NTNU

Faculty of Medicine

Department of Laboratory Medicine, Children's and Women's Health

WRITTEN EXAMINATION:
MOL3005 Immunology

Thursday Dec 15th 2011, 9.00 am - 1.00 pm

ECTS credits: 7.5

Number of pages (including front-page): 3

Examination support: Language dictionary (Medical dictionaries or similar dictionaries on biology are not permitted).

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Examination results are announced on http://studweb.ntnu.no/

Examination question 1 (26 points).

a) What is phagocytosis and why is it important?

b) What types of phagocytic cells do we have and what are their major characteristics?

c) Shortly describe the difference between humoral and cell-mediated immunity

d) What are the major properties of the innate immune system?

e) How is LPS recognized and what are the two main cytokine responses activated in innate immune cells in response to LPS?

f) How do cells of the innate immune system contribute to activation of adaptive immune responses?

g) Cytokines rarely act alone. They can have pleiotropic effects, redundant effects, synergistic effects or antagonistic effects. Describe these terms.

Examination question 2 (23 points).

a) Viral antigens are predominantly presented via MHC class I molecules, bacterial antigens via MHC class II. What is the reason for this?

b) Name and briefly explain a process by which bacterial antigens can be presented via MHC I to CD8+ T cells.

c) Why could it be interesting to use this mechanism to develop more successful vaccines?

d) List central steps in T-cell activation. Name accessory factors that are involved and briefly explain how they contribute to successful T cell activation.

e) Into which main effector T cell subsets can naïve CD4+ and CD8+ T differentiate upon activation?

f) What factors determine the differentiation into the different CD4+ T cell effector lineages and what are the main characteristics/functions of the different subsets?

Examination question 3 (22 points).

a) Draw the structure of an antibody and indicate major functions

b) Mention the three main mechanisms that generate immunoglobulin diversity.

c) Where and at which level in the B-cell development do these processes occur?

d) Describe the mechanism of V(D)J recombination (include a figure, remember to explain your drawing).

e) Describe the mechanism of class switching.

f) Describe the main differences between a primary and secondary humoral immune response.

Examination question 4 (14 points).

a) Describe the Th1/Th2 balance briefly

b) What type of immune response is best for fighting virus infections?

c) Type I interferons are efficient in antiviral defences. Shortly describe why and how?

d) List the major pathways of cell death, and three mechanisms for induced cell death

Examination question 5 (15 points).

a) Complement is important in many immune reactions. What triggers activation of complement?

b) What are the main biological functions of complement factor split products a?

c) Coombs and Gell classified hypersensitivity reactions into several types. How many?

d) Why are the immediate reactions immediate and the delayed type delayed? Explain in only a few words.

e) Explain the development of the severe hemolytic disease of the newborn (erythroblastosis fetalis). You may illustrate by drawing a schematic. Which type of hypersensitivity is this? Explain shortly how this condition may be treated.