A mathematical modeling toolbox for ion channels and transporters across cell membranes

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The following supplementary material is from " A mathematical modeling toolbox for ion channels and transporters across cell membranes" manuscript. It contains an overview of all equations related to Ion channels, Pumps, Cotransporters, and Symporters, organized in a table form. The detailed transporters along with the descriptions of their equatuons can be found from here.

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1.4. Chloride channels

1.4.1. Calcium dependent Chloride Channels (CaCC)

Calcium dependent Chloride Channels (CaCC)	Ref
$\boxed{I''^{M-N}_{Cl,CaCC} = n''^{M-N}_{CaCC}\, g^{M-N}_{Cl}\, f_o^{Cl,CaCC}(V_m^{M-N} - V_{Cl}^{M-N(a)})} \quad (81)$ where:	
1. Hill model: $f_o^{Cl,\,CaCC} = \frac{1}{1 + \left(\frac{K_{CaCC}}{[Ca]_i}\right)^{\eta_{CaCC}}} \quad (82)$	[5]
2. High positive voltage (HPV) enhanced calcium activation CaCC model: $f_o^{Cl,\,CaCC} = f_o^{CaCC,\,HPV}\frac{1}{1 + (\frac{K_{CaCC}}{[Ca]_i})^{\eta_1}} \quad (83)$ $\frac{\mathrm{d}f_o^{CaCC,\,HPV}}{\mathrm{d}t} = \frac{\bar{f}_o^{CaCC,HPV} - f_o^{CaCC,\,HPV}}{\tau_{CaCC}} \quad (84)$ $\bar{f}_o^{CaCC,HPV} = \frac{1}{1 + exp\frac{-\left(V_m - V^{CaCC}_{half\ max}\right)}{V_{CaCC}}} \quad (85)$ $V^{CaCC}_{half\ max} = \sigma\sqrt{2ln2} + \mu \quad (86)$ $\tau_{CaCC}(V_m) = \frac{1}{\sigma\sqrt{2\pi}}exp\left(-\left(\frac{V_m - \mu}{\sqrt{2}\sigma}\right)^2\right) \quad (87)$	[3]
3. Steady state Arreola model: $f_o^{Cl,\,CaCC} = \frac{1}{1 + K_2\left(\frac{K_1^2}{[Ca]_i^2} + \frac{K_1}{[Ca]_i} + 1\right)} \quad (88)$ $K_1 = 234\ exp\left(\frac{-0.13FV_m^{M-N}}{RT}\right),\ K_2 = 0.58exp\left(\frac{-0.24FV_m^{M-N}}{RT}\right)$	[7, 24, 25]
$V_{Cl}^{M-N(a)} = \frac{RT}{z_{Cl}F}ln\left(\frac{[Cl]_{N(l)}}{[Cl]_{M(i)}}\right) \quad (89)$	

Table 7: The corresponding equations describing the flux and current transported via calcium dependent chloride channels (CaCC) across the cell membrane