Development of Complex Curricula for Molecular Bionics and Infobionics Programs within a consortial* framework**

Consortium leader

PETER PAZMANY CATHOLIC UNIVERSITY

Consortium members

SEMMELWEIS UNIVERSITY, DIALOG CAMPUS PUBLISHER

The Project has been realised with the support of the European Union and has been co-financed by the European Social Fund ***

**Molekuláris bionika és Infobionika Szakok tananyagának komplex fejlesztése konzorciumi keretben

***A projekt az Európai Unió támogatásával, az Európai Szociális Alap társfinanszírozásával valósul meg.

BASICS OF NEUROBIOLOGY

Neurobiológia alapjai

CELL ORGANELLES I.

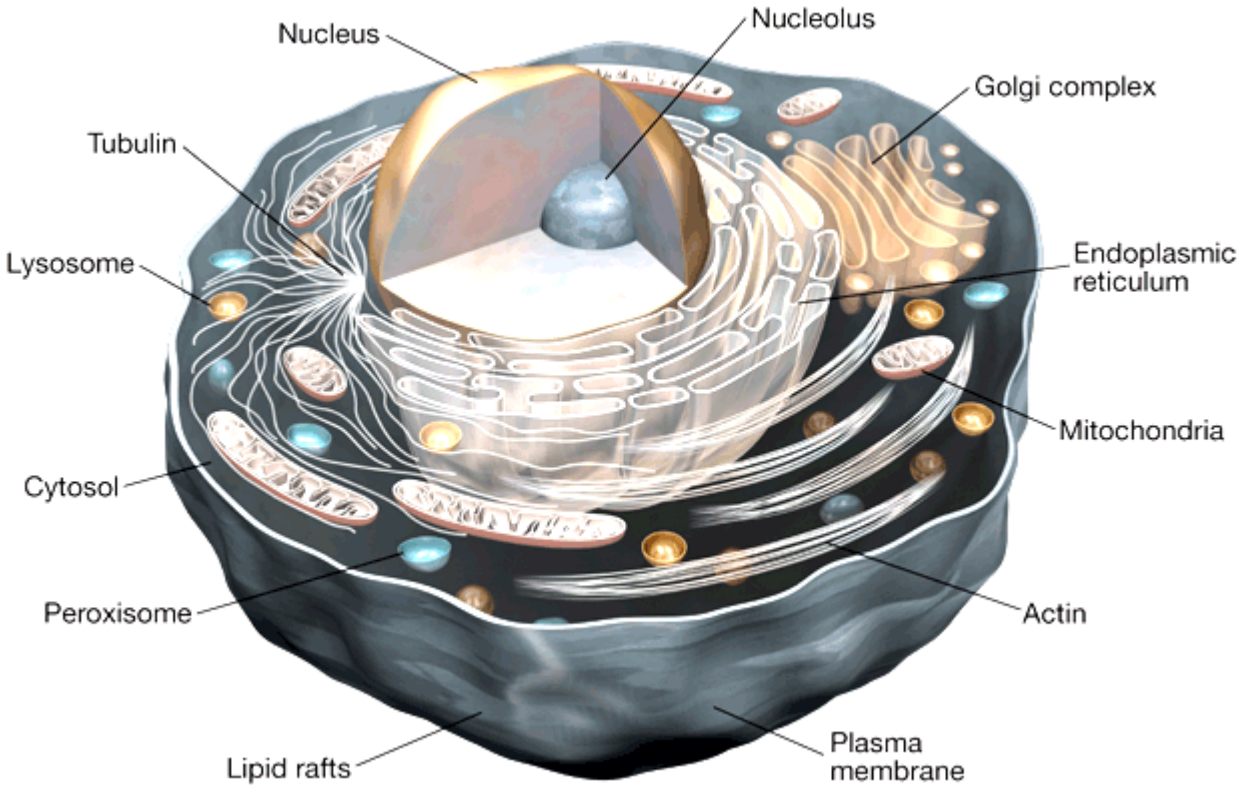
(Sejtalkotók I.)

ZSOLT LIPOSITS

PROKARYOTIC AND EUKARYOTIC CELLS

SUBCELLULAR STRUCTURES OF THE ANIMAL CELLS

- CELL MEMBRANE
- CYTOPLASM
- CELL NUCLEUS
- NUCLEOLUS
- ROUGH ENDOPLASMIC RETICULUM
- SMOOTH ENDOPLASMIC RETICULUM
- GOLGI APPARATUS
- TRANSPORT VESICLES
- LYSOSOMES
- MITOCHONDRION
- CYTOSKELETON
- CILIUM
- CENTRIOLUM


Nucleus
Nucleolus
Golgi complex
Tubulin
Lysosome
Endoplasmic reticulum
Mitochondria
Cytosol
Peroxisome
Actin
Lipid rafts
Plasma membrane

THE CELL MEMBRANE

FLUID MOSAIC MODEL OF MEMBRANE STRUCTURE

STRUCTURE OF THE PHOSPHOLIPID MOLECULE, AMPHIPATHIC CHARACTER

THE PHOSPHOLIPID BILAYER

INNER MEMBRANE PROTEINS

SURFACE PROTEINS

TRANSMEMBRANE PROTEIN

GLYCOPROTEINS AND GLYCOLIPIDS

FREEZE-FRACTRURE IMAGE OF THE MEMBRANE, P AND E FACES

CYTOPLASM

CELL MEMBRANE-ENCLOSED PART OF THE CELL HOSTING THE CELL ORGANELLES

IT IS A GEL THAT MAKES UP 70% OF THE WHOLE CELL VOLUME

CONTAINS WATER, INORGANIC SALTS AND ORGANIC MOLECULES

THE CYTOSKELETON IS EMBEDDED, THE ORGANELLES ARE SUSPENDED IN IT

SITE OF METABOLIC ACTIONS, SIGNAL TRANSDUCTION AND CELL DIVISION

GIVES A PLASTIC CHARACTER TO THE CELL

IN CONVENTIONAL HISTOLOGICAL PREPARATIONS IT SHOWS EOSINOPHYLIA

IN SLICE PREPARATION ITS HARVESTING IS POSSIBLE FOR MOLECULAR ANALYSIS

TRANSPORT ACROSS PLASMA MEMBRANES

PASSIVE DIFFUSION

CONCENTRATION GRADIENT DEPENDENT, ALCOHOL, GASES

FACILITATED DIFFUSION

PASSIVE, REQUIRES TRANSPORTERS, GLUCOSE, AMINO ACIDS

ACTIVE TRANSPORT

REQUIRES ENERGY (ATP), OPERATES AGAINST CONCENTRATION GRADIENTS

UTILIZES TRANSMEMBRANE CHANNELS, SODIUM/POTASSIUM PUMP

BULK TRANSPORT

ENDOCYTOSIS, EXOCYTOSIS

PHAGOCYTOSIS

PINOCYTOSIS

CELL NUCLEUS

NUCLEAR ENVELOPE

DOUBLE MEMBRANE LAYER, CONTINUOUS WITH ROUGH ENDOPLASMIC RETICULUM

NUCLEAR PORES

HOLES IN THE DOUBLE MEMBRANE, NUCLEAR PORE COMPLEX, REGULATES TRAFFICKING BETWEEN THE NUCLEUS AND CYTOPLASM (MACROMOLECULES, RNA)

NUCLEAR MATRIX

DNA (DEOXYRIBONUCLEIC ACID), GENETIC CODE, EU- AND HETEROCHROMATIN

RIBONUCLEIC ACID (RNA), TRANSFER, MESSENGER AND RIBOSOMAL

NUCLEOPROTEINS, HISTONE- AND NON-HISTONE TYPES, REGULATE TRANSCRIPTION

BARR BODY, FEMALE SEX-CHROMOSOME

STORAGE OF GENETIC INFORMATION, THE HUMAN GENOME, TRANSCRIPTION

NUCLEOLI

ONE OR TWO SPHERICAL STRUCTURES LOCATED IN THE NUCLEUS

NO MEMBRANE COVER

PROMINENT IN CELLS UNDER INTENSE PROTEIN SYNTHESIS

DEVELOPS AT NUCLEOLAR ORGANIZING REGIONS (ribosomal RNA genes)

STRUCTURALLY ORGANIZED IN FIBRILLAR CENTERS (FC), DENSE FIBRILLAR COMPONENT (DFC) AND GRANULAR COMPONENTS (GC)

PRODUCE RIBOSOMAL RNAs THAT ARE CONJUGATED WITH RIBOPROTEINS IN ORDER TO MAKE RIBOSOMAL SUBUNITS

ROUGH ENDOPLASMIC RETICULUM (RER)

A LABYRINTHINE COMPLEX MEMBRANE STRUCTURE COMPOSED BY TUBULES, VESICLES AND FLATTENED SACS

RIBOSOMES ARE ATTACHED TO THE OUTER SURFACE OF THE PARALLELLY ORIENTED SACS

DUE TO ITS HIGH RIBONUCLEIC ACID CONTENT IT SHOWS AN INTENSE BASOPHYLIA

IN NEURONS, THE RER PATCHES ARE CALLED NISSL-BODIES

PROTEIN SYNTHESIS TAKES PLACES AT THE RIBOSOMES OF THE OUTER SURFACE

NEWLY SYNTHESIZED PROTEINS GET INTO THE LUMEN OF THE MEMBRANE SACKS

IN CELLULAR HYPERTROPHY, RER BECOMES DOMINANT IN THE CYTOPLASM

SMOOTH ENDOPLASMIC RETICULUM (SER)

IRREGULAR NETWORK OF MEMBRANOUS TUBULES AND VESICLES

IN CONTRAST TO RER, IT DOES NOT CARRY RIBOSOMES

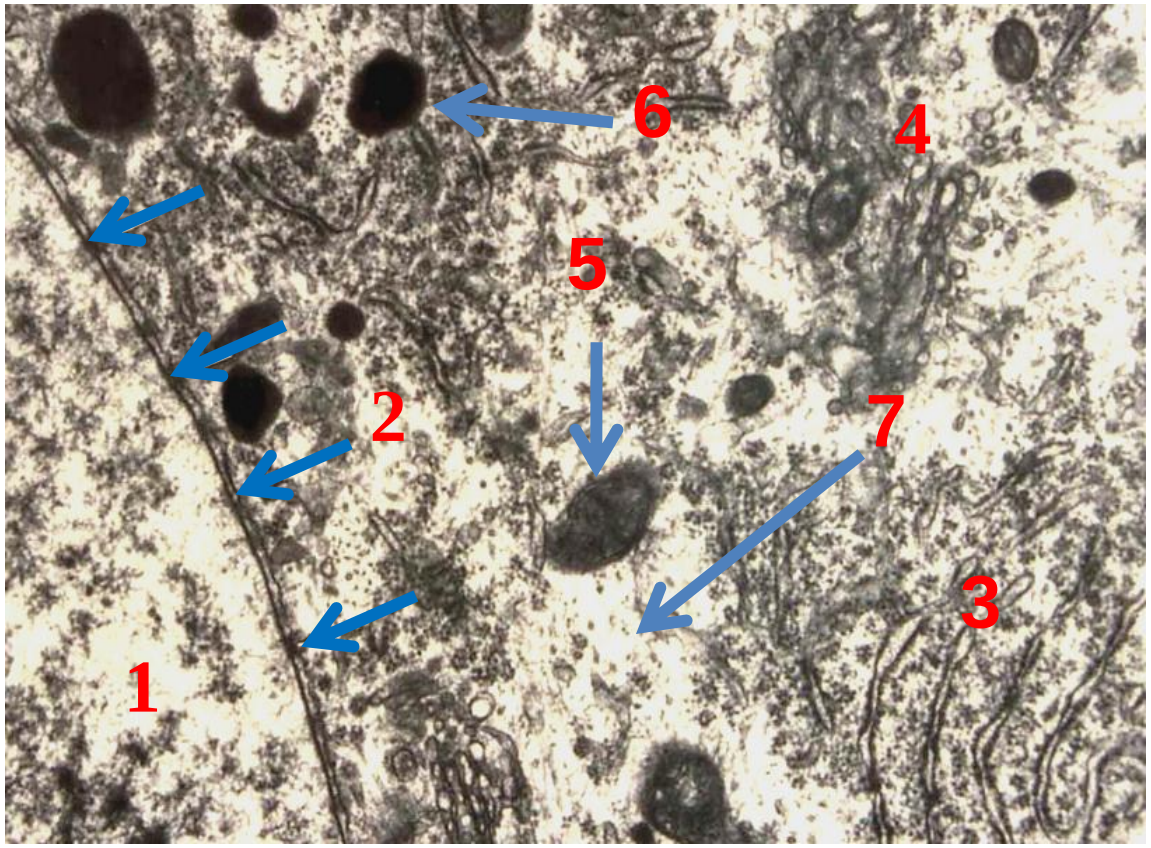
CONTINUOUS WITH THE RER SYSTEM AND LINKED TO THE GOLGI SYSTEM

SER TAKES PART IN LIPID SYNTHESIS, GLYCOGEN METABOLISM, BRAKE DOWN OF METABOLITES AND DETOXIFICATION

STORES AND RELEASES CALCIUM IN EXCITABLE TISSUES (MUSCLE, NERVOUS TISSUE)

ABUNDANT IN LIVER CELLS AND STEROID-SYNTHESIZING ENDOCRINE CELLS

ULTRASTRUCTURAL DETAILS OF ORGANELLES



1. NUCLEUS
2. NUCLEAR MEMBRANE
3. ROUGH ER
4. GOLGI-APPARATUS
5. MITOCHONDRION
6. LYSOSOME
7. CYTOPLASM