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دائرة الامتحانات الرسمية

| مسابقة في الثقافة العلميّة – مادة علوم الحياة | الاسم: |
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Exercise 1 (7 points)   Fight Against Obesity

Although many factors can affect obesity, yet this latter is mainly due to an energetic imbalance where the energy supply is higher than the energy expenditure. This energetic imbalance depends at the same time on the environment, the behavior of the individual, and his genetic predisposition. Energetic supplies consist of the energy contained in solid foods and beverages that can be metabolized (used) by the body.

Document 1

1- Pick out from document 1:
    1.1- The cause of obesity.
    1.2- The factors that affect the energetic balance.
    1.3- The constituents of the energetic supplies.

Obesity corresponds to the increase of the body mass due to the accumulation of fatty acids in the adipose tissue. In order to reduce obesity, two hypotheses are formulated:

Hypothesis 1: It's preferable to adopt a moderate physical activity for a longer duration.
Hypothesis 2: It's preferable to adopt an intense physical activity for a short duration.

In order to validate one of these hypotheses, the variation of the use of fatty acids in the blood and the muscular glycogen as sources of energy is measured in the following two cases:

Case 1: A moderate physical exercise during two different durations. The results are represented in document 2.
Case 2: An intense physical exercise of thirty-minute duration. The results, in this case, show a weak utilization of fatty acids as a source of energy.
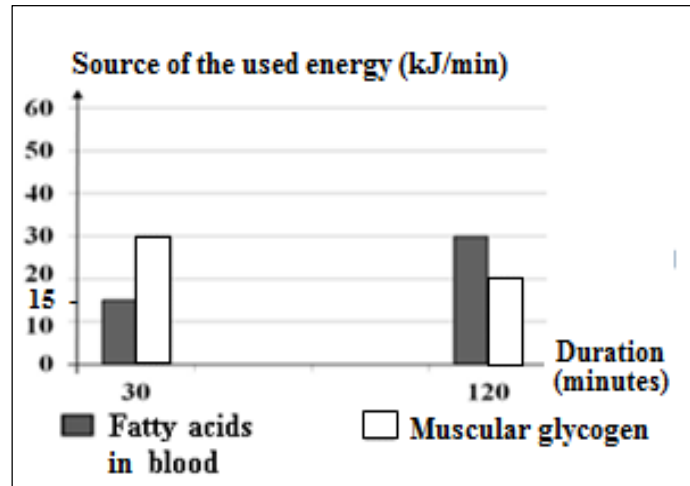
2- Draw a table showing the variation of the source of energy used as a function of the duration of the exercise (document 2).
3- Analyze the results obtained in document 2.
4- Indicate the hypothesis validated by the experimental results in the two cases. Justify the answer.
5- Name two diseases that are enhanced by obesity.

Document 2

## Exercise 2 (6.5 points)   A Characteristic of a Receptor

In the framework of studying the characteristics of sensory receptors, three experiments A, B and C are performed. Stimulations of supraliminal intensities (above threshold) are applied on three different receptors: Pacini corpuscle, Ruffini corpuscle, and Krause corpuscle. The obtained APs are recorded at the level of the nerve fiber that corresponds to each type of the receptors.

The results of the experiments A and B are represented in document 1.

1- Define the threshold intensity.
2- Pick out from document 1 the stimulus used in each experiment.
3- Specify, based on experiments A and B, the receptor that is sensitive to pressure and the one that is sensitive to heat.
4- Draw out the characteristic of the receptors revealed in document 1.

In experiment C, the three receptors are subjected to an intense cold.

5- Based on document 1, draw in case of experiment C, the possible recordings obtained at the level of the nerve fibers corresponding to each of the three types of the studied receptors, knowing that only Krause corpuscle is sensitive to cold.
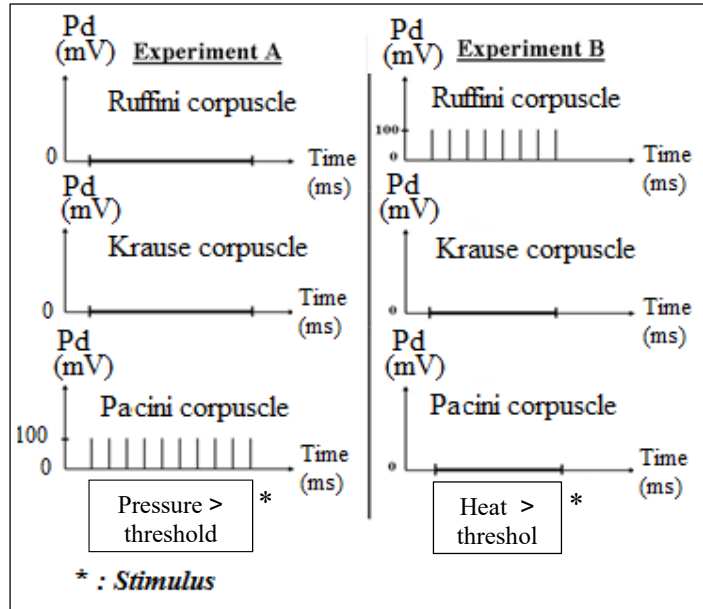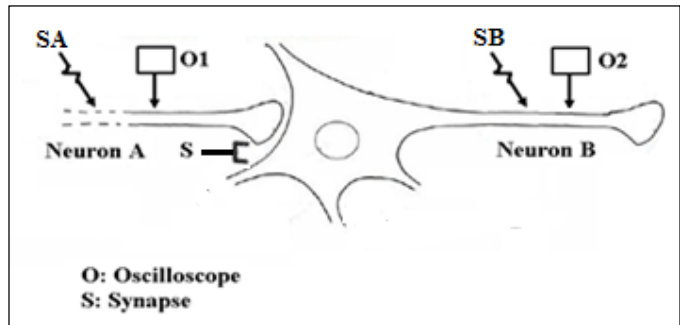
Document 1

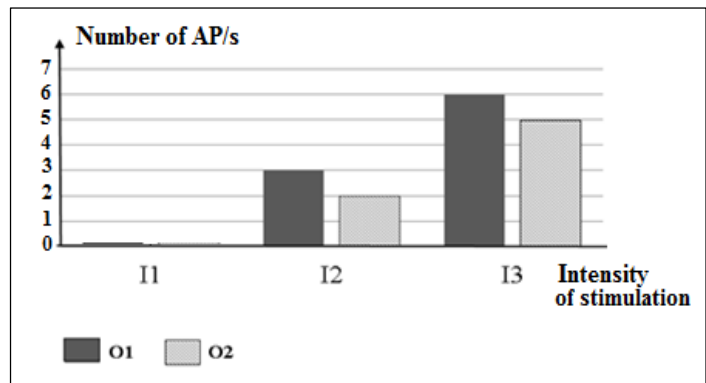## Exercise 3 (6.5 points)   Synaptic Functioning

In the framework of studying the transmission of the nerve message, three stimulations (SA) of increasing intensities I1, I2, and I3 are applied at the level of neuron A. The experimental setup is shown in document 1 and the obtained results are represented in document 2.

1- Analyze the results obtained at the level of neuron A (recorded by O1).
2- Draw out the type of coding of the nerve message.
3- Specify whether synapse S is excitatory or inhibitory.

An effective stimulation SB is applied at the level of neuron B (document 1). A response is recorded only by O2.

4- Draw out a characteristic of the transmission of the nerve message at the level of a synapse.
5- List the steps of the transmission of the nerve message at a synapse.

Document 1

Document 2