

BIO-714 Mechanisms of cell motility

Verkhovsky Alexander

Cursus	Sem.	Type
Biotechnology and Bioengineering		Opt.

English
2
Oral
60h
28
28
15

Frequency

Every year

Remark

Next time: Fall 2023 (6 participants minimum)

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).

Note

Minimum 6 participants Maximum 15 participants

Keywords

cell migration, cytoskeleton, actin, myosin, microtubules

Learning Prerequisites

Recommended courses

basic biology

Assessment methods

Oral

Resources

Moodle Link

• https://go.epfl.ch/BIO-714