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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1.1.3. *Voltage Gated Potassium Channel (VGPC, k_v)*

Voltage Gated Potassium Channel (VGPC, k_v)	**Ref**
$$\boxed{i_{K,K_v} = g_{K_v}(f_o^{Kv})^2\left(V_m^{M-N} - V_{K,rev}^{M-N}\right)} \quad (15)$$ where:	[4]
$$f_o^{Kv} = C_f f_f^{Kv} + C_s f_s^{Kv} \quad (16)$$	
$$\frac{df_f^{Kv}}{dt} = \frac{\bar{f}_o^{Kv} - f_f^{Kv}}{\tau_{f_f}^{Kv}} \quad (17)$$	
$$\frac{df_s^{Kv}}{dt} = \frac{\bar{f}_o^{Kv} - f_s^{Kv}}{\tau_{f_s}^{Kv}} \quad (18)$$	
$$\tau_{f_f}^{Kv} = A_{\tau_{f_f}^{Kv}}\, exp\left[\left(\frac{-(V_m^{M-N} + V_{\tau_{f_f}^{Kv}})}{k_{\tau_{f_f}^{Kv}}}\right)^2\right] - B_{\tau_{f_f}^{Kv}} \quad (19)$$	
$$\tau_{f_s}^{Kv} = A_{\tau_{f_s}^{Kv}}\, exp\left[\left(\frac{-(V_m^{M-N} + V_{\tau_{f_s}^{Kv}})}{k_{\tau_{f_s}^{Kv}}}\right)^2\right] + B_{\tau_{f_s}^{Kv}} \quad (20)$$	
$$\bar{f}_o^{Kv} = \frac{1.0}{1.0 + exp\left(\frac{-(V_m^{M-N} - V_{1/2,Kv}^{M-N})}{k_{Kv}}\right)} \quad (21)$$	
$$V_{1/2,Kv} = A \quad (22)$$	
$$\boxed{i_{K,Kv} = g_{K_v}\left(V_m - V_{K,rev}\right)} \quad (23)$$ where:	[9]
$$g_{K_v} = g_{Kv}^{\circ} n^4 \quad (24)$$	
$$\frac{dn}{dt} = \alpha_n\ \left(1 - n(t)\right) - \beta_n\ n(t) \quad (25)$$	

Table 2: The corresponding equations describing the ionic current transported via Voltage Gated Potassium Channel (VGPC, k_v) across the cell membrane