

Biochemistry and Pathobiochemistry

Examination topics for the state doctoral examination

General biochemistry topic areas

- Relation of the structure of biomolecules to their properties and functions – proteins, nucleic acids, saccharides, lipids.
- Metabolism of saccharides and lipids in the aspect of biological energetics.
- Enzymes – mechanisms of action, kinetics, regulation of activity.
- Biological synthesis and decomposition of amino acids, their transformation to specialized biomolecules – porphyrins and bile pigments. Neurotransmitters, hormones.
- Biochemistry of transmission of genetic information (enzymology of nucleic acids).
- Proteosynthesis.
- Regulation of gene expression.
- Molecular principles of intracellular cell signalling.
- Molecular principles of intercellular communication.

Supramolecular biochemistry

- Structure of membranes and cell organelles
- Cytoskeleton
- Extracellular matrix
- Function of cell organelles (Golgi apparatus, endoplasmic reticulum, lysosomes, mitochondria, ribosomes)
- Membrane transport
- Cell cycle and its regulation, tumour cell proliferation
- Apoptosis

Examples of special topic areas (according to the doctorand's bias)

Methodology

- Isolation and purification of biomolecules
- Immunochemical methods
- Sequencing of proteins and nucleic acids
- Manipulation with nucleic acids, gene engineering
- Isolation of cells, cell cultures
- Spectrophotometry

Other questions considering the topic of the dissertation thesis – will be set by the examining board and supervisor.

Recommended literature

A university textbook of medical biochemistry, e.g.
Harper's illustrated biochemistry, by Murray R. K. et al.
Medical Biochemistry, by J. Baynes and M. Dominiczak
Molecular Biology of the Cell, by Bruce Alberts