

Human Physiology - Exam 2 Study Guide

Receptors and Signal Transduction

What determines a cell's response to a message?

What is signal transduction?

Second messengers: what are they? Examples?

Signal transduction pathways: cascades and amplifications

Compare tyrosine kinase and G protein-coupled receptors (GPCRs)

Endocrinology

What is a hormone?

Comparison: endocrine system vs. nervous system:

Hormone synthesis, storage, transport, half-life, release and mechanism of action
for each of the three classes of hormones (peptides, steroids, amines
(catecholamines and thyroid hormones))

Control of hormone release: trophic hormones, simple endocrine reflex pathway,
synergism, permissiveness, antagonism

Membrane Potential

Resting potential of a membrane - what causes it?

Na⁺/K⁺ pumps: what do they do? where are they found?

Equilibrium potentials - what are they? what are they based on?

What determines an ion's driving force?

Introduction to the Nervous System

Divisions of the nervous system

Cell types: neuron, supporting cells

Classification of neurons and nerves based on structure and function

Coding of information: depolarization and hyperpolarization

Action potentials: characteristics, events involved, flow of ions, refractive period,
how stimulus intensity is coded, conduction down the axon, etc.

Transmission of an impulse across a synapse: characteristics, events involved,
flow of ions, how stimulus intensity is coded, etc.

Ligand-operated channels vs. voltage-operated channels

The Central Nervous System

Structural organization of the brain

Cerebrum: main functions of each lobe, cerebral lateralization

Physiological basis of language, memory, emotion, motivation (in brief)

Diencephalon: main functions of the thalamus, hypothalamus, pituitary gland

Midbrain, hindbrain basic functions

What is the diffuse modulatory system?

The Autonomic Nervous System

Compare somatic motor neurons with autonomic neurons

Compare the 2 divisions of the autonomic NS

Sympathetic: where preganglionic neurons originate, organization of ganglia, what it is responsible for, how it functions as a unit

Parasympathetic: where preganglionic neurons originate, what it is responsible for

Cholinergic stimulation response characteristics:

nicotinic vs. muscarinic subtypes (structure, function)

Adrenergic stimulation response characteristics:

alpha vs. beta receptors (what do they do?)

Adrenal sympathetic pathway

Antagonistic vs. cooperative vs. complementary effects of the sympathetic and parasympathetic

Sensory Physiology

Characteristics and types of sensory receptors

Phasic vs. tonic receptors

What is lateral inhibition and why is it important?

Cutaneous sensations: receptor fields, sensory acuity

Taste: taste buds, structure, types, how stimulated

Olfaction: how routed through brain

Equilibrium and the vestibular apparatus

Hearing: ear anatomy, transduction of mechanical to electrical signals, hearing impairments

Vision: rods vs. cones, transduction of light energy to electrical energy, accommodation, acuity, myopia, hyperopia, astigmatism, retina structure and function, neural processing of visual information

Muscle Physiology

Skeletal muscle microanatomy

Types of muscle contractions: isotonic, isometric, twitch, summation, tetanus

Mechanisms of contraction and the sliding filament theory

Regulation of contraction and the roles of Ca⁺⁺

Energy requirements of skeletal muscle (specifically, how is ATP used?)

Excitation / contraction coupling