Single-compartment soma with calcium buffering (CBP)	Soma: $I_{Ca,T}$, $I_{Ca,L}$, $I_{Ca,N}$, $I_{Ca,HVA}$, $I_{K,Ca}$, $I_{K,DR}$, $I_{K,A}$, I_H, I_B	Soma: I_{NaKP}, I_{CaP}, I_{NaCaX} (calcium)	-	(Amini et al., 1999)
3.	Three compartments – Soma, proximal and distal dendrites	$I_{K,DR}$, I_L	I_{NaKP} (sodium in all)	Distal dendrite: I_{NMDA}, I_{AMPA}, I_{GABAA}	(Canavier, 1999)
4.	(Amini et al., 1999) model with calcium diffusion (also abstract version)	Soma: I_{Ca}, $I_{K,Ca}$, I_K, I_L	Soma: (calcium)	-	(Medvedev et al., 2003; Medvedev and Kopell, 2001; Wilson and Callaway, 2000)
5.	Two (Canavier, 1999) models coupled at distal dendrites	I_{Na}, $I_{K,DR}$, I_L, $I_{K,A}$	I_{NaKP}	Distal dendrite: I_{NMDA}	(Komendantov and Canavier, 2002)
6.	Soma with four identical branched dendrites with a single proximal and two distal branches	Soma: I_{Na}, $I_{K,A}$, $I_{K,DR}$, I_L, $I_{K,Ca}$, $I_{Ca,T}$, $I_{Ca,L}$, $I_{Ca,N}$ Dendrite: I_{Na}, $I_{K,A}$, $I_{K,DR}$, I_L	Soma: I_{NaKP}, I_{CaP} (calcium) Dendrite: I_{NaKP}	Soma: I_{GABAA} Dendrite: I_{NMDA}, I_{GABAA}	(Komendantov et al., 2004)
7.	Modified (Komendantov	Soma: I_{Na}, $I_{K,A}$, $I_{K,DR}$,	Soma: I_{NaKP}, I_{CaP}	Soma: I_{GABAA}	(Canavier and Landry, 2006)

	et al., 2004) model with I_{AMPA} synaptic current in dendrite	$I_{K,Ca}$, I_L, $I_{Ca,T}$, $I_{Ca,L}$, $I_{Ca,N}$ Dendrite: I_{Na}, $I_{K,A}$, $I_{K,DR}$, I_L	(calcium) Dendrite: I_{NaKP} (sodium)	Dendrite: I_{NMDA}, I_{AMPA}, I_{GABAA}	
8.	Modified (Wilson and Callaway, 2000) model with I_{AMPA} and I_{NMDA} synaptic currents along with spiking generating ion channels	Soma:I_{Ca}, $I_{K,Ca}$, I_K, I_L, I_{Na}, $I_{K,DR}$	Soma: (calcium)	Soma: I_{NMDA}, I_{AMPA}	(Kuznetsov et al., 2006)
9.	Single-compartment soma	Soma: $I_{Ca,L}$, $I_{Ca,B}$, $I_{K,ERG}$, $I_{K,Ca}$, I_H, I_L	Soma: I_{CaP} (calcium)	-	(Canavier et al., 2007)
10.	Modified (Komendantov et al., 2004) model with pacemaking mechanism throughout soma and dendrites	Soma: I_{Na}, I_A, $I_{K,DR}$, I_L, $I_{K,Ca}$, $I_{Ca,L}$ Dendrite: I_{Na}, I_A, $I_{K,DR}$, I_L, $I_{K,Ca}$, $I_{Ca,L}$	Soma: (calcium)	-	(Kuznetsova et al., 2010; Yu et al., 2014)
11.	Single-compartment soma	Soma: $I_{Ca,L}$, I_{Na}, $I_{K,DR}$, $I_{K,Ca}$, I_L	Soma: I_{CaP} (calcium)	-	(Drion et al., 2011)
12.	Single-compartment soma which is combines conductance mechanisms from (Amini et al., 1999) and (Kuznetsov et al., 2006)	Soma: $I_{Ca,L}$, I_{Na}, $I_{K,DR}$, $I_{K,Ca}$, I_L, I_K	Soma: I_{CaP} (calcium)	Soma: I_{NMDA}, I_{GABAA}	(Oster and Gutkin, 2011)
13.	Single-compartment	Soma: $I_{Ca,L}$, I_{Na}, $I_{Na,HCN}$,	Soma: I_{NaKP}, I_{CaP}, I_{NaCaX}	-	(Francis et al., 2013)

	soma with calcium buffering (CBP)	$I_{L,Na}$, $I_{K,DR}$, $I_{L,IR}$, $I_{K,Ca}$	(calcium, sodium, potassium, calbindin, calmodulin)		
14.	Modified (Kuznetsov et al., 2006) model with altered NMDA and $I_{K,ERG}$ along with full morphology of dendrite (reduced model)	Soma: $I_{Ca,L}$, I_{Na}, $I_{K,DR}$, $I_{K,Ca}$, I_L, $I_{K,ERG}$	Soma: I_{CaP} (calcium)	Soma: I_{NMDA}, I_{AMPA}	(Ha and Kuznetsov, 2013; Zakharov et al., 2016)
15.	Single-compartment soma	Soma: I_{Na}, $I_{K,DR}$, I_L,	-	Soma: I_{NMDA}, I_{AMPA}	(Qian et al., 2014)
15.	Single-compartment soma with full morphology of dendrite	Soma: I_{Ca}, I_{Na}, $I_{K,DR}$, $I_{K,Ca}$, $I_{L,Ca}$, $I_{K,ERG}$, I_H, I_L	Soma: I_{CaP} (calcium)	-	(Yu and Canavier, 2015)
16.	Simple (spiking) dopaminergic neuronal model	Izhikevich (point neuron) – two variable neuronal model	-	-	(Cullen and Wong-Lin, 2015; Muddapu et al., 2019)
17.	Modified (Ha and Kuznetsov, 2013)	Soma: I_{Ca}, I_{Na}, $I_{Na,S}$, $I_{K,DR}$, $I_{K,Ca}$, I_L, I_K, I_H	Soma: I_{CaP} (calcium)	Soma: I_{NMDA}, I_{AMPA}, I_{GABAA}	(Morozova et al., 2016b, 2016a)
18.	Single-compartment soma with calcium buffering (CBP) along $I_{K,ATP}$ mediated bursting	Soma: $I_{Ca,L}$, I_{Na}, $I_{K,DR}$, $I_{K,ATP}$, $I_{L,Ca}$, I_L	Soma: I_{CaP} (calcium)	Soma: I_{NMDA}	(Knowlton et al., 2018)

19.	Modified (Kuznetsova et al., 2010) model	$I_{Ca,L}$, $I_{Ca,T}$, I_{Na}, $I_{Na,HCN}$, $I_{K,DR}$, $I_{K,B}$, $I_{K,Ca}$, $I_{K,A}$, $I_{K,ERG}$, I_L	Soma: I_{CaP} (calcium)	-	(Rumbell and Kozloski, 2019)

$I_{Ca,T}$ – T-type calcium current; $I_{Ca,L}$ – L-type calcium current; $I_{Ca,N}$ – N-type calcium current; $I_{Ca,HVA}$ – residual high-voltage activated calcium current; I_{Ca} – calcium current; $I_{K,Ca}$ – calcium-activated (small conductance) potassium current; $I_{K,DR}$ – delayed rectifier potassium current; $I_{K,A}$ –transient outward (4-aminopyridine-sensitive) potassium current; I_H – hyperpolarization-activated cation current; I_B – background current (sodium, potassium, calcium); I_{NaKP} – sodium-potassium pump; I_{CaP} – calcium pump; I_{NaCaX} – sodium-calcium exchanger; I_L – leaky current; I_{Na} – fast spiking (tetrodotoxin-sensitive) sodium current; I_{NMDA} – N-methyl-D-aspartic acid (NMDA) current; I_{AMPA} – alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) current; I_{GABAA} – gamma-aminobutyric acid A-class (GABAA) current; $I_{K,ERG}$ – ERG (ether-a-go-go-related gene) potassium current; $I_{Ca,B}$ – background calcium leak current; $I_{L,Ca}$ – leaky calcium current; CBP – calcium-binding proteins; $I_{L,Na}$ – leaky sodium current; $I_{K,IR}$ – inward rectifying potassium current; $I_{Na,HCN}$ – hyperpolarization-activated cyclic nucleotide (HCN) sodium current; $I_{Na,S}$ – subthreshold sodium current; I_K – intrinsic potassium current; $I_{K,ATP}$ – ATP-sensitive potassium current; $I_{K,B}$ – large conductance potassium current;

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