

## Spring 2003 Immunology Exam #3 - Chapters 8 - 10

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 class time on Wednesday April, 2. **EXAMS ARE DUE AT CLASS TIME ON WEDNESDAY APRIL 2.** 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.

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)?

**12 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.

primary focus

recirculate

FasL

affinity maturation

TI antigen

colostrum

staple conformation

FcRn

ADCC

transcytosis

M cells

T<sub>H</sub>3

## **Part II**

**These questions are intended to be ones which require you to synthesize a lot of specific information. I decided to see how you can integrate this information rather than breaking it up into smaller unrelated questions.**

**10 pts.**

1) Design a strategy to shift an allergic response to grass from an annoying one to a harmless response. As you outline your approach, connect your approach to theory or rules we have covered. An answer that lacks theoretical backing will be worth only half the number of points. Although I would be eternally grateful for a simple and readily available answer, I will evaluate your answer based on theoretical constraints rather than on currently practiced immunotherapy.

**10 pts.**

2) Outline how you could immunize a person to elicit a cytotoxic T cell response instead of an antibody response. Use as your goal to eliminate a virus that infects muscle cells.

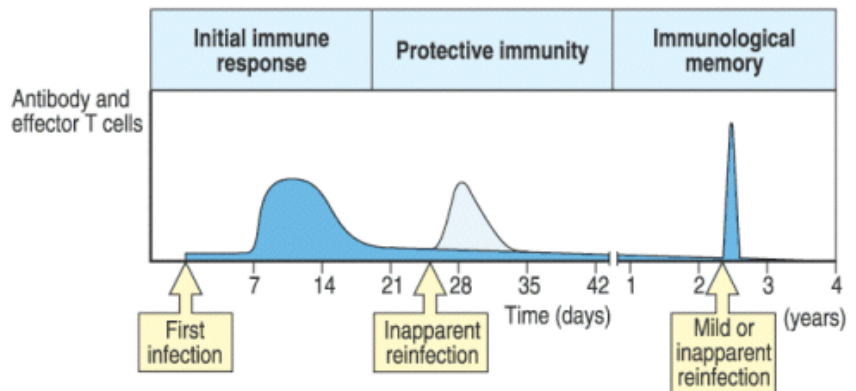
**10 pts.**

3) Outline how you could help someone infected with intestinal worms if the worms have been in the patient for over a year. These worms burry their sucker parts into your intestinal lining but the bulk of their body is within the lumen of your intestines. You cannot simply say give them drugs that kill worms. I want you to devise an immunology-based treatment. For this question, you have unlimited lab help and funding, so don't let something simple like purifying a protein or cloning a gene stop you.

**35 pts.**

4) **OUTLINE** a normal immune response to particular antigens listed below. To answer this multi-part question, use the following figure to guide your multi-part answers. One caveat, the timeline in this figure is in days and years, but your time line should be first exposure at day zero, second exposure 3 months later and final exposure 2 years after first exposure.

- a. allergic response to a bee sting
- b. anthrax infection in lungs
- c. tuberculosis infection
- d. Giardia in your intestines
- e. bot fly larvae under your skin



**6 pts.**

5) Explain how your immune response to a virus can leave you vulnerable to serious infection under the following condition. This virus has 3 proteins on its outer coat and all 3 are needed to infect your cells. Each year one of these proteins mutates such that the protein still functions but your antibodies can no longer recognize the mutated protein. The first year you generate a strong humoral response but in year three, you get very sick.

**7 pts.**

6) Outline how to vaccinate an infant against a new pathogen if the outer surface of the pathogen is composed of sugars only. Furthermore, explain the infant's immune system would respond after vaccination to successfully protect the infant from infection.

**6 pts.**

7) Describe two components of the immune system where invariant TCRs appear to play a critical role in your immune system.

**4 pts.**

8) List as many examples as you can how a mothers boost the immunity of their children.

**+2 Bonus Points:** With regards to our immune system, speculate what multicellular parasites must be able to do in order to survive in human hosts?