Anatomy Lab (1)

- This sheet only includes the extra notes for the lab handout regarding the theoretical part, as for the practical part it includes everything the doctor mentioned.

Theoretical Part

Page (2 A)

- Telencephalon of forebrain grows faster than the diencephalon containing it inside.
- The lateral and the third ventricles communicate together via an opening called: the interventricular foramen.
- Cavity of the midbrain stays narrow unlike the cavities of the telencephalon and diencephalon which enlarge during development.
  ** We will talk about the production of the CSF later on in another lecture.*
- CSF is produced inside the ventricles from a modified plexus of capillaries called the choroid plexus.
- CSF goes from the lateral ventricle to the third ventricle through the interventricular foramen then from the third ventricle to the fourth through the cerebral aqueduct.
- There are 3 openings in the roof of the fourth ventricle -one in the middle and two on the sides- which are called : central aperture of magendie (middle) and lateral apertures of lushka (one on each side), that the CSF pass through to the subarachnoid space.
- CSF will return to the venous circulation by a mechanism that we'll be taking later on.

Page (2B)

- Nervous system is driven from the ectoderm.
- The cells at the sides of the neural plate grow faster of the cells in the middle causing it to fold.
- Before the two neural folds fuse together, some cells manage to escape and form the neural crest which develops into:
  a. Ganglia; spinal or autonomic.
  b. Schwan cells; responsible for mylenation.
  c. Some facial cartilages; ectoderm gives mesoderm.
  d. Part of interventricular septum of the heart.
  e. Adrenal medulla; which is a modified sympathetic ganglion.
  f. Melanocytes in the skin; that give the skin its color.
- Neural tube develops into the brain and the spinal cord.

Page (2C)

- Neural tube is still opened from both sides, at the 25th day the anterior (rostral) neuropore closes and at the 27th the posterior (caudal) neuropore closes.
- Anencephalus means without a brain, it can be easily detected nowadays by ultrasound and taking a sample from the amniotic fluid which will show high levels of alpha feto-protein.
- This case is incompatible with life and we will either have a stillbirth or the baby will die within hours, thus if it was confirmed it's legal to do abortion.

Page (2D)

- In the development of the vertebrae we have two laminae that fuse together forming the laminar (vertebral) arch, where the spine is located.
- In cases of failure of closure of the posterior neuropore we will get one of these four cases mentioned in this page.
- In Rachischisis (picture A), nothing is covering the spinal cord and it is not folded (it's wide open) making it prone for infections, the motor neurons in that area are probably damaged as well, it is the most dangerous defect and is often associated with anencephalus.

Page (2E)

- All of these defects are incompatible with life.

Page (2F)

- The picture shows a fetus with rachischisis and anencephaly.
- Axons; either myelinated or poorly myelinated.
- Centrally myelin is produced by oligodendocytes while peripherally it is produced by schwan cells.
- Myelination in the spinal cord itself starts at the cervical region and sensory nerves, while regarding the roots the anterior start before the posterior.
- Myelination in the brain , we have two motor pathways;
  a. Pyramidal; responsible for fine movements.
  b. Extrapyramidal; responsible for the movement of proximal muscles.

  The extrapyramidal pathway gets myelinated before the pyramidal which is largely unmylinated at birth and this is the reason why human babies can't walk at birth.

- Myelination starts at the age of 6 months.

Page (3)

- Frontal lobe mainly carries out motor functions.
- Anterior part of the frontal lobe; the prefrontal association cortex is responsible for the control of social behavior, if it was injured; change in behavior will occur.
- Parietal lobe is mainly for sensation and association.
- Occipital lobe is mainly responsible for vision.
- Temporal lobe is mainly responsible for hearing.
- We have three important sulci:
  a. **Central Sulcus** which separates the frontal and parietal lobes.
  b. **Lateral Fissure** which separates the frontal and parietal lobes (above) from the temporal lobe (below)**.**
  c. **Parieto-occipital Sulcus** on the medial side of the hemisphere.
- Precentral gyrus is suspected to be the origin of all motor pathways.
- Histologically it is layered; in the 5^{th} layer we have the giant cells of Betz.
- Ares 6 is divided into a lower part; premotor cortex and an upper part; supplementary motor cortex.
- Area 8 is the posterior part of the middle frontal gyrus; Frontal eye fields that control the eye movement – via 3^{rd}, 4^{th} and 5^{th} cranial nerves – if it's active in the left the eyes go to the right and vice versa, if it was injured on the left the eyes go to the left since the right will take over**. *this is important and is a potential exam question.***
- Inferior frontal gyrus on the left is the main speech area; Broca's area of speech.
- Somaticsensory cortex receives sensation from body wall; pain and temperature and from the muscles and joints; proprioception, the left receives the right and vice versa.
- The upper surface of the superior temporal gyrus is area 41, 42 and is responsible for hearing; Primary auditory cortex. Next to it we have the auditory association area.
- Each sensory area has an association area next to it.
- **Names of the sulci in the picture:**
  1. Superior frontal sulcus. (Between superior frontal g. and middle frontal g.)
  2. Precentral sulcus. (In front ofprecentral g.)
  3. Postcentral sulcus. (Behind the postcentral g.)
  4. Intraparietal sulcus. (Below sup. Parietal lobe)
  5. Superior temporal sulcus. (Below sup. Temporal g.)
  6. Inferior temporal sulcus. (Below middle temporal g.)
  7. Inferior frontal sulcus. (The part coming out of the precentral sulcus)
- Areas 39 and 40 are related to speech and we'll take them in details later on.

Page (4)

- Medial surface of cerebral hemisphere.
- First thing we notice is the corpus callosum which consists of 4 parts:
  a. Rostrum
  b. Genu
  c. Body
  d. Splenium

  (a) And (b) connect the two frontal lobes together, (c) connects the temporal and parietal lobes of both sides together and (d) connects the occipital lobes on both sides together.

- Above the corpus callosum we can notice the cingulate gyrus which becomes into a narrow part called the isthmus that continues as the parahippocampus which ends as the uncus.
- These are the limbic lobe which is a part of the limbic system that is responsible for: a. memory b. emotional behavior.
- The uncus is the only part involved in olfaction.
- Paracentral lobule is the continuation of areas; 4, 6, 3, 1 and 2, and it's responsible for movement of the lower limb.
- On both sides of the Calcrine Sulcus in occipital lobe we have the primary visual area (17), areas (18, 19) are visual association areas.
- **Names of the sulci in the picture (below):**
  1. Cingulate sulcus. (Above the cingulated g.)
  2. Marginal sulcus. (Behind paracentral lobule)
  3. Collateral sulcus. (Below fusiform g.)

Practical Part

First he showed a **picture** of the corpus callosum which connects the right and left hemispheres, it has 3 parts.

Then he showed a **cerebral hemisphere**; first thing we come across is the genu anteriorly and the splenium posteriorly.

Then he showed us the central sulcus that separates the frontal lobe from the parietal. Each lobe follows the bone above it.

Below the corpus callosum there's a cavity which is the lateral ventricle and there's a bulging nucleus in the cavity which is the caudate nucleus which is a part of the basal ganglia below it there's the thalamus and below it is the hypothalamus, together they form the diencephalon which can't be seen from outside after them there's the brain stem.

We can also see the lateral fissure/sulcus, above it there's the frontal and parietal lobes and below it we have the temporal lobe.

On the medial (inner) surface we can see the parieto-occipital fissure which separates the parietal lobe anteriorly from the occipital lobe posteriorly.

In the middle of the occipital we have the calcarine fissure, above and below it we have area 17 which is responsible for vision, right next to it we can find areas 18 and 19 which are called either secondary or association visual areas.

Then he showed us the hindbrain; it contains two cerebellar hemispheres in front of them we have the pons and medulla. We find it in the posterior cranial fossa.

Hindbrain has a cavity; fourth ventricle which is behind the pons and medulla and in front of the cerebellum.

Then he showed us the brain stem which consists of the medulla, pons and midbrain. Then he showed us the cerebral pyramid in the midbrain on both sides.

Anterior surface of the medulla where we have the pyramid on both sides as well. Inside the pyramid we have the pyramidal tracts; corticospinal and corticobulbar.

Below the pyramid there's crossing between the right and left motor neurons.

You must be able to differentiate between the hindbrain and the brainstem with the cerebellum.

Cerebellum; 2 hemispheres with vermis in between connecting them. It is further divided into anterior lobe, posterior lobe and flocculonodular lobe. Vertically it is divided into vermis, next to it there's the paravermis and the lateral part which is a big constituent of the hemispheres.

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