

### Resting membrane potential

#### Question 1

Among the following cell types, which cell type does not have a resting membrane potential ?

- a. nerve cells (neurons)
- b. striated muscle cells
- c. smooth muscle cells
- d. cells in a salivary gland
- e. none of the above

#### Question 2

By convention, during an electrophysiological recording of the resting membrane potential the recording electrode is located

- a. inside the cell
- b. outside the cell, in the extracellular fluid.

#### Question 3

A potassium ion channel that opens when a ligand binds to the channel is

- a. a leakage channel
- b. a gated channel

#### Question 4

The Na<sup>+</sup>/ K<sup>+</sup> ATPase pump moves

- a. 1 K<sup>+</sup> out of the cell for each Na<sup>+</sup> moved into the cell
- b. 3 Na<sup>+</sup> out of the cell for 2 K<sup>+</sup> moved into the cell
- c. 2 Na<sup>+</sup> out of the cell for 3 K<sup>+</sup> moved into the cell
- d. 3 K<sup>+</sup> out of the cell for 2 Na<sup>+</sup> moved into the cell
- e. 2 K<sup>+</sup> out of the cell for 3 Na<sup>+</sup> moved into the cell

#### Question 5

If a cell plasma membrane had only leakage channels specific for potassium and no leakage channels for the 3 other main ions (Na<sup>+</sup>, Cl<sup>-</sup>, Ca<sup>++</sup>), its resting membrane potential would be

- a. about - 70 mV, the typical value observed in human cells
- b. about + 70 mV, the typical value observed in human cells
- c. lower than -70 mV, about - 90 mV
- d. higher than - 70 mV, around - 20 mV

Question 6

In humans, the normal  $K^+$  plasma concentration is 4.5 mM. What happens to the resting membrane potential of cells when the plasma concentration increases up to 6 mM ?

- a. it remains unchanged due to homeostasis
- b. it increases (becomes less negative), cells get depolarized
- c. it decreases (becomes more negative), cells get hyperpolarized

Question 7

Aquaporin 1 is a channel allowing water to cross the plasma membrane.

The movement of water through aquaporin is

- a. a passive transport
- b. an active transport

Question 8

A knock out mouse was generated in which the gene encoding aquaporin 1 is inactivated.

Aquaporin 1 is the only aquaporin present in the red blood cells' plasma membrane.

When red blood cells taken for the KO mice are put in pure distilled water

- a. the red blood cells volume remains unchanged
- b. the red blood cell burst open but it takes more time than for the red blood cells from a control mouse
- c. the red blood cells shrink but it takes more time than for the red blood cell from a control mouse
- d. the red blood cells shrink faster than the red blood cells from a control mouse

**Basics on nucleic acids**

Question 9 (one correct answer)

In a DNA double helix

- (a) the two DNA strands are identical.
- (b) uracil pairs with adenine.
- (c) thymine pairs with cytosine.
- (d) the two DNA strands run antiparallel.
- (e) the nucleotides are ribonucleotides.

This is a diagram of a small portion of a DNA molecule. Match the terms below to the numbered labels on the figure.

