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.

1.4.2. Cystic Fibrosis Transmembrane conductance Regulator (CFTR)

Cystic Fibrosis Transmembrane conductance Regulator (CFTR)		Ref
		[26]
$$I''^{M,N(a)}_{Cl,CFTR} = n''^{M-N(a)}_{CFTR} P^{M(a)}_{Cl,CFTR} \frac{z^2_{Cl} F^2 V^{M-N(a)}_m}{RT} \frac{[Cl]_N - [Cl]_M exp^{\frac{z_{Cl}FV^{M-N(a)}_m}{RT}}}{1 - exp^{\frac{z_{Cl}FV^{M-N(a)}_m}{RT}}}$$	(90)	
		[5, 8, 27]
$$I''^{M-N(a)}_{Cl,CFTR} = n''^{M-N(a)}_{CFTR} g^{M-N}_{CFTR} f^{Cl,CFTR}_o (V^{M-N(a)}_m - V^{M-N(a)}_{Cl,rev})$$	(91)	
		[6]
$$I''^{M-N(a)}_{Cl,CFTR} = n''^{M-N}_{CFTR} g_{CFTR} \left(V^{M-N}_m - V^{M-N}_{Cl,rev} \right)$$	(92)	
$$I''^{M-N(a)}_{HCO3,CFTR} = n''^{M-N}_{CFTR} \beta\, g_{CFTR} \left(V^{M-N}_m - V^{M-N}_{HCO3,rev} \right)$$	(93)	
where:		
$$\beta = \frac{g_{CFTR,HCO_3}}{g_{CFTR,Cl}}$$	(94)	
		[28]
$$I''^{M-N}_{Cl,CFTR} = n''^{M-N}_{CFTR} (\bar{g}^{M-N}_{Cl}\ g^{CFTR}_{Cl})\left(V^{M-N(a)}_m - V^{M-N}_{Cl,rev} \right)$$	(95)	
$$I''^{M-N}_{HCO_3,CFTR} = n''^{M-N}_{CFTR} (\bar{g}^{M-N}_{HCO_3}\ g^{CFTR}_{HCO3})\left(V^{M-N(a)}_m - V^{M-N}_{HCO_3,rev} \right)$$	(96)	
Where		
$$g^{M-N}_x([x]_M, [x]_N) = [x]_M [x]_N \frac{ln\left(\frac{[x]_M}{[x]_N}\right)}{[x]_M - [x]_N}$$	(97)	
$$V^{M-N(a)}_{Cl,rev} = \frac{RT}{z_{Cl}F} ln\left(\frac{[Cl]_{N(l)}}{[Cl]_{M(i)}}\right)$$	(98)	
$$V^{M-N}_{HCO_3,rev} = \frac{RT}{z_{HCO_3}F} ln\left(\frac{[HCO_3]_N}{[HCO_3]_M}\right)$$	(99)	

Table 8: The corresponding equations describing the ionic current transported via cystic fibrosis transmembrane conductance regulator (CFTR) channels across the cell membrane (part 1/2 continued on the next page).