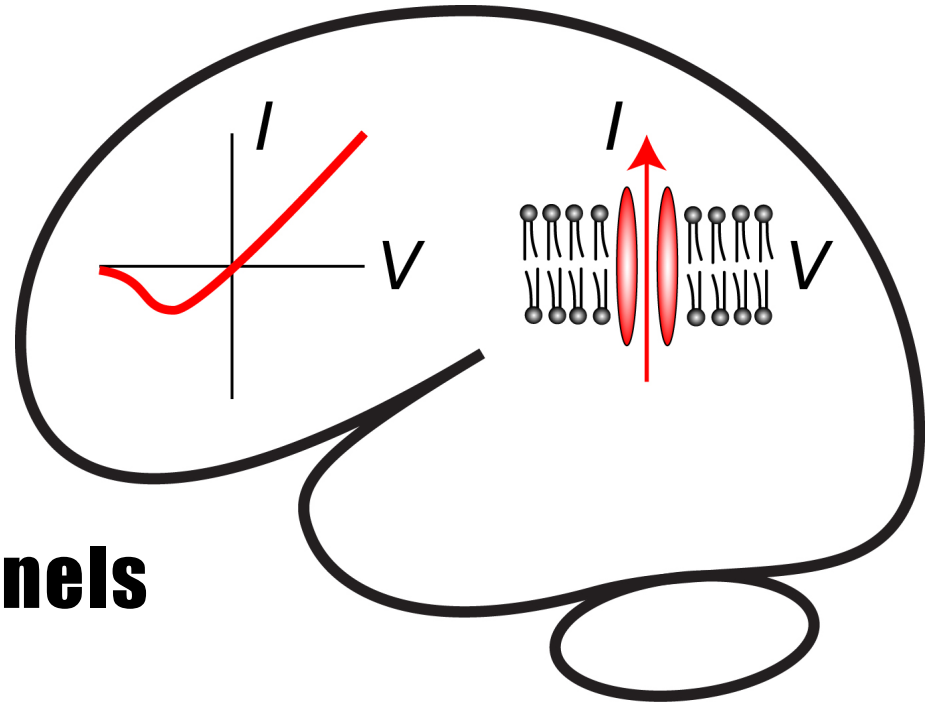
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE



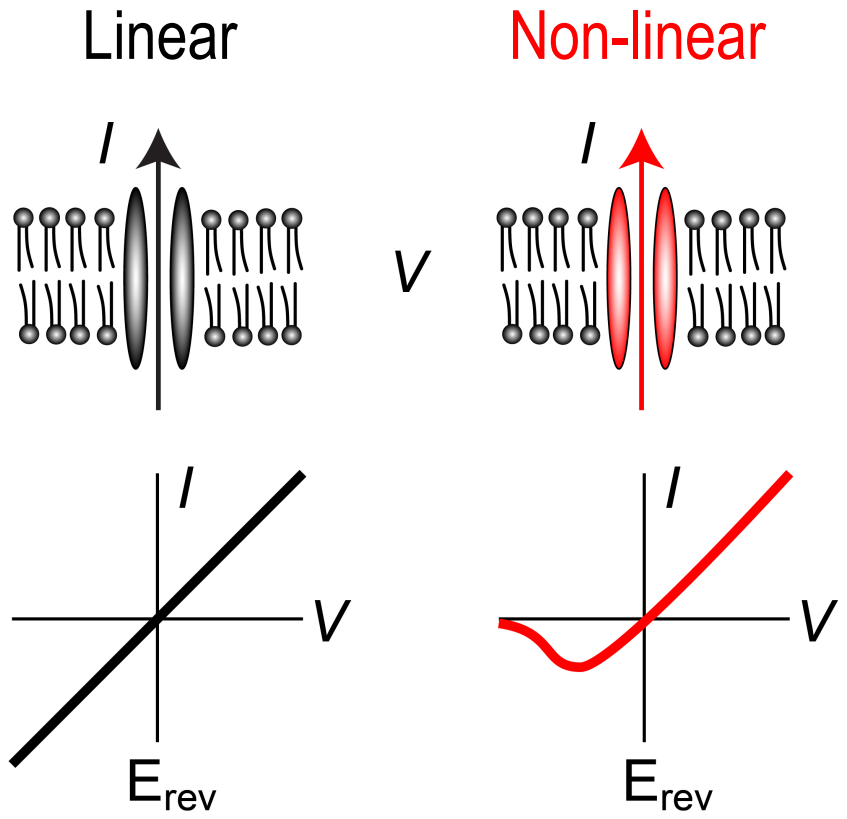
2.1 Voltage-gated channels

Cellular Mechanisms of Brain Function

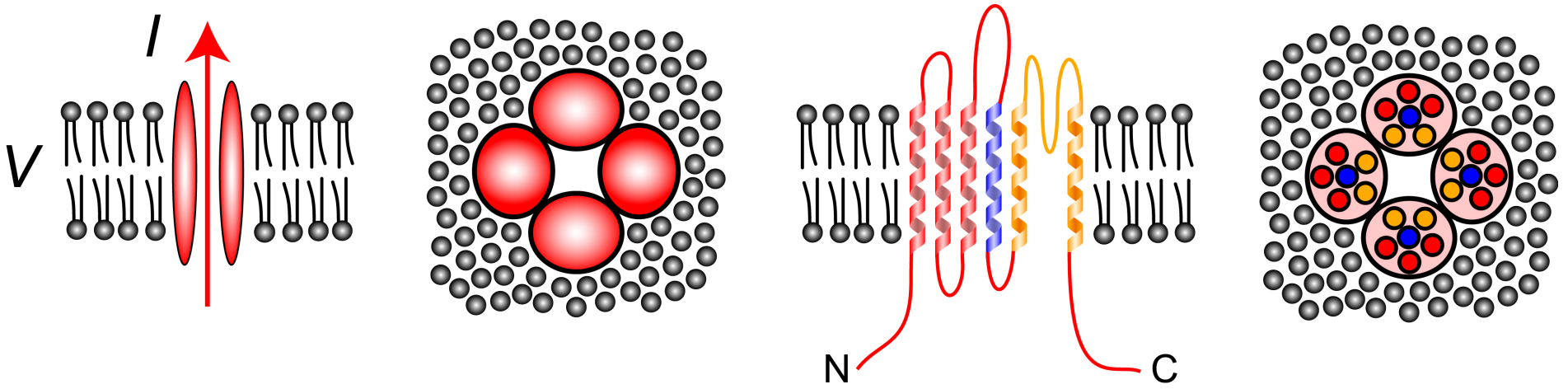
Prof. Carl Petersen

Voltage-gated ion channels

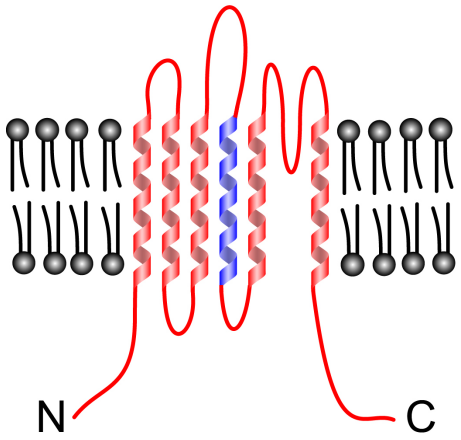
Voltage-gated ion channels

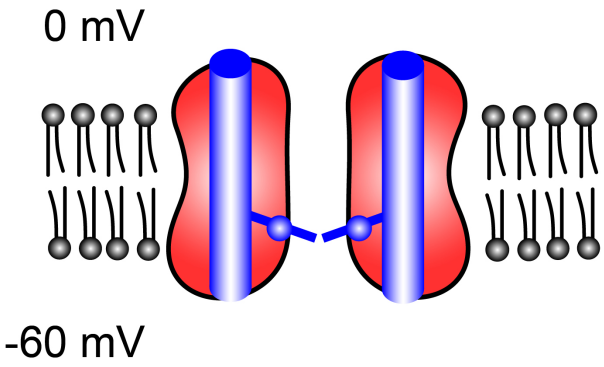


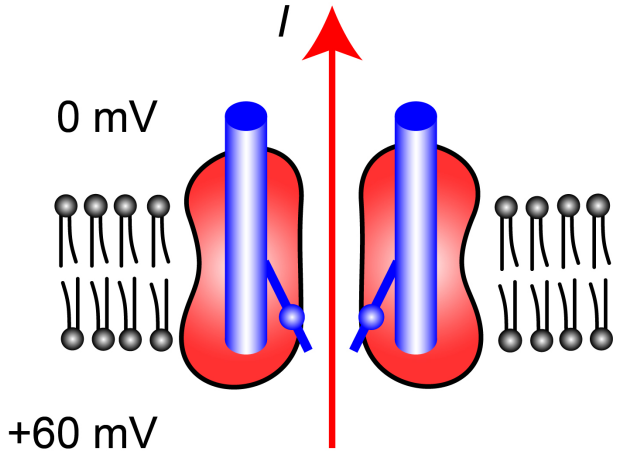
Protein structure of voltage-gated ion channels



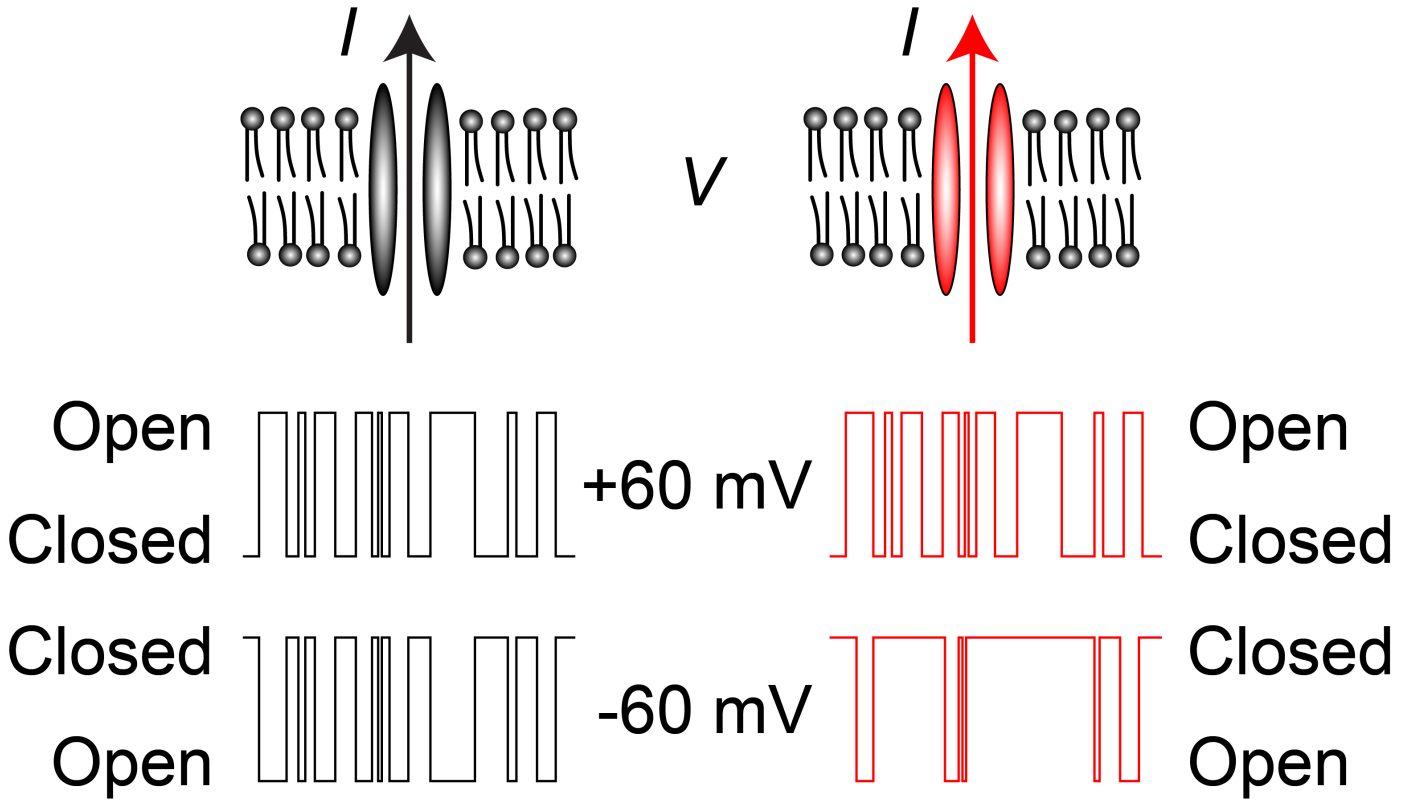
Voltage-gating mechanisms



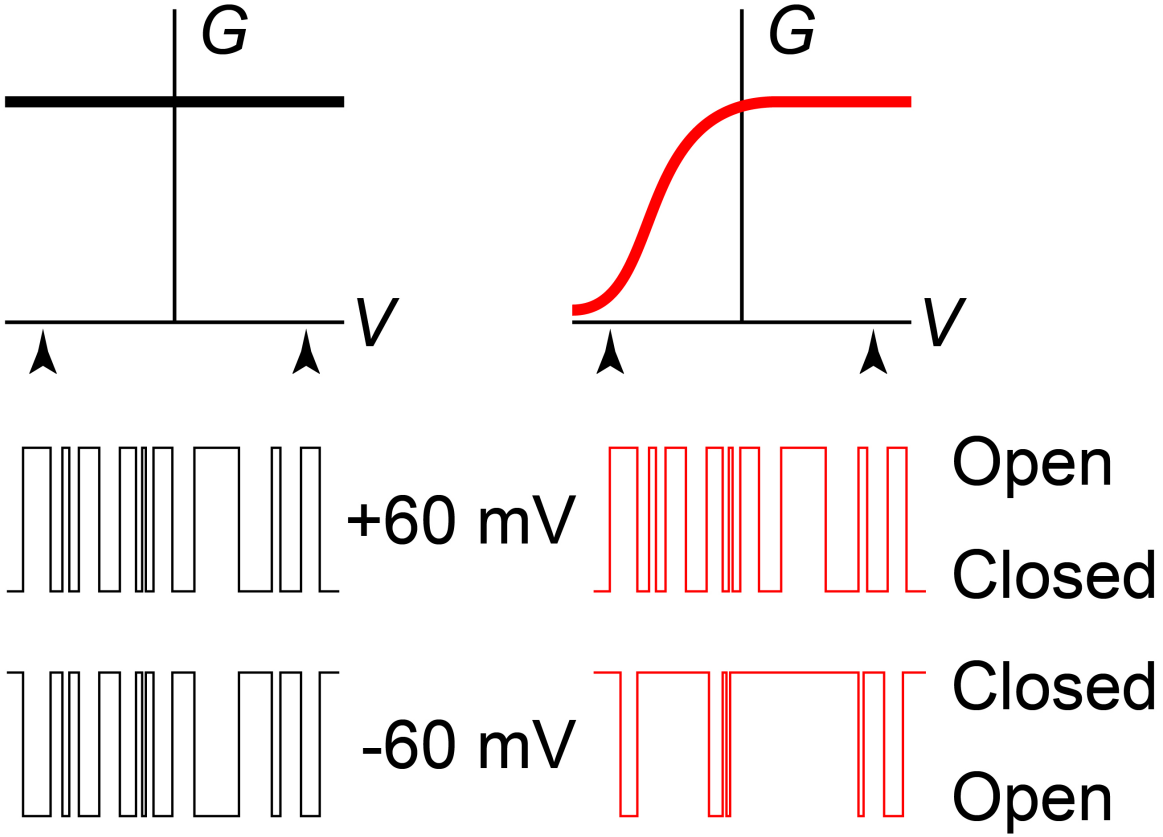




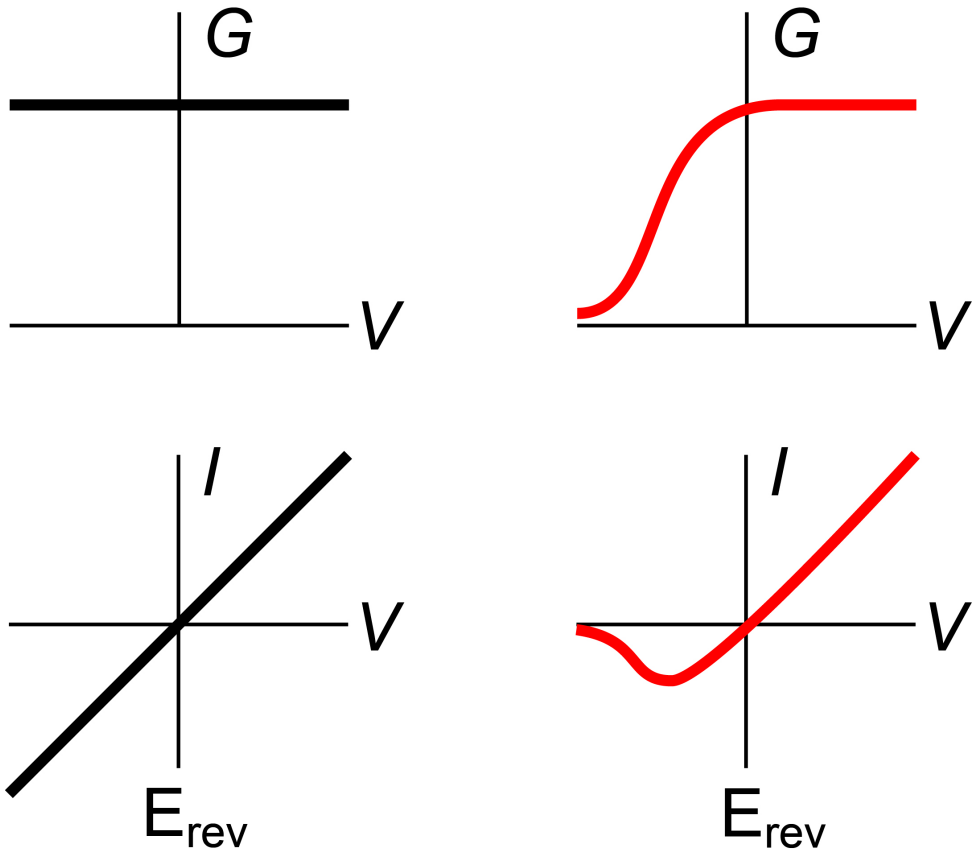
Voltage-dependent open probability



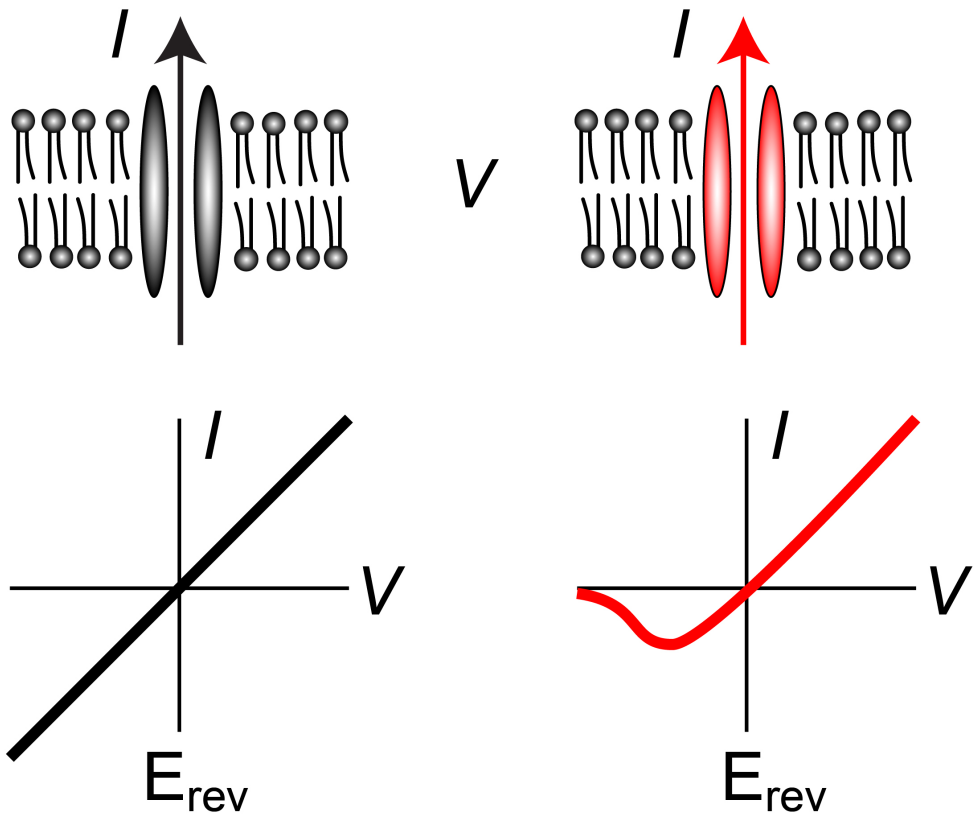
Voltage-dependent conductance



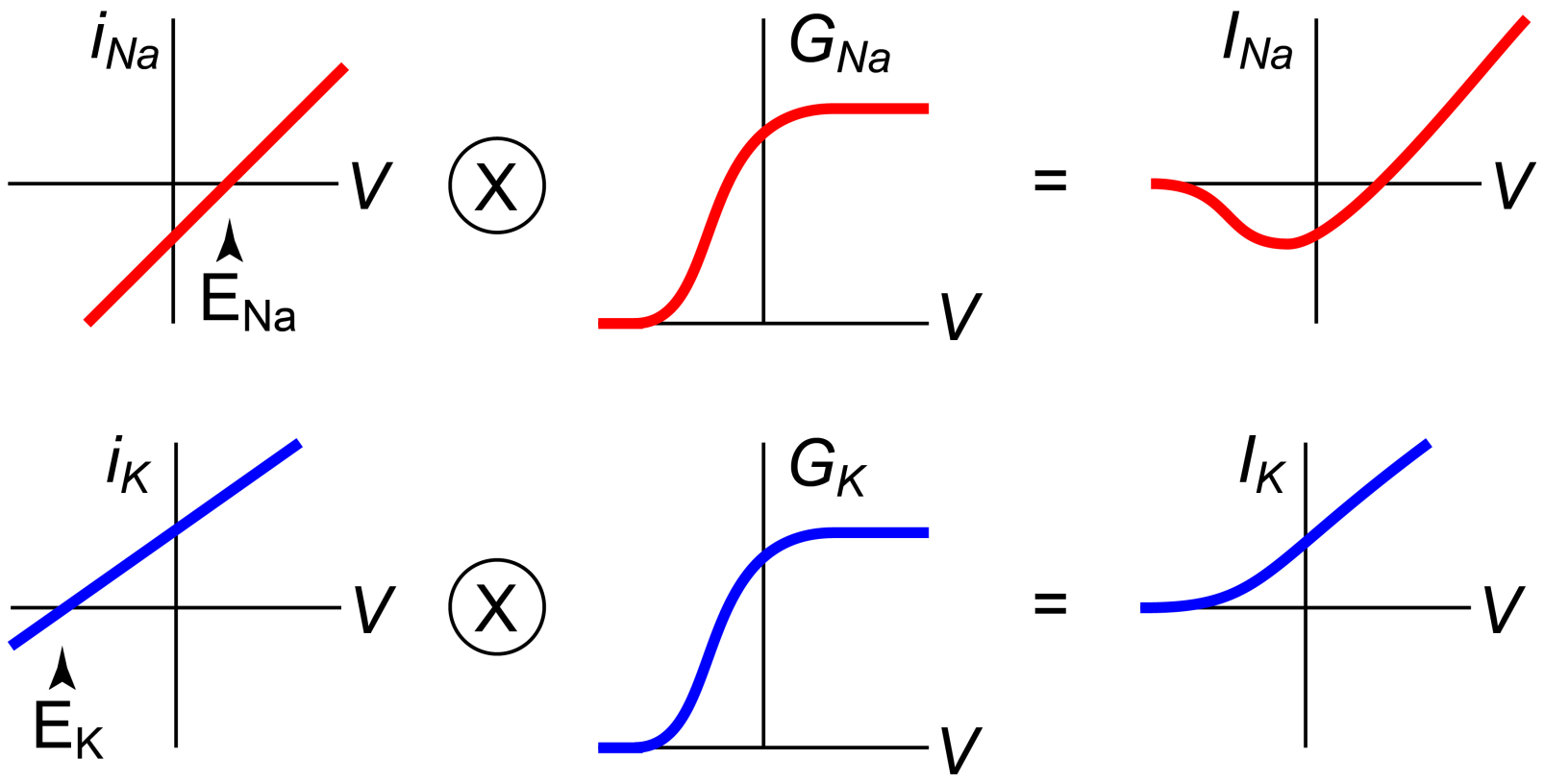
Voltage-dependent currents



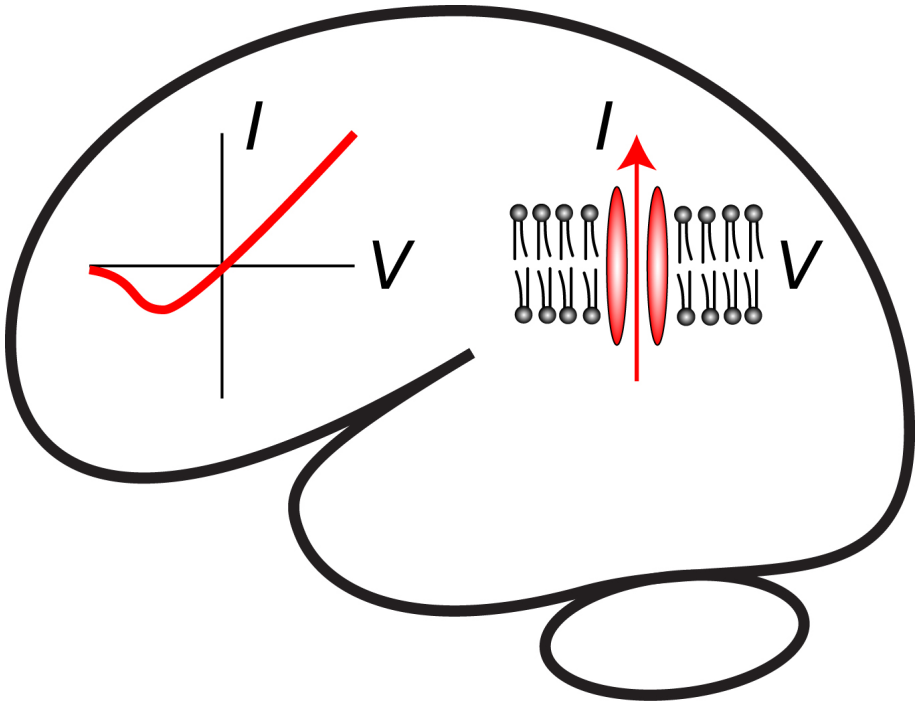
Voltage-dependent ion channels



Voltage-dependent Na^+ and K^+ channels



Voltage-gated Na^+ and K^+ channels



Some numbers – single channel conductance

g_{Na} and g_K: ~20 pS

Some numbers – explosive Na^+ conductance

Some numbers – stabilising K^+ conductance

Voltage-gated ion channels

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- The open probability of a voltage-gated ion channel depends strongly upon the membrane potential (V_m).
- Voltage-gated Na^+ channels drive explosive depolarisation. Voltage-gated K^+ channels stabilise hyperpolarised V_m.