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Development of Complex Curricula for Molecular Bionics and Infobionics Programs within a consortial* framework**

Consortium leader

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Consortium members

SEMMELWEIS UNIVERSITY, DIALOG CAMPUS PUBLISHER

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**Molekuláris bionika és Infobionika Szakok tananyagának komplex fejlesztése konzorciumi keretben

***A projekt az Európai Unió támogatásával, az Európai Szociális Alap társfinanszírozásával valósul meg.



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BASICS OF NEUROBIOLOGY

Neurobiológia alapjai

ORGAN SYSTEMS

Szervrendszerek

ZSOLT LIPOSITS

FEATURES OF THE HUMAN BODY

MAJOR PARTS

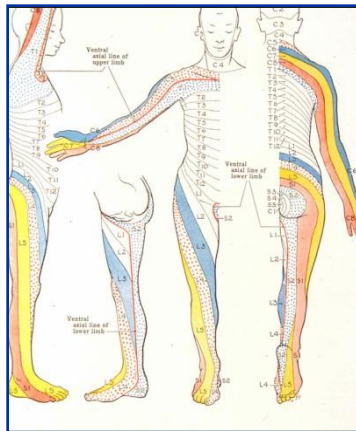
CAPUT
CERVIX
TRUNCUS
EXTREMITIES

MAIN REFERENCE PLANES

FRONTAL
SAGITTAL
HORIZONTAL

BILATERAL SYMMETRY

PAIRED ORGANS
UNPAIRED ORGANS



METAMERIA

VERTEBRAL COLUMN
INTERCOSTAL STRUCTURES
DERMATOMES

GENDER DIFFERENCES

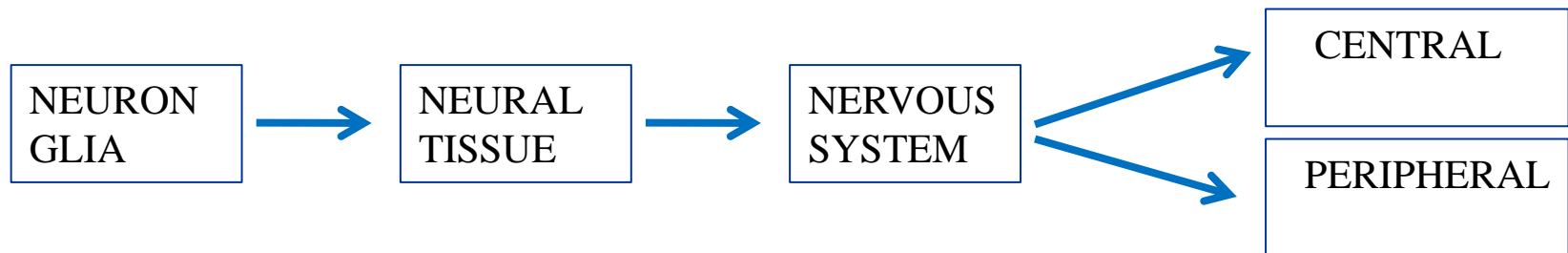
ORGANIZATION OF THE HUMAN BODY

STRUCTURAL HIERARCHY

MOLECULES
SUBCELLULAR ORGANELLES
CELLS
TISSUES
ORGANS
ORGAN SYSTEMS
HUMAN BODY

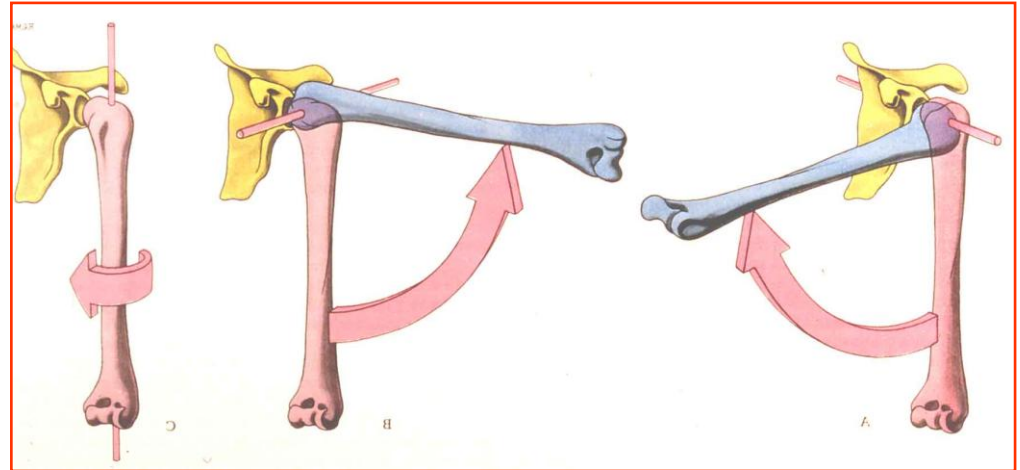
ORGAN SYSTEMS

SKELETAL SYSTEM
MUSCULAR SYSTEM
CIRCULATORY SYSTEM
VISCERAL SYSTEM
NERVOUS SYSTEM
ENDOCRINE SYSTEM
ORGANS OF SPECIAL SENSES
LYMPHATIC AND IMMUNE



THE SKELETAL SYSTEM, BIOMECHANICS

TYPES OF BONES
TYPES OF JOINTS
LIGAMENTS
MOVEMENTS



MOVEMENTS

ROTATION

ABDUCTION - ADDUCTION

FLEXION – EXTENSION

CIRCUMDUCTION

AXES

VERTICAL

ANTERO-POSTERIOR

TRANSVERSE

THE MUSCULAR SYSTEM

TYPES OF MUSCLE TISSUES

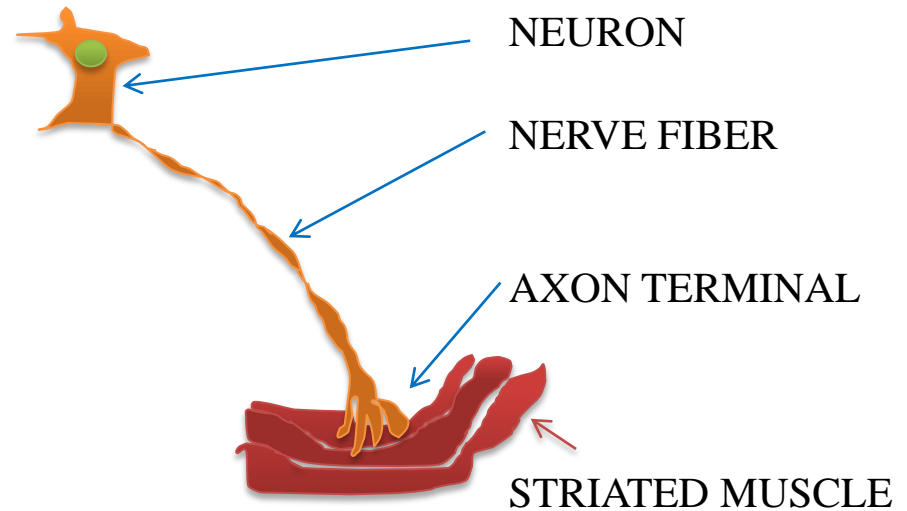
STRIATED, SKELETAL MUSCLE
SMOOTH, VISCERAL MUSCLE
CARDIAC MUSCLE

FEATURES OF MUSCLE TISSUES

EXCITABILITY
CONTRACTION

BIOROBOTICS

THE MOTOR UNIT



ACTION POTENTIAL



ACETYLCHOLINE RELEASE



CONTRACTION → MOVEMENT

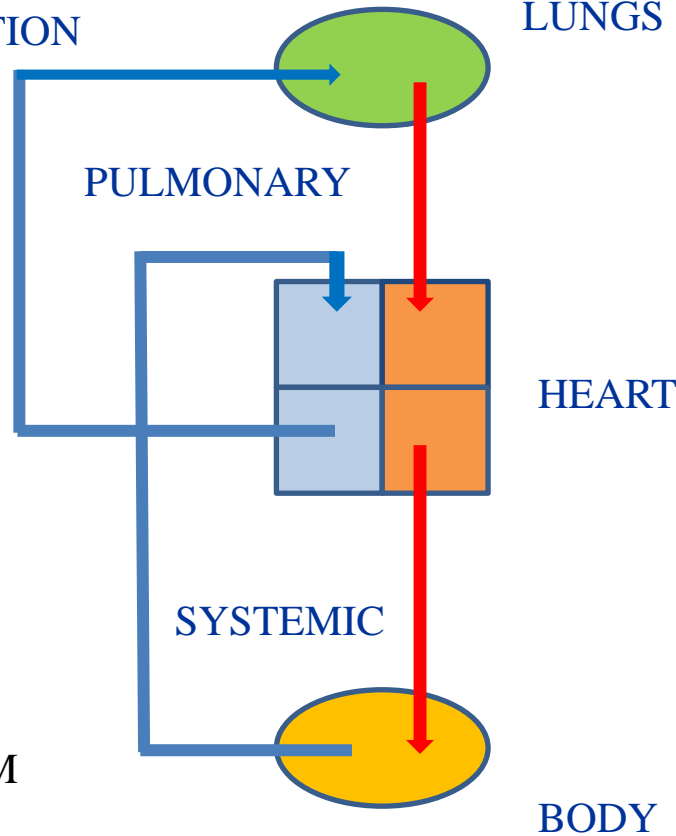
THE CIRCULATORY SYSTEM

STRUCTURE AND FUNCTION

HEART
ARTERIES
CAPILLARIES
VEINS

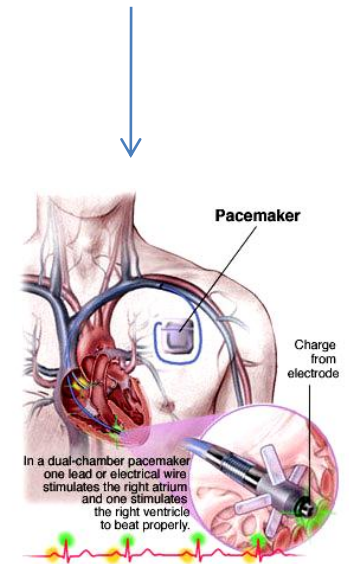
CIRCULATIONS

SYSTEMIC
PULMONARY
MICROCIRCULATION
THE LYMPHATIC SYSTEM



INNOVATIONS

ARTEFICIAL HEART PACEMAKER



THE VISCERAL SYSTEM

CONSTITUENTS

MAIN FUNCTIONS

DIGESTIVE SYSTEM

BREAK DOWN OF FOOD

ABSORPTION OF GLUCOSE, FATTY- AND AMINO ACIDS

DIGESTIVE ENZYME AND HORMONE PRODUCTION

EXCRETION OF WASTE MATERIAL

RESPIRATORY SYSTEM

GAS EXCHANGE

ACID-BASE BALANCE

VOCALIZATION

URINARY SYSTEM

PRODUCTION AND EXCRETION OF URINE

REGULATION OF ELECTROLYTES

MAINTENANCE OF ACID-BASE HOMEOSTASIS

REPRODUCTIVE SYSTEM

PRODUCTION OF GAMETE CELLS

REPRODUCTION

SEX HORMONE PRODUCTION

ENDOCRINE SYSTEM

PRODUCTION AND RELEASE OF HORMONES INTO BLOOD STREAM, REGULATION OF HOMEOSTASIS

THE NERVOUS SYSTEM

ANATOMICAL DIVISIONS

CENTRAL NERVOUS SYSTEM: BRAIN AND SPINAL CORD (MEDULLA SPINALIS)

PERIPHERAL NERVOUS SYSTEM: CRANIAL AND SPINAL NERVES

FUNCTIONAL DIVISIONS

SOMATIC NERVOUS SYSTEM

VISCERAL, AUTONOMIC NERVOUS SYSTEMS

STRUCTURAL UNITS OF BRAIN (ENCEPHALON)

CEREBRUM: TELENCEPHALON, DIENCEPHALON

BRAIN STEM: MIDBRAIN (MESENCEPHALON), PONS (METENCEPHALON),
CEREBELLUM, MEDULLA OBLONGATA (MYELENCEPHALON)

FUNCTIONS: COGNITION, LEARNING, MEMORY, SENSORY AND MOTOR CONTROL,
AUTONOMIC REGULATION, CONTROL OF ENDOCRINE GLANDS, ADAPTATION AND
CONNECTION WITH ENVIRONMENT, REGULATION OF BEHAVIOUR

THE ENDOCRINE SYSTEM

DEFINITION: DUCTLESS GLANDS THAT SECRETE HORMONES INTO THE BLOOD

REGULATION: PREDOMINANTLY BY THE HYPOTHALAMUS

MAIN PARTS OF THE SYSTEM

PINEAL GLAND

PITUITARY GLAND

THYROID GLAND

PARATHYROID GLAND

ADRENAL GLAND

TESTES AND OVARIES

PANCREAS

GI TRACT

REPRESENTATIVE HORMONES

MELATONIN

OXYTOCIN, VASOPRESSIN, TROPH HORMONES

THYROXINE, TRIIODOTHYRONINE

PARATHORMONE

CORTISOL, ALDOSTERONE, ADRENALINE

TESTOSTERONE, ESTROGENS, PROGESTERONE

INSULIN, GLUCAGON, SOMATOSTATIN

GASTRIN, GHRELIN, HISTAMINE, CHOLECYSTOKININ

FUNCTIONS: REGULATION OF HOMESTASIS, ADAPTATION, REPRODUCTION, MOOD

ORGANS OF SPECIAL SENSES

VISUAL SYSTEM: DETECTION OF ELECTROMAGNETIC WAVES IN THE VISIBLE RANGE OF LIGHT

AUDITORY SYSTEM: SENSE OF SOUND PERCEPTION

VESTIBULAR SYSTEM: SENSING BODY MOVEMENT, DIRECTION AND ACCELERATION

OLFACTORY SYSTEM: SENSE OF SMELL, PROCESSES ODOR MOLECULES

TASTE SYSTEM: CHEMICAL SENSE, TRIGGERS INGESTION AND PREPARES THE GI-TRACT FOR FOOD INTAKE

IMAGING OF THE ORGAN SYSTEMS

X-RAY

COMPUTED TOMOGRAPHY (CT)

MAGNETIC RESONANCE IMAGING (MRI)

FUNCTIONAL MRI (fMRI)

POSITRON EMISSION TOMOGRAPHY (PET)

ULTRASONOGRAPHY

