

Spring 2003 Immunology Exam #2 - Chapters 5 - 7

There is no time limit on this test, though I have tried to design one that you should be able to complete within 4 hours, except for typing. You are not allowed to use your notes, or any books, any electronic sources, nor are you allowed to discuss the test with anyone until all exams are turned in at noon on Friday February, 28. **EXAMS ARE DUE AT NOON ON FRIDAY FEBRUARY 28.** The **answers to the questions must be typed on a separate sheet of paper** unless the question specifically says to write the answer in the space provided. If you do not write your answers on the appropriate pages, I may not find them unless you have indicated where the answers are. There is one question where you will have to use the internet. For this question only, you may use a browser but you may only go to the one site indicated in this test. There are 3 pages to this exam, including the cover sheet.

When you are ready to take the exam, send me an email with the subject line of **Immunology Test**. This will generate an automated email telling you how to download the exam.

-3 pts if you do not follow this direction.

Please do not write or type your name on any page other than this cover page. Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print here):

Write out the full pledge and sign:

How long did this exam take you to complete (excluding typing)?

10 pts.

I. Define these terms: 1 pts each. Define the terms and demonstrate your knowledge. These terms can be define succinctly so using a lot of words is not the best way to demonstrate your fluency with these terms. You may combine words with pictures if this helps, but don't hand write the words unless you print VERY neatly. However, note that unlike the first test, I will not be grading these as harshly since they are worth fewer points.

AIRE

tapasin

HLA-B53

toxic shock syndrome

SH2

CD3

double positive thymocyte

pT \square

isotype exclusion

CAD

Part II

These questions are intended to be very large ones. Your answers should summarize a lot of information. I decided to see how you can integrate this information rather than breaking it up into smaller unrelated questions.

12 pts.

1) Explain how the tetanus vaccine works. Begin with what is injected and follow it through to the adaptive immune response. Do not address the issue of being re-exposed to tetanus toxin due to exposure after immunization. For your answer, please use an outline and/or pictures to show all the significant steps in this process. Do not address lymphocyte development or selection in this answer. Do not address details of signal transduction either.

12 pts.

2) Explain how a small pox vaccine works. Begin with what is injected and follow it through to the adaptive immune response. Do not address the issue of being re-exposed to the virus due to exposure after immunization. For your answer, please use an outline and/or pictures to show all the significant steps in this process. Do not address lymphocyte development or selection in this answer. Do not address details of signal transduction either.

12 pts.

3) Make two flow charts or outlines to show how information flows from ligand binding to a BCR to the production of secreted IgA. Your answer should be divided into two halves. The first half is information from the outside to the inside. The second half is how the B cell responds to produce secreted IgA. For this question, assume the antigen stimulates a thymus-independent response. Remember to stick to the significant steps of signal transduction and antibody production. Start with a mature B cell and make all of your flow charts/outlines legible.

5 pts.

4) One way to treat someone with allergies is to inject them with the soluble allergy-producing antigen over a long period of time. Explain how this might lead to the reduction of an immune response.

34 pts.

5) Each year, Project Life raises money to tissue type people on campus. Imagine a donor has this genotype

A1 B1 C1 DP11 DQ11 DR112

A2 B2 C2 DP22 DQ22 DR243

while the recipient has this genotype

A3 B3 C3 DP33 DQ33 DR356

A4 B4 C4 DP44 DQ44 DR487

Part a: Explain what would happen to developing immature B cells if the donor's bone marrow were transplanted into the host and the host was first treated to kill all of the host's bone marrow. Begin your answer with a B cell that has a fully formed BCR and stop your answer once the B cell leaves the bone marrow, if that is possible.

Part b: Explain what would happen to developing immature T cells if the donor's bone marrow were transplanted into the host and the host was first treated to kill all of the host's bone marrow. Begin your answer with a T cell that has a fully formed TCR and stop your answer once the T cell leaves the thymus, if that is possible.

Part c: Explain what would happen to the bone marrow recipient if he/she were infected with a virus 1 year after the bone marrow transplant. Start your answer after the virus has infected a particular cell and stop your answer after the adaptive immune response, if that is possible.

9 pts.

6) a. Where does an anergic B cell die?

b. How/why does it die?

c. Does the death of an anergic B cell differ from the death of the other 5×10^5 newly made B cells? Explain your answer.

6 pts.

7) How are recirculating T cells kept alive? In other words, describe the interactions that mature but naïve T cells use to avoid apoptosis.

+2 Bonus Points: Would a surviving T cell have more or less Bcl-2 than a T cell that fails positive selection? Explain your answer.