SUPPLEMENT

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Model reactions (values for D1/D2/D3 where applicable)

Name	Reaction	Flux	Parameters	Reference
SERCA2b	$Ca^{2+}_{cyt} \rightarrow Ca^{2+}_{dts}$	$\frac{V[Ca^{2+}_{cyt}]^{1.7}}{K^{1.7}+[Ca^{2+}_{cyt}]^{1.7}}$,	$V = k[SERCA2]\mu M \cdot s^{-1}$, k = 25/35/21, $K = 0.27\mu M$	[6]
SERCA3	$Ca^{2+}_{cyt} \rightarrow Ca^{2+}_{dts}$	$\frac{V[Ca^{2+}_{cyt}]^{1.8}}{K^{1.8}+[Ca^{2+}_{cyt}]^{1.8}}$,	$V = k[SERCA3]\mu M \cdot s^{-1}$, k = 36/36/39, $K = 1.1\mu M$	[6]
Leak	$Ca^{2+}_{dts} \leftrightarrow Ca^{2+}_{cyt}$	$\gamma ln\frac{[Ca^{2+}_{dts}]}{[Ca^{2+}_{cyt}]}$,	$\gamma = 21\mu M \cdot s^{-1}$	[6]
IP3R	$Ca^{2+}_{dts} \rightarrow Ca^{2+}_{cyt}$	$\gamma P_0[IP3R] ln\frac{[Ca^{2+}_{dts}]}{[Ca^{2+}_{cyt}]}$, , $P_0 = \left(0.9\frac{[IP3Ra]}{[IP3R]} + 0.1\frac{[IP3Ro]}{[IP3R]}\right)^4$	$\gamma = (13/13/12.5)\cdot 10^4 s^{-1}$	[6]
IP3R	$IP3Ra \rightarrow IP3Ro + Ca^{2+}_{cyt}$	$\frac{k_1 L_1[IP3Ra]}{L_1+[Ca^{2+}_{cyt}]}$,	$k_1 = 11.94s^{-1}$	[6]
IP3R	$IP3Ro + Ca^{2+}_{cyt} \rightarrow IP3Ra$	$\frac{(k_5 L_5+K_5)[Ca^{2+}_{cyt}][IP3Ro]}{L_5+[Ca^{2+}_{cyt}]}$,	$k_5 = 4(\mu M \cdot s)^{-1}$, $K_5 = 4707s^{-1}$	[6]
IP3R	$IP3Ro \rightarrow IP3Rn + IP3$	$\frac{(K_3+k_{m3}[Ca^{2+}_{cyt}])L_5[IP3Ro]}{L_5+[Ca^{2+}_{cyt}]}$,	$k_{m3} = 2.5(\mu M \cdot s)^{-1}$, $K_3 = 1.4s^{-1}$	[6]
IP3R	$IP3Rn + IP3 \rightarrow IP3Ro$	$\frac{(k_3 L_3+k_{c3}[Ca^{2+}_{cyt}])[IP3][IP3Rn]}{L_3+[Ca^{2+}_{cyt}]\left(1+\frac{L_3}{L_1}\right)}$,	$k_3 = 37.4(\mu M \cdot s)^{-1}$, $k_{c3} = 1.7(\mu M \cdot s)^{-1}$	[6]
IP3R	$IP3Ro \leftrightarrow IP3Rs$	$\frac{k_4 L_5[IP3Ro]}{L_5+[Ca^{2+}_{cyt}]} - k_{m4}[IP3Rs]$,	$k_4 = 0.11s^{-1}$, $k_{m4} = 29.8s^{-1}$	[6]
IP3R	$IP3Rn + Ca^{2+}_{cyt} \leftrightarrow IP3Ri1$	$\frac{k_2[Ca^{2+}_{cyt}][IP3Rn]}{L_1+[Ca^{2+}_{cyt}]\left(1+\frac{L_1}{L_3}\right)} - k_{m2}[IP3Ri1]$,	$k_2 = 1.78s^{-1}$, $k_{m2} = 0.84s^{-1}$	[6]
IP3R	$IP3Ra + Ca^{2+}_{cyt} \leftrightarrow IP3Ri2$	$\frac{k_2[Ca^{2+}_{cyt}][IP3Ra]}{L_1+[Ca^{2+}_{cyt}]} - k_{m2}[IP3Ri2]$,		[6]
NCLX	$Ca^{2+}_{mit} \rightarrow Ca^{2+}_{cyt}$	$\gamma\left(1+\frac{K}{[Ca^{2+}_{mit}]}\right)^{-1} e^{\frac{F(\Delta\psi-\Delta\psi*)}{2RT}}$	$\gamma = 1.84\cdot 10^3 \mu M \cdot s^{-1}$, $K = 3\,\mu M$, $\Delta\psi^* = 0.091V$	[6]
UNI	$Ca^{2+}_{cyt} \rightarrow Ca^{2+}_{mit}$	$\gamma\frac{[Ca^{2+}_{cyt}]}{K^2+[Ca^{2+}_{cyt}]^2}\frac{(\Delta\psi-\Delta\psi*)^3}{(\overline{\Delta\psi})^3+(\Delta\psi-\Delta\psi*)^3}\frac{\frac{2F\Delta\psi}{RT}\left([Ca^{2+}_{cyt}]-[Ca^{2+}_{mit}]e^{-\frac{2F\Delta\psi}{RT}}\right)}{1-e^{-\frac{2F\Delta\psi}{RT}}}$	$\gamma = 64.2\mu M^2 \cdot s^{-1}$, $K = 0.07\,\mu M$, $\Delta\psi^* = 0.013V$, $\overline{\Delta\psi} = 0.124V$	[6]
CaM	$CaM + 4Ca^{2+}_{cyt} \leftrightarrow CaMb$	$k[CaM][Ca^{2+}_{cyt}]^4 - k_m[CaMb]$	$k = 763/657/168(uM^4 \cdot s)^{-1}$, $k_m = 7s^{-1}$	[32]
Calr	$Calr + Ca^{2+}_{DTS} \leftrightarrow CalrB$	$k[Calr][Ca^{2+}_{DTS}] - k_m[CalrB]$	$k = 25(uM \cdot s)^{-1}$, $k_m = 100s^{-1}$	[33]
END	$END + Ca^{2+}_{DTS} \leftrightarrow ENDB$	$k[END][Ca^{2+}_{DTS}] - k_m[ENDB]$	$k = 0.05(uM \cdot s)^{-1}$, $k_m = 100s^{-1}$	[34]
SCaMC	$SC + 2Ca^{2+}_{Mit} \leftrightarrow SCB$	$k[SC][Ca^{2+}_{cyt}]^2 - k_m[SCB]$	$k = 4.5/33/64(uM^2 \cdot s)^{-1}$, $k_m = 1s^{-1}$	[36]
CypD	$CypD + 4Ca^{2+}_{Mit} \leftrightarrow CDB$	$k[CypD][Ca^{2+}_{cyt}]^4 - k_m[CDB]$	$k = 4.5/33/64(uM^4 \cdot s)^{-1}$, $k_m = 1s^{-1}$	[36]

Non-zero initial concentrations (values for D1/D2/D3 where applicable)

Variable	Concentration, μM	Variable	Concentration, μM	Variable	Concentration, μM	Variable	Concentration, μM
CaM	6/14/5	Calr	*208/224/70*	CypD	32/27/13	UNI	7.3/2.8/7.5
Ca^{2+}_{DTS}	293/242/398	END	*116/111/112*	SERCA2	10/7.3/11	NCLX	0.2/0.1/0.14
IP3R	2.7/1/1.5	SC	*2.1/3.1/1.1*	SERCA3	19/9/15		