

# Physiology of Cells II.

Electrophysiology of Cell Membranes

Electrical Excitability, Action Potentials

Synaptic Transmission, Neuromuscular Junction

Physiology of Skeletal, Cardiac and Smooth Muscle Cells

# Electrophysiology of Cell Membranes

## ➤ Ionic Basis of Membrane Potentials

- Transport of ions across membranes
- Ionic channels – structure and function, selectivity, gating
- Membrane potential is generated by ion gradients (equilibrium potential, resting membrane potential)

## ➤ Measurement of Ionic Currents

# Electrical Excitability, Action Potentials

- **Electrical Excitability** (threshold, electrotonic potential, local response)
- **Action Potential (neuron, skeletal muscle, cardiac muscle)**
  - Phases
  - Ionic base (voltage-gated vs. other subtypes of ionic channels)
  - Pathophysiology – first remarks
- **Propagation of Action Potentials** (local current loops, myelin sheet, gap junctions)

# Synaptic Transmission

## ➤ **Electrical vs. Chemical Synapses**

## ➤ **Chemical Synapses**

- Structure, Classification (according to place and response)
- Neurotransmitters – Types, Mechanisms of Action
- Summation of Information from Individual Synapses

## ➤ **Neuromuscular Junction** (structure, function, endplate potential)

# **Physiology of Skeletal, Cardiac and Smooth Muscle**

- **Structure**
- **Origin of Electrical Excitation**
- **Action Potential Configuration, Ionic Base**
- **Excitation – Contraction Coupling**
- **Regulation of the Force of Contraction**