

Dental Conference 1 – Ion Channels and Resting and Action Potentials

Ponder these questions in preparation for the conference. There is no need to prepare written answers.

1. Why is the resting potential of a neuron typically so much closer to the potassium Nernst potential than to the sodium Nernst potential?
2. What will be the consequences of blocking the Na^+/K^+ exchange pump on the resting and action potentials?
3. The voltage-dependent sodium channel of the squid axon has an activation gate that opens and an inactivation gate that closes in response to depolarization. So, how do you get current flow through that channel to cause an action potential?
4. How does positive feedback drive the action potential?
5. Dendrite X is thicker than dendrite Y and has a considerably higher density of leakage channels? If they have the same synaptic inputs, which dendrite will show more temporal summation, or will it occur to the same degree in the two dendrites? What about spatial summation?
6. Why is the site of initiation of the action potential typically the initial segment of the axon rather than the dendrites or the cell body, which see incoming synaptic potentials sooner?