This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 03

26JAN2024

Do NOT write in this box. Your MARK will be placed here.

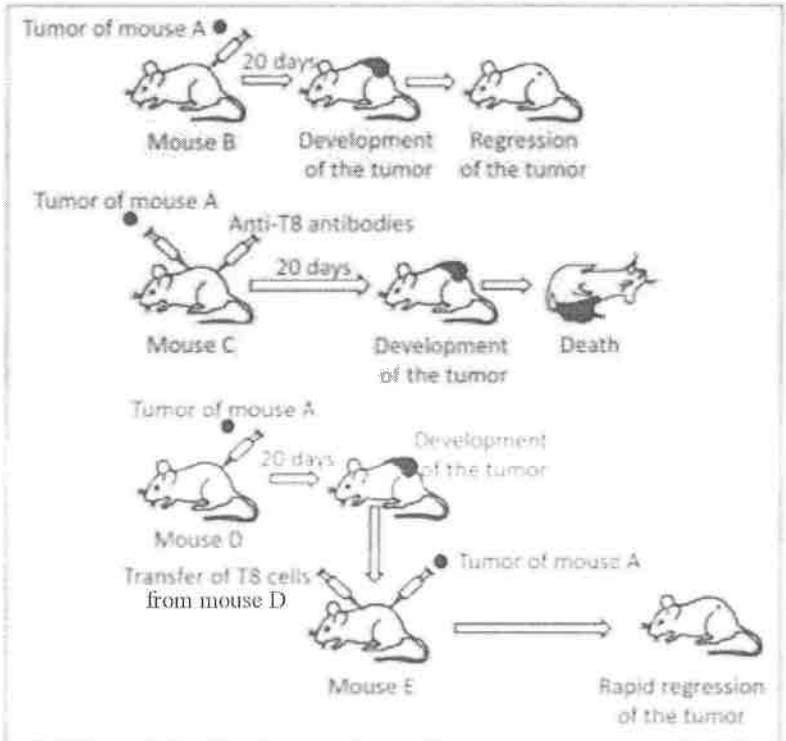
Subject :	Biology
Class :	12E
Teacher :	Christine Khalil
Duration :	1 hour

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

In 1960, C. Brunet suggested the theory of "cancer immunosurveillance", according to which the body recognizes cancerous cells because they express antigens on their surface. This theory has made it possible to set up immunotherapy (to stimulate the immune system to fight against a disease) which remains one of the current research avenues in the fight against cancer.
To determine certain aspects of the immune response against cancer cells, the following experiments are performed.

Experiment 1: Document 1 summarizes a series of experiments realized on mice of the same strain. Anti-T8 antibodies block the action of T8 lymphocytes.



Document 1

1. Interpret the experiments of document 1. (2)
2. Specify the type of the immune response shown in document 1. (1.5)

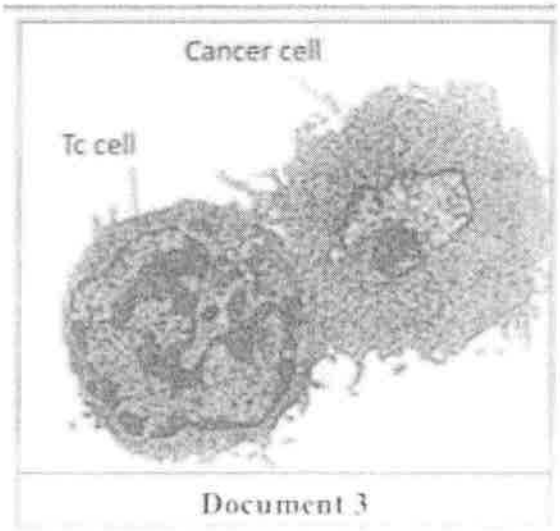
Experiment 2: In order to know how lymphocytes recognize cancer cells, we prepare 3 culture media 1, 2 and 3. Document 2 shows the content of each medium and the obtained results.

3. Determine, based on document 2, the necessary conditions for the action of lymphocytes. (2.5)

Medium	1	2	3
Content	Activated lymphocytes of strain A + cancer cells of strain A	Activated lymphocytes of strain A + cancer cells of strain B	Activated lymphocytes of strain A + normal cells of strain A
Results	Destruction of cells	No destruction of cells	No destruction of cells

Document 2

Document 3 shows an electronography of a Tc lymphocyte recognizing a cancer cell at the level of the tumor.



Document 3

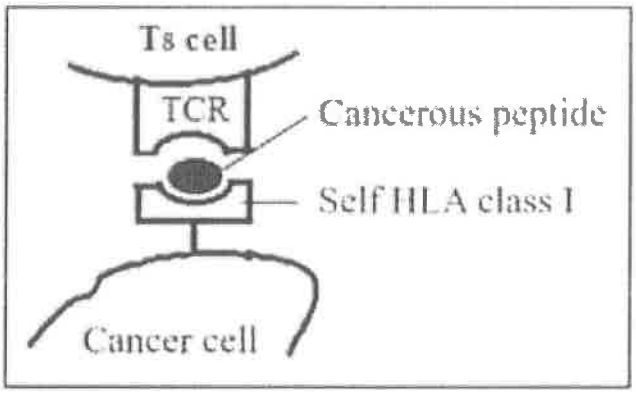
4. Draw a figure showing the different molecules involved in the recognition of the cancer cell by the Tc cell. (1.5)
5. Explain, based on your own knowledge, how does the elimination of cancer cells occur in such an immune response. (2.5)

To amplify the immune response against cancer cells, interleukin 2 is injected.

6. Explain how can interleukin 2 amplify the immune response against cancer cells. (2)

Bareme for 12E SE03

1. There is regression of the tumor after its development in mouse B injected with a tumor of mouse A. While, mouse C dies after the development of the tumor in this mouse injected with tumor of mouse A and anti-T8 antibodies. Whereas, there is rapid regression of the tumor in mouse E injected with tumor of mouse A and T8 cells taken from mouse D which showed a development of the tumor after being injected with tumor of mouse A.
   This indicates that T8 cells are responsible for tumor regression. (2)
2. Specific cell-mediated immune response since it is done by T8 cells that are effectors of this response. (1.5)
3. There is destruction of cancer cells of strain A by activated lymphocytes of strain A. On the contrary, there is no destruction of cancer cells of strain B and normal cells of strain A by the same lymphocytes. Therefore, T lymphocytes of a strain only destroy cancer cells of the same strain as them. (2.5)
4. Figure showing the different molecules involved in the recognition of the cancer cell by a Tc cell. (1.5)



5. The T killer lymphocyte recognizes using its TCR the complex non-self-peptide with HLA class I on the surface of the target cell. The T killer then secretes perforin that forms polyperforin channels through the membrane of the target cell. Then, they secrete granzymes that penetrate into the cell through the polyperforin channels leading to the degradation of the DNA of the target cell resulting in its death. Finally, the T killer detaches and searches for another target cell while the dead cell is eliminated by phagocytosis. (2.5)
6. IL-2 stimulates the proliferation of T8 cells which allows them to differentiate into T killer cells capable of destroying cancer cells. (2)