

Cell Biology and Pathology

Examination topics for the state doctoral examination

A. Molecular and Cellular Biology

Basic chemical composition of a cell and the cell metabolism

Genome and gene expression

DNA – replication, transcription; RNA – types, splicing

Biological functions of proteins – enzymes

Cell – types (eukaryotes, prokaryotes, vegetable vs. animal cell) and basic organization

Structure and function of biological membrane and cell organelles

Cell nucleus – structure, function, pathology

Cellular transport

Cytoskeleton – components and their functions

Cell cycle and cell division, cell death

Stem cells and cell differentiation

Basic types of tissues

Intercellular communication, cell adhesion and motion

Structure and function of intercellular matrix

B. Basic methods for investigation of cells and tissues

Microscoping technique – optical and electron microscope, advanced microscoping methods

Methods in histochemistry; immunocytochemistry and histochemistry

Basic molecular genetic methods – PCR, sequencing, in situ hybridization

Survey of biochemical methods in cell biology – blotting techniques

Model organisms, tissue and cell cultures

C. General pathology of cells and tissues

Regressive changes to cells and tissues

Inflammation and survey of defensive response of the organism

Interactions of cells with pathogens

Regeneration and reparation of tissues, metaplasia

Tumour transformation of the cell, major types of tumours

Physiological and pathological growth of vessels

Cellular biological bases of cardiovascular and metabolic conditions

Recommended literature

Alberts B. et al.: Molecular Biology of the Cell (6th edition), 2014, Garland Science

Alberts B. et al.: Essential Cell Biology (4th edition), 2016, Garland Science

Pollard T. D., Earnshaw W. C., Lippincott - Schwartz J.: Cell Biology, (3rd edition), 2016, Elsevier

Lodish H. et al.: Molecular Cell Biology (8th edition), 2016, W. H. Freeman and Co.

Weinberg R. A.: The Biology of Cancer (2nd edition), 2013, Garland Science

Sambrook J. et al: Molecular cloning: A laboratory manual/Joseph Sambrook,

David W. Russel, (3rd edition) Cold Spring Harbor, NY: Cold Spring Harbor Laboratory, 2001.