WARSZAWSKI
UNIWERSYTET
MEDYCZNY

Katedra i Zakład Histologii i Embriologii
Centrum Biostruktury
Warszawski Uniwersytet Medyczny

CYTOPHYSIOLOGY 6-year MD program 2024/25
SECOND YEAR

LITERATURE
Obligatory:
Basic Course Textbooks:
Essential Cell Biology - Alberts at all (ed.)
Medical Cell Biology by Goodman (ed.)
Rewiew:
Cell and Molecular Biology Lippincott's ilustrated Review by Chandar , Viselli
Supplementary:
Molecular Cell Biology by Albers et all (ed.)
Cell Biology by Karp
The cell – a molecular approach by Cooper, Hausman (ed.)

1.	**8, 10 October**	**Physiology of selected cytoplasmic processes. Structure and function of cytoplasm and cell membranes.**. Physiology of membrane enclosed compartment. Physiology of selected cytosolic processes. Ribosomes, Polisomes. Endo and exocytosis pathways. Interactions between cells and extra-cellar matrix. Cytoskeleton. Physiology of cell membranes. Structure of lipids and their function In the cell and extracellular matrix. Lipids rafts. Caveolae. Asymmetry of the plasma membrane. Cellular transport. Glucose transporters. ABC transporters and MDR phenomenon.	**Łukasz Biały, Associate Professor**
2.	**15, 17 October**	**Cytophysiology of Cell nucleus and function. Structure of nucleus** Structure of the cell nucleus. Structure of chromatin and its modifications. Tissue specific modifications of chromatin. Transcriptional activity of chromatin. RNA interference Chromosomes. Telomers. Nuclear structures involved in RNA processing.Nucleolus- structure and function. Nuclear envelope and nuclear-cytoplasmic transport. Nuclear processes before cell division. RNA interference.	**Agata Góźdź, PhD**
3.	**22, 24 October**	**Cell to cell communication** **Cell signalling – intracellular pathways.** Types of communication between cells in the human body. The answer of cells to extracellular stimuli**.** Receptors, second messengers (cAMP, cGMP, Ca2+. IP3, DG at al.), transcription factors (general and specific – ie. CREB, AP-1, NFkB). Structure and function of G-proteins. Receptor and non-receptor tyrosine kinases. Kinases Src, Jak. MAP, Akt, PI3K pathways.	**Anna Iwan, Associate Professor**
4.	**29, 31 October**	**Cell signalling events.** **Clinical aspect of cell signalling .** Cell signalling by selected hormones, cytokines, growth factors and extra-cellar matrix components. Pathways activated by insulin, steroid hormones, nitric oxygen. Abnormalities in the cell signalling in human diseases. Cell signalling pathways as a therapeutic target.	**Jacek Malejczyk, Professor**

5.	**5, 7 November**	**Cell proliferation.** **Regulation of the cell cycle.** Types of cell division; mitosis, meiosis. Cell cycle. Structure and function of mitotic spindle. Karyo- and cyto- kinesis. Cyklins i CDKinases. Role of p53, p21. pRb, Cdc25, Cdc6, APC-complex. Action of drugs interfering with cell division.	**Justyna Niderla-Bielińska, Associate Professor**
6.	**19, 21 November**	**Cell differentiation.** **Stem cells** Mechanism of cell differentiation. Genes involved in Cell differentiation. Epigenetic mechanisms. Cell differentiation during embryogenesis and tissue regeneration. Cell potency. Stem cells, progenitor cells. Cell differentiation of stem cells in the human body.	**Ewa Jankowska Steifer, Associate Professor**
7.	**26, 28 November**	**Cell senescence and aging.** **Cell death** Cellular senescence. Replication senescence. Cell death: apoptosis, necrosis and other types of cell death. Apoptotic pathways. Execution of apoptosis. Caspases. Apoptosis without caspases. Physiological apoptosis. Apoptosis induction as a therapeutic target. Methods of detecting of apoptotic cells.	**Anna Hyc, Associate Professor**
8.	**3, 5 December**	**Mechanisms of oncogenesis**. **Caner transformation.** Protective cellular mechanisms against cancer transformation. Abnormal gene expression in cancer. Role of p53, p21, Rb, onco mi-RNA. ATM/ATR, BRCA1/2. Malignant transformation on the example of retinoblastoma, colon cancer, breast cancer, lung cancer, chronic myeloid leukaemia.	**Łukasz Biały, Associate Professor**
9.	**10, 12 December**	**Cancer cell biology - selected topics.** **Molecular cancer therapy.** Cancer cells properties. Abnormalities in cellar processes in cancer cells. Abnormal cell growth. Models of cancer evolution. Cancer stem cell theory. Tumor progression. Tumor angiogenesis. Cancer cell – extracellular matrix interactions and metastasis**.** Cellular target of anticancer drugs incl. molecular targets of novel drugs in oncology.	**Izabela Młynarczuk-Biały, Associate Professor**
10.	**17, 19 January**	**Regenerative medicine and tissue bio- engineering.** **Cell therapy.** Cells in regenerative medicine. Stem cells – embryonic and somatic. Differenciated cells: autologenic, izogenic (syngenic), allogenic, xenogeneic, primary and secondary. Method of stem generation: embryonic, somatic and induced stem cells. Therapeutic cloning**.** Stem cell therapy possibilities in clinical usage.	**Ilona Kalaszczyńska, PhD**
11.	**14, 16 January**	**Tissue and cell banking for medical proposes.** Rules of tissue and cell banking. Qualification of donors of tissues and cells. Organisation of tissue and cell banking in Poland, EU at the word. Types of transplantation. Clinical usage of transplants. Coordination 2f tissue and cell transplantation. Advanced technology medical products (ATPM) in tissue and cell banking. Types of the scaffolds and cells in tissue engineering. Transplantation in a regenerative medicine.	**Artur Kamiński, Associate Professor**
12.	**21, 23 January**	**Methods of cell culture and techniques used in the medical research** Methods of cell culture for medical research and regenerative medicine. The in vitro experiment on cell cultures. Types of the cell cultures. Cytostatic/cytotoxic tests in a drug discovery. Laboratory methods of cell research in medicine.	**Anna Hyc, Associate Professor**

EXAMINATION: 30.01.2025; Retake: 13.02.2025