

# Membrane Biochemistry in Health and Disease

Course # 2226-FS2018-0

Matthias Hediger, Dimitrios Fotiadis, Christiane Albrecht, Daniel Fuster, Andrea Chicca, Roch-Philippe Charles, Martin Lochner, Christine Peinelt and guest speakers

Philosophisch-naturwissenschaftliche Fakultät – Biologie - Bachelor in Biology, Specialisation in Cell Biology and Master in Molecular Life Sciences - Wahlveranstaltungen Bachelor in Cell Biology (B) and Master in Molecular Life Sciences (M)

Wednesday, February 28, 2018 – May 30, 2018, 16:15 - 18:00

Institute of Biochemistry and Molecular Medicine (IBMM),  
Gertrud-Woker-Strasse 5, lecture room, ground floor

**ATTENTION: Lecture 7 is exceptionally held on MONDAY, April 16, 2018**

**A minimal attendance of 80% of the lectures will be required to attend to the exam.**

**Learning objectives:** In this lecture series, the students will receive an overview of general membrane biochemistry as well as in-depth insight into basic and applied research pertaining to transporters, ion channels and membrane receptors. Transfer of knowledge is based on a mixture of lectures and interactive discussions.

## Part 1 – Basic aspects of membrane biochemistry

### 1. 28.02.2018 (Matthias Hediger)

- **Introduction to lecture series**
- **Membrane structure and organization**  
Membrane lipids, organization (bilayers, liposomes), asymmetry, mobility, glycolipids, membrane proteins.
- **Types of membrane transport proteins**  
Ion-coupled transporters, facilitated transporters, SLC families, channels, ABC transporters, pumps and porins.

### 2. 07.03.2018 (Dimitrios Fotiadis, Sofia Verouti and Geneviève Escher)

- **Methods for the characterization of membrane protein structure**  
Purification, overexpression, structural biology methods
- **Transgenic tools to study membrane transport proteins**

### 3. 14.03.2018 (Matthias Hediger and Post-Docs)

- **Transporters and channels in health and diseases: From basic science to therapeutic applications**  
Nutrient transporters, TRP ion channels and store-operated calcium channels

### 4. 21.03.2018 (Dimitrios Fotiadis)

- **Structure and function of G-protein-coupled receptors**

### 5. 28.03.2018 (Christoph von Ballmoos and Benjamin Clémenton)

- **Mitochondrial membrane proteins involved in oxidative phosphorylation**
  - a. Redox driven proton transport and ATP synthesis
  - b. Mitochondrial carrier family SLC25

## Part 2 – Research

04.04.2018 Easter Break

**6. 11.04.2018 (Christiane Albrecht)**

- Clinical implications of ATP-binding cassette (ABC) transporters

**7. MONDAY, 16.04.2018 (Daniel Fuster)**

- Sodium/hydrogen exchangers and acid-base physiology

**8. 25.04.2018 (Andrea Chicca and Jürg Gertsch)**

- Structure, function and pharmacology of endocannabinoid receptors

**9. 02.05.2018 (Christine Peinelt and Jean-Sébastien Rougier)**

- Pathophysiology of Ion channels
- Pathophysiology of Nav1.5 in the heart – molecular mechanisms and future therapeutic directions

**10. 09.05.2018 (Roch-Philippe Charles)**

- Membranes and cancers:
  - a. Epithelial to mesenchymal transition
  - b. Warburg effect

**11. 16.05.2018 (Sonja Kleinlogel and Marcel Egger)**

- Glutamate receptors in the visual system
- The role of InsP3 signalling in cardiac arrhythmogenicity

**12. 23.05.2018 (Martin Lochner)**

- Development of chemical ligands for membrane proteins

**Exam Wednesday, 30.05.2018, 16h15 – 18h00**