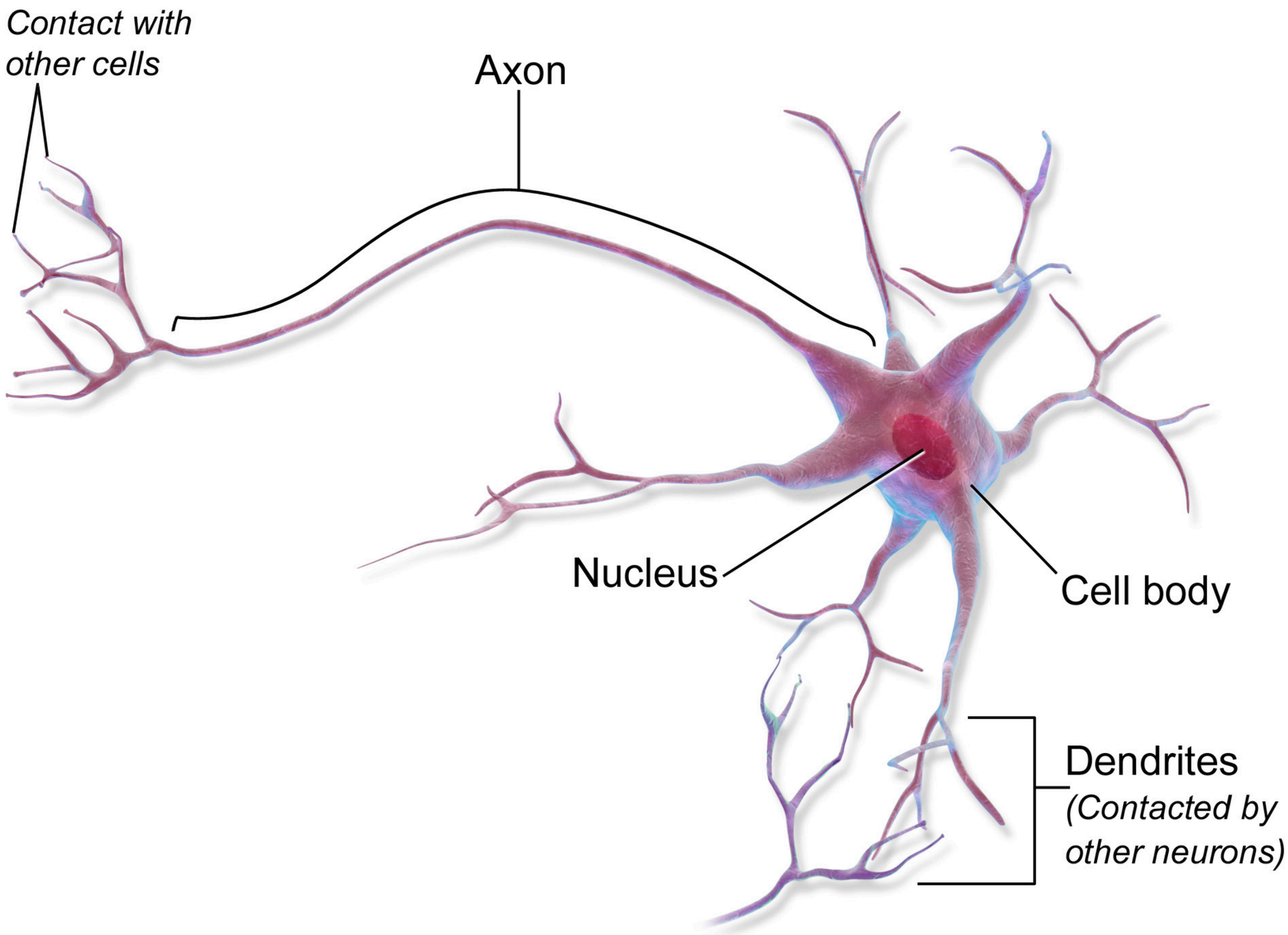
The Action Potential

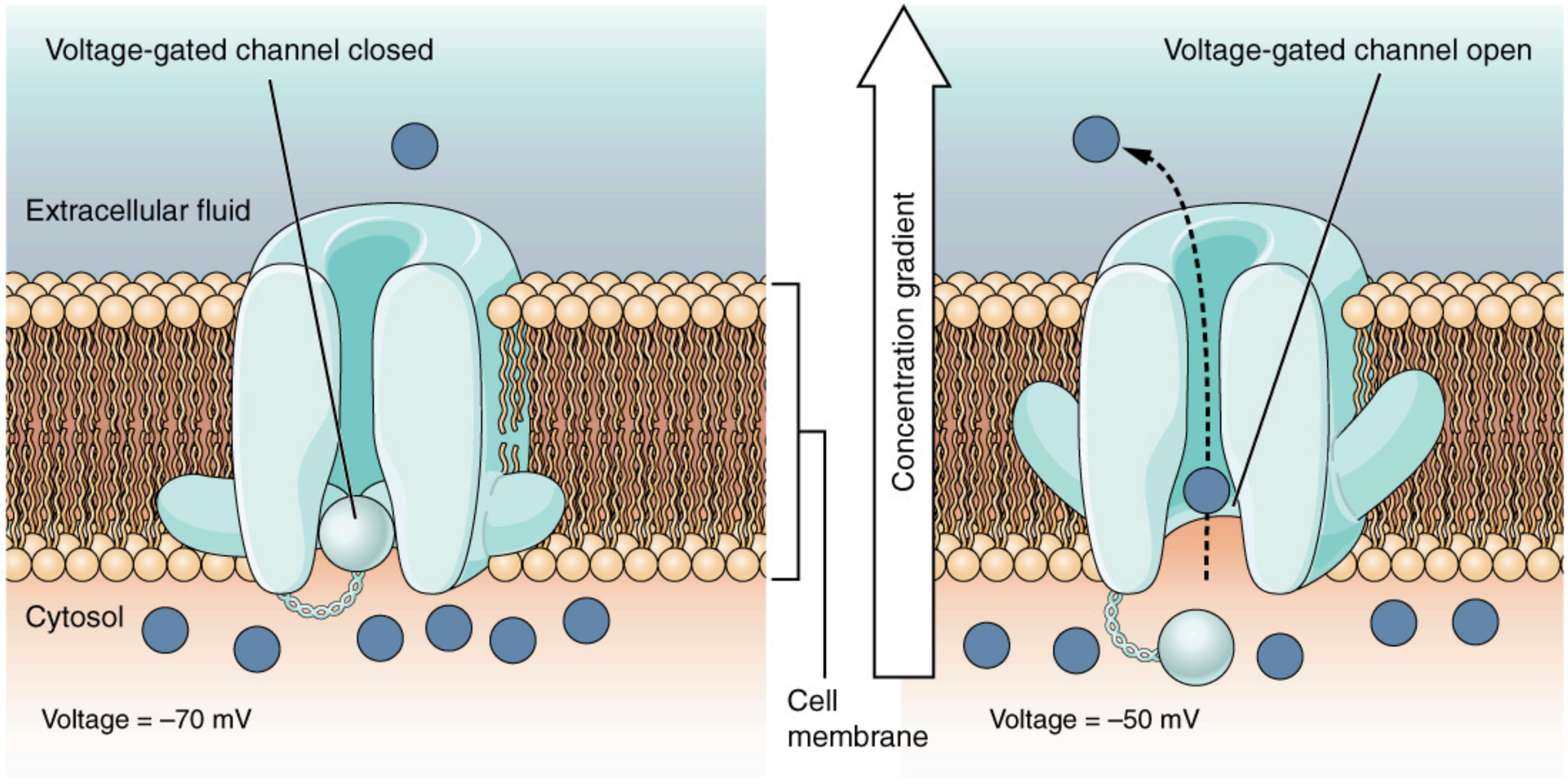


steven j. barnes

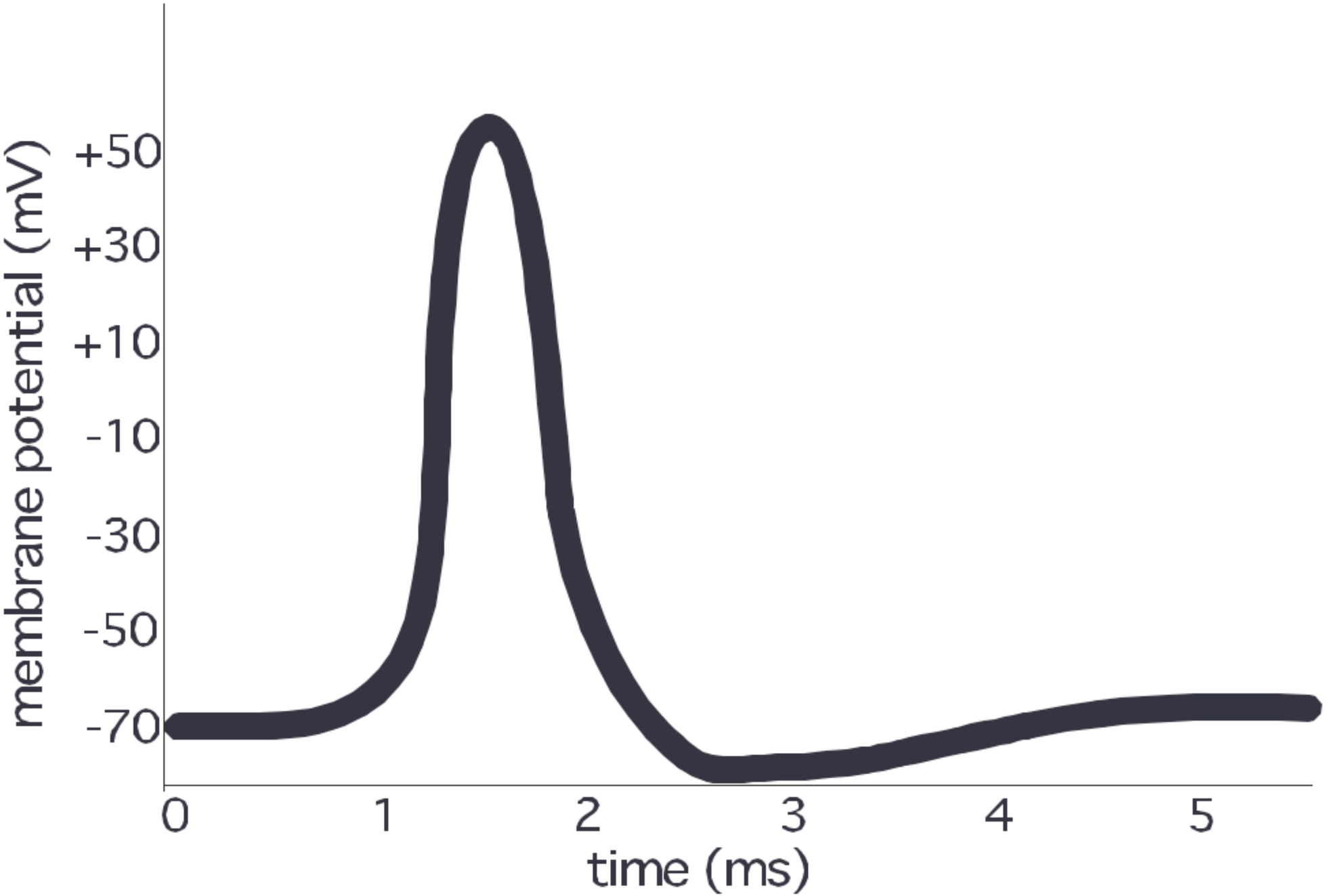
- Describe the ionic basis of action potentials, including the three phases of an action potential.
- Describe how action potentials are conducted along myelinated and unmyelinated axons.

Learning Goals

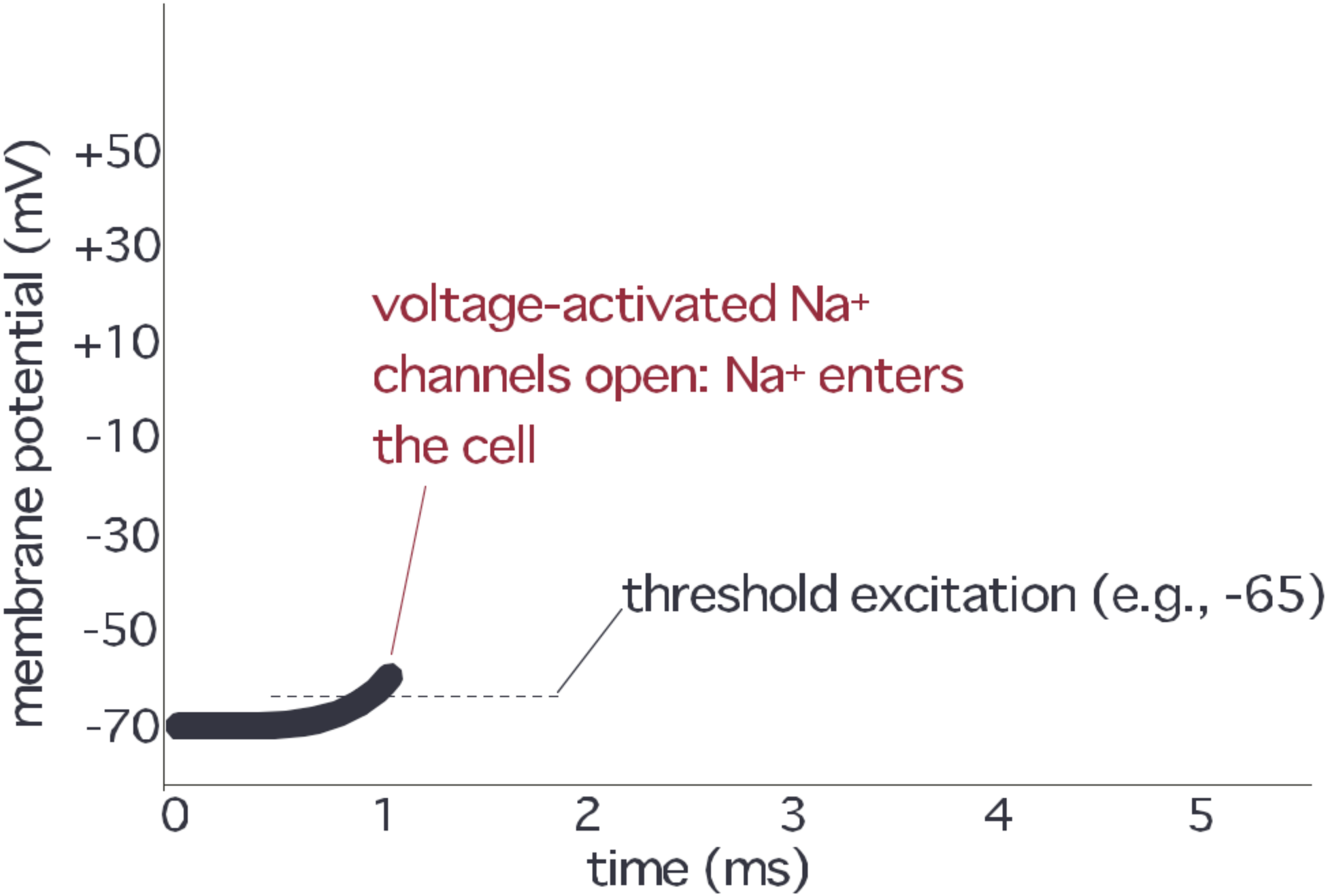
AP generation and conduction are both the result of voltage-activated ion channels.



Ionic Basis of APs

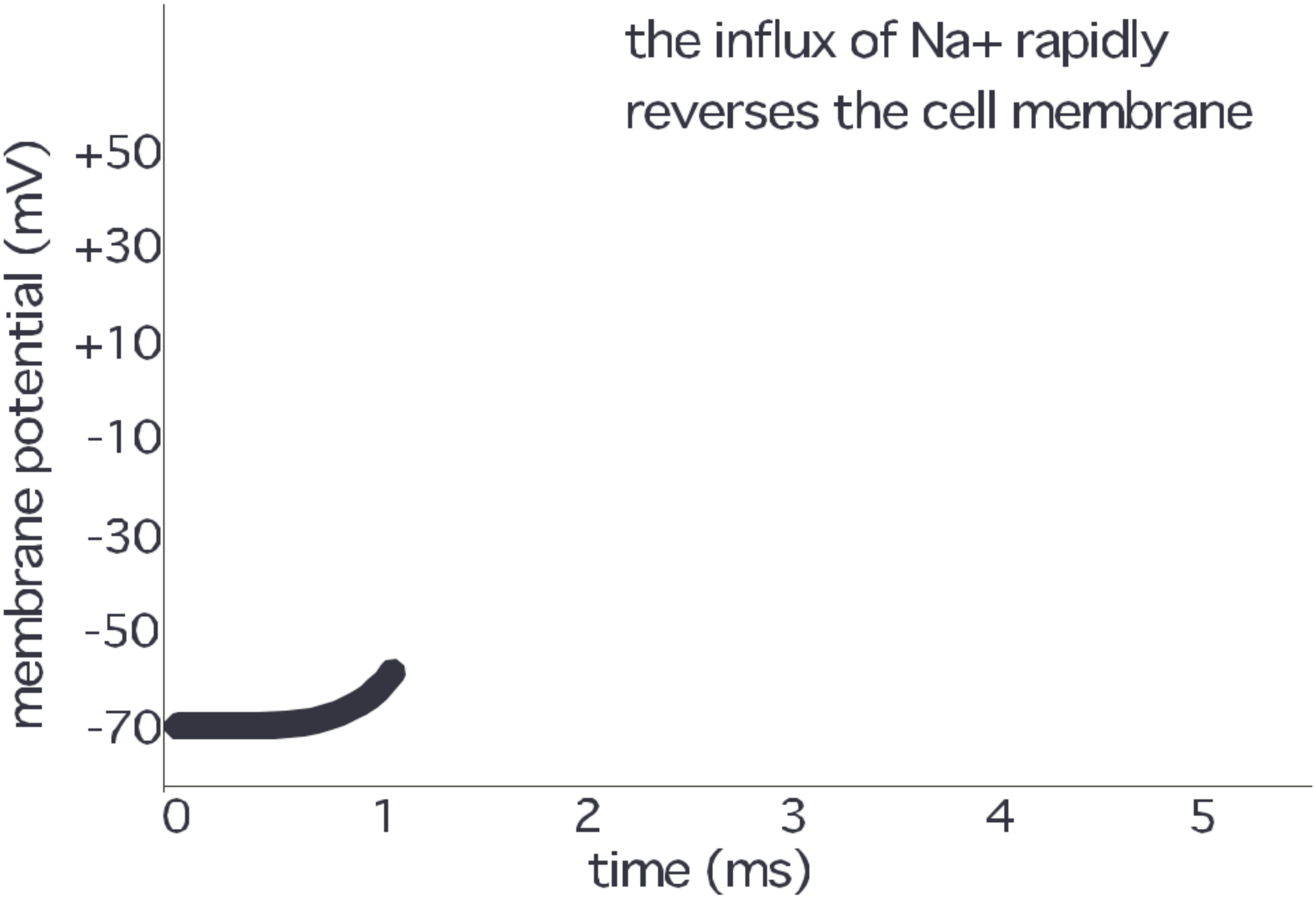


Ionic Basis of APs

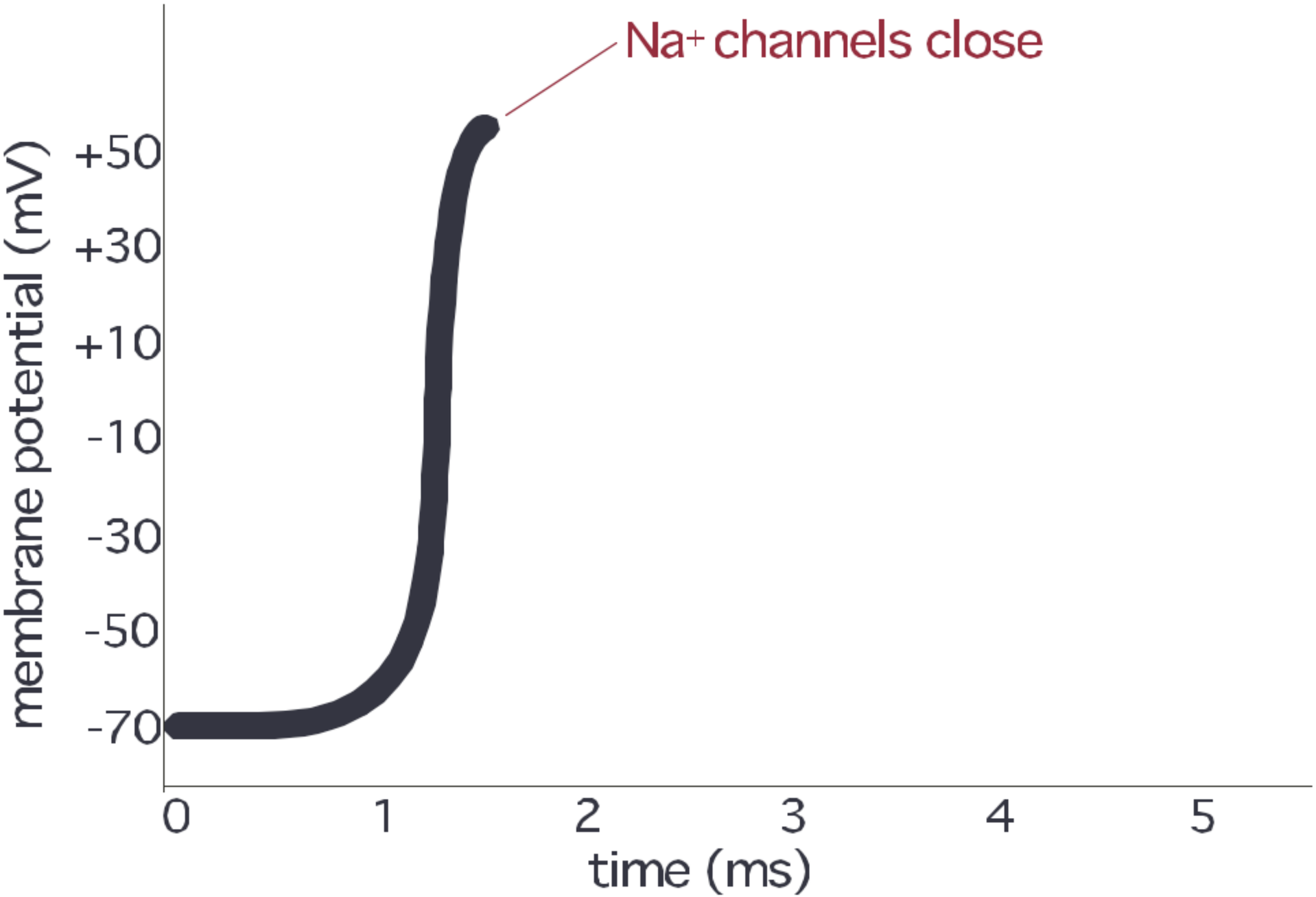


Ionic Basis of APs

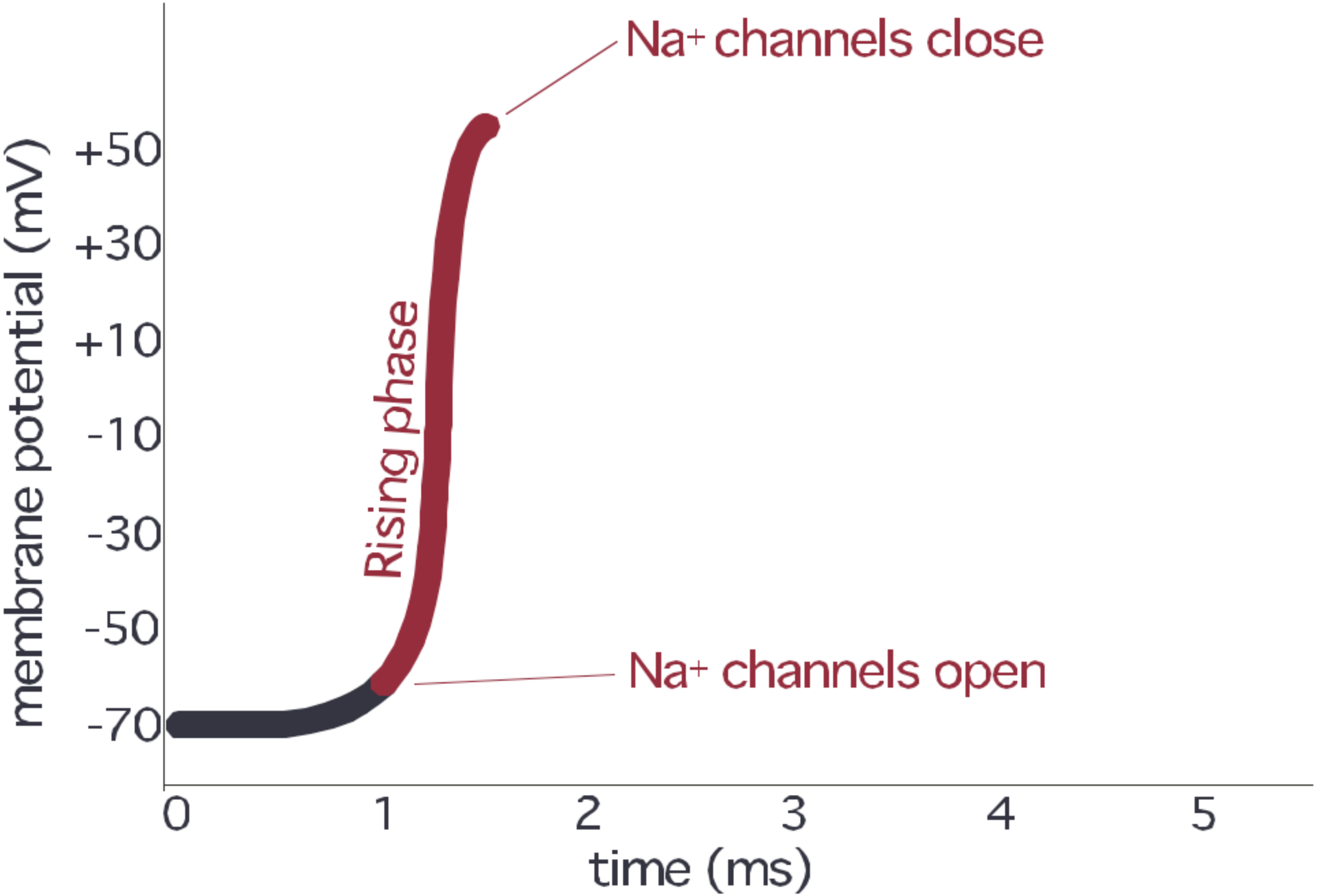
the influx of Na+ rapidly reverses the cell membrane



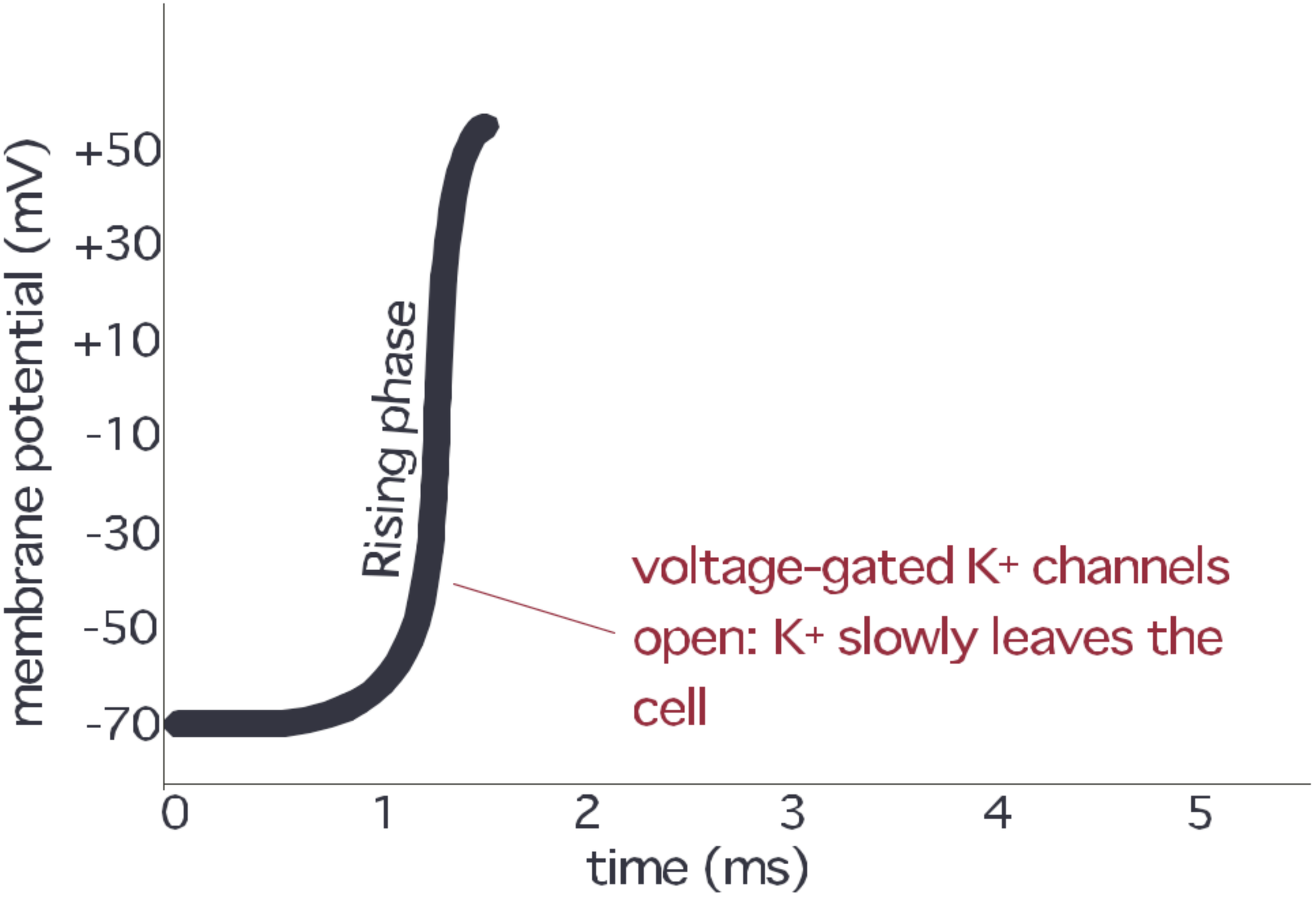
Ionic Basis of APs



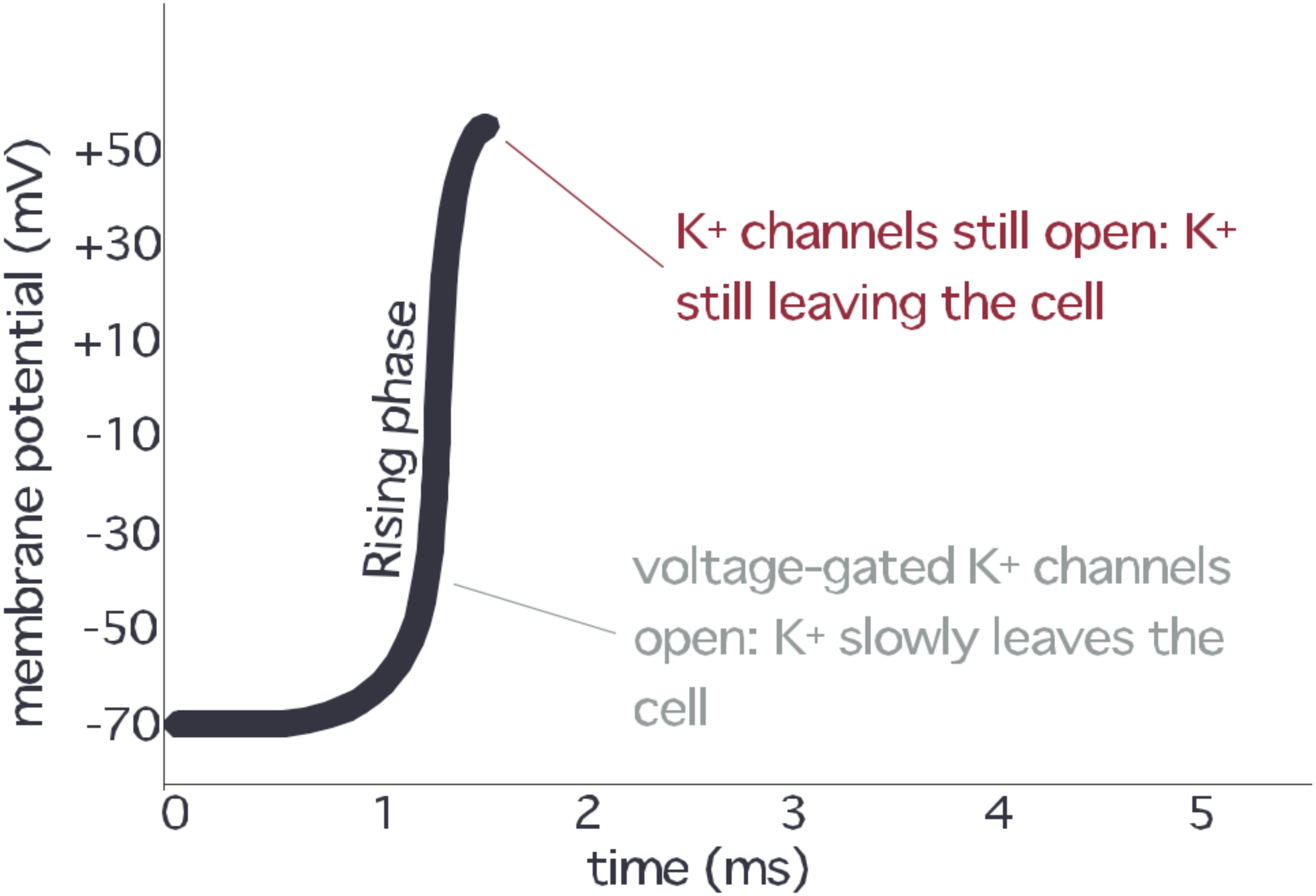
Ionic Basis of APs



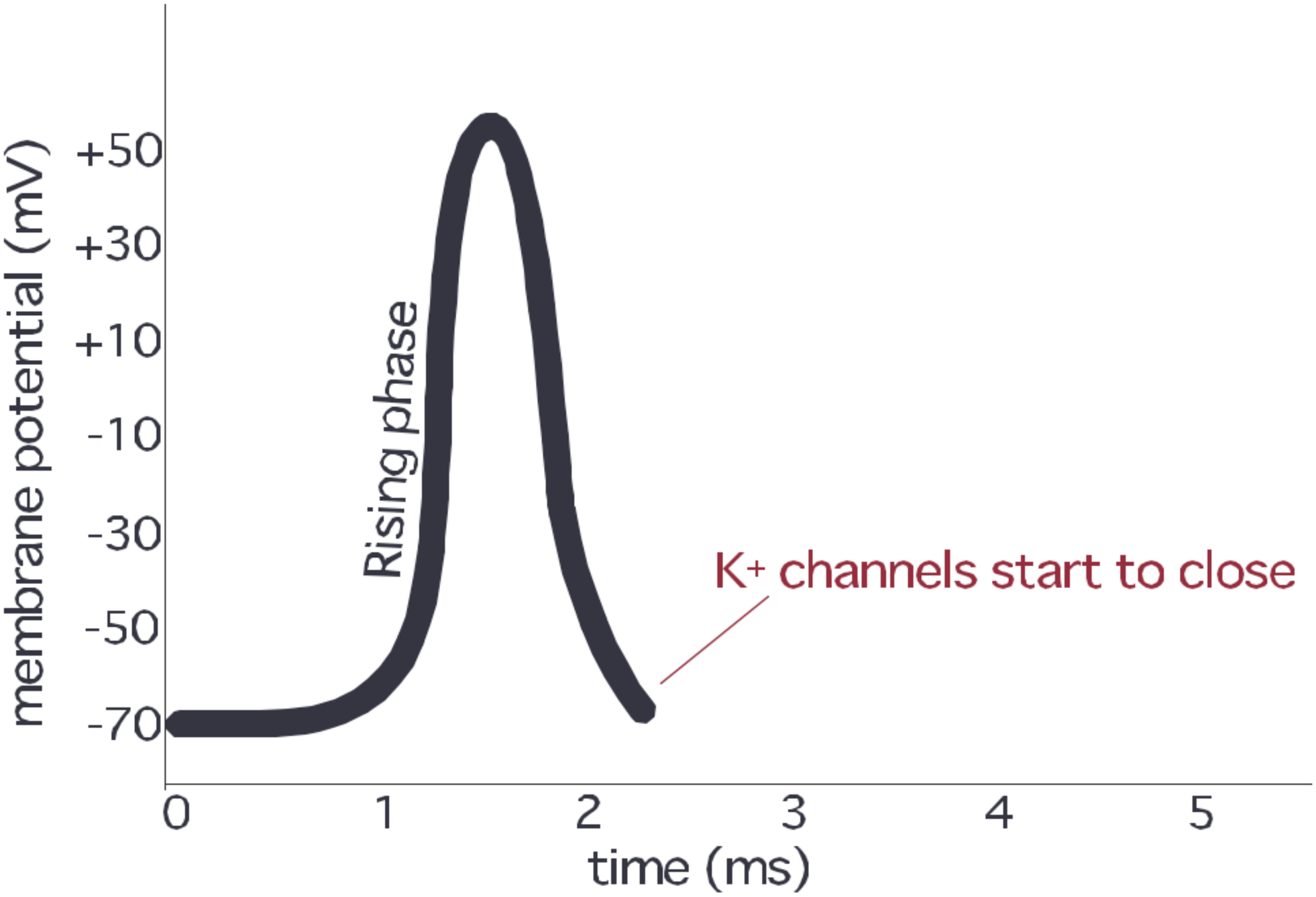
Ionic Basis of APs



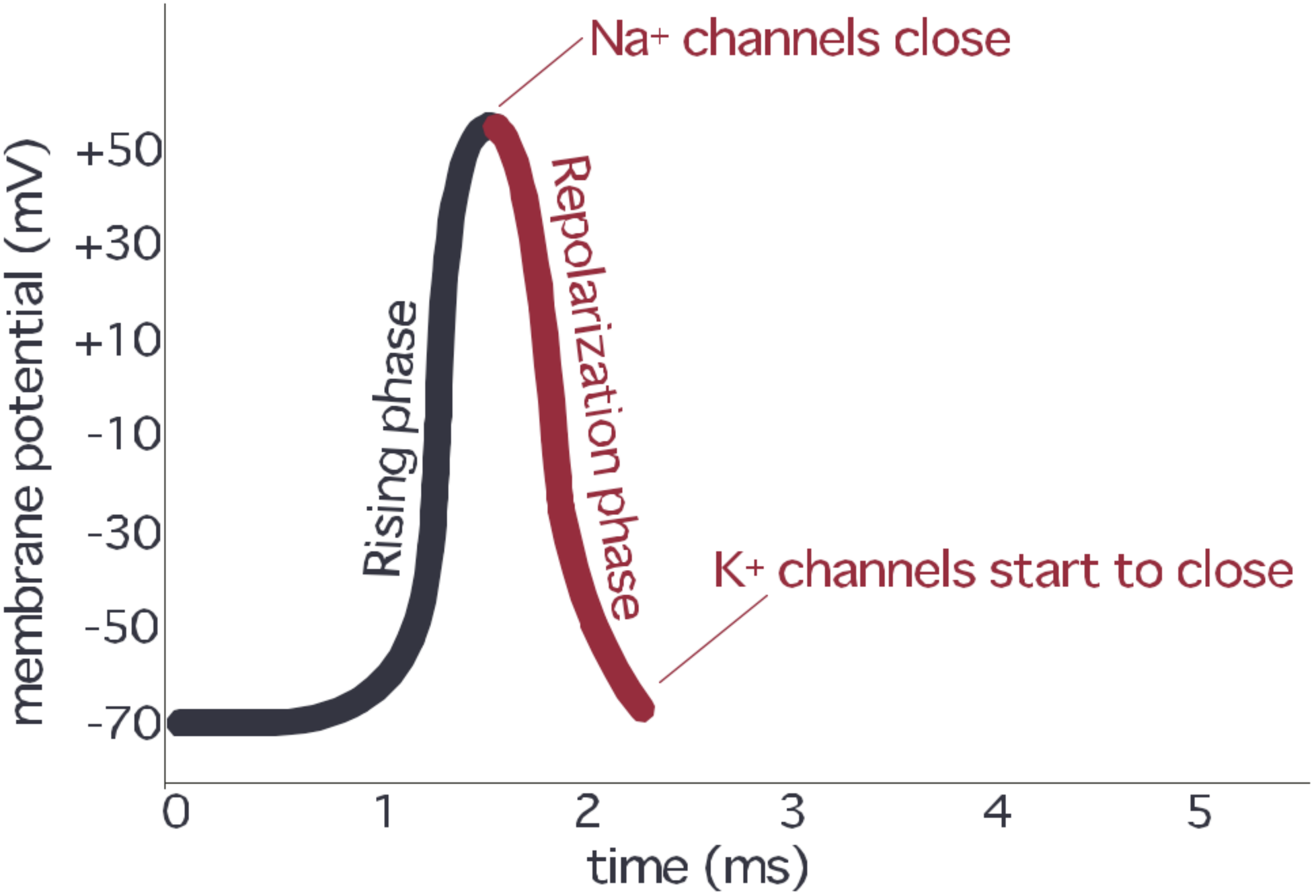
Ionic Basis of APs



Ionic Basis of APs

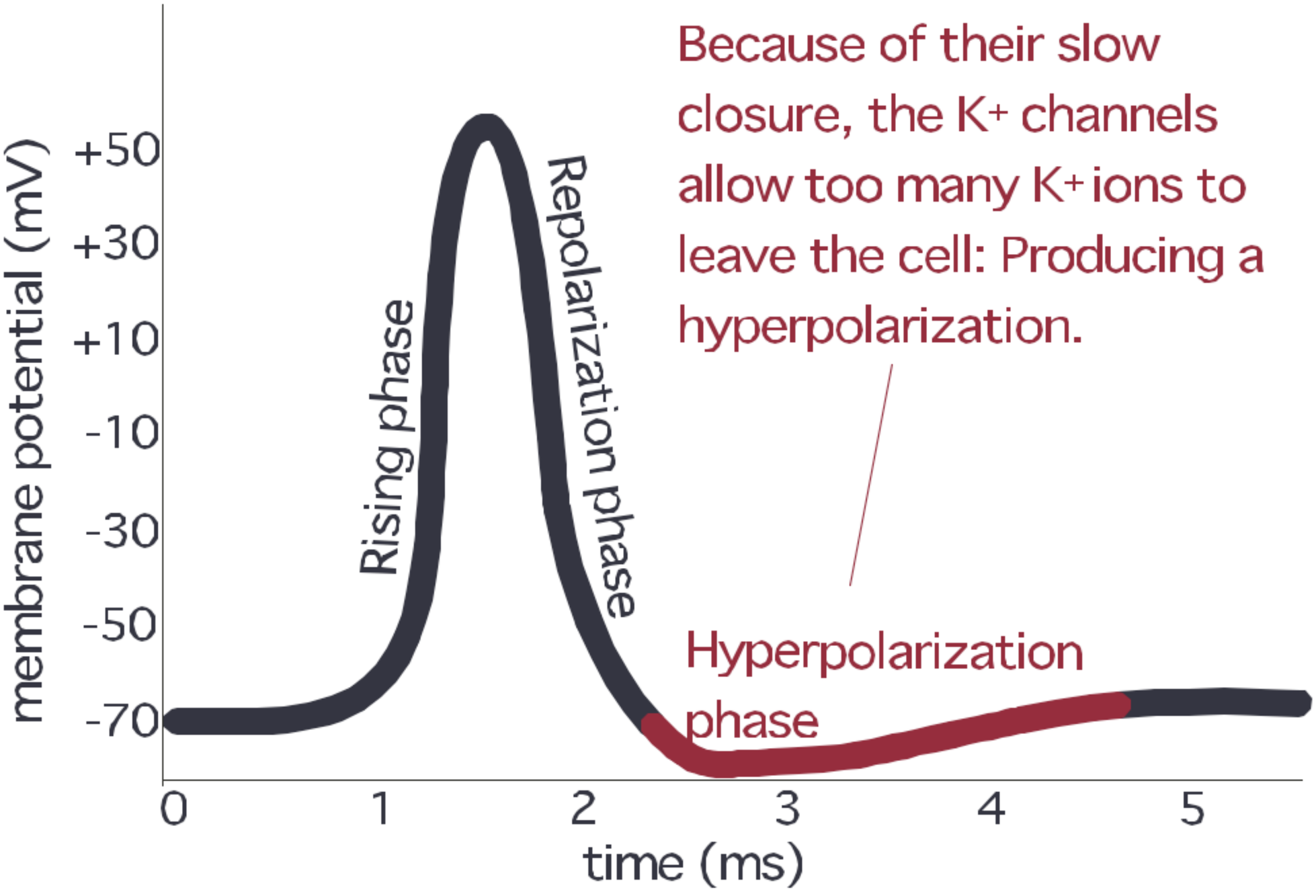


Ionic Basis of APs

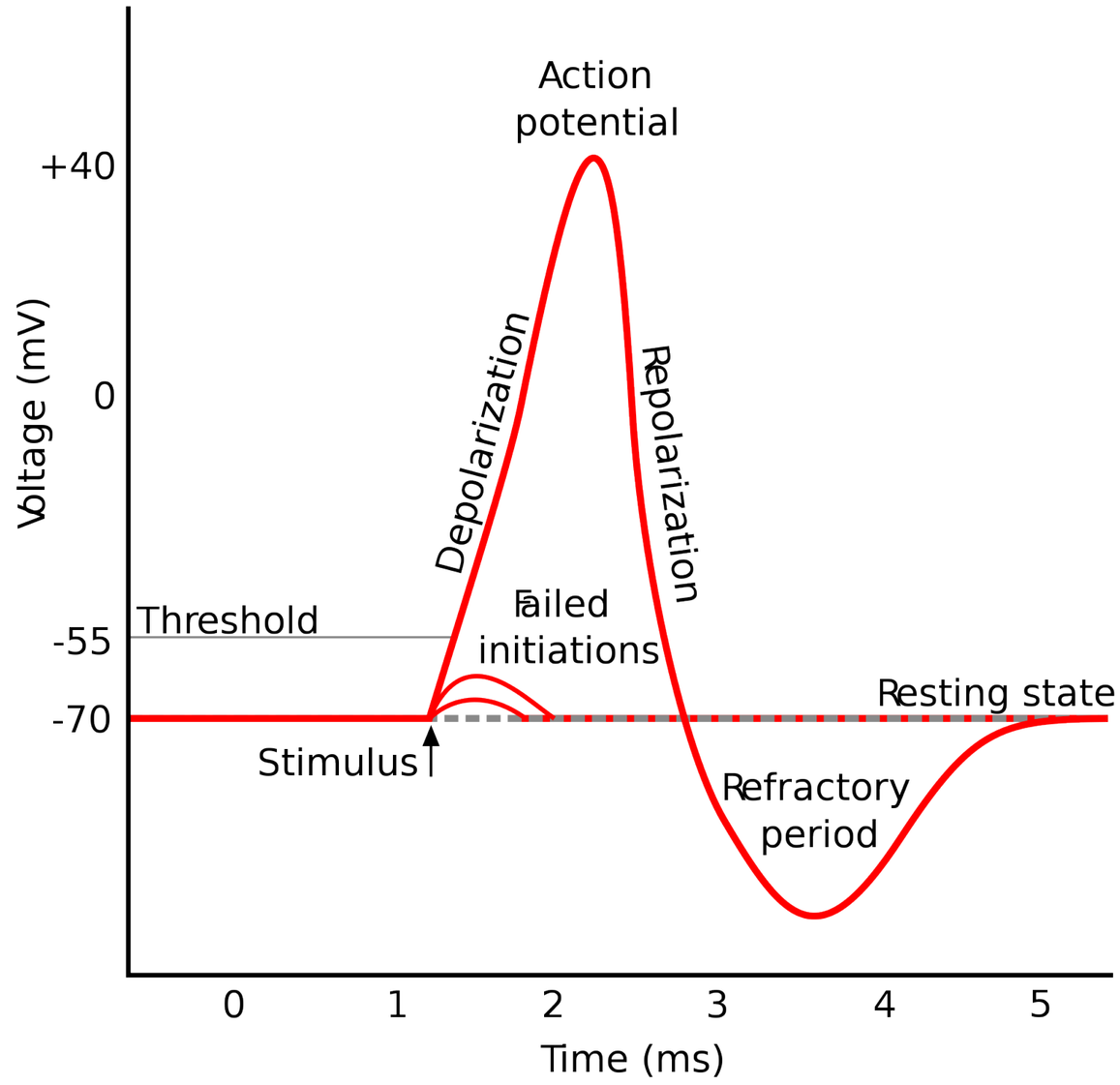


Ionic Basis of APs

Because of their slow closure, the K^+ channels allow too many K^+ ions to leave the cell: Producing a hyperpolarization.

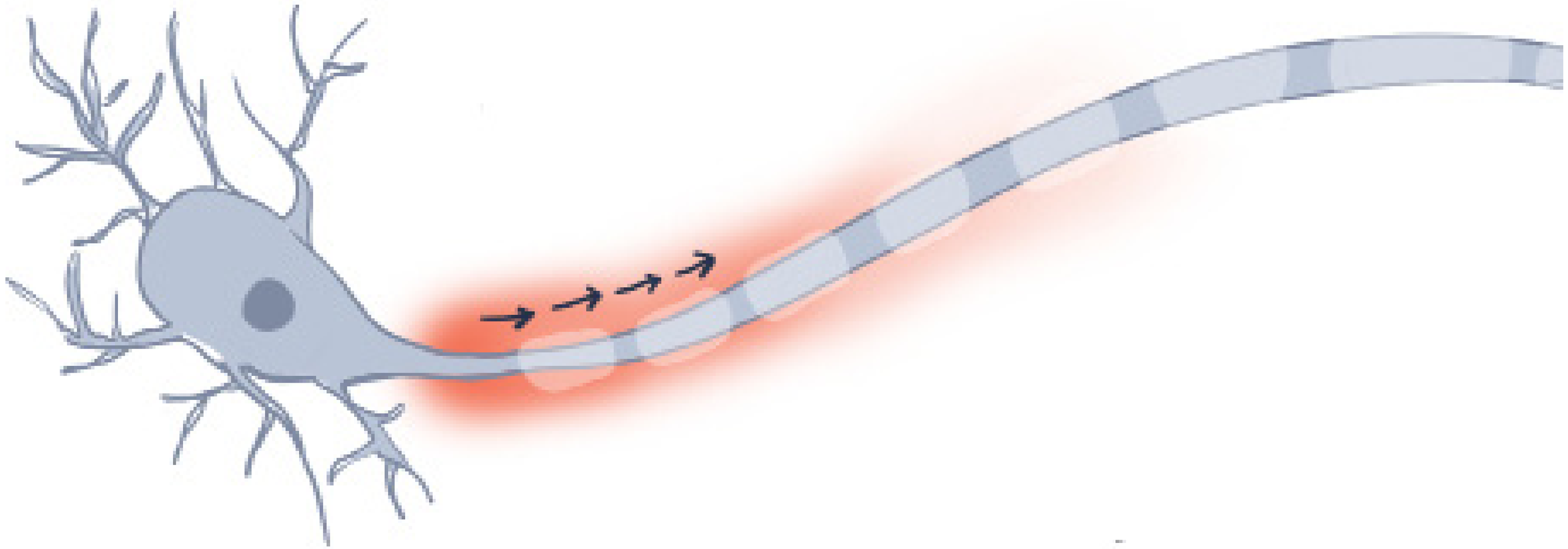


Ionic Basis of APs



Refractory Period

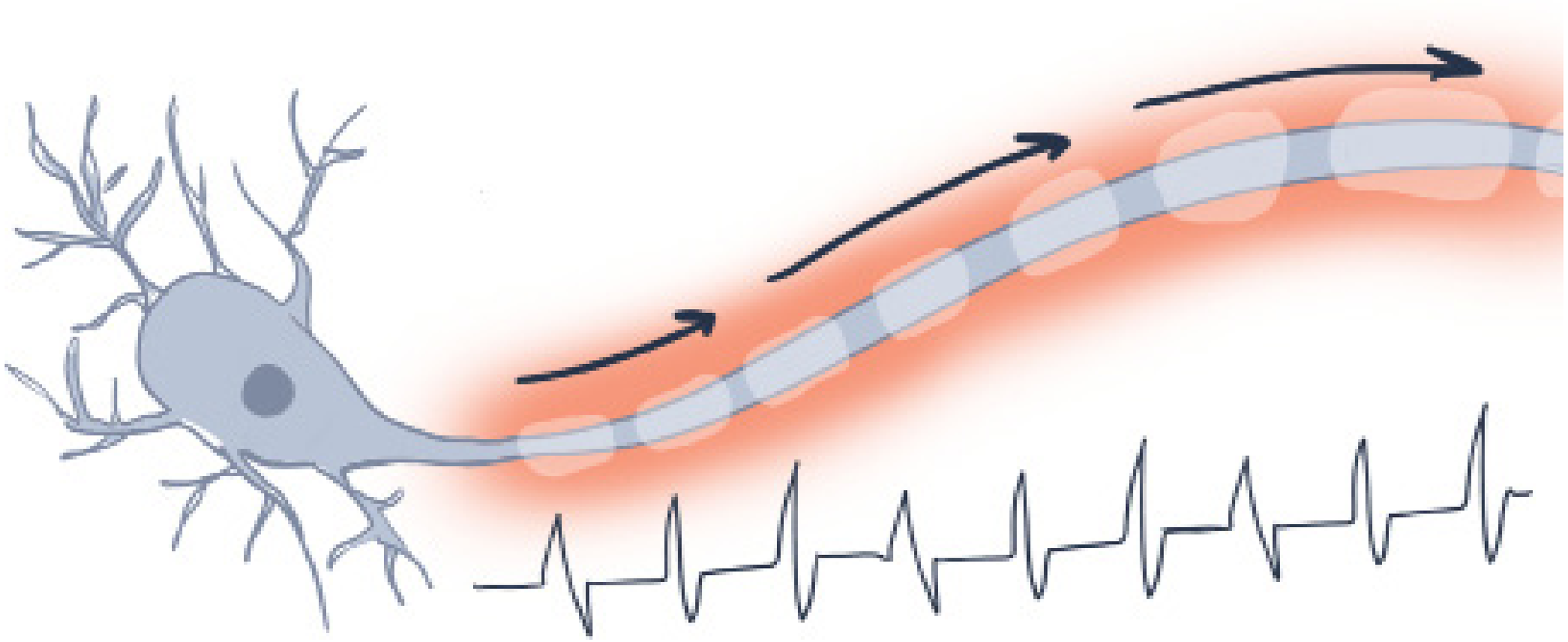
Effect of subthreshold stimulation of an axon:



An excitatory potential is produced, but it is not sufficient to elicit an AP.

Conduction of APs

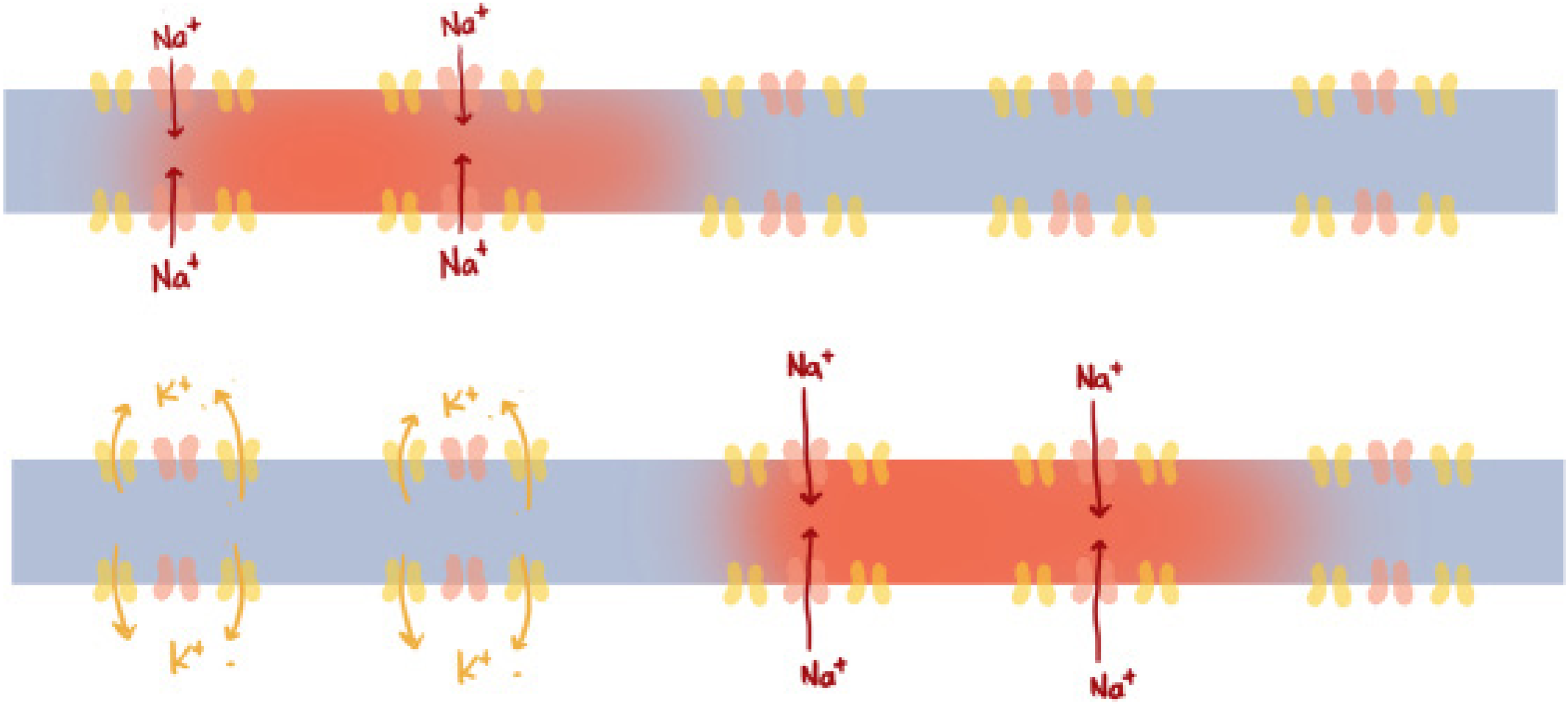
Effect of suprathreshold stimulation of an axon:



An excitatory potential is produced that exceeds the threshold of excitation and produces an AP.

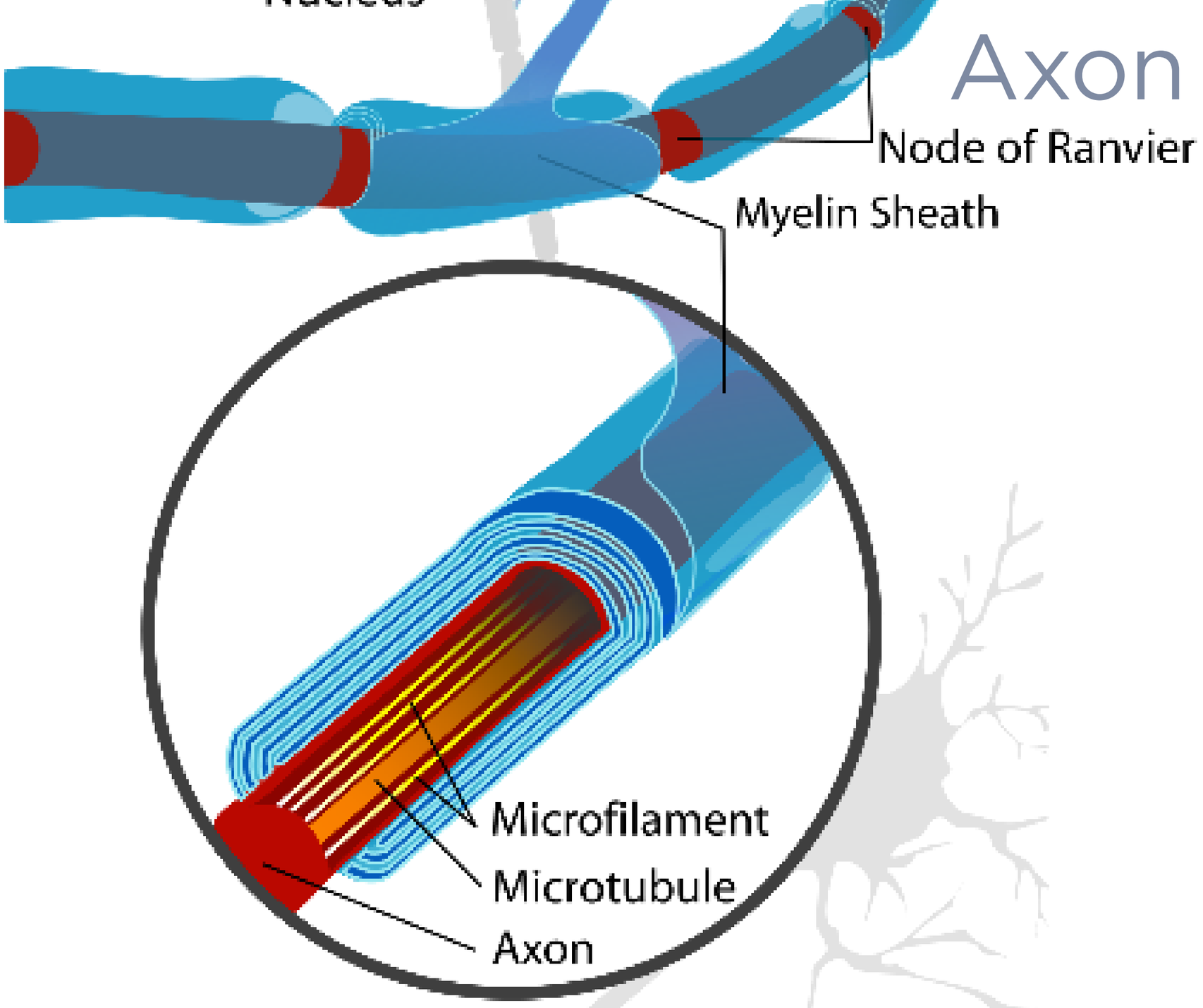
Conduction of APs

Conduction in an Unmyelinated Axon



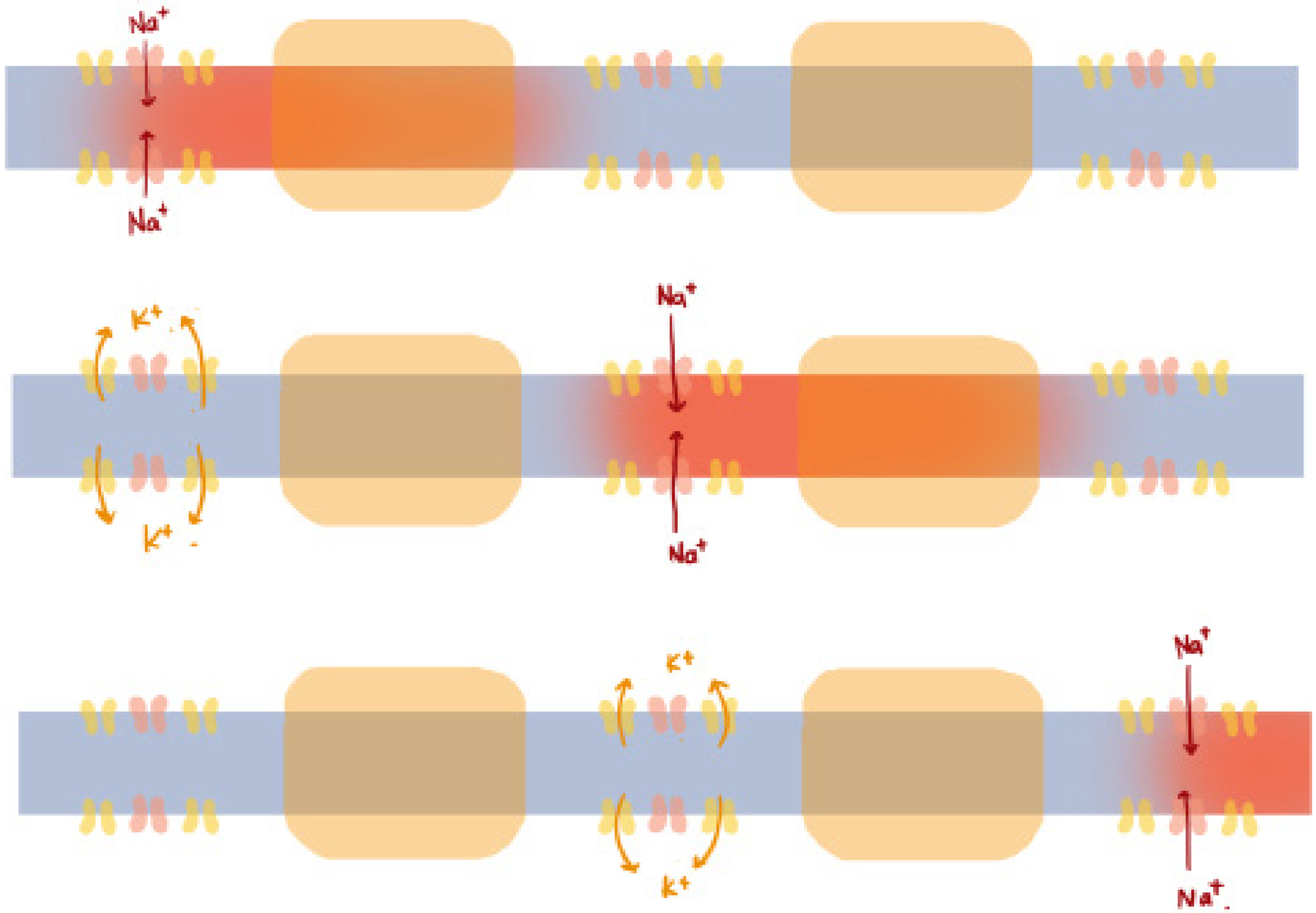
Conduction of APs

Axon Myelination



Conduction of APs

Conduction in a Myelinated Axon



Conduction of APs