

Brain Cutting Manual

Update 2021

Neuropathology Faculty involved in Brain cutting:

- Andrew Lieberman, MD, PhD (*) Chief of Neuropathology Division
- Sandra Camelo-Piragua, MD(#) Neuropathology Fellowship, Program Director
- Sriram Venneti, MD, PhD (#)
- Sean Ferris, MD, PhD (*)
- Kyle Conway, MD (!)

(*) ADRC only

(#) Adult and pediatric Medical autopsies and Medico-Legal consultations

(!) Estimated to join the team May 2022



NP Faculty (Brain cutting)



Sandra I. Camelo-Piragua, MD

Associate Professor
Neuropathology

Neuropathology Fellowship
Program Director



Sriram Veneti, MD, PhD

*Associate Professor
AI and Robert Glick Family
Research
Professor of Pediatrics
Experimental Pathology*



Andrew P. Lieberman, MD, PhD

Gerald D. Abrams Collegiate Professor
Neurodegenerative Disease
Director of Neuropathology

ADRC



Sean Ferris, MD, PhD

Assistant Professor
Neuropathology

NP Fellows

2021-2023



Emile Pinarbasi, MD, PhD

NP Admin



Gran, Gerson

Administrative Assistant Intermediate H

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E-Mail: ggran@med.umich.edu

Neuropathology Resources

<https://www.pathology.med.umich.edu/internal/tools-training>

DEPARTMENT OF PATHOLOGY LABORATORIES COVID19 RESOURCES INSIDE PATHOLOGY

Anatomic Clinical Education Experimental Informatics Molecular

- Calendars
- Pathology Directory
- UM Directory
- Employee Recognition
- Forms
- HO Internal Page
- MSTAR
- PathCMS Admin
- Policies & Procedures
- Tools & Training**

Anatomic Pathology

- Autopsy & Forensic Case Reports
- Cutting Manual
- Cutting Manual (Neuropathology Brain)
- Cytopath Telepathology
- ImmunoQuery Training Video
- Kellogg Specimen Tracking Tool
- Molecular Testing, Block Requirements
- OR Specimen Tracker
- QA Meetings
- Reading Room Glance-Based Microscopy
- Sign-out Room Tools
- SoftPathDx Training Information
- Sterile Lung Biopsies with a partner
- Sterile Lung Biopsies no partner

Cardiovascular

Central Nervous System (Neuropathology, Nerve and Muscle)

- CJD Biopsy Procedure
- Grossing of Nerve Biopsy
- MiOncoSeq Brain Tumor Protocol
- Muscle Freezing and Grossing Procedure
- Muscle Preparation for the House Clinicians
- Nerve Preparation for in house clinicians
- Temporal Lobectomy for Epilepsy

Decalcification

Brain Cutting Workflow

Full Adult Medical Autopsy

Is there any neuro abnormality by clinical history or at the time of extraction?

YES

NO

Fix brain in Formalin X 2 weeks

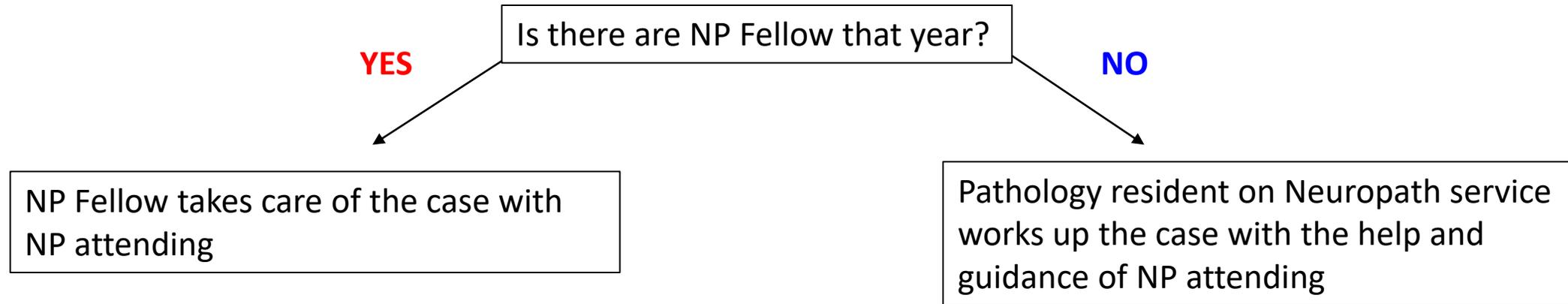
Brain Schedule for Brain Cutting

Resident is responsible to submit a one paragraph summary with pertinent clinical data and neurologic question the week before Brain cutting to NP Admin

Resident is expected to attend brain cutting, present case, take notes of gross findings. If there is a NP fellow, he/she will complete the gross description with the notes taken. If there is no NP fellow, the resident is responsible for completing gross description and send to the faculty no later than the Friday of the conference.
Review **slides** with NP attending and/or fellow

- Cut Fresh with Autopsy attending and take sections.
- Fix sections in formalin x 2d before submitting.
- Review sections with autopsy attending if any question consult the NP attending on surgical service that week.
- If NP attending consults on the slides send micro and final neuro to NP attending for editions

Neurodegenerative Cases (ADRC) or Brain only autopsies



Medico-Legal Autopsy

Forensic Pathologist may decide there is Neuro question to be addressed. Fix brain in Formalin X 2 weeks and schedule for Brain cutting contacting the UMHS morgue coordinator who will put the case in Queue to be cut at conference.

Forensic trainee or attending is responsible to submit a one paragraph summary with pertinent clinical data and neurologic question the week before Brain cutting to NP Admin

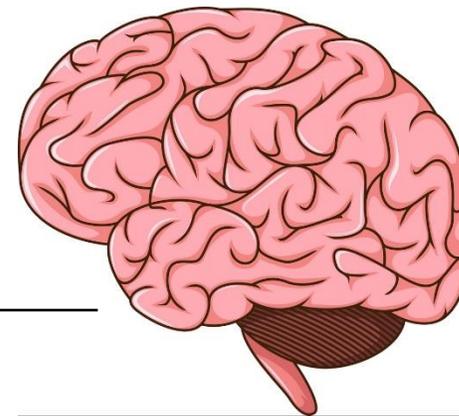
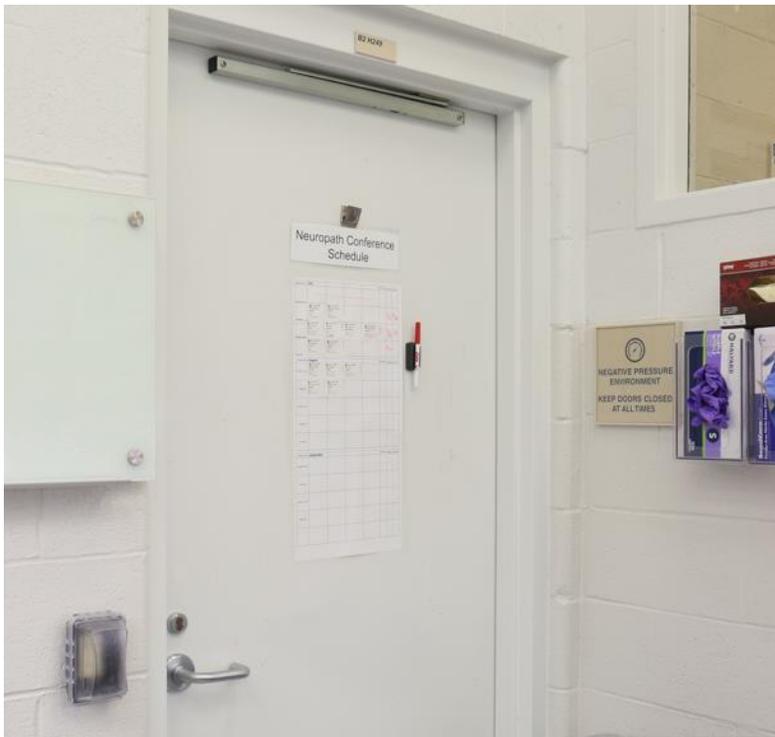
- For Forensic cases NP attending guides and helps Forensic Pathology team but **NP attending name DOES NOT go in the report.**
- Forensic Pathology team writes and edits the report

- Cut Fresh with Forensic Pathology attending and take sections.
- Fix sections in formalin
- Review sections with Forensic Pathology attending. if any question consult the NP attending on surgical service that week.
- For Forensic cases NP attending guides and helps Forensic Pathology team but **NP attending name DOES NOT go in the report**

Alternatively, cases will go to Forensic Pathologist with Neuropathology expertise



Autopsy and Forensic Services



UMHS
ADRC
Pedi
ME

Neuropath Conference
Schedule

July		Presented	Original	Reviewed
Jul 01-05	Jul 06-10	Jul 11-15	Jul 16-20	Jul 21-25
Jul 26-30	Jul 31			
August		Presented	Original	Reviewed
Aug 01-05	Aug 06-10	Aug 11-15	Aug 16-20	Aug 21-25
Aug 26-30	Aug 31			





Neuropathology: Specimens from autopsy Brain Conference

Conference Date:

AU/ME#:

Name:

Fresh specimen weight:

Postmortem interval:

Clinical History:

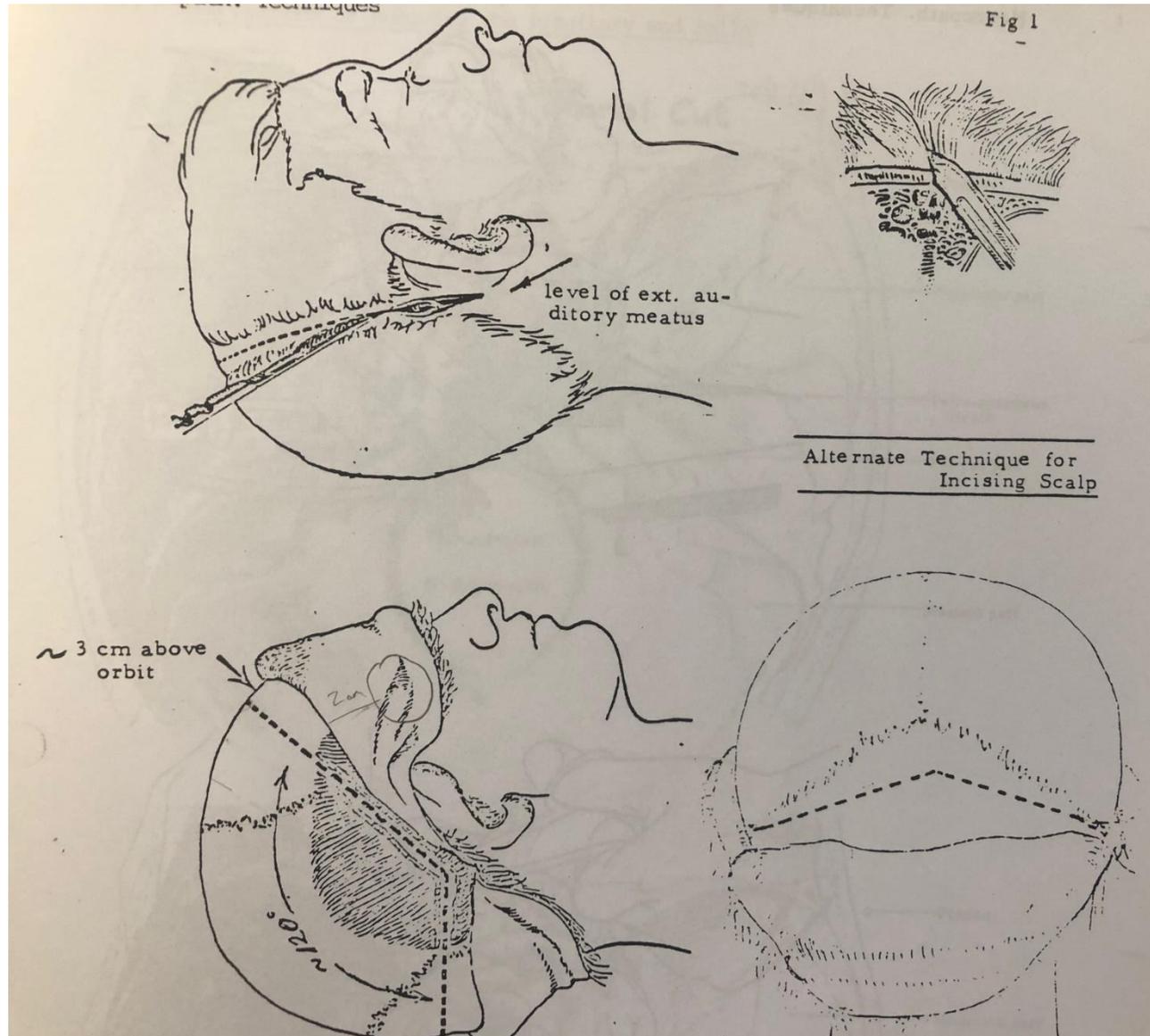
Indications:

Specific questions for neuropathology:

Brain cutting: Tuesday 1pm NCRC

- Fill out the NP Brain Conference form as soon as you are done with your autopsy
- Check your email to review when your case is scheduled for conference (usually 2 weeks later)
- Attend Brain cutting conference. Come prepared with clinical history and any pertinent general autopsy findings
- If no NP fellow, the resident is expected to complete Gross Neuropathologic Examination and send NP faculty no later than Friday
- NP fellow receives slides and review with resident
- NP faculty reviews case gives feedback

Brain Removal Adults



Normal Adult Brain Weight 1,200-1,400 g



JHMS NEUROPATHOLOGY BRAIN CUTTING

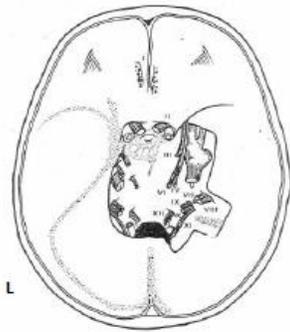
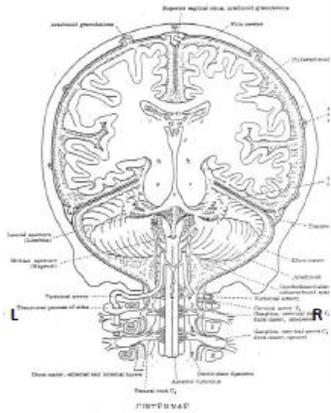
Resident/Fellow: _____ Case #: _____
Patient's name: _____ Reg#: _____
Date of Autopsy: _____ Date of Brain cutting: _____ NP Attending: _____

Brief summary of General Clinical History and Gross autopsy findings:

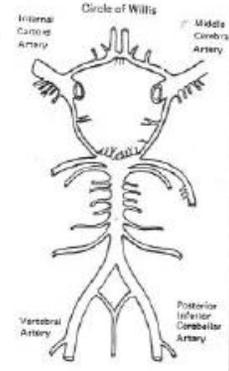
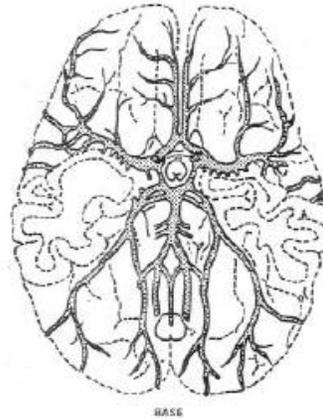
Summary of Neurological related history including CNS imaging:

NEUROPATHOLOGY GROSS AUTOPSY FINDINGS:

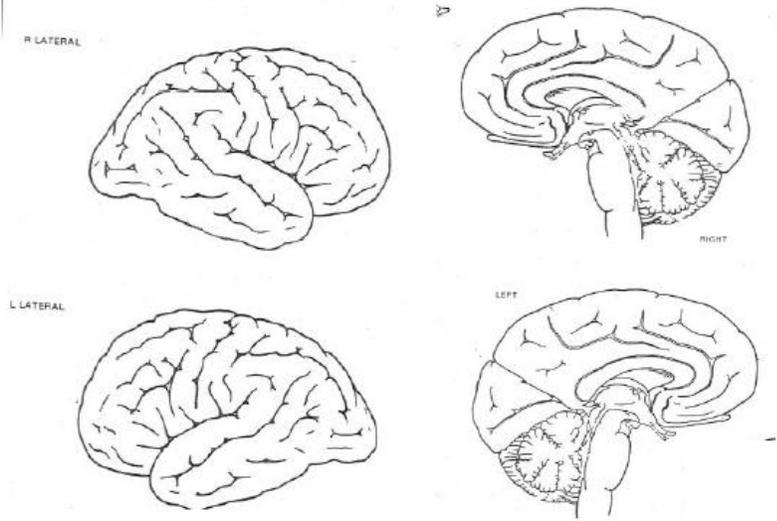
Skull, Meninges, Midline Structures



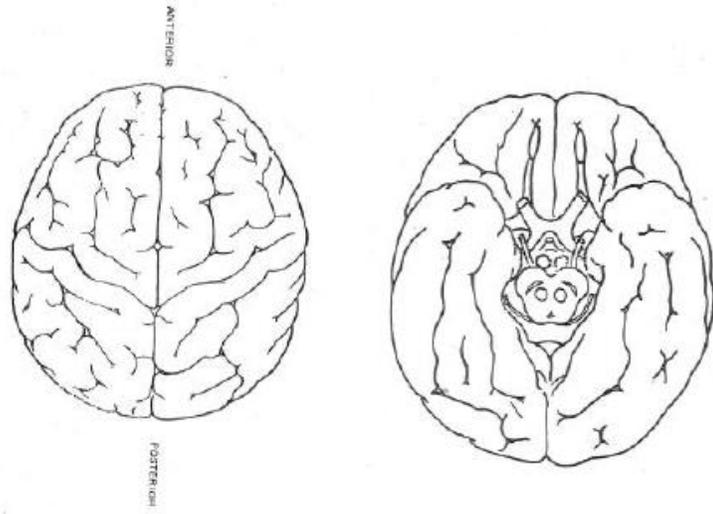
Vasculature



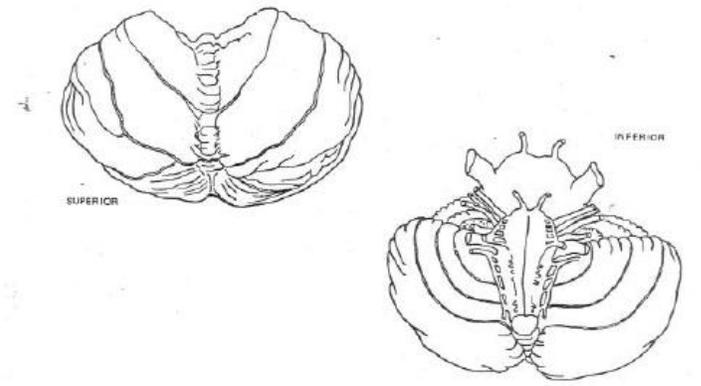
Cerebrum External Surfaces



Cerebrum External Surfaces



Cerebellum, Brain Stem and Cranial Nerves External Surfaces

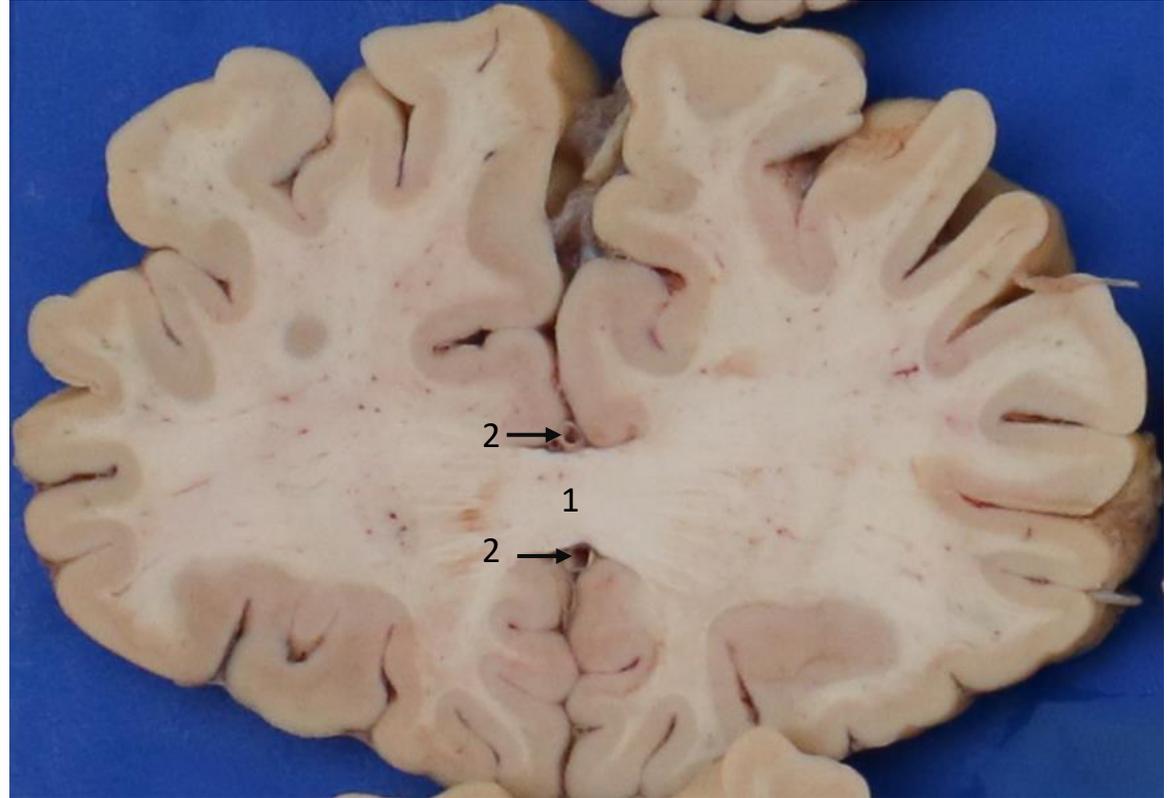


Brain Landmarks

1. At the anterior tip of the temporal lobes



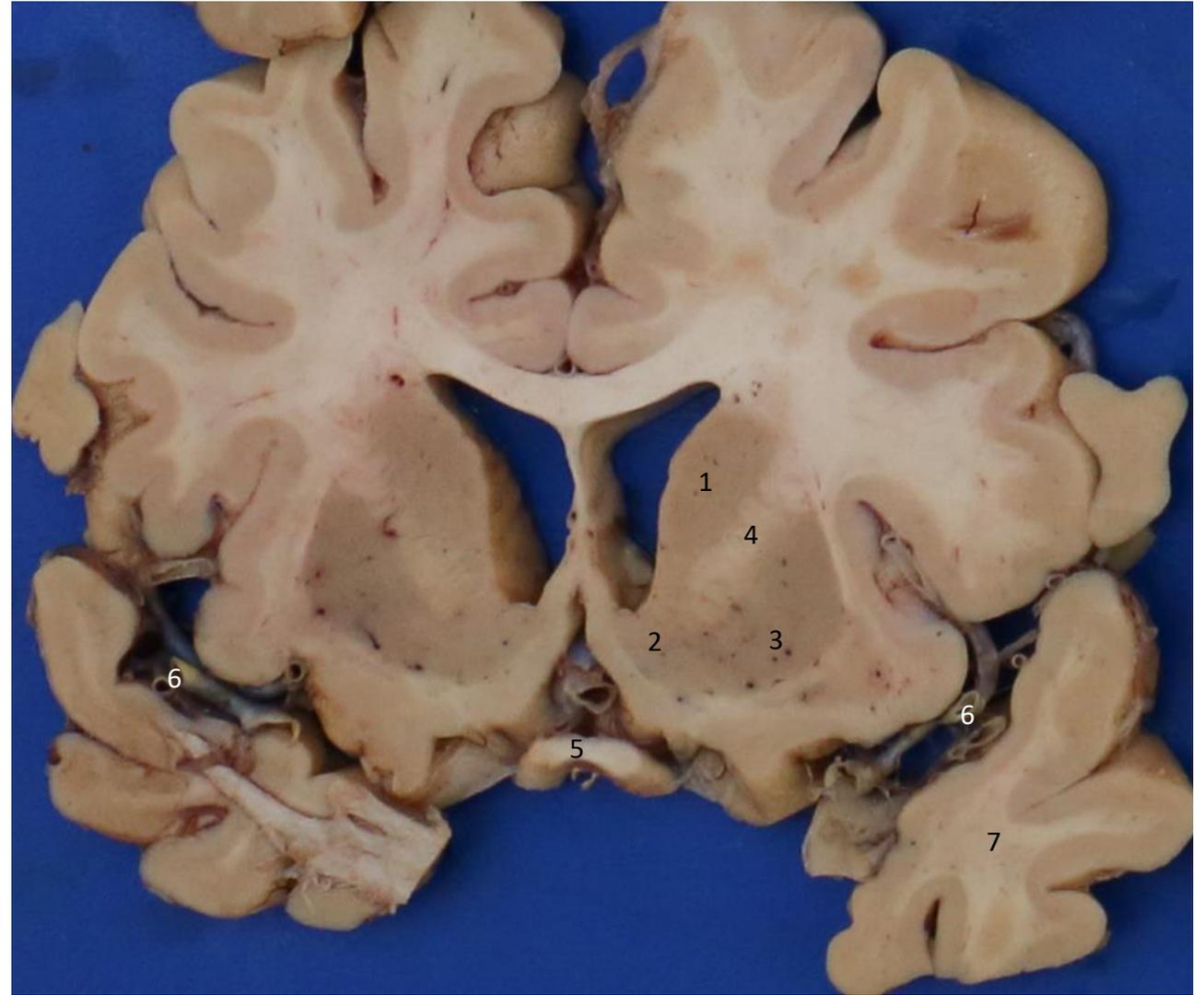
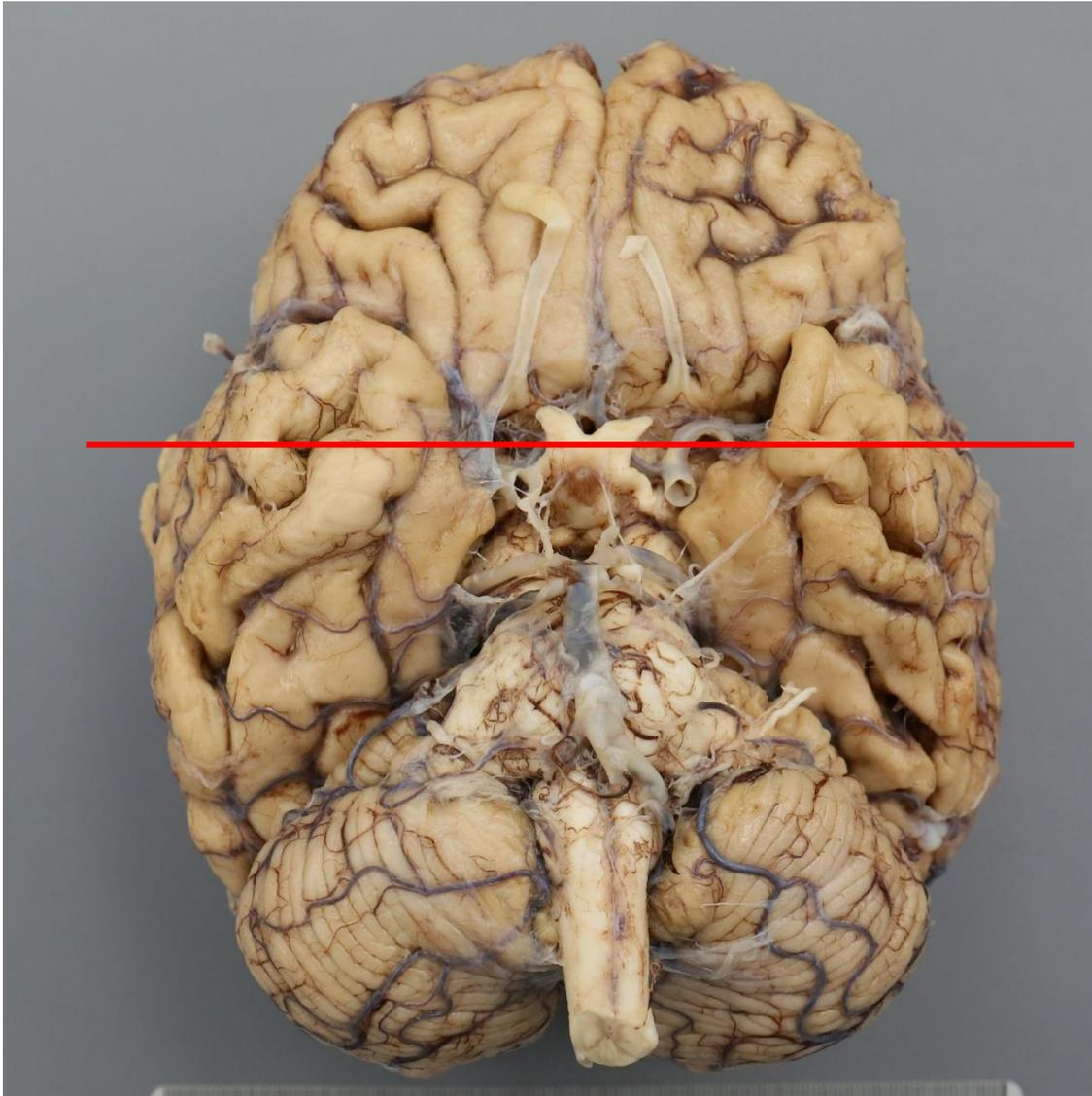
Frontal lobes



1. Genu of Corpus callosum
2. ACA

Brain Landmarks

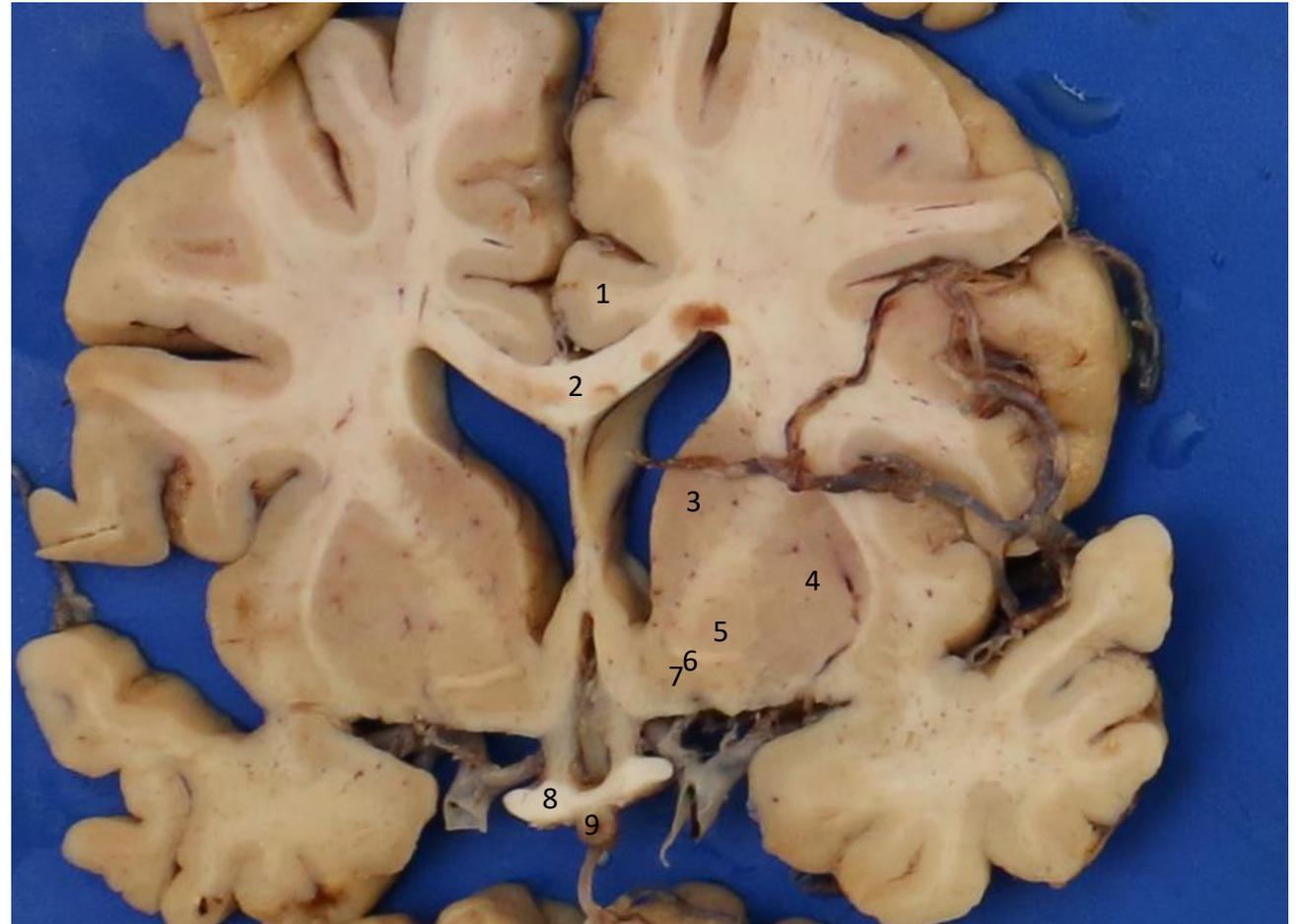
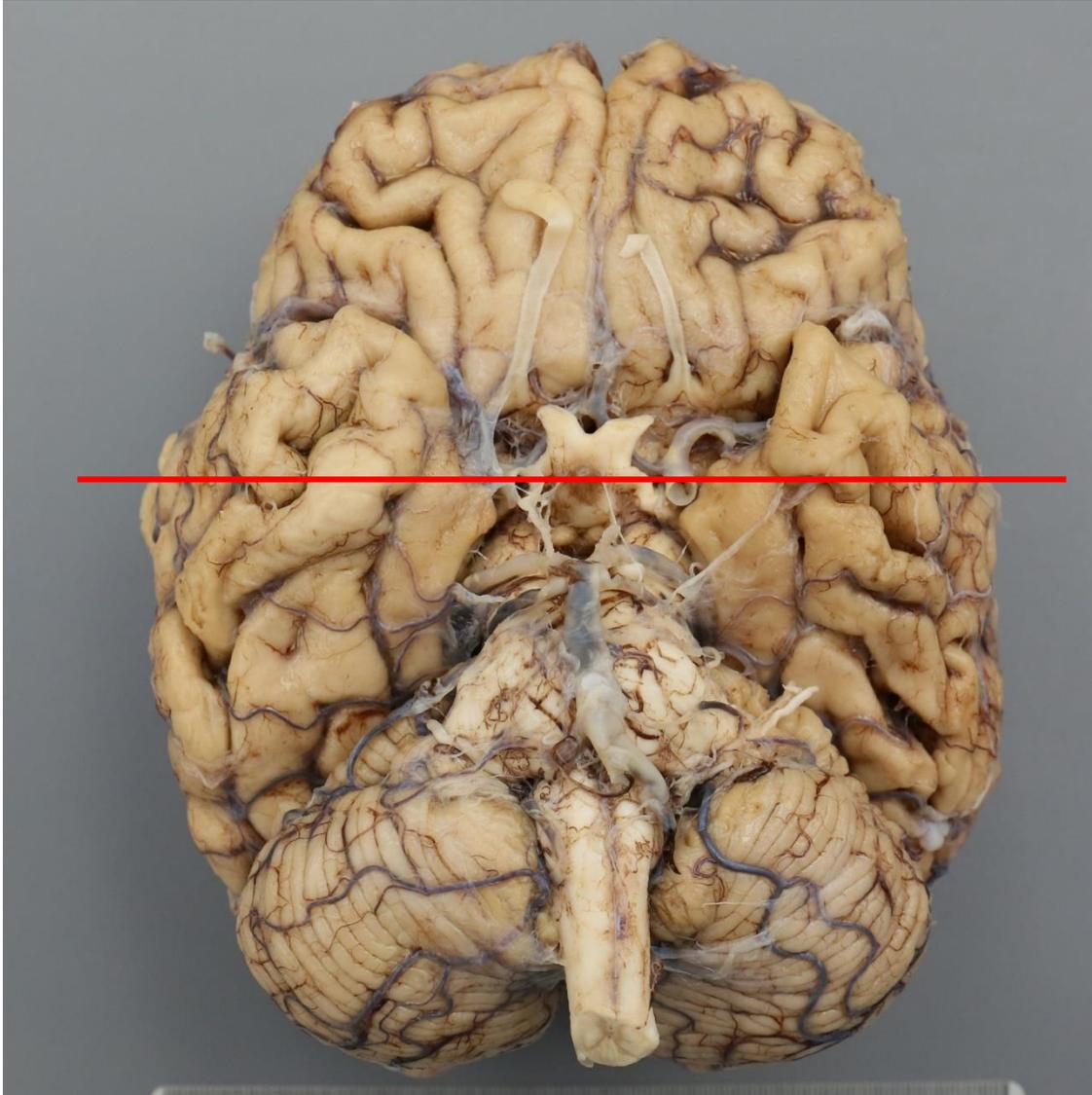
2. At the Chiasm



- | | | |
|--------------|---------------------|------------------|
| 1. Caudate | 4. Internal capsule | 7. Temporal Lobe |
| 2. Accumbens | 5. Chiasm | |
| 3. Putamen | 6. MCA | |

Brain Landmarks

3. At the pituitary stalk



1. Cingulate
2. Corpus callosum
3. Caudate
4. Putamen
5. Globus pallidus
6. Anterior Commissure
7. Nucleus Basalis
8. Optic Tract
9. Pituitary stalk

Brain Landmarks

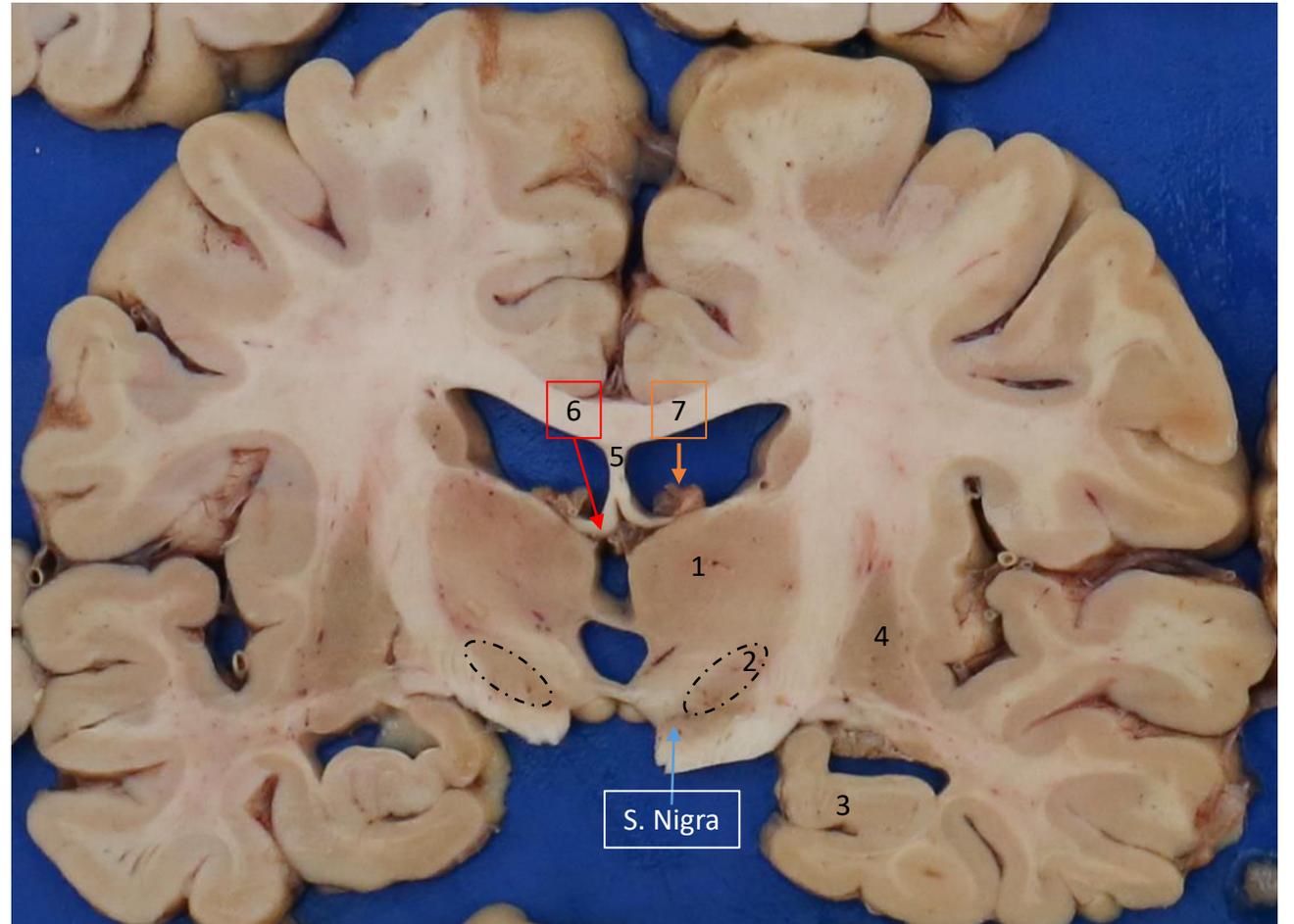
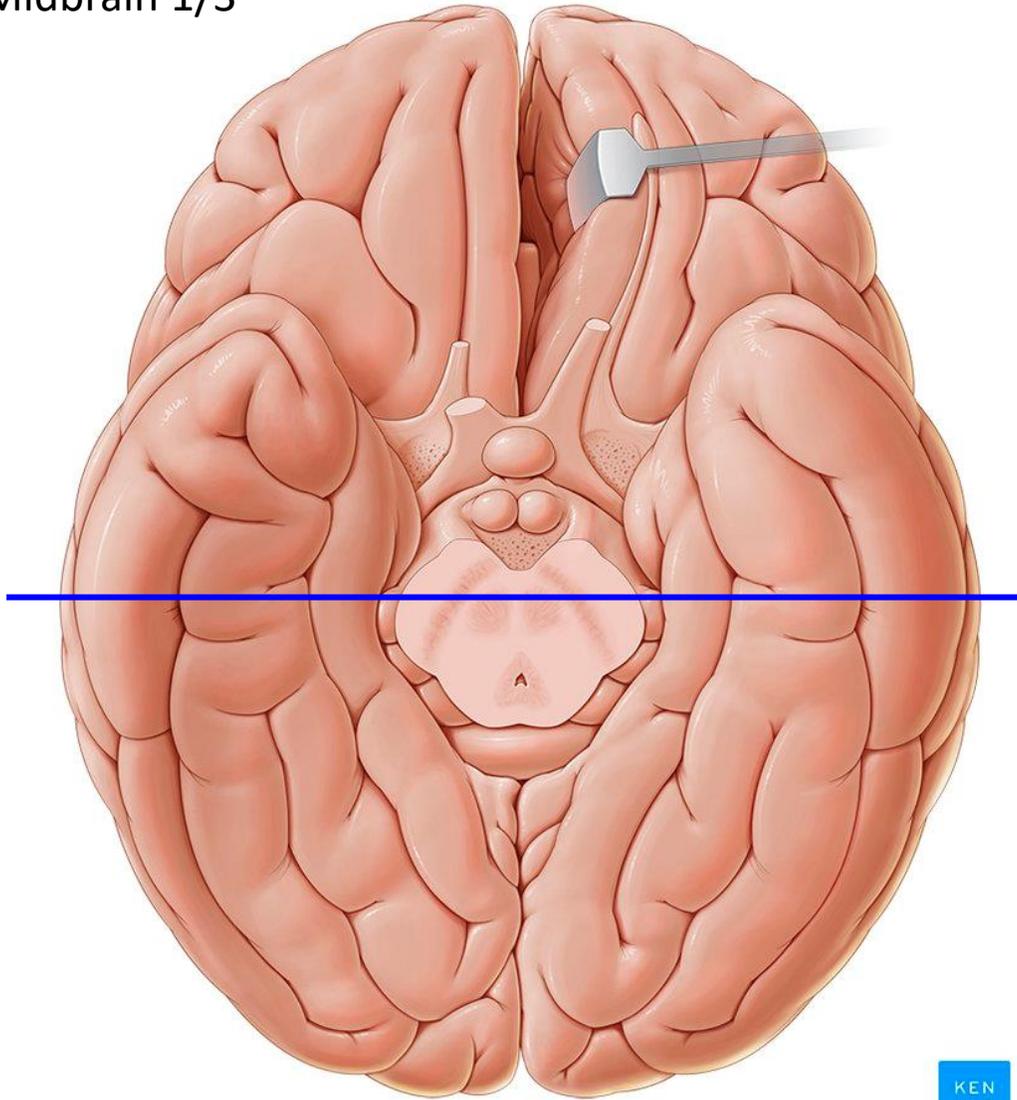
4. At the mammillary bodies



- | | |
|----------------------|-------------------------|
| 1. Caudate | 5. Putamen |
| 2. Thalamus | 6. Insular cortex |
| 3. Mammillary bodies | 7. Amygdala |
| 4. 3rd Ventricle | 8. Anterior hippocampus |

Brain Landmarks

5. Midbrain 1/3

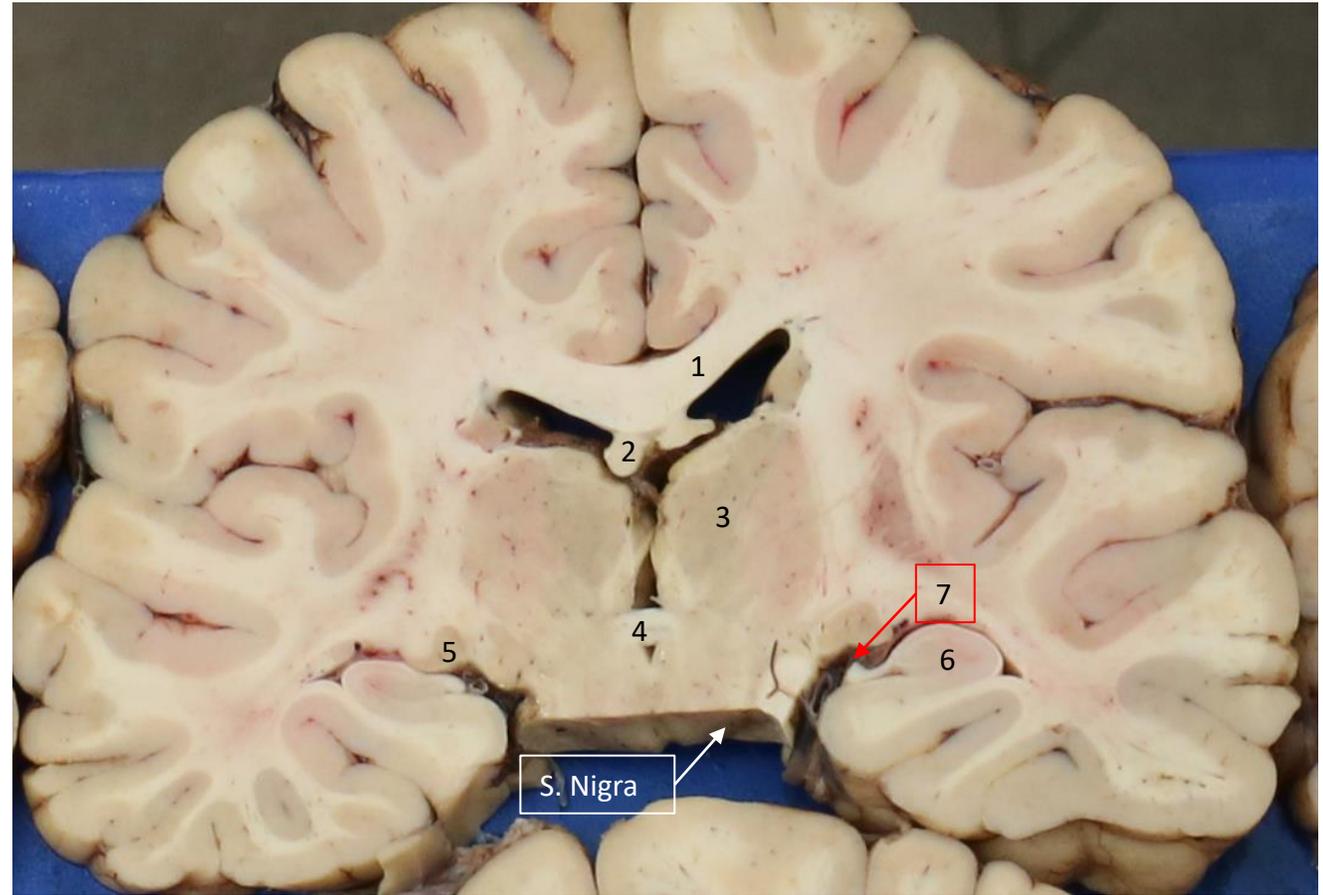
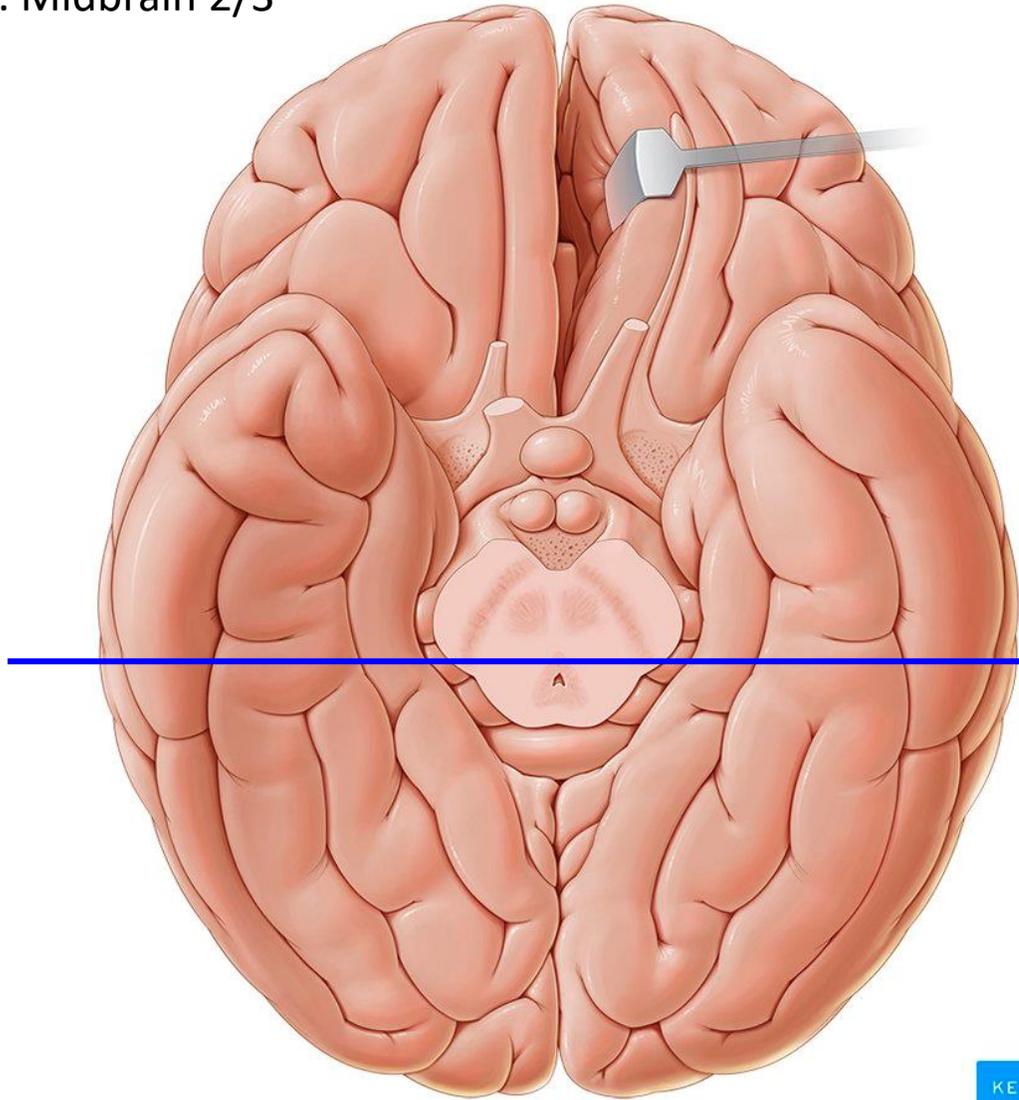


- 1. Thalamus
- 2. Subthalamic nucleus
- 3. Anterior hippocampus
- 4. Putamen

- 5. Septum pellucidum
- 6. Fornix
- 7. Choroid plexus

Brain Landmarks

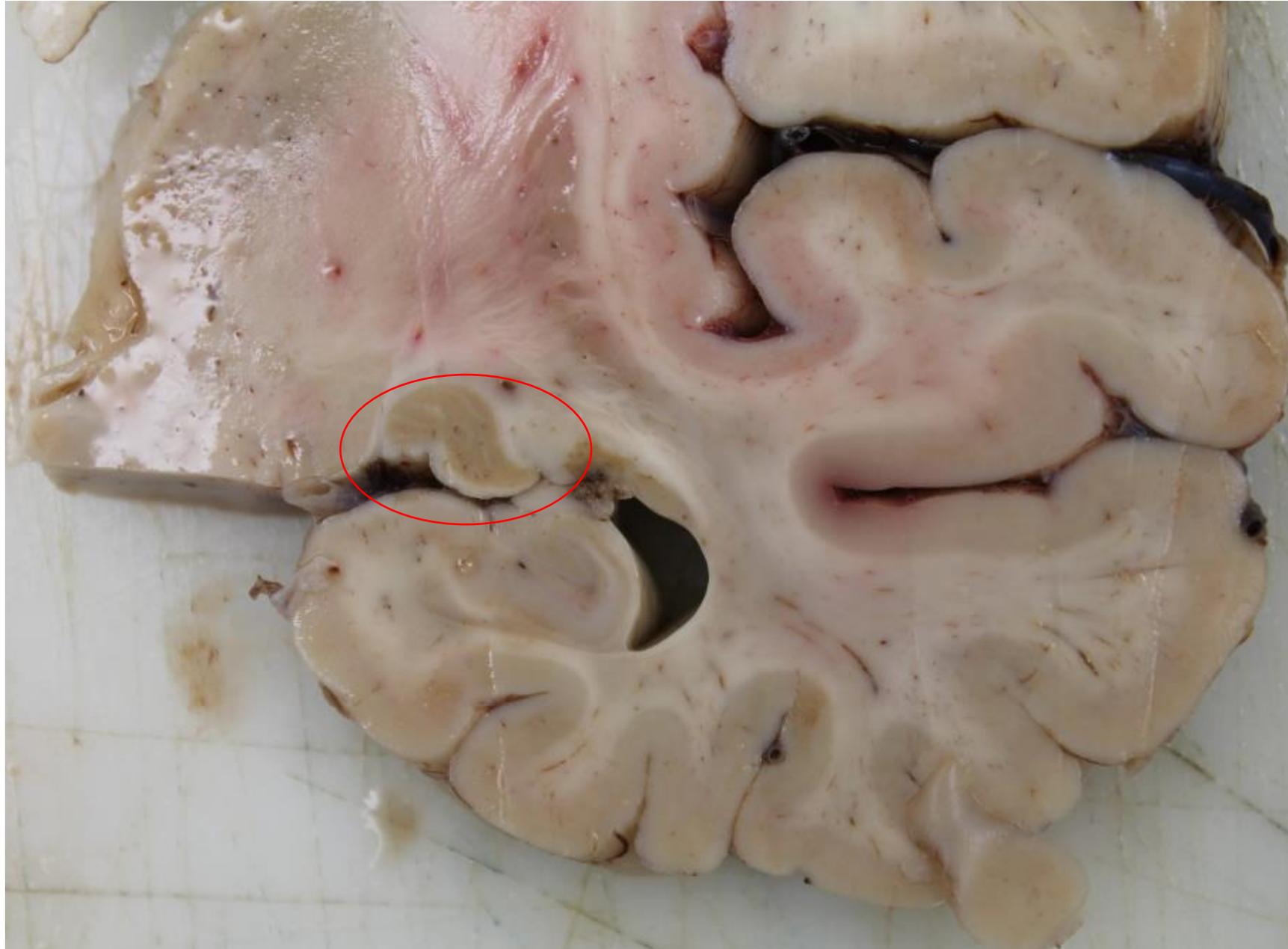
5. Midbrain 2/3



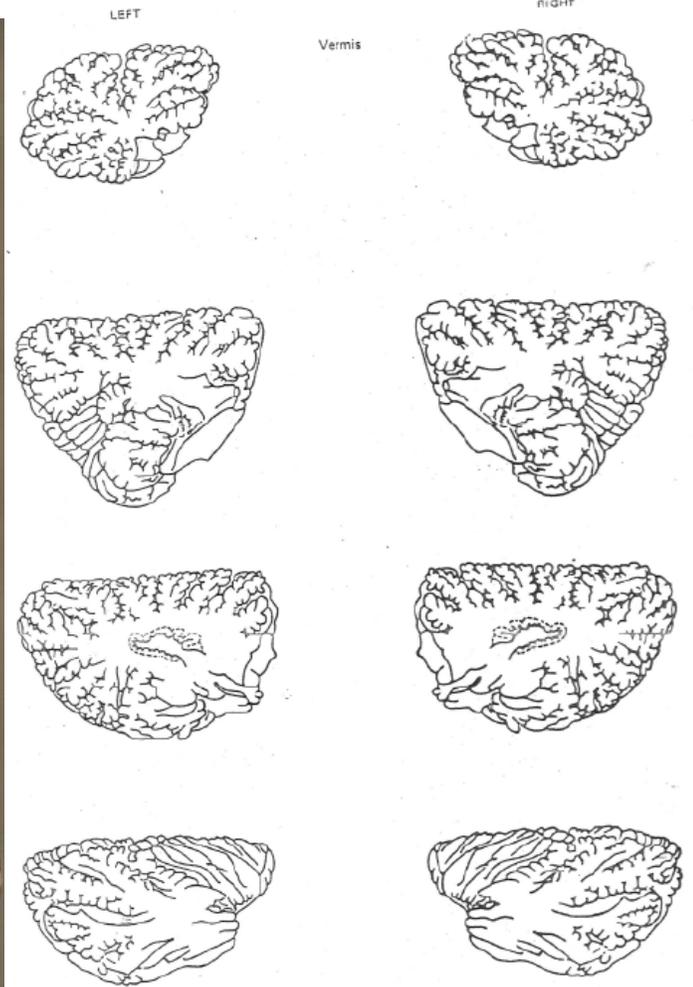
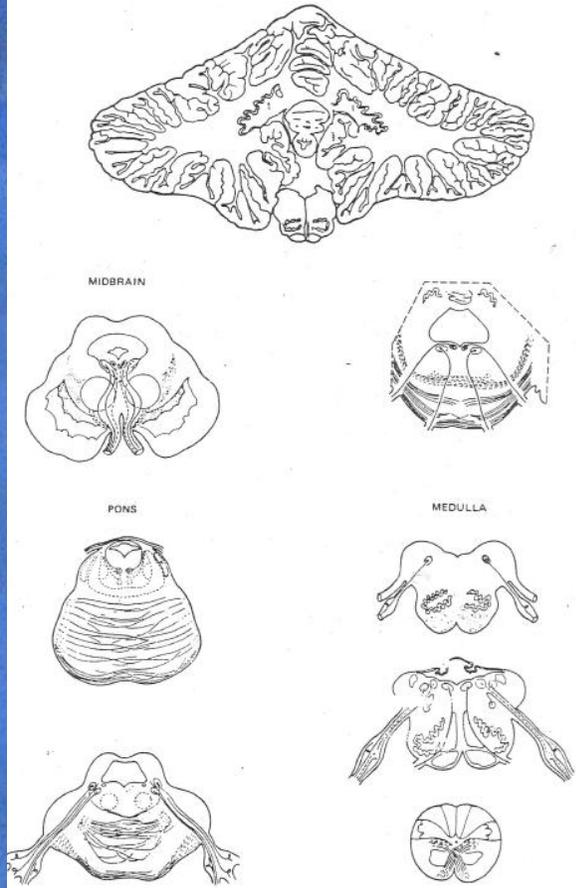
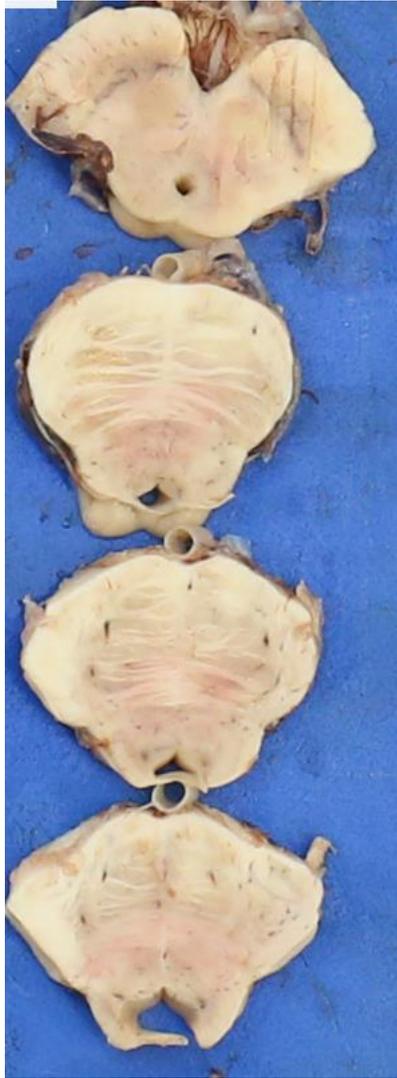
- 1. Corpus callosum
- 2. Fornix
- 3. Thalamus
- 4. Massa Intermedia

- 5. Lateral geniculate
- 6. Hippocampus
- 7. Fimbria

Napoleon's Hat: LGN

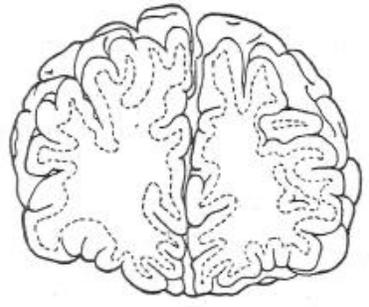


AU-21-127

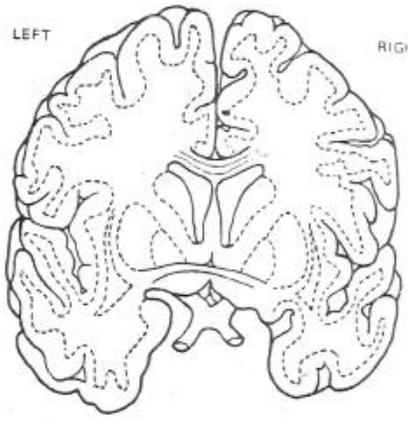




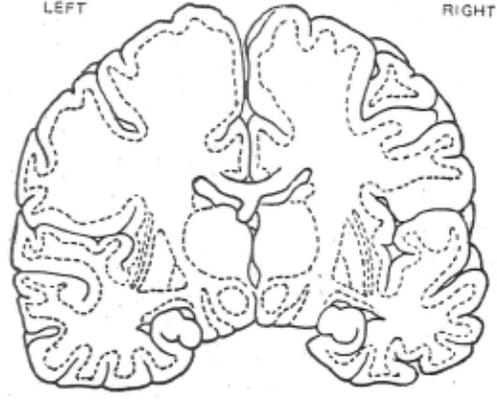
LEFT RIGHT



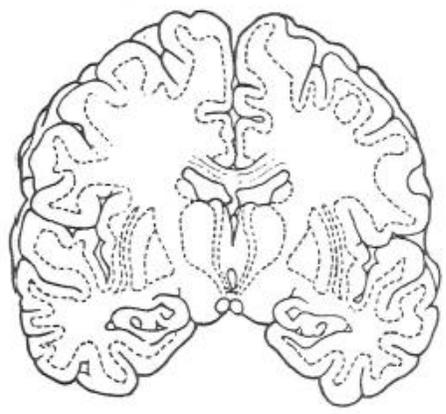
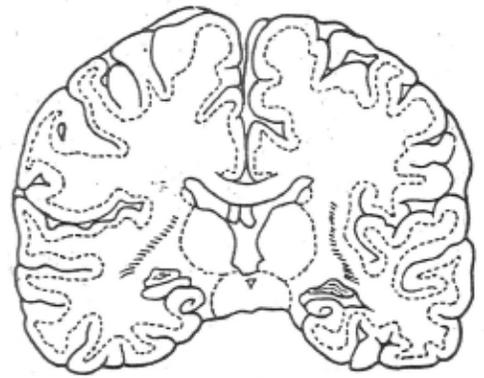
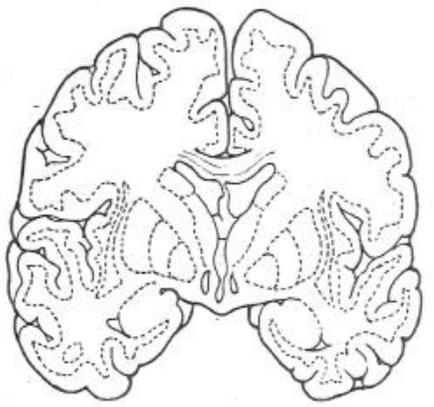
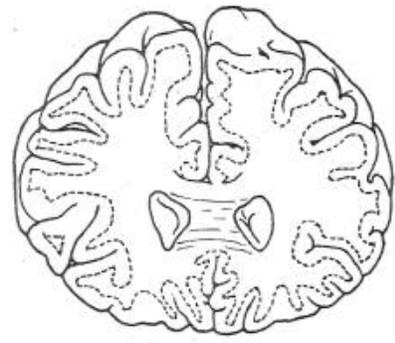
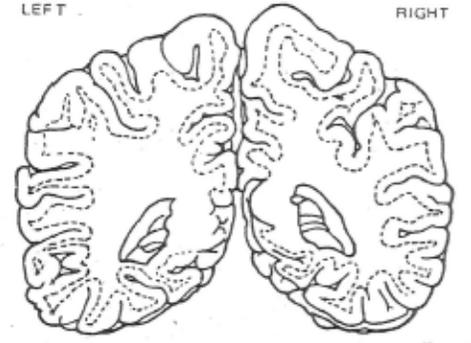
LEFT RIGHT



LEFT RIGHT



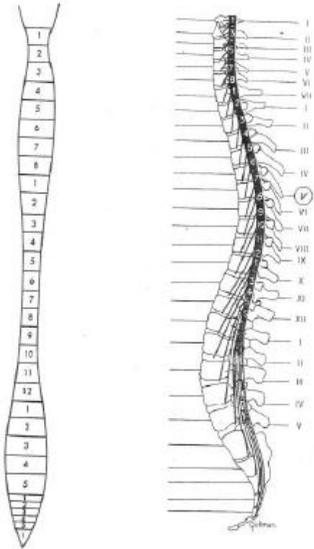
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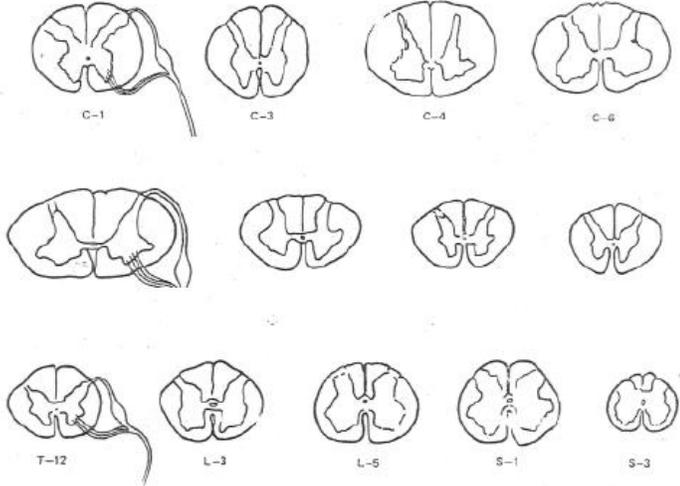
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Spinal Cord Levels- External Surface



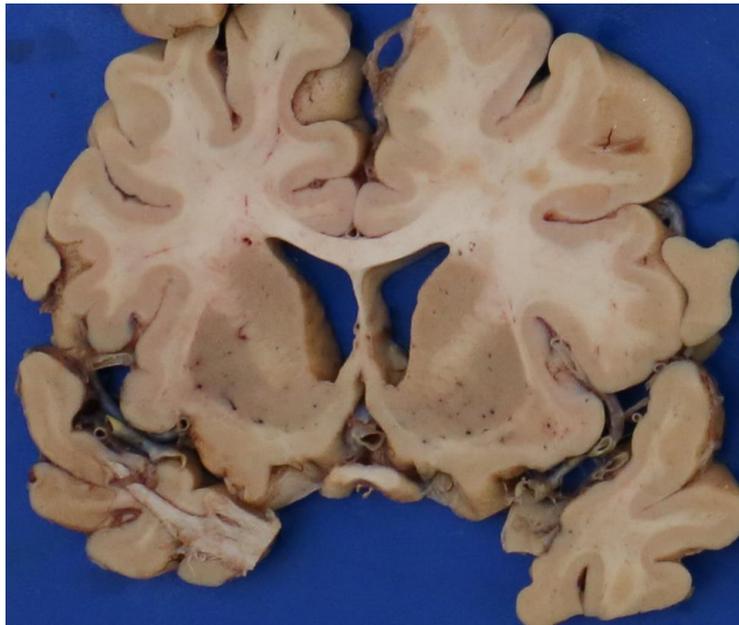
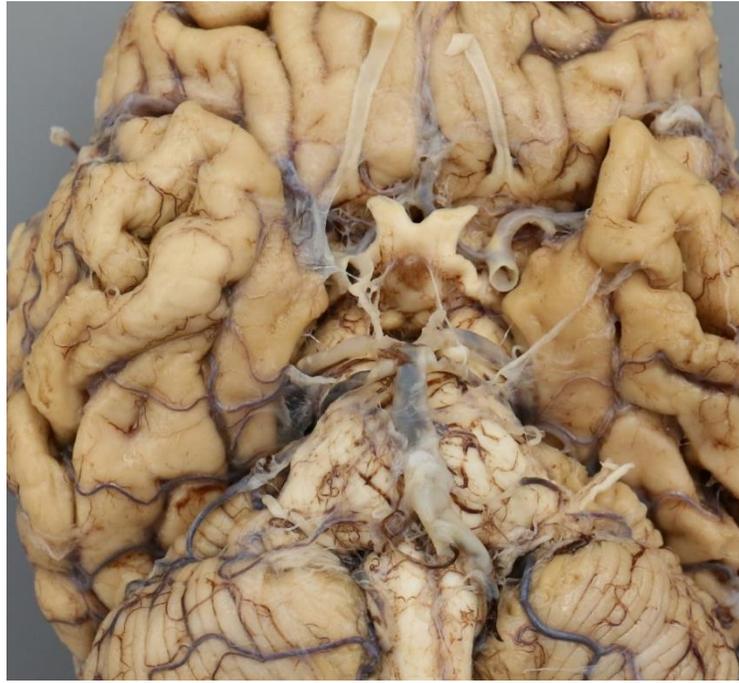
Cross Sections Spinal Cord



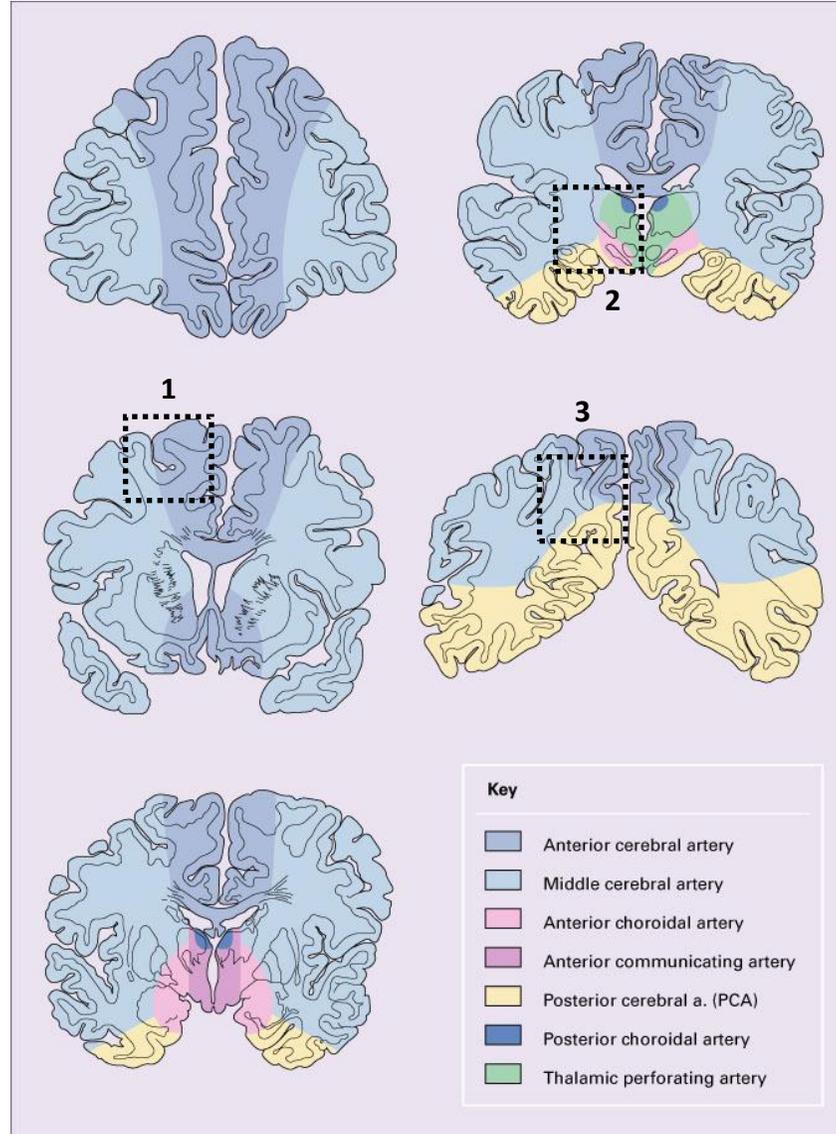
Suggested Sections for brain cutting

1. Include a section of any abnormal brain regions identified at brain cutting.
2. In hypoperfusion/ischemic events, include appropriate watershed areas (2-4 cassettes).
3. If history of alcohol abuse, include a section of superior and inferior cerebellar vermis, mammillary bodies and periaqueductal grey matter.
4. Brains without gross pathology and additional sections for the above-mentioned cases:
 - A. Cerebral cortex (frontal, temporal, parietal OR occipital).
 - B. Basal ganglia.
 - C. Hippocampus at the level of the lateral geniculate (LGN) a.k.a. Napoleon's hat
 - D. A section of brain stem (midbrain, pons and /or medulla)

Vessels

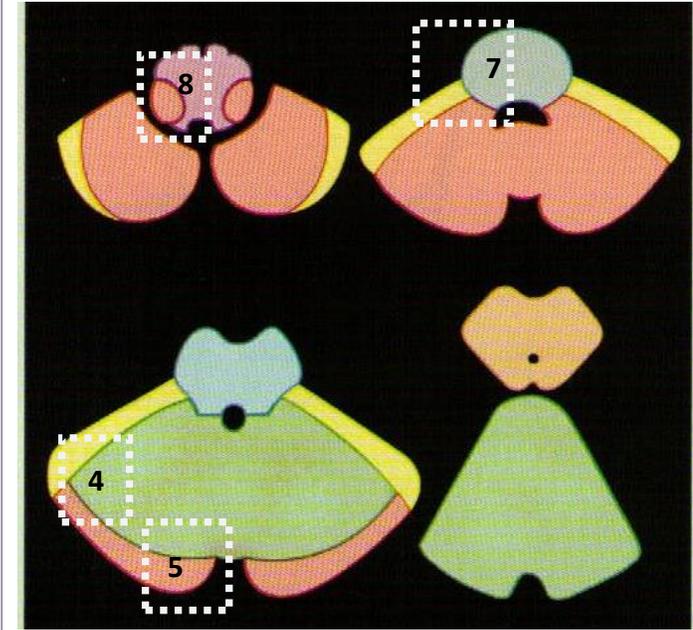


CNS WATERSHED AREAS (SCP sections)



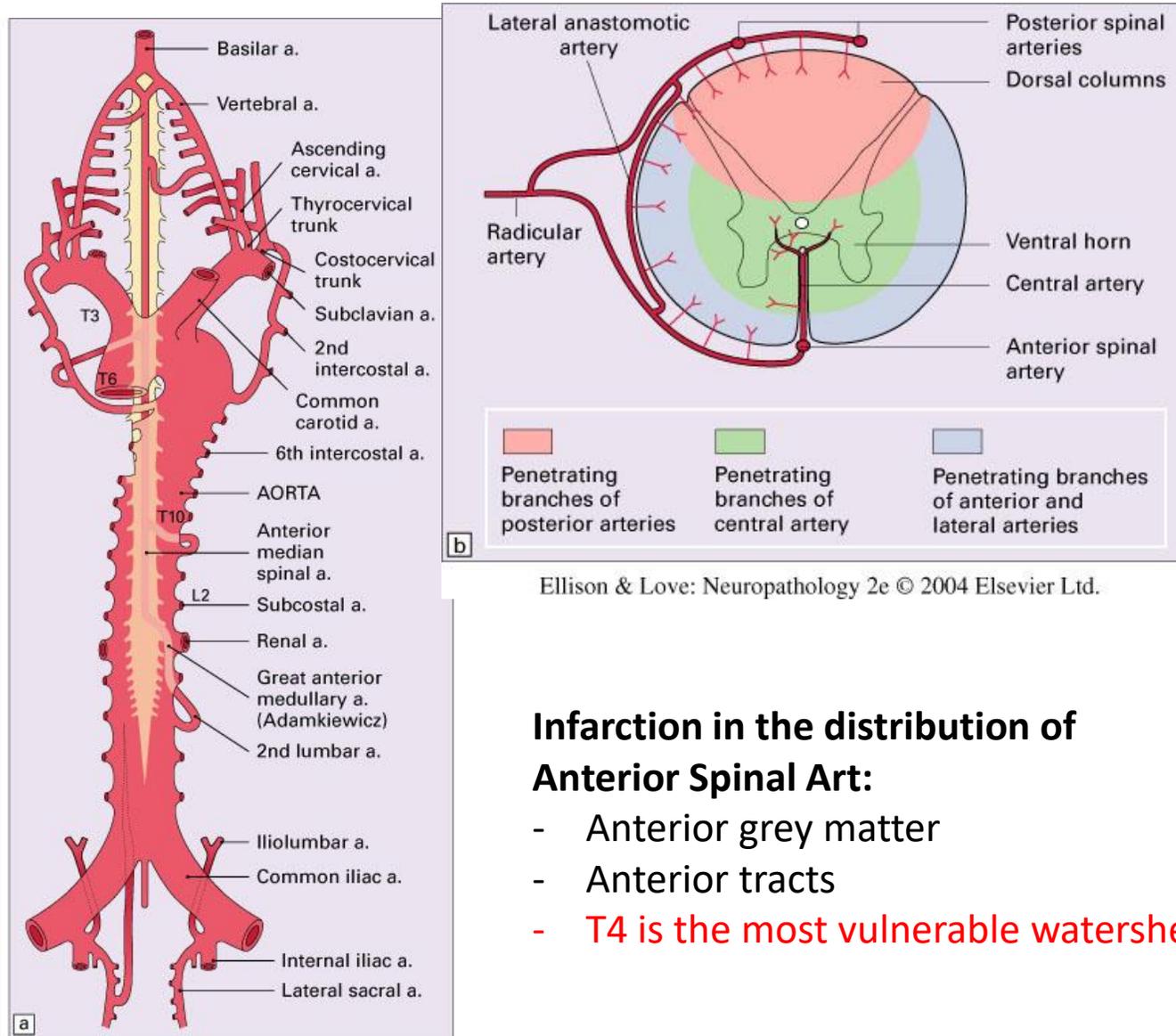
Ellison & Love: Neuropathology 2e © 2004 Elsevier Ltd.

1. Superior and Middle Frontal gyrus at the level of CAP
2. Thalamus, Red nucleus, SN and LGN
3. Medial Parieto-Occipital cortex



- Light Blue: Pontine perforating arteries
- Green: Sup Cerebellar Art
- Yellow: Antero Inferior Cerebellar artery
- Red: Postero Inferior Cerebellar artery
- Orange: Medullary Perforating arteries

4. Cerebellar hemispheres
5. Cerebellar vermis
6. Pons
7. Medulla



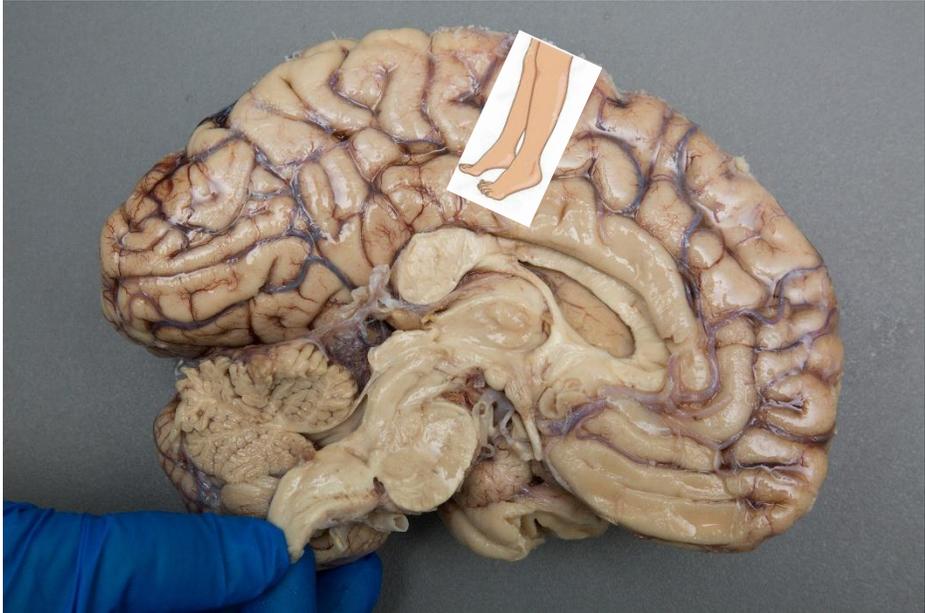
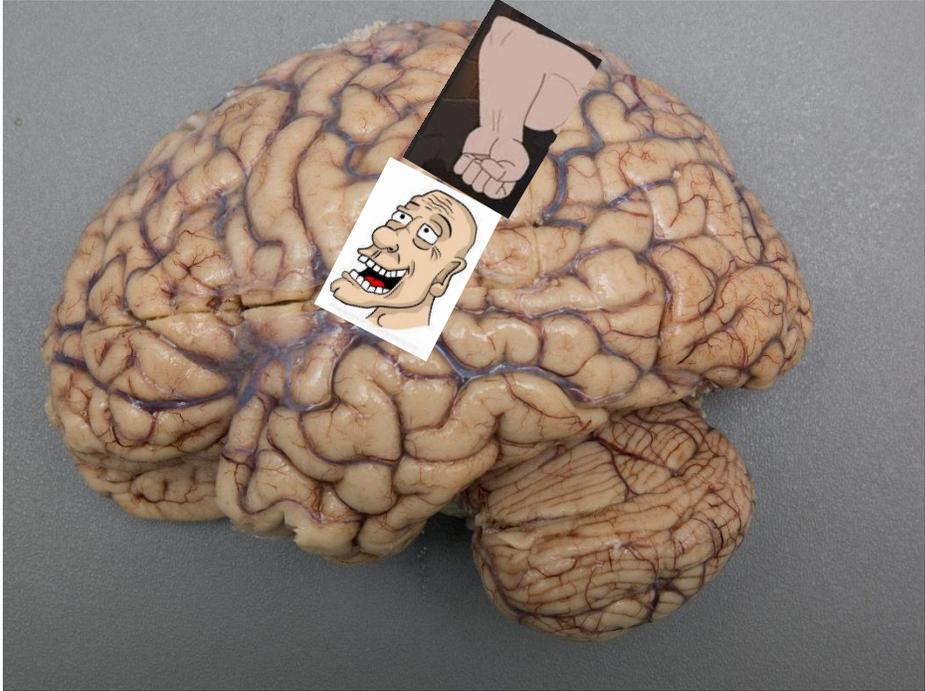
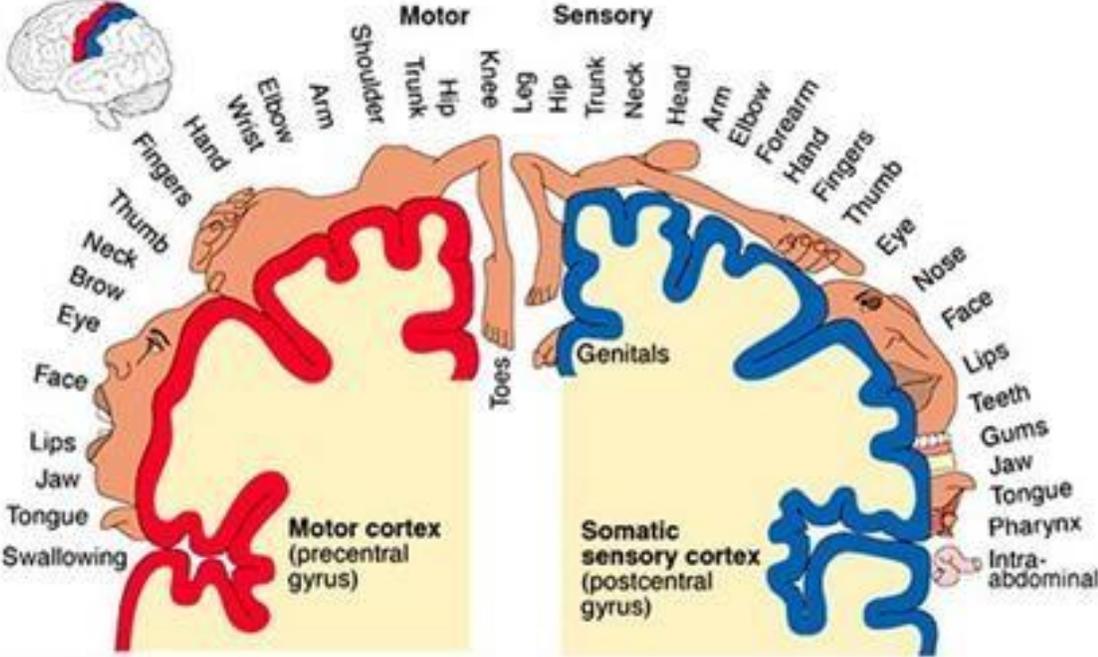
Ellison & Love: Neuropathology 2e © 2004 Elsevier Ltd.

Infarction in the distribution of Anterior Spinal Art:

- Anterior grey matter
- Anterior tracts
- T4 is the most vulnerable watershed area

Ellison & Love: Neuropathology 2e © 2004 Elsevier Ltd.

HOMUNCULUS



Brain Gross Description Template

In Soft **Ctrl+A: AUB**

The brain weighs <New Edit Field> g **Fix/Fresh** (normal range: 1200 - 1400 g). Both the external and internal surfaces of the dural leaflets are smooth and free from nodules. The superior sagittal sinus is **patent**. There **is /is no** evidence of cingulate, uncal, or cerebellar tonsillar herniation. The leptomeninges are **(thin, translucent, and free from exudates or cloudy)**. Examination of the arteries of the circle of Willis and their major branches reveals they are patent with **mild/moderate/severe** atherosclerosis. Aneurysms **are/are not** seen. The superficial veins of the brain and cranial nerves are unremarkable. There **is/is no** atrophy primarily affecting the <New Edit Field> lobes. After coronal sectioning, the cerebral hemisphere reveals a cortex of <New Edit Field> mm at the level of the genu of the corpus callosum. The lateral ventricle **is/ is not** dilated. The septum pellucidum is **unremarkable**. The centrum semi-ovale is **(free from hemorrhage and tumor mass)/or has XXX lesions**. The central nuclei of the brain, including caudate, globus pallidus, putamen, thalami, lateral geniculate bodies and subthalamic nuclei all are **unremarkable**. The hippocampus and amygdala are **Select One**. The substantia nigra and locus ceruleus are **Select One**. The remainder of the midbrain, pons, medulla, cerebellar hemispheres, vermis and cerebellar nuclei are <New Edit Field>. The spinal cord is <New Edit Field> OR not available for examination.

Sections for Neurodegenerative Cases

1 Middle Frontal Gyrus

2 Superior and Middle Temporal Gyrus

3 Inferior Parietal Cortex

4 Occipital, Primary Visual Cortex

5 Anterior cingulate with corpus callosum

6 Amygdala

7 Nucleus basalis at the level of anterior commissure.
Include Basal Ganglia GP and Putamen

8 Hippocampus at the level of the lateral geniculate

9 Subthalamic nucleuses and Thalamus

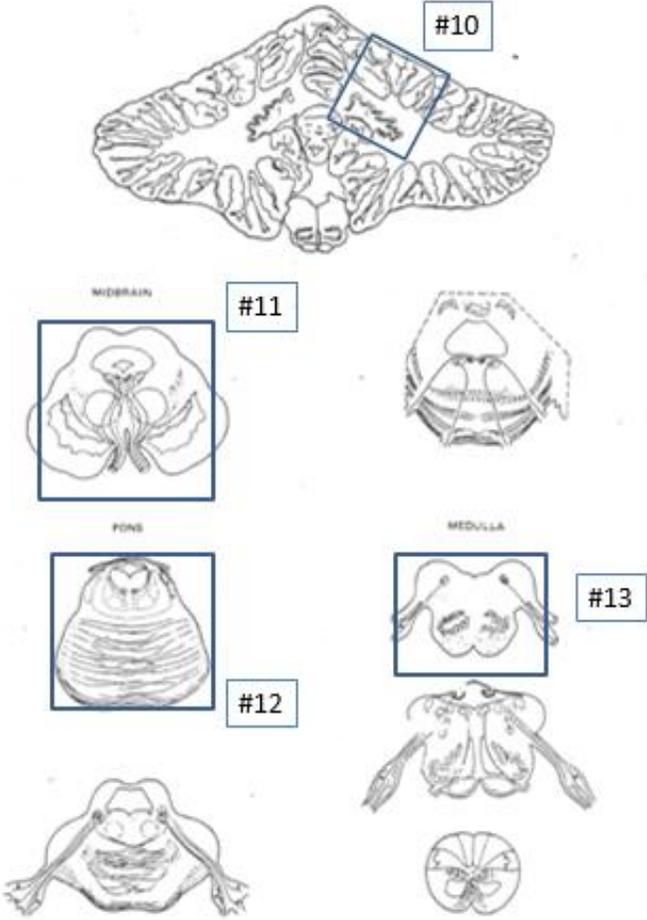
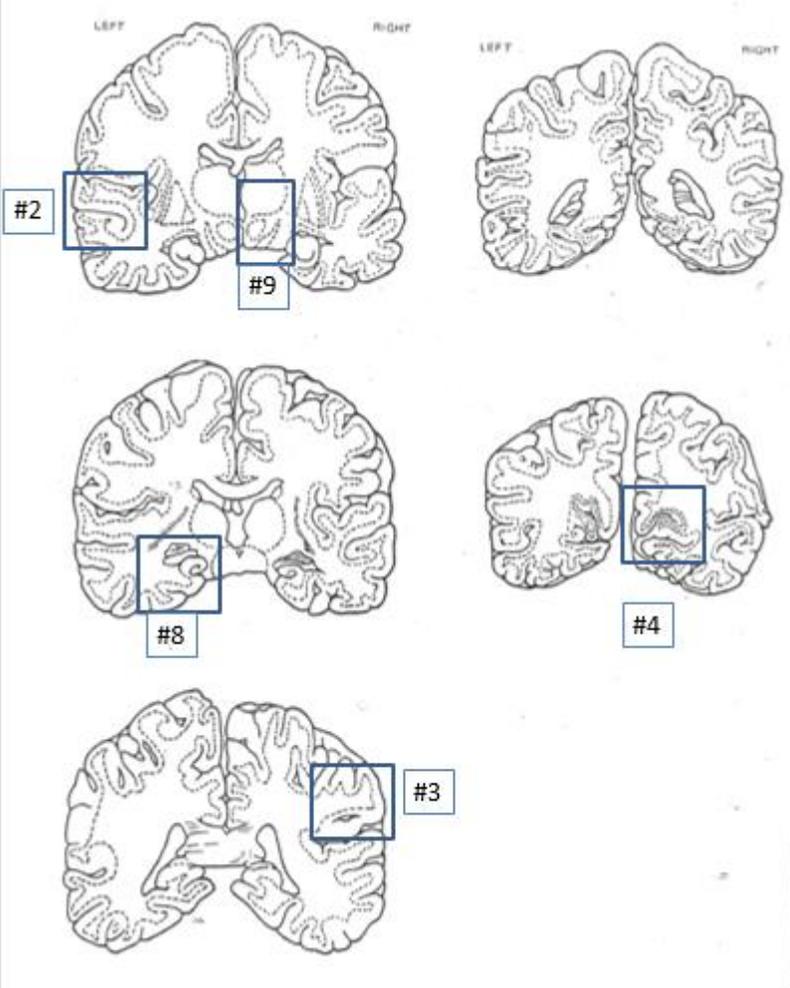
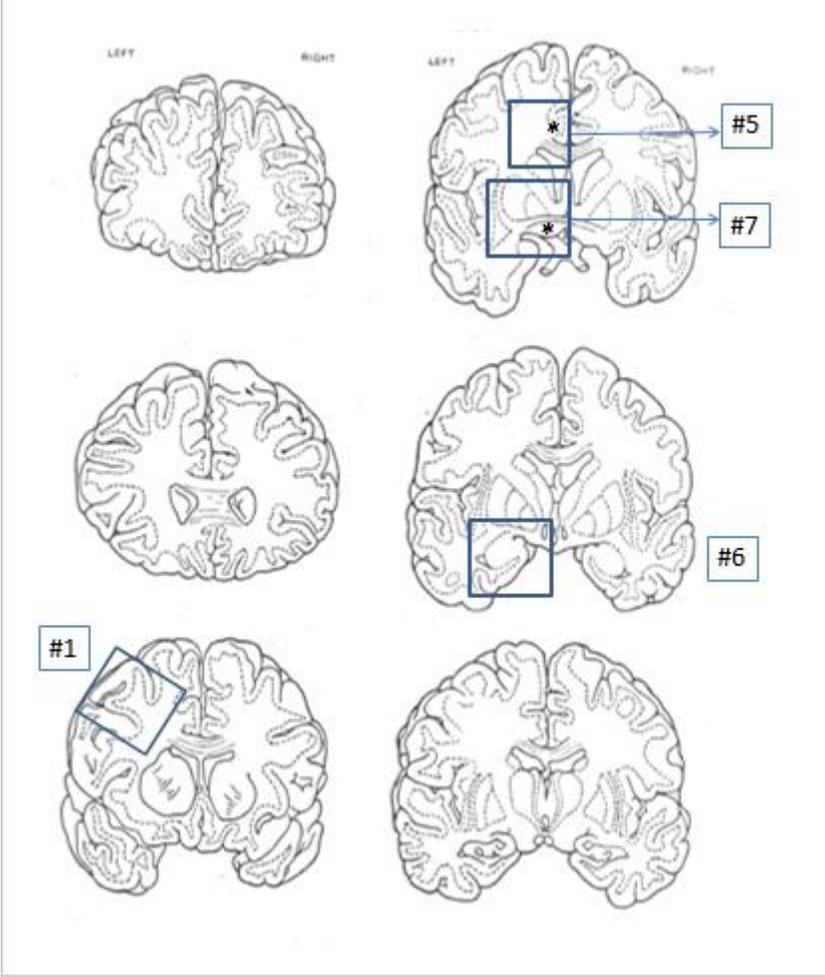
10 Superior cerebellum with full dentate nuclei

11 Midbrain at the level of the red nucleus

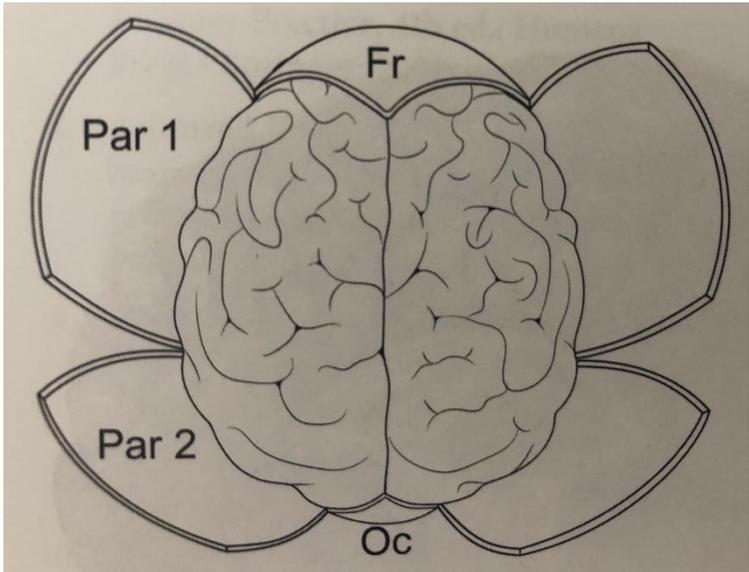
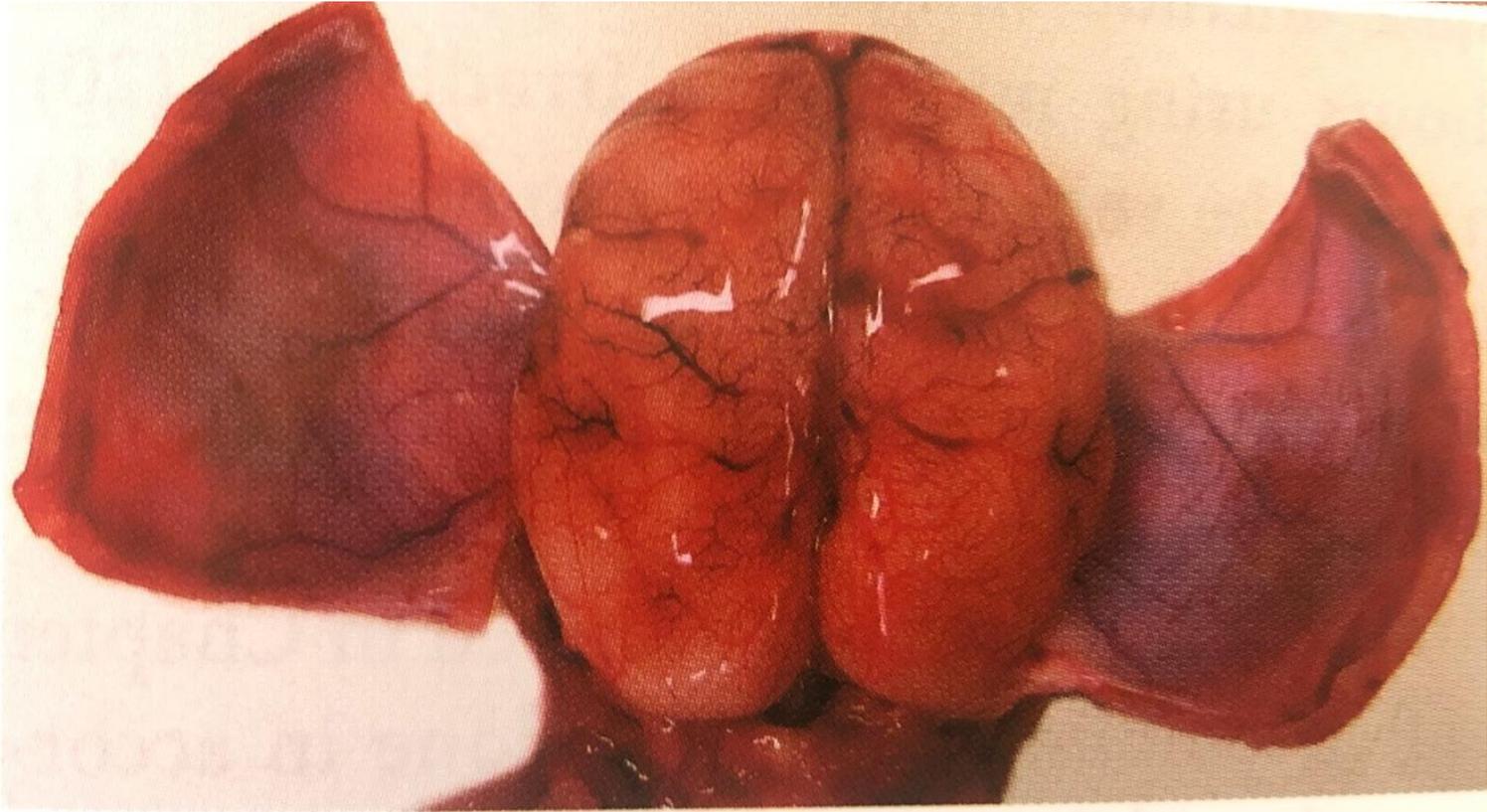
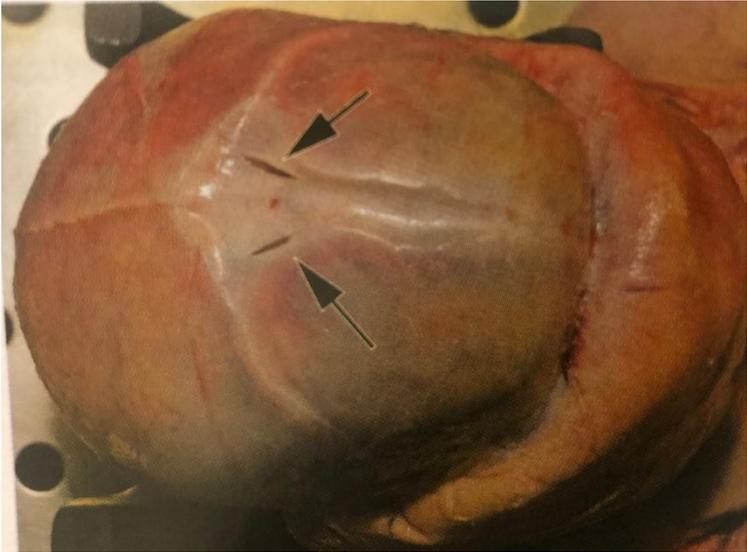
12 Pons one section with basis pontis and 1 or 2
additional levels of locus ceruleus

13 Medulla at the level of inferior olivary nucleus

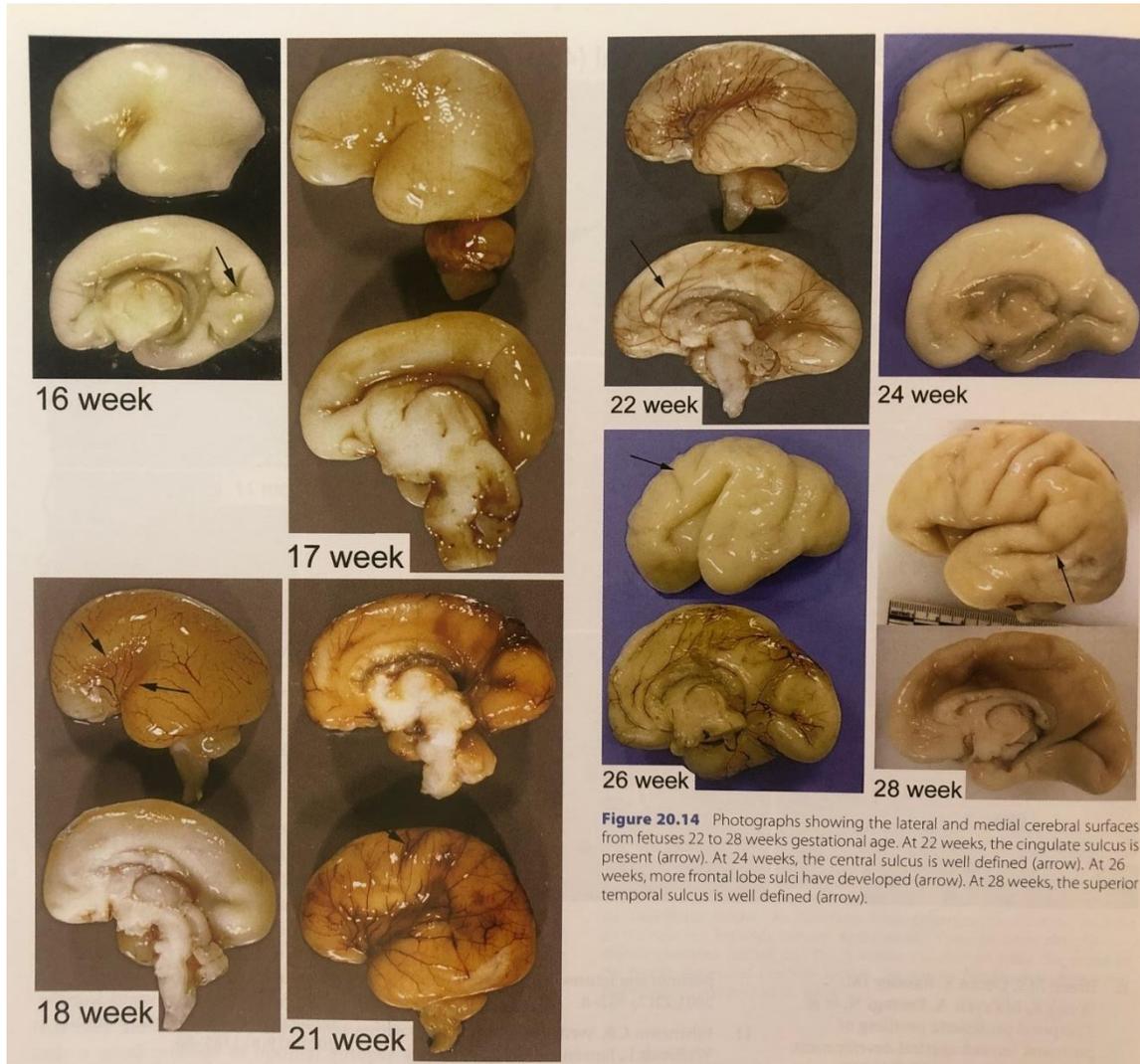
Sections for Neurodegenerative Cases



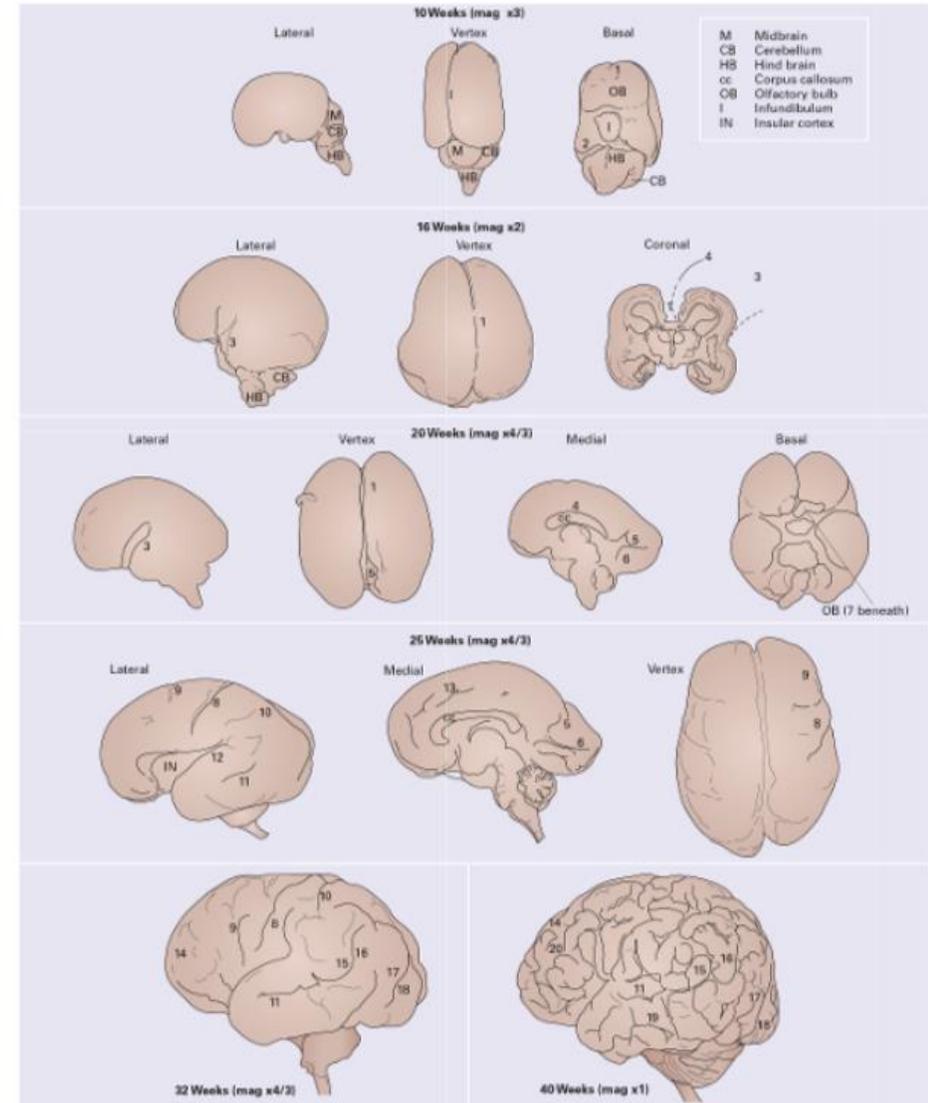
Brain Removal Perinatal



Perinatal/ Infant Brains

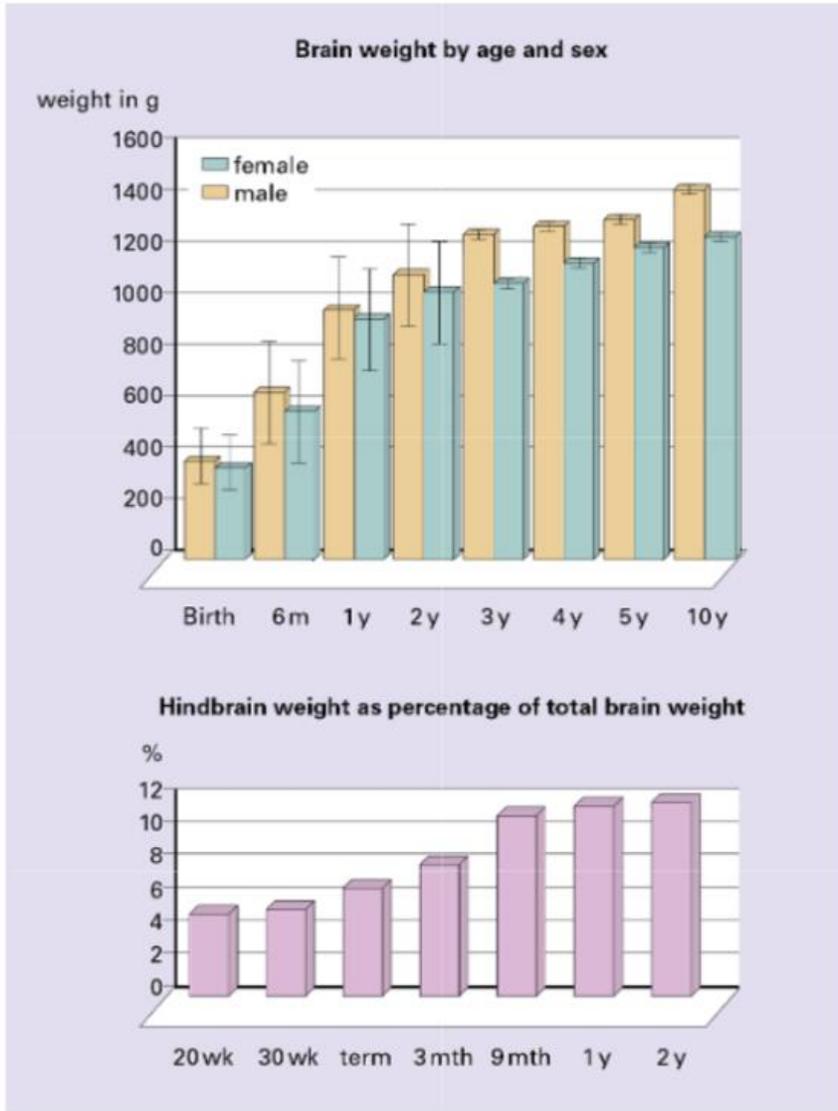


Perinatal Neuropathology
Cambridge University Press



Neuropathology 3rd Ed
Elsevier

Perinatal/ Infant Brains



B. If child abuse is suspected remove the cervical spinal cord on block with the spine

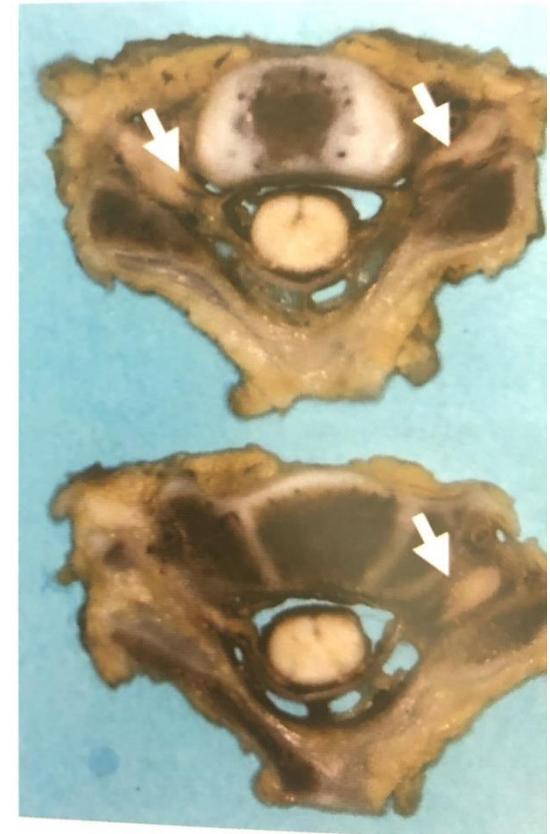


Figure 10.4 A vertebral en bloc specimen, dorsal aspect, here including skull at top, cervical and rostral thoracic vertebrae, and spinal cord. B. If child abuse is suspected remove the cervical spinal cord on block with the spine. Perinatal Neuropathology Cambridge University Press

Neuropathology Resources

Camelo-Piragua

Basic Neuropathology Curriculum 2021

<https://www.dropbox.com/sh/h5q4qdyg1desb69/AA CfDf-chRz1MHxZhB6w1Cf2a?dl=0>

LabPortal:

Scanned slides >20,000 Neuropathology slides

https://labportal.med.umich.edu/portal/apps/tumor_boards/search

Venneti

Course Director Neuropathology 858

<http://www.med.umich.edu/digitallab/path858/index.html>

<https://pathology.med.umich.edu/slides/dirView.php?path=/Neuropath858>



 MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN Applications ▾ Help ▾

[Home](#)

Accession	Stain	Organ	Species
<input type="text"/>	<input type="text"/>	Brain	<input type="text"/>

Only return results with UM accession number

Search returned 22372 results. Can not display this many results. Please add additional filters.

SUGGESTED SCHEDULE

Week 1	Slide 1 Slides 2-8 Slides 9-20	Normal cortex Cerebral vascular disease Infectious diseases (begin)
Week 2	Slides 21-27 Slides 28-37	Continue Infectious diseases Toxic, metabolic, demyelinating diseases
Week 3	Slides 48-50 Slides 51-61 Slides 62-67	Degenerative disease Dementia/degenerative diseases Spinal cord diseases
Week 4	Slides 68-87	Tumors

[Slide Collection](#)

Slide collection for this course. Slides 38N-47N are normal reference slides that you might want to refer to as you look at the pathology slides.