

مسابقة في مادة علوم الحياة

المدة: ساعة

(باللغة الإنكليزية)

الاسم:

الرقم:

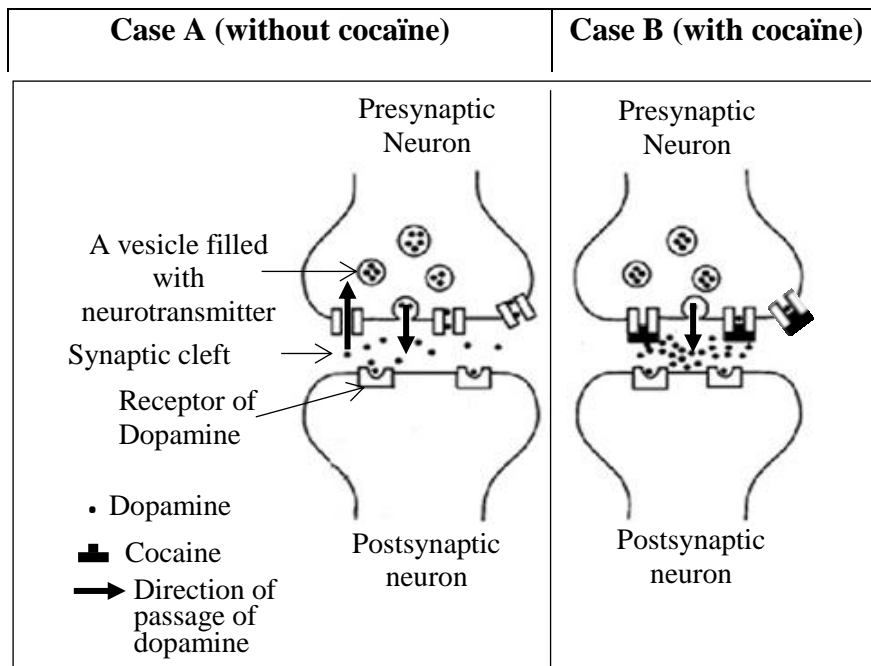
Exercise 1 (7 points)

Cocaine , a Fake Paradise

Cocaine is a drug of plant origin. It acts at the level of dopamine synapses.

Dopamine is a neurotransmitter responsible for the sensation of pleasure.

Document 1 shows the functioning of a dopamine synapse without cocaine (Case A) and with cocaine (Case B).



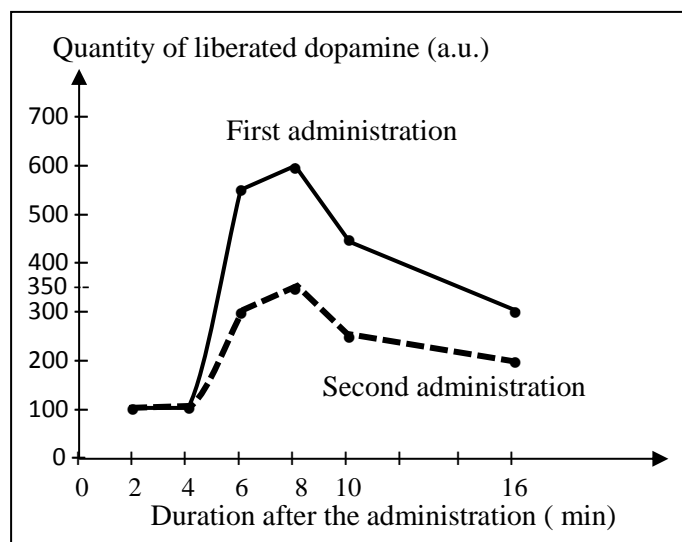
Document 1

1. **Draw out** the step of synaptic transmission that is perturbed by cocaine.
2. **Explain** how cocaine leads to a stronger sensation of pleasure.

In an attempt to verify if cocaine provokes quick occurrence of tolerance, researchers carried out the following experiment:

A monkey receives the first administration of cocaine followed by a second one of the same dose, several days later. The amount of dopamine liberated by the nerve cells of the brain is measured after each administration of cocaine.

The below document (doc.2) presents the obtained results.



Document 2

Tolerance to a drug corresponds to the reduction of the effect of this drug.

3. **Show**, by referring to document 2, that cocaine leads to a state of tolerance.
4. **Name** a consequence of the consumption of drugs other than tolerance.
5. **Justify** the following statement:

“Cocaine is an artificial paradise that leads quickly to hell”.

Exercise 2 (7 points)

Advantages of Dietary Fibers

Dietary fibers constitute an important part of all balanced food diets; even though they are neither digested nor absorbed by the body.

In the digestive tract, the intestinal transit has a normal duration that ranges between 30 and 40 hours. In case this duration exceeds 72 hours, the dietary fibers accelerate the intestinal transit, but in case this duration is less than 24 hours, the dietary fibers slow down this transit.

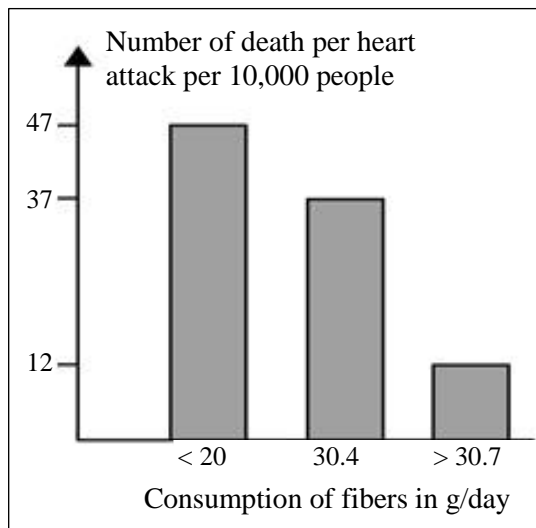
Moreover, a diet rich in dietary fibers provokes a decrease in cholesterol and triglycerides (lipids) levels in the blood.

1. **Justify** the following statement:

"Dietary fibers control food transit".

2. **Explain** the mechanism which permits the formation of atheroma plaque due to high level of cholesterol in blood.

The below **document (doc.1)** represents the results of a study that shows the variation of the number of death by heart attack as a function of the daily consumption of dietary fibers.



Document 1

3. Draw a table that represents the results illustrated in document 1.

4.1. Analyze the results represented in document 1.

4.2. What do you conclude?

The below **document (doc.2)** represents a comparison between Europeans living in Africa and the native people of Africa

Europeans living in Africa are more affected than native people of Africa by diseases such as disruption of intestinal transit as well as cardiovascular diseases. The diet of these European immigrants provides less than 25 g of dietary fibers per day, while that of the African population provides up to 100 g of dietary fibers per day.

Document 2

5. Explain , based on all what preceded:

Why Europeans living in Africa suffer from cardiovascular diseases more than native African people.

Exercise 3 (6 points)

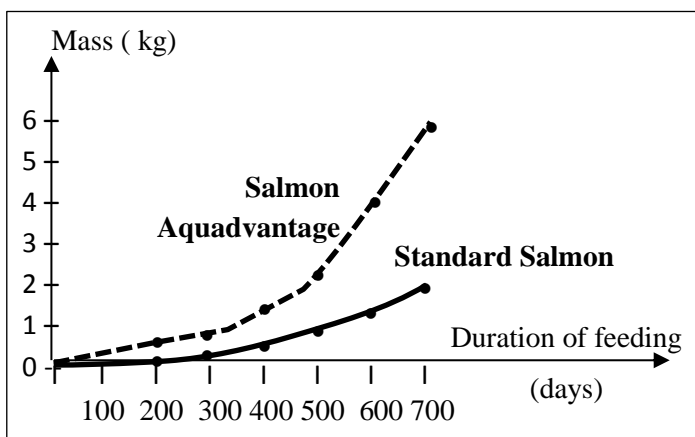
The Salmon « Aquadvantage »

Salmon « Aquadvantage » is a genetically modified salmon that received the gene of growth hormone (GH) from another species of fish, *S.chinook*. Salmon « Aquadvantage » has been recently accepted to be consumed by humans.

1. Pick out the gene involved in the production of salmon « Aquadvantage ».
2. Name the enzyme utilized in cutting the gene.

As compared to the standard salmon (non-transgenic), **the salmon « Aquadvantage » needs 20% less food, it is more resistant to cold**, and consequently it can grow throughout the year. Moreover, **its raising does not require any antibiotic**.

The document below represents the variation of the mass of salmon "Aquadvantage" and that of standard salmon. These fish are raised under the same conditions, starting the first day of feeding.



3. Show, by referring to the document, that this transgenesis permits salmon fish to grow faster.
4. Why the salmon "Aquadvantage" is qualified as transgenic fish?
5. Draw out two advantages of raising this type of salmon for the fish farmer.