PROGRAM REALIZACJI ZAJĘĆ

Schedule for anatomy classes.

Przedmiot: ANATOMIA PRAWIDŁOWA

Human anatomy

Tematyka ćwiczeń.

Kierunek: LEKARSKI - semestr zimowy - moduł 3/7

Field of study: Faculty of medicine - fall semestr - part 3/7

CENTRAL NERVOUS SYSTEM (CNS)

LABORATORY CLASSES 1

Wet lab classes with PBL and SGD (Classes will be conducted at the *Collegium Anatomicum*. Wet preparations. Classes implemented using VR, *Anatomage* and the „inverted spotters" method*)*.

Review - Cranial Bones

1. General anatomical terms of nervous system:
   - neuron classification, synapse, neuroglia, white and grey matter, nuclei, ganglia and plexus.
   - Classification of nervous tracts and pathways (association tract, projection tract and commissural tract of telencephalon).

2. Divisions of the nervous system and brain
   - Central and peripheral nervous system
   - Somatic and autonomic nervous system
   - CNS division according to the embryonic development: telencephalon, diencephalon, mesencephalon (midbrain), pons, medulla oblongata (myelencephalon), cerebellum.
   - Clinical division of the CNS into cerebrum (cerebral hemispheres, diencephalon), brainstem (midbrain, pons, medulla oblongata) and cerebellum

2. **Telencephalon- part I**

   - General structure and main parts: cerebral hemispheres, basal ganglia, lateral ventricles
   - Cerebral cortex (frontal, parietal, temporal, occipital, insular lobes- their gyri and sulci)
   - Functional areas of the cerebral cortex
   - General information about cerebral dominance
   - Olfactory system (olfactory pathway and olfactory cortex)

3. Limbic system (limbic lobe and general information about its other structures and role of the limbic system.

4. **Telencephalon- part II**

   - Structure and localization of the subcortical nuclei of the telencephalon (basal ganglia)
     - Caudate nucleus, lentiform nucleus (putamen and globus pallidus), claustrum, amygdaloid nuclear complex
     - Basal ganglia as parts of the striatal (extrapyramidal) motor system and general information about the role of the extrapyramidal motor system
   - White matter of the brain hemisphere
     - Associative pathways of the brain hemisphere (arcuate fasciculus, fornix)
     - Cerebral commissures (corpus callosum, anterior commissure, commissure of the fornix)
     - Internal capsule (detailed structure, localization and role)
   - Lateral ventricle (localization, parts, connection and role in production of the cerebrospinal fluid),
     - interventricular foramen (foramen of Monro), septum pellucidum, choroid plexus of lateral ventricle.

PBL - Problem Based Learning
SGD - Small Group Discussion

LABORATORY CLASSES 2

Wet lab classes with PBL and SGD (Classes will be conducted at the *Collegium Anatomicum*. Wet preparations. Classes implemented using VR, *Anatomage* and the „inverted spotters" method*)*.

Diencephalon:

1. Thalamus
   - Localization and boundaries
   - Internal structure of the thalamus (thalamic nuclei- their connections and role)
     - Anterior nucleus
     - Dorsal nuclei (pulvinar)
     - Ventral nuclei
     - Intralaminar nuclei
     - Lateral and medial geniculate bodies (metathalamus)
2. Epithalamus
   - Localization and role of the pineal body, habenular trigone, medullary stria of the thalamus and posterior commissure
3. Hypothalamus
   - Localization, external morphology and structures of the hypothalamus
     - Optic chiasm, tuber cinereum, infundibulum and hypophysis, mamillary bodies
   - Hypothalamic regions, nuclei and their role
     - Lateral hypothalamic nucleus, preoptic nucleus, supraoptic region (anterior, paraventricular, supraoptic nuclei), tuberal region (ventromedial, arcuate nuclei), mamillary region (mamillary, posterior nuclei)
   - Role of the hypothalamus in the maintenance of homeostasis
4. Subthalamus
   - Localization and role of the subthalamic nucleus (part of the extrapyramidal motor system)
5. Third ventricle
   - Localization, connections and role in production of the cerebrospinal fluid

Brainstem = midbrain + pons + medulla oblongata (part I)

6. Mesencephalon (midbrain)
   - External morphology and structures of the midbrain
     - Cerebral aqueduct, tectum, cerebral peduncle (tegmentum and basis pedunculi)
   - Localization and role of the internal structures of the midbrain
     - Nuclei of the superior and inferior colliculi
     - Substantia nigra
     - Periaqueductal gray matter
     - Nuclei of the cranial nerves (oculomotor, trochlear, trigeminal)
     - Red nucleus as a part of the reticular system
   - White matter of the midbrain
     - Descending motor pathways in the basis pedunculi (corticospinal, corticobulbar, corticopontine)
     - Descending motor extrapyramidal pathways in tegmentum (rubrospinal)
     - Ascending sensory pathways in tegmentum (medial, lateral and spinal lemnisci)
     - Associative pathways of the midbrain (medial and dorsal longitudinal fasciculi)
7. Pons:
   - External morphology and structures of the pons
   - Cerebellopontine angle and its clinical significance
   - Localization and role of the internal structures of the pons
     - Pontine nuclei
     - Nuclei of the cranial nerves (trigeminal, abducent, facial, vestibulocochlear)
     - Locus ceruleus
   - White matter of the pons
     - Descending motor pathways in the basis pedunculi (corticospinal, corticobulbar, corticopontine)
     - Descending motor extrapyramidal pathways in tegmentum (rubrospinal)
     - Ascending sensory pathways in tegmentum (medial, lateral and spinal lemnisci)
     - Associative pathways of the midbrain (medial and dorsal longitudinal fasciculi)
8. Medulla oblongata (myelencephalon)
   - External morphology and structures of the medulla oblongata
     - Ventral surface (pyramid, olive, cranial nerves)

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SGD - Small Group Discussion

- Dorsal surface (gracile and cuneate tubercles and fasciculi; rhomboid fossa)
- Localization and role of the internal structures of the medulla oblongata
  - Descending motor pathways (pyramids and pyramidal decussation)
  - Descending motor extrapyramidal pathways and relay nuclei (olivary nucleus, olivospinal and olivocerebellar pathways)
  - Ascending sensory pathways and relay nuclei (nucleus gracilis and nucleus cuneatus, medial lemniscus and decussation of the medial lemniscus), spinal lemniscus
  - Nuclei of the cranial nerves (trigeminal, glossopharyngeal, vagus, accessory, hypoglossal)
- Role of the medulla oblongata

LABORATORY CLASSES 3

Wet lab classes with PBL and SGD (Classes will be conducted at the *Collegium Anatomicum*. Wet preparations. Classes implemented using VR, *Anatomage* and the „inverted spotters" method*).*

Brainstem = midbrain + pons + medulla oblongata (part II)

1. General information about the reticular system
   - Autonomic centers responsible for respiration, circulation and gastrointestinal motility
   - Role of the ascending and descending reticular system of the brainstem
2. Fourth ventricle
   - Localization and walls, rhomboid fossa, connections and role in production and circulation of the cerebrospinal fluid)
3. Main division of the cerebellum
   - Vermis, hemispheres (significance of the cerebellar tonsil), cerebellar peduncles
   - Lobes of the cerebellum: flocculonodular, anterior and posterior
4. Internal structures of the cerebellum
   - Medullary core and nuclei (fastigial, emboliform, globose and dentate)
   - Afferent and efferent cerebellar pathways
5. Role of the cerebellum and its clinical division into zones
   - Vermal zone connected with maintenance of posture and balance
   - Paravermal zone connected with maintenance of muscle tone
   - Lateral zone of hemisphere connected with coordination of motor activity

Spinal cord

6. Localization and external morphology of the spinal cord
   - Shape, enlargements, conus medullaris and its localization in the vertebral canal, filum terminale
   - Superficial structures and sulci of the spinal cord
7. General structure of the spinal nerves
   - Names, roots (ventral, dorsal), dorsal root ganglion, cauda equina
8. Internal structure of the spinal cord
   - Gray matter
     - Horns of the spinal cord (ventral, dorsal, lateral), sacral parasympathetic nucleus and their functional significance
   - White matter
     - Funiculi of the spinal cord (ventral, dorsal, lateral)
4. Tracts of the spinal cord (course, place of deccussation, functional character)
   - Ascending spinal tracts: lateral spinothalamic tract, ventral spinothalamic tract, dorsal column- medial lemniscus pathway, spinocerebellar tracts
   - Descending spinal tracts : corticospinal (pyramidal) tracts, extrapyramidal motor tracts
   - Upper and lower motor neurons
     - Main differences between injury of the upper and lower neurons

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5. **Autonomic nervous system (ANS)**
6. Parts of ANS (sympathetic, parasympathetic, enteric)
7. General course of the autonomic fibers (preganglionic and postganglionic neurons)
8. Centers of ANS

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SGD - Small Group Discussion

- Limbic system
  - Hippocampus: hippocampal formation, hippocampal cortex.
  - Limbic system: tracts of limbic lobe and system, afferent and efferent fibres, basal nuclei.
- Hypothalamus
- Autonomic centers of the brainstem
- Autonomic centers of the spinal cord

9. Course of the sympathetic preganglionic fibers, sympathetic ganglia, general course of the sympathetic postganglionic fibers
10. Course of the parasympathetic preganglionic fibers, parasympathetic ganglia, general course of the parasympathetic postganglionic fibers
11. Meninges of the brain and spinal cord
    - Dura mater
      - Falx cerebri, tentorium cerebelli, diaphragma sellae
      - Dural venous sinuses
    - Spinal epidural space and potential cranial epidural space
    - Subdural space
    - Arachnoid
      - Arachnoid granulations
    - Subarachnoid space and its most important cisterns (cerebellomedullary and spinal)
    - Pia mater
12. Blood supply of the meninges (meningeal arteries)

LABORATORY CLASSES 4

Wet lab classes with PBL and SGD (Classes will be conducted at the *Collegium Anatomicum*. Wet preparations. Classes implemented using VR, *Anatomage* and the „inverted spotters" method*)*.

1. Arterial blood supply of the brain
   - Arteries of the brain (origin, general course, branches)
     - Internal carotid artery
     - Vertebral artery
   - Arterial circle of Willis
   - Areas of supply of the particular brain arteries and their branches
2. Veins of the brain : superficial and deep cerebral veins
3. Arterial blood supply of the spinal cord
   - Vertebral artery and its branches (anterior and posterior spinal arteries)
   - Segmental arteries (significance of artery of Adamkiewicz)
   - Areas of supply of the particular spinal cord arteries (segmental vulnerability)
4. Main veins of the spinal cord

- REViEW - HEAD AND NECK
- **REVIEW - CENTRAL NERVOUS SYTSEM (CNS)**

- Clinical anatomy.
- Radiological visualization of cerebral hemispheres, brainstem and cerebellum, spinal cord in CT, and NMR examinations
- Radiological visualization of meninges and vascular system of brain and spinal cord in CT, NMR and angiographic examinations

CREDIT 3

Credit: CENTRAL NERVOUS SYTSEM - SPOTTERS / inverted spotters
Credit: CENTRAL NERVOUS SYTSEM - SCQ / MCQ

PBL - Problem Based Learning
SGD - Small Group Discussion

LABORATORY CLASSES - REVIEW- extra

- **Osteology and arthrology - all**
- **Head and neck - all**
- **Central Nervous System - all**

MCQ - Multiple Choice Question
SCQ - Single Choice Question

PBL - Problem Based Learning
SGD - Small Group Discussion