**Homework-2**

1.Which way does current flow across the membrane during the rising phase of the action potential? During the falling phase?

(1) Rising phase: From outside to inside.

(2) Falling phase: From inside to outside.

2. Suppose you are recording action potentials from a neuron. How would the action potential be affected if you remove Na+ from the external medium? What if you remove external K+ instead?

(1) The action potential will disappear.

(2) It will take longer time and stronger stimulus to produce an action potential.

3. How does the voltage sensitivity of K+ conductance contribute to the action potential?

(1) The increasing of K+ conduction have a delay to reach the maximum, it gives Na+ current an opportunity to change membrane potential more positive.

(2) As K+ conduction’s rising and Na+ channel’s inactivation, K+ current became the dominant current during falling phase to make membrane potential back to resting potential.

4. What prevents action potentials from turning around and going back up the axon?

The inactivation of voltage-dependent Na+ channel prevents continua excitement of channels. Thus, action potential can only cause a new action potential at the areas where haven’t excited during a short interval.

5. What is patch clamping useful for?

It gives researchers an opportunity to determine the properties of single channel on membrane. And the variants of patch clamp like ‘whole-cell recording’ provides a convenient way to change intercellular component.

6. What experimental approaches can be used to determine which ions can pass through a particular ion channel?

Cell-attached recording by patch clamp.

**Key Terms**

activate

inactivate

membrane conductance

membrane permeability

passive current flow

refractory period

regenerative

resistance

tetraethylammonium ions

tetrodotoxin (TTX)

voltage clamp technique

active transporters

ATPase pump

inactivation

ion selectivity

macroscopic current

microscopic current

mutagenesis

Na+ pump

ouabain

pore

voltage sensor

voltage-gated

X-ray crystallography