

Spring 2006 Immunology Exam #1 - Chapters 1 - 4

There is no time limit on this test, though I have tried to design one that you should be able to complete within 3 hours. You are not allowed to use your notes, any books, any electronic sources, nor are you allowed to discuss the test with anyone until all exams are turned in at 9:30 am on Friday February 3. **EXAMS ARE DUE AT CLASS TIME ON FRIDAY FEBRUARY 3.** Turning in an exam late will cost you a letter grade for each 24 hours. The **answers to the questions must be typed** unless the question specifically says to write/draw the answer in the space provided. If you do not type your answers on the appropriate pages, I may not find them unless you have indicated where the answers are. You will need black, blue, and red ink pens, as well as a regular pencil to answer at least one question on this exam.

There are 3 pages to this exam, including the cover sheet.

-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 this exam?

30 pts.

I. Define these terms: 3 pts each. First define the terms and then provide a specific example to further demonstrate your knowledge. Do not draw pictures as part of your definitions. These terms can be define succinctly, so using a lot of words is not the best way to demonstrate your fluency with these terms. If you do not know a real example, make up one that is very similar to a real one, but be sure to indicate when you are making up a hypothetical example.

Langerhan's cell

self antigen

γ/δ T cells

zymogen

C5a

adjuvant

hapten

β_2 microglobulin

allotype

12/23

Part II

10 pts.

- 1) a. In outline format, explain the clonal selection theory.
- b. If all the mature B cells in a small population (≤ 50) came from one immature B cell, describe in detail the BCRs on these mature B cells.

10 pts.

- 2) a. Give three reasons we get booster shots?
- b. Graph the anti-tetanus toxin antibody concentration and isotype in your blood over time (in years): prior to immunization; after first round of immunization; after first booster shot.

10 pts.

- 3) Warts are caused by viruses living in your skin cells. Explain why warts are able to survive in your skin and your immune system can do very little to get rid of them.

8 pts.

- 4) Based only on what we know so far (Chapters 1 – 4) about the immune system, explain a typical reaction to a mosquito bite.

10 pts.

5) For this question, you will make one single drawing that has multiple layers. I suggest you practice at least once so you get it the way you want.

- a. Use **black ink** to draw a picture of a TCR and label the CDRs.
- b. Use **blue ink** to indicate the sites of TCR somatic recombination junctions.
- c. Use **red ink** to indicate the sites of TCR somatic hypermutations.
- d. Use **normal pencil** to superimpose the location of an MHC I plus peptide on top of your TCR.

6 pts.

6) List as many ways as you can think of which our immune systems kill bacterial infections.

8 pts.

7) Draw a picture of a Ig heavy chain gene after somatic recombination that could be used to produce an IgD molecule.

8 pts.

8) Draw a picture of a T helper cell interacting with a macrophage in such a way that the T helper cell will be activated. Label all the important parts.