BIO-714 **Mechanisms of cell motility**

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Cursus	Sem.	Type
Biotechnology and Bioengineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Oral
Workload	60h
Hours	**28**
Courses	28
Number of positions	**15**

Frequency

Every 2 years

Remark

Next time: Spring 2022

Summary

Mechanisms of cell motility

Content

1. Overview of different types of cell motility. Mechanisms of bacterial motility and chemotaxis.
2. Eucaryotic cell motility: flagellated and ciliated cells, crawling cell motility.
3. Motile machinery: types of the cytoskeletal structures, principles of assembly of cytoskeletal filaments (treadmilling, dynamic instability).
4. Motile machinery: accessory proteins, regulation of assembly and supramolecular organization of the cytoskeleton.
5. Methods to study cytoskeletal dynamics: live digital fluorescence microscopy, photoactivation, photobleaching, fluorescence speckle microscopy, and others.
6. Mechanisms of actin assembly in protrusion at the leading edge of the cell.
7. Biophysics of protrusion, forces and modeling.
8. Cell-substrate attachment: molecular composition and dynamics of adhesion sites.
9. Introduction to motor proteins, active cycle, steps and forces.
10. Microtubule-dependent motors, role in intracellular transport and mitosis.
11. Myosin superfamily of motor proteins, non-conventional myosins in intracellular transport and hearing.
12. Myosin II, coordination of protrusion, attachment and contraction in the cell translocation.
13. Signaling to motility and the origins of cell polarity (directional sensing in chemotaxis, PH-domain proteins, small GTPases, calcium).
14. Interaction between actin and microtubules in cell polarization and motility (budding yeast model, animal cell mitosis and cytokinesis, cell migration).

Keywords

cell migration, cytoskeleton, actin, myosin, microtubules

Learning Prerequisites

Recommended courses

basic biology

Assessment methods

Oral