WRITTEN EXAMINATION:
MOL3005 Immunology

Thursday December 13th 2012, 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/ Jan 18th
Examination question 1 (25 points).

a) Lymphoid organs are divided into primary central and secondary peripheral organs. Briefly describe the organs and their main role(s) in the immune system. 6p

b) Only a very small portion of thymocytes (developing T cells) survive the thymic maturation process. What are the reasons? 6p

c) Specific interaction of the T cell receptor with the MHC-peptide complex is the central step in T cell activation. What else is needed for successful T cell activation? Name and describe the function of accessory molecules. 7p

d) MHC molecules serve different roles and are recognized by different immune cells. Briefly describe receptors and immune cells that recognize MHC, and for what purpose. 6p

Examination question 2 (27 points).

a) How do the toll-like receptors (TLR) and inflammasomes collaborate in interleukin (IL)-1b secretion? 6p

b) *Yersinia pestis* is a Gram negative bacterium famous for causing bubonic plague (svartedauden) when transmitted to humans through flea bites. Explain the innate mechanism for why *Y. pestis* is so potent in humans? 6p

c) What are the main effector functions of the complement products C3b, C5a and C5b-9? 6p

d) Describe the three pathways for induced cell death (apoptosis)? 9p

Examination question 3 (25 points)

Describe B-cell development and detail the mechanisms contributing to antibody diversity, including those occurring during antigen-dependent activation of B-cells in germinal centres.

Examination question 4 (16 points).

a) What does the abbreviation HIV stand for and what type of disease will HIV result in if untreated? 4p

b) Why are untreated HIV patients susceptible to opportunistic infections? What branch of the immune system is most affected, and how does this explain the vulnerability to some opportunistic pathogens more than others? 6p

c) How can you test if a person is HIV-positive? During the course of infection, when would you expect the different available test methods to be best – and why? 6p

Examination question 5 (7 points).

Describe the combined views of the hygiene hypothesis and the developmental immunologic programming on the susceptibility for developing IgE-mediated allergy (type 1 hypersensitivity).