
بسم الله الرحمن الرحيم

RADIOLOGY REVIEW

Lecture 3

BY

DR. AHMAD MOKHTAR ABODAHAB - MD

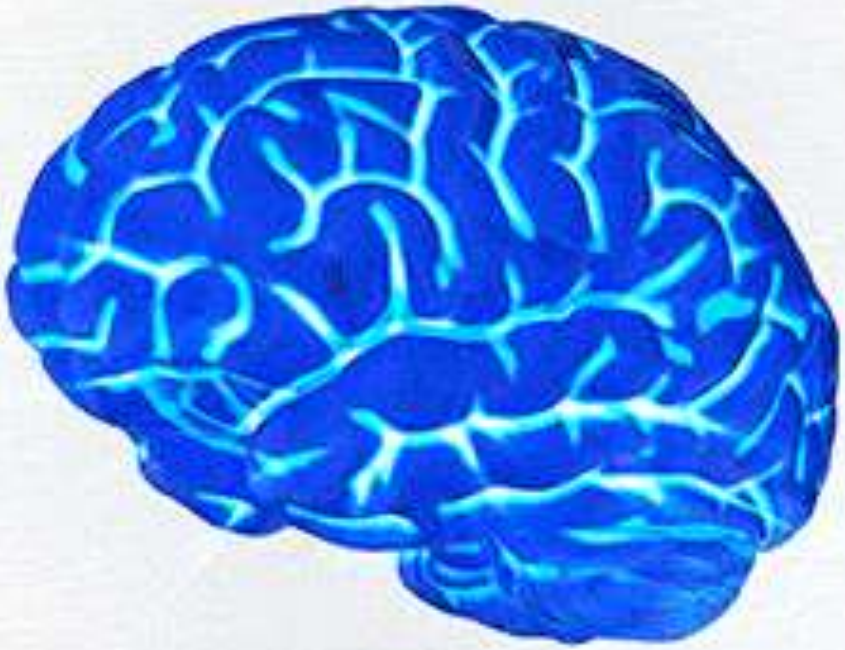
Lecturer of Radiology – Sohag University

Certified Trainer – Supreme Council of Egyptian Universities

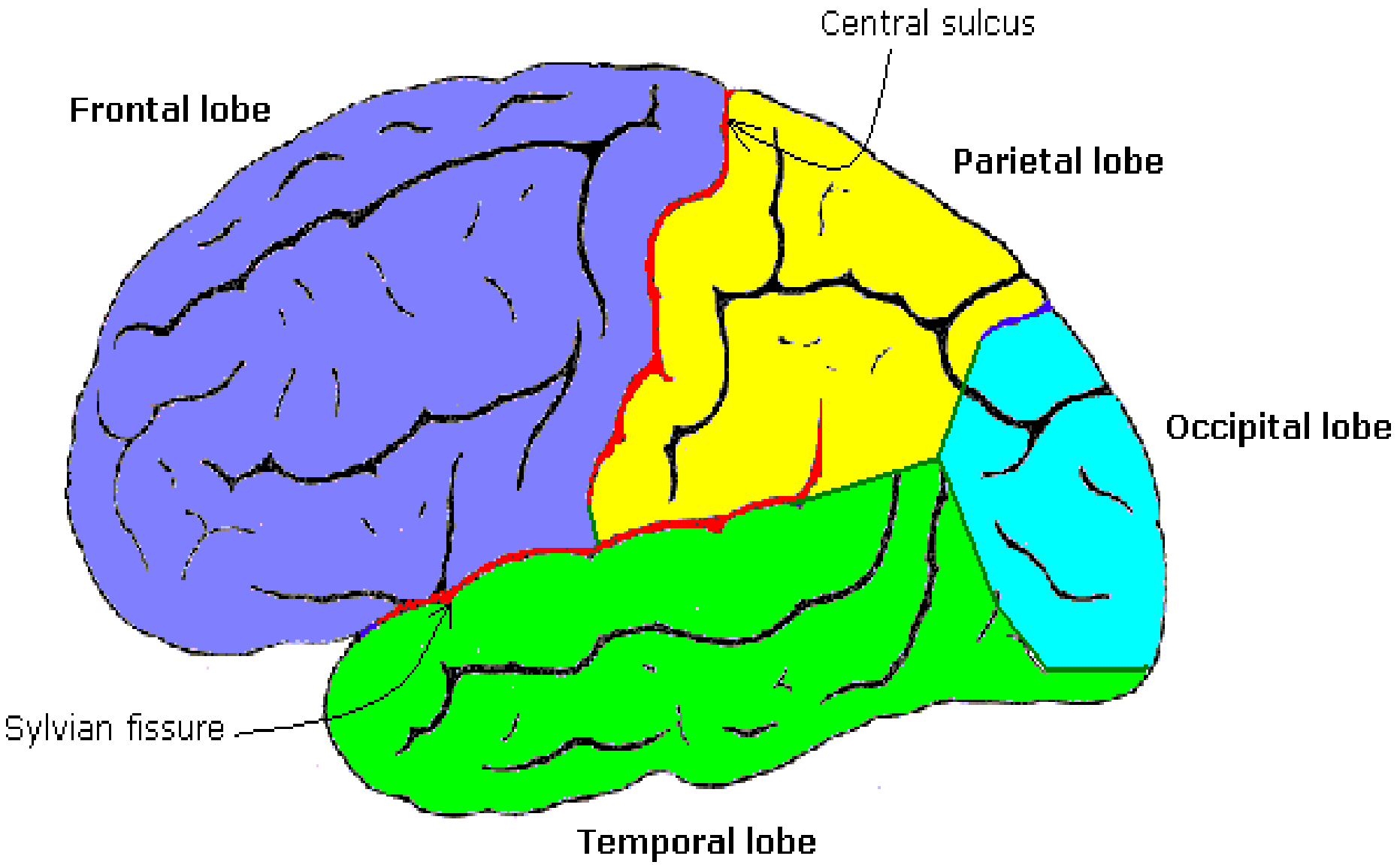
Saudi German Hospital - Hail

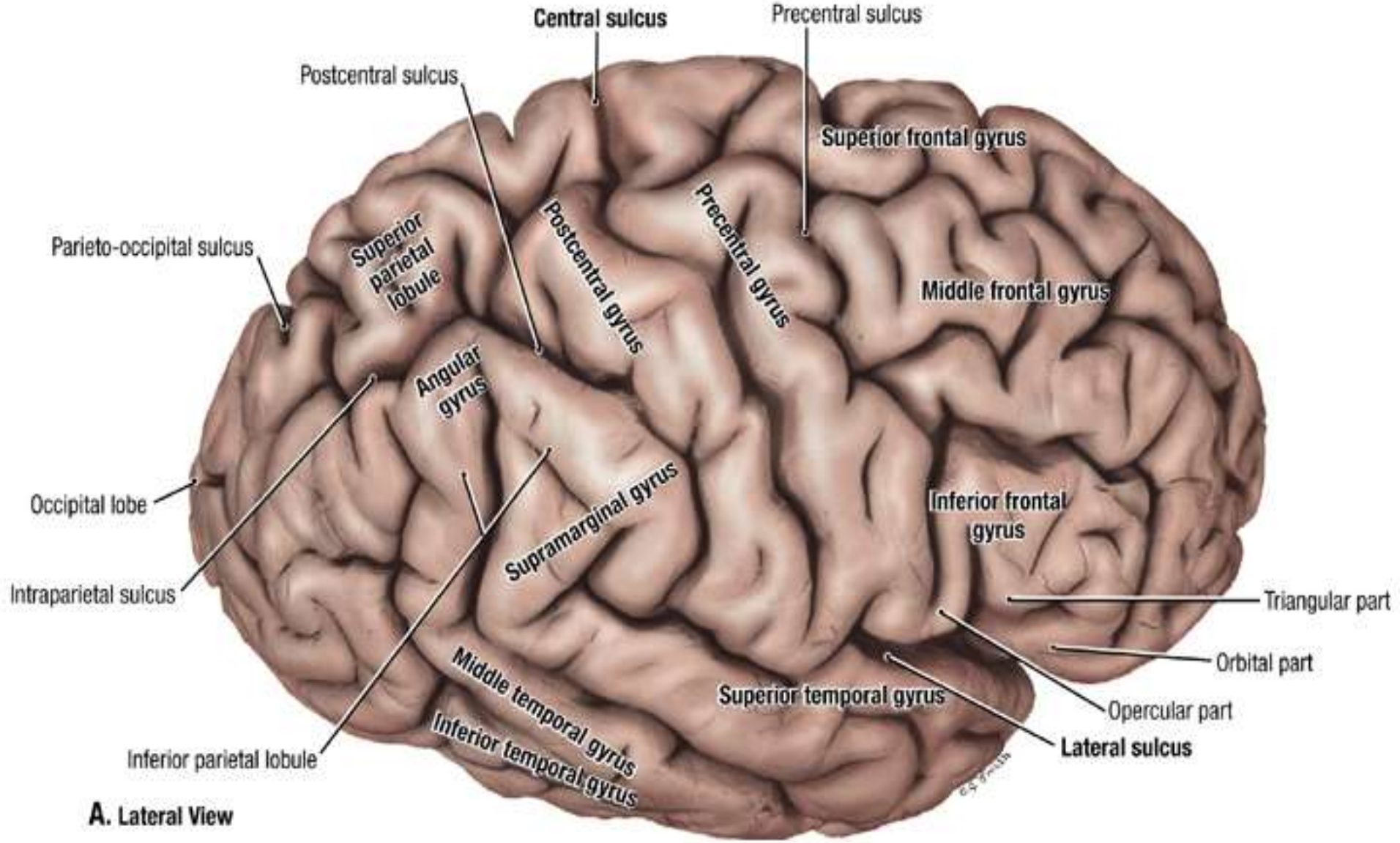
GROSS ANATOMY

- ✓ LOBES / BONES
- ✓ VENT. SYSTEM
- ✓ CEREBELLUM
- ✓ BRAIN STEM



Lobes of the brain





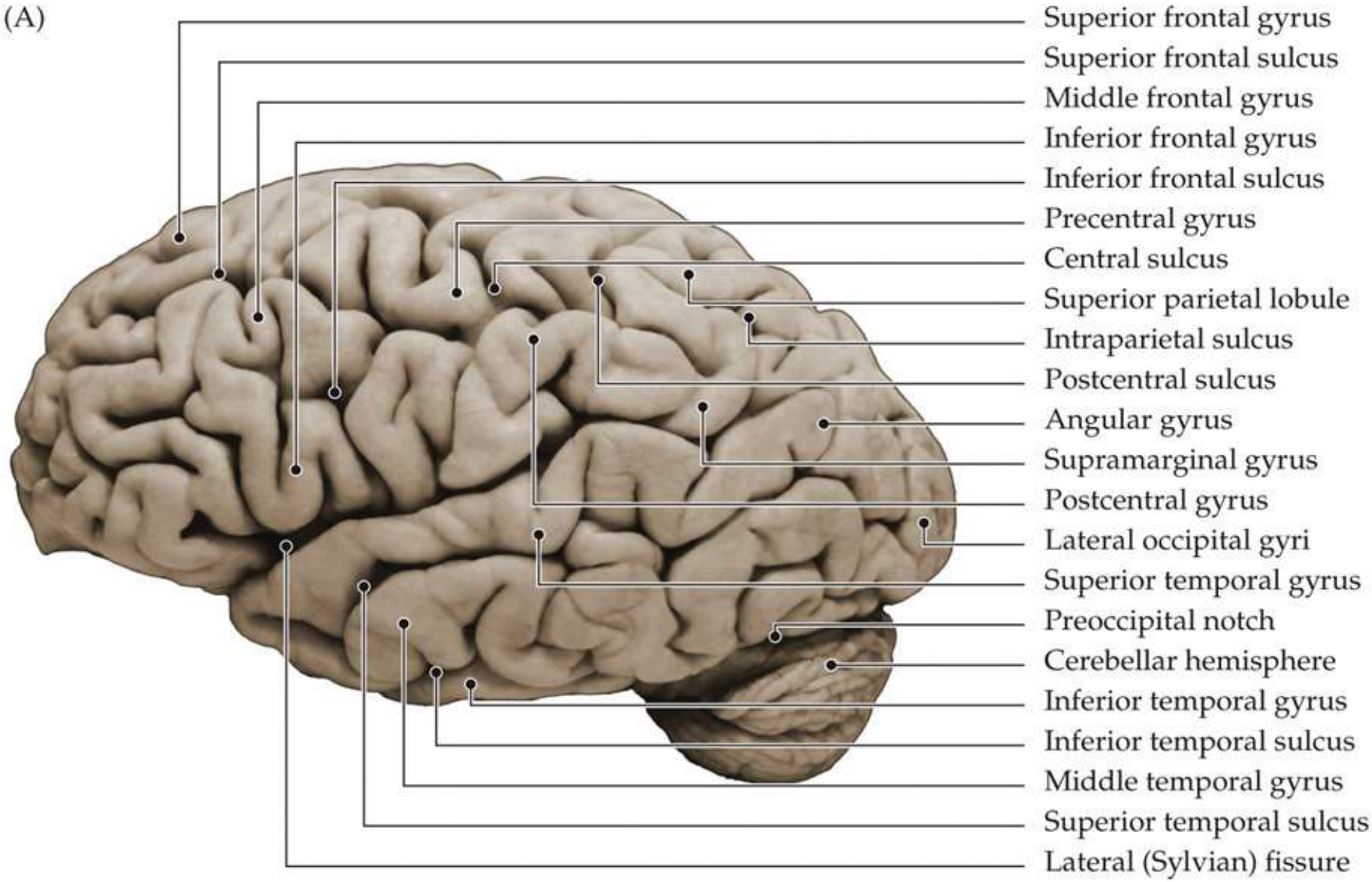
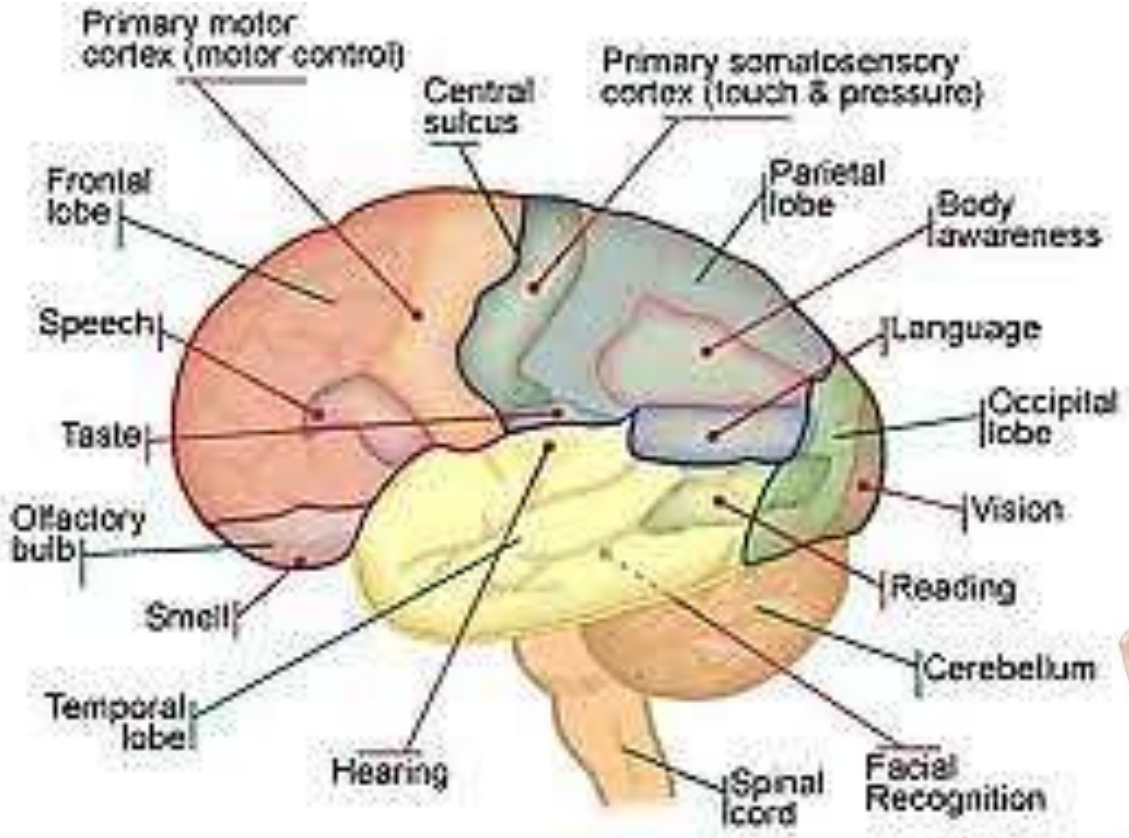
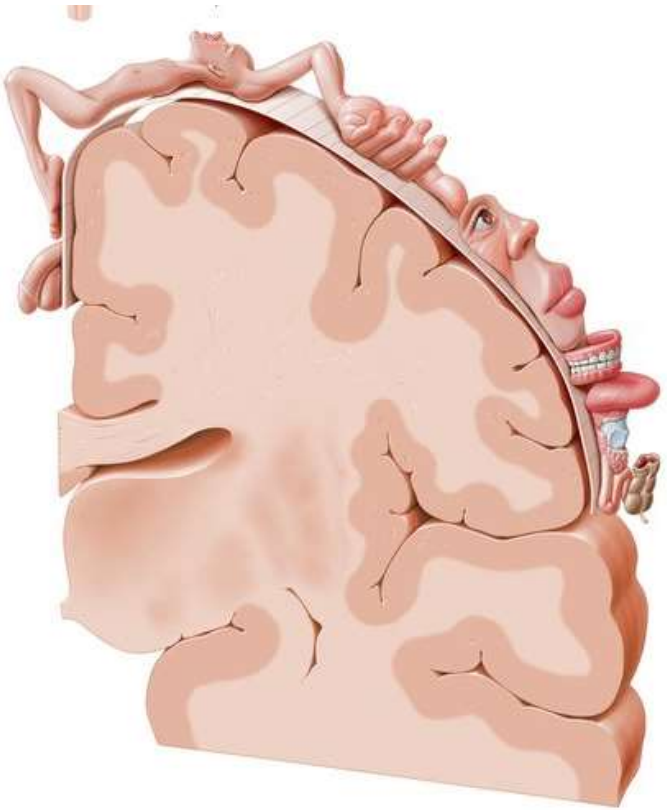


Figure 2.1. The lateral surface of the human brain. (Atlas Plate 1(1) from *Neuroscience, 6th Ed.*)

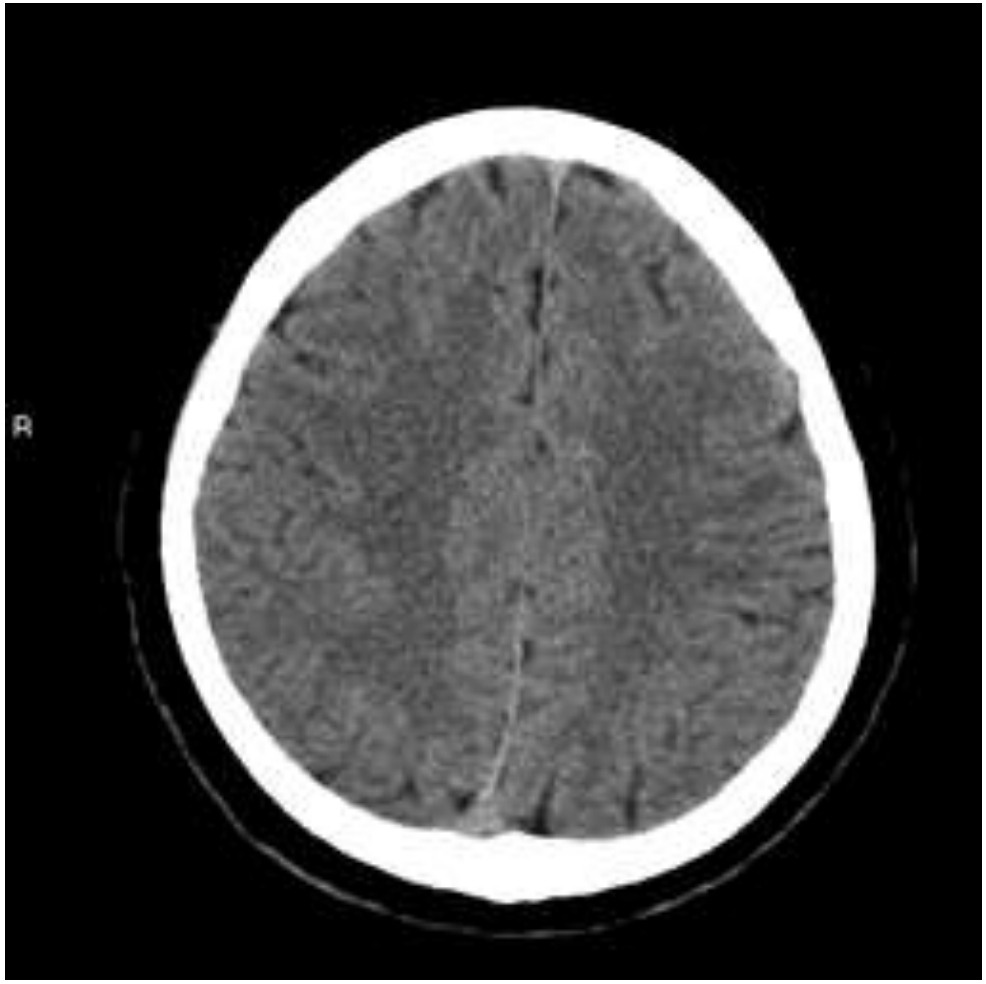

Primary motor cortex (motor control)
Central sulcus
Primary somatosensory cortex (touch & pressure)
Frontal lobe
Parietal lobe
Body awareness
Speech
Language
Taste
Occipital lobe
Vision
Olfactory bulb
Reading
Smell
Cerebellum
Temporal lobe
Hearing
Spinal cord
Facial Recognition



Brain CT Densities:

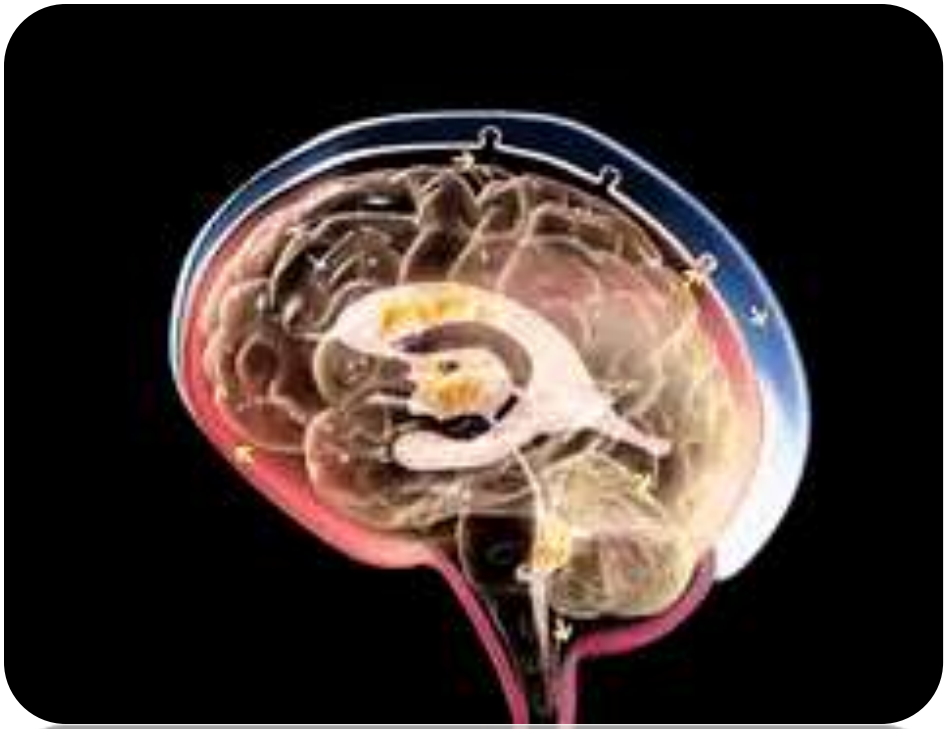
air	--- 1000
fat	---70
Pure water	**0**
Csf	+8
White matter	+30
Gray matter	+45
blood	+70
Bone/calcification	+1000

- Attenuation difference between **cortex** and **white matter** approximately **7 HU**



Attenuation difference between cortex and white matter: approximately 7 HU

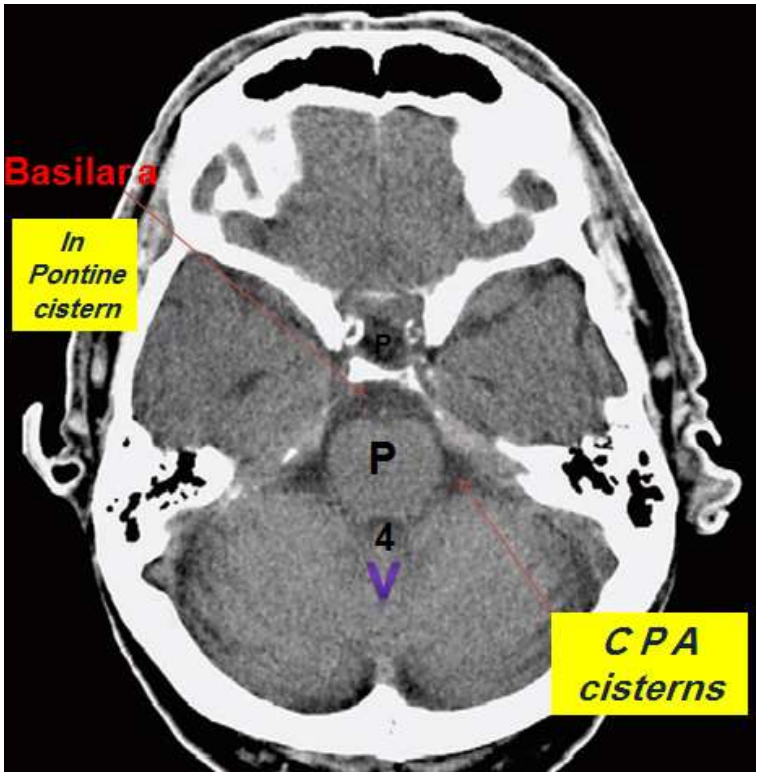
CSF SPACES

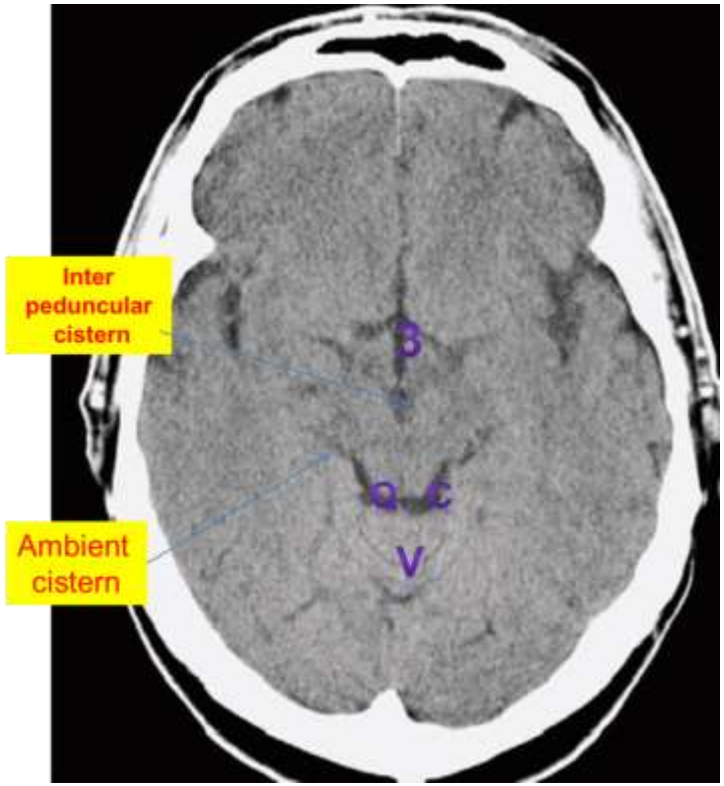


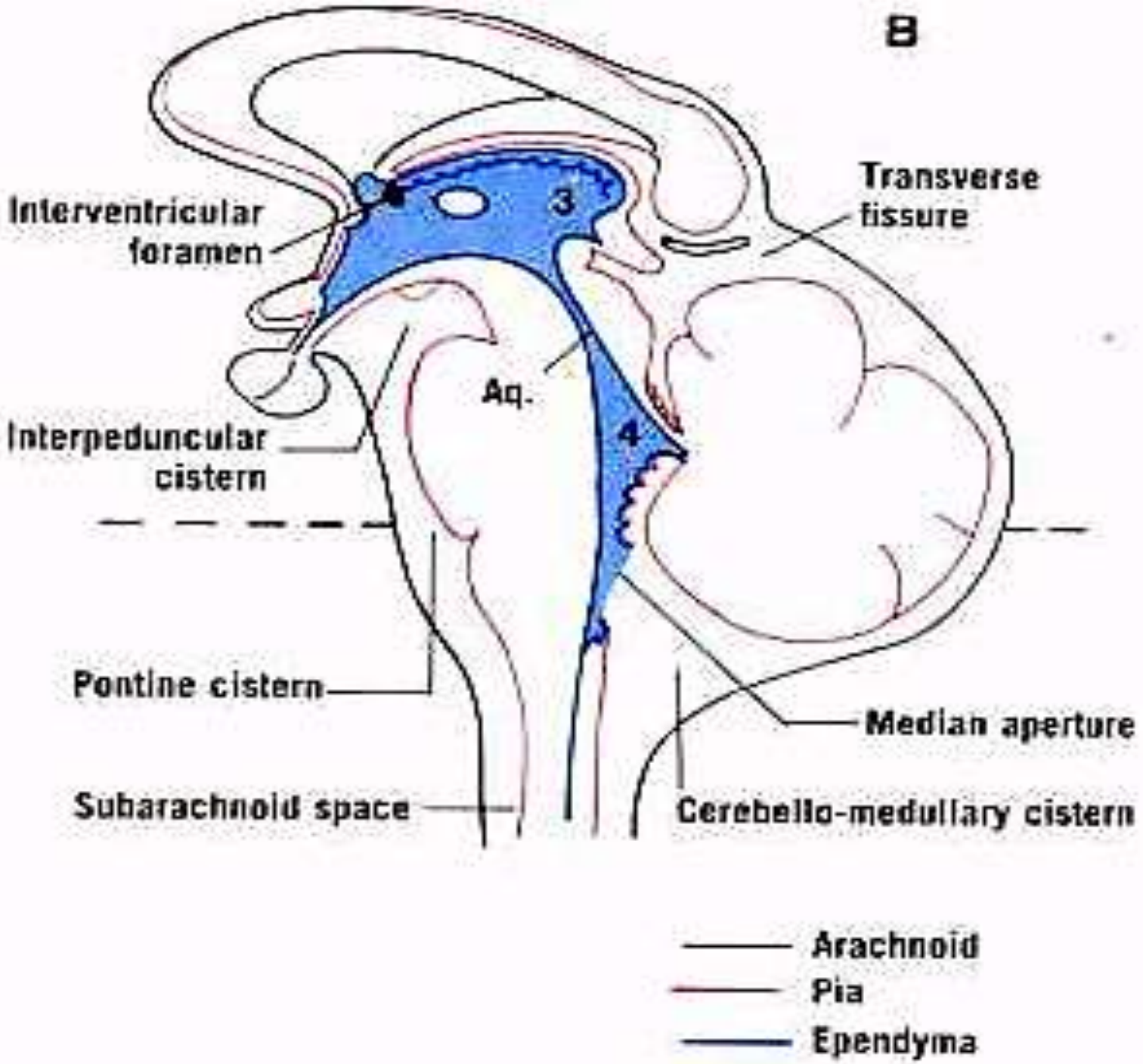
Cisterns

- A **cistern** (Latin) = **opening**
- is any **opening** in the subarachnoid space .
- created by a separation of the **arachnoid** and **pia mater**.
- **Filled with CSF**.
- Many cisterns ,several large, each with their own name.

- **Cerebello-medullary cistern (Cisterna magna)**
  - largest of the subarachnoid cisterns.
- **Pontine cistern** (Prepontine cistern or cisterna pontis)
- **Interpeduncular cistern** (Cisterna interpeduncularis)
- **Superior cistern** (***Quadrigeminal cistern***)
- **Ambient cistern**



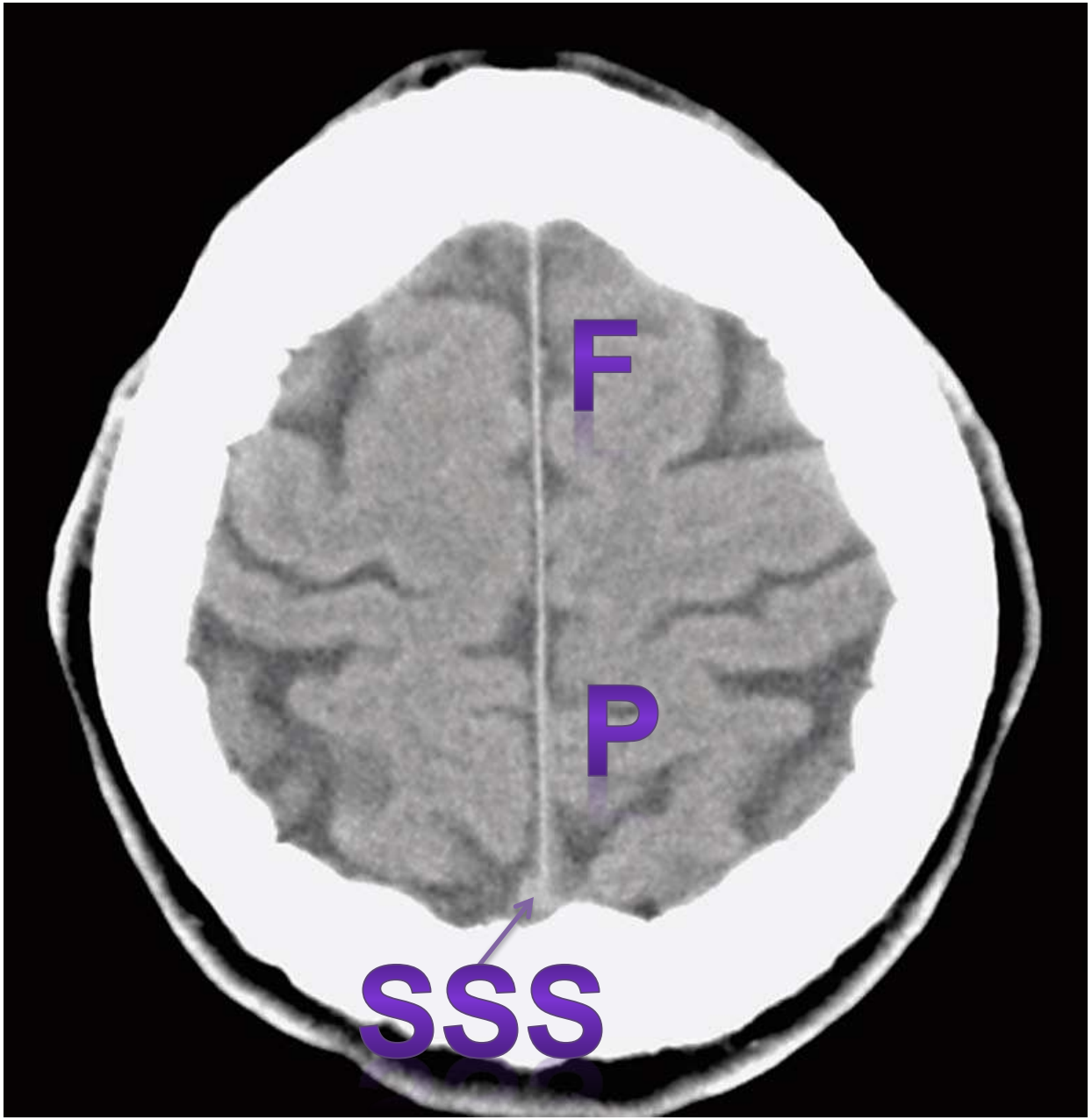


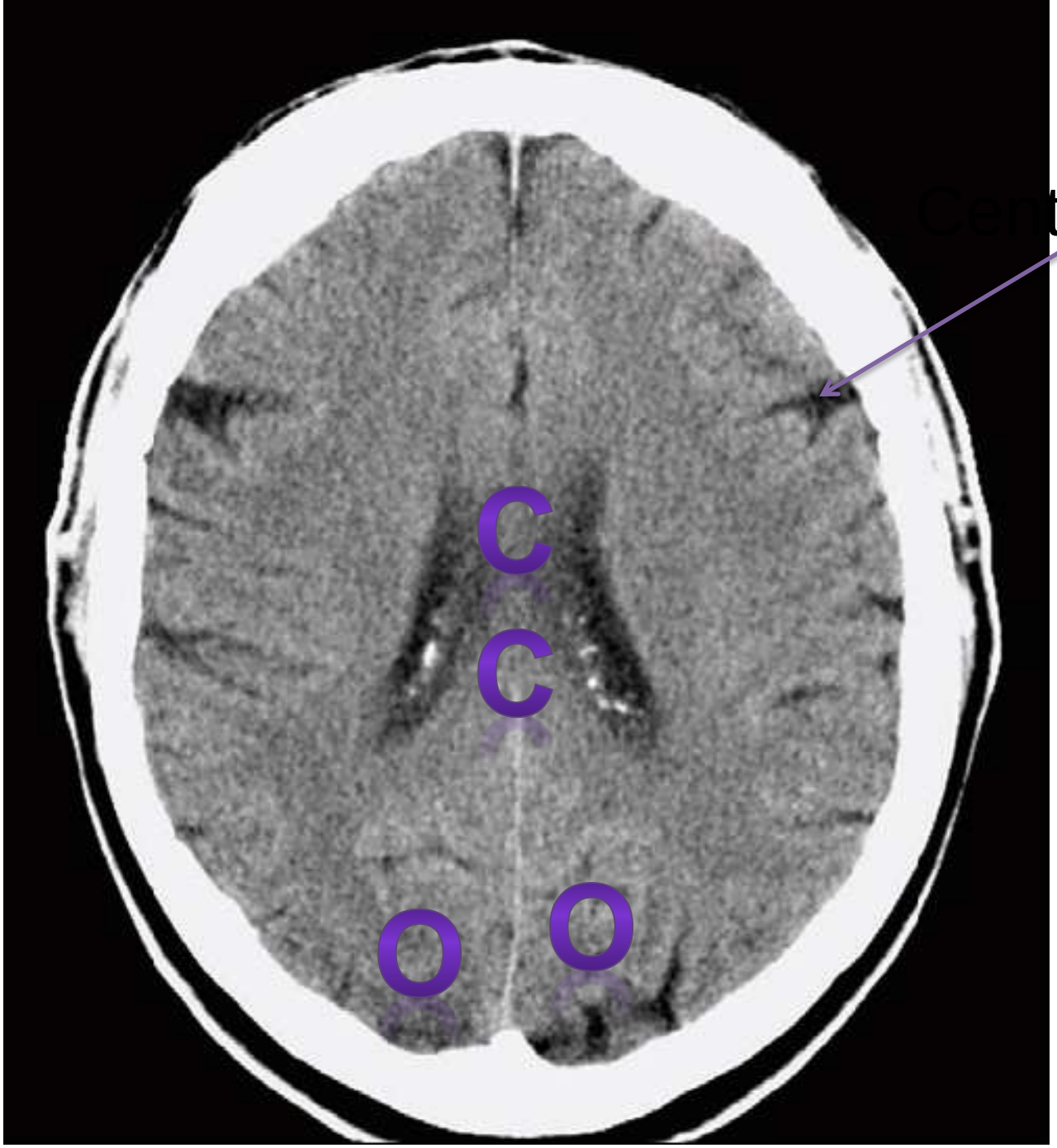

B
Interventricular foramen
3
Transverse fissure
Aq.
4
Interpeduncular cistern
Pontine cistern
Median aperture
Subarachnoid space
Cerebello-medullary cistern
Arachnoid
Pia
Ependyma

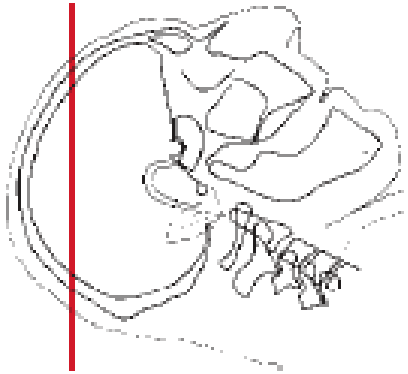
Ventricle or Cistern

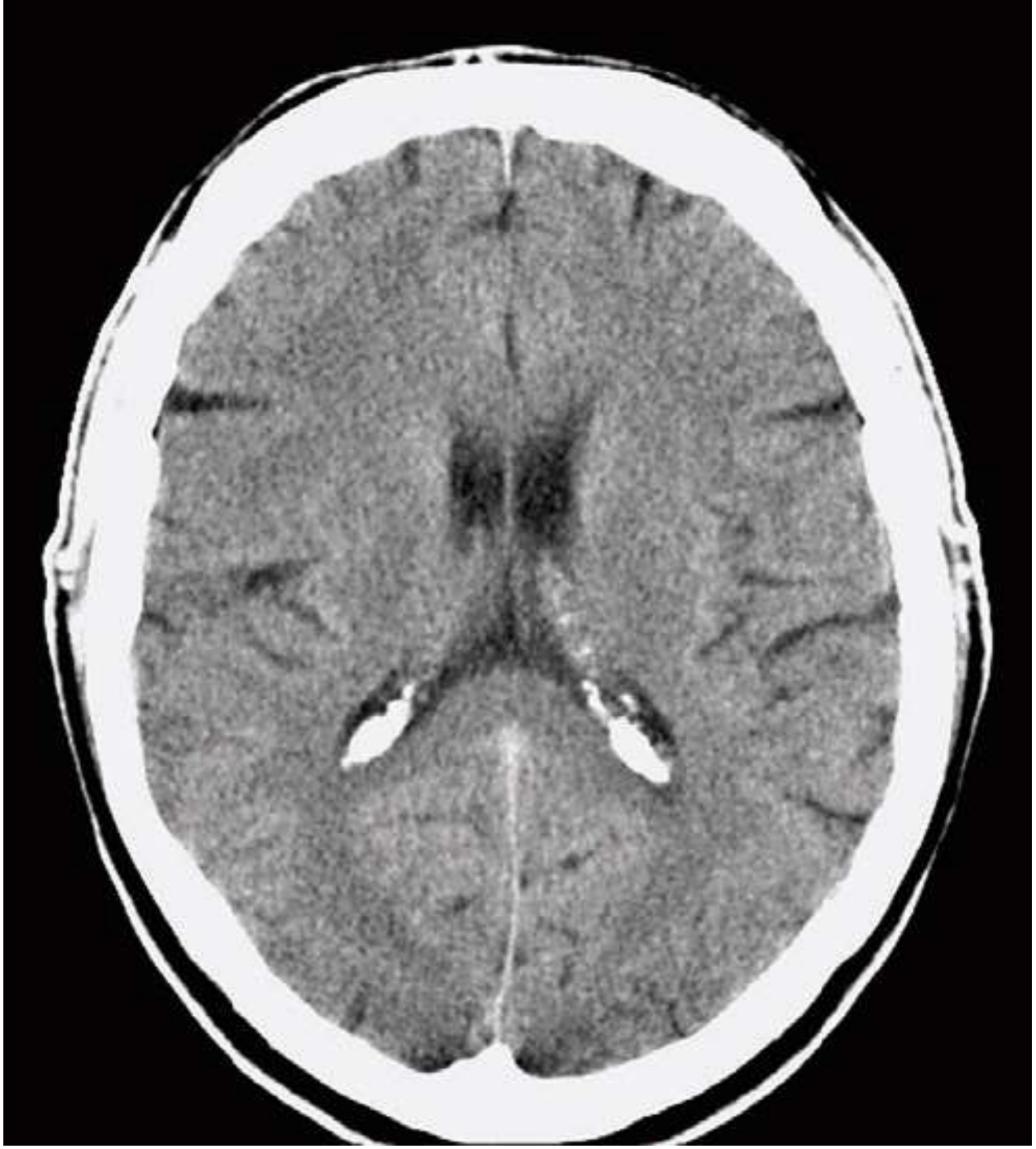
The CerebroSpinal Fluid
CSF

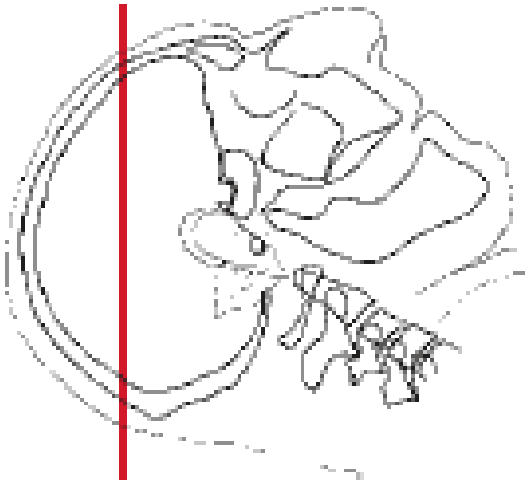
Ventricular system
is lined by Ependymal layer

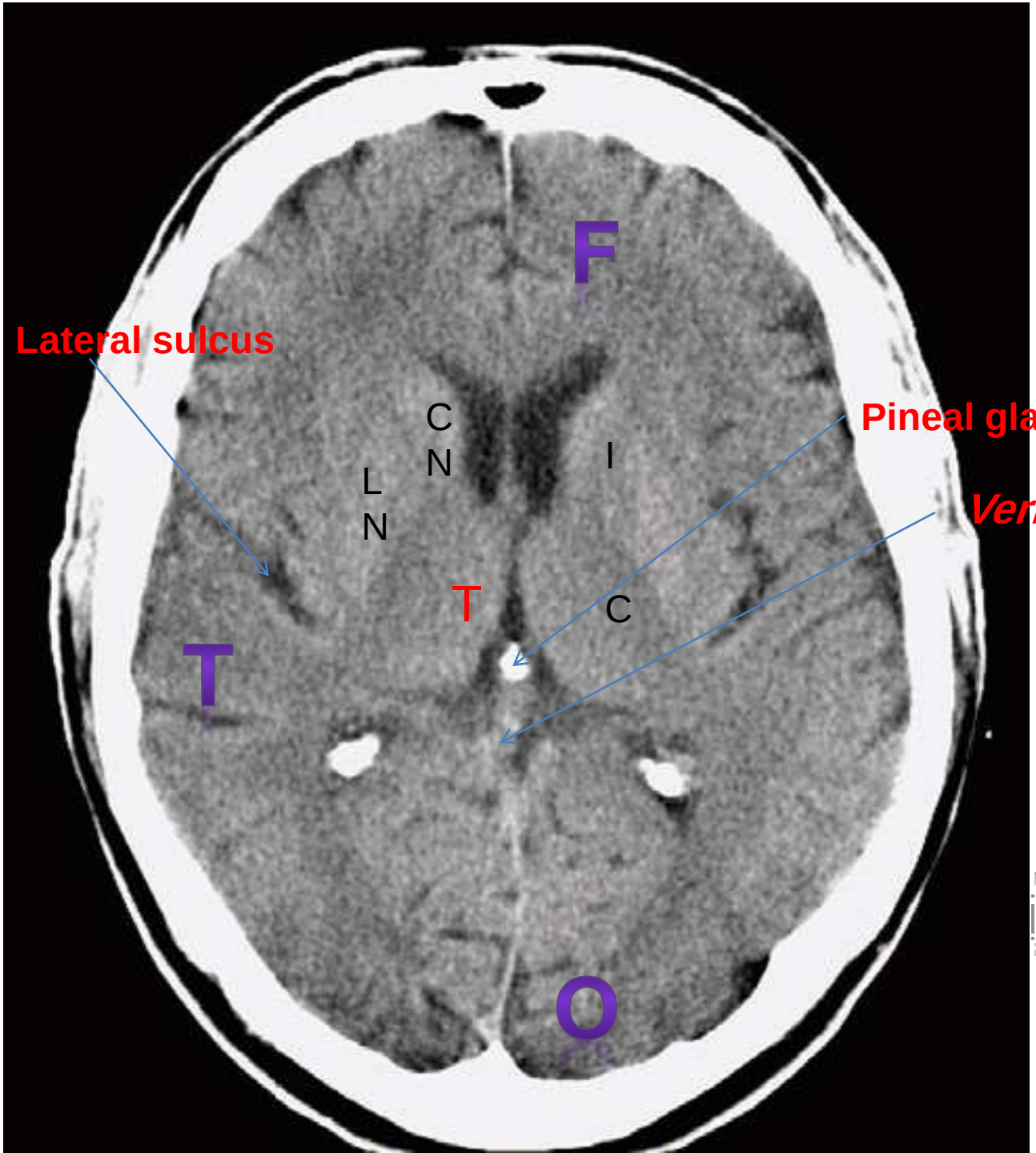

F
P
SSS

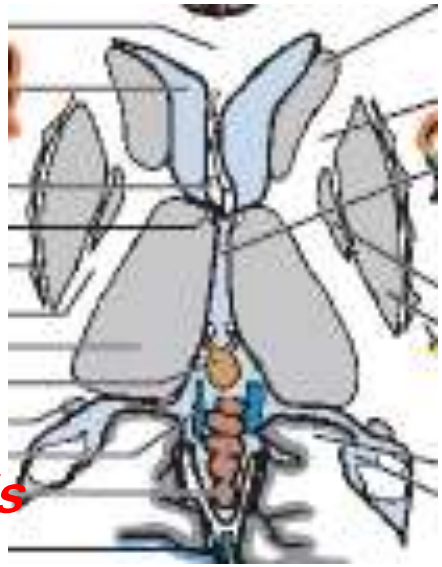

Central sulcus
C
C
O
O

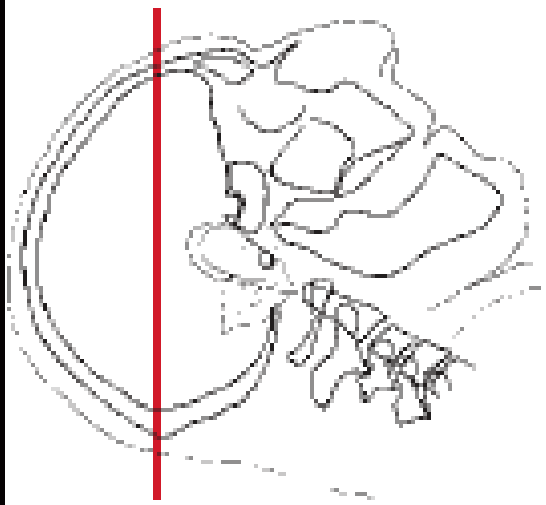


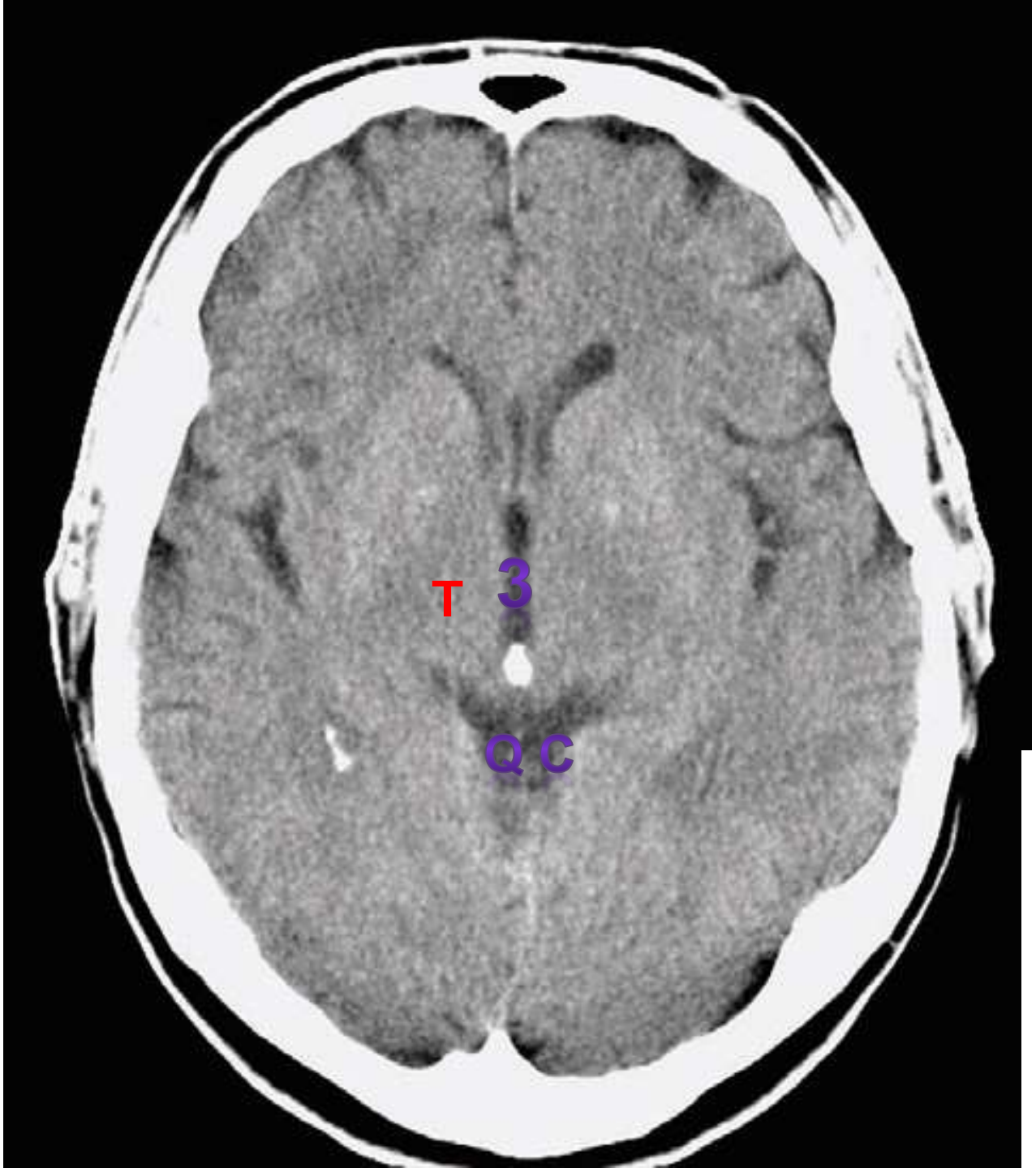


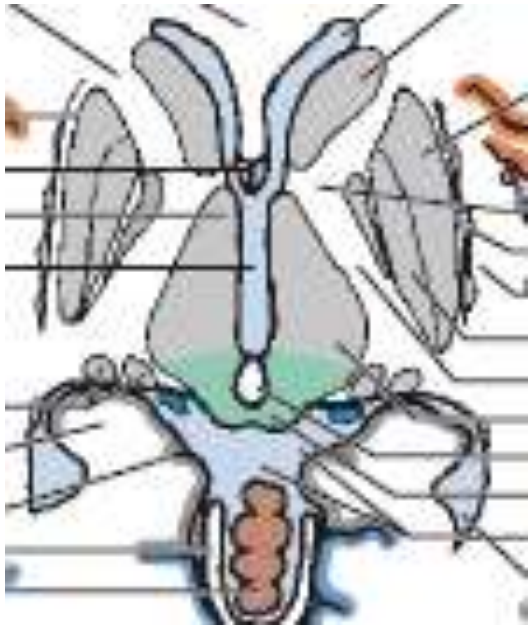


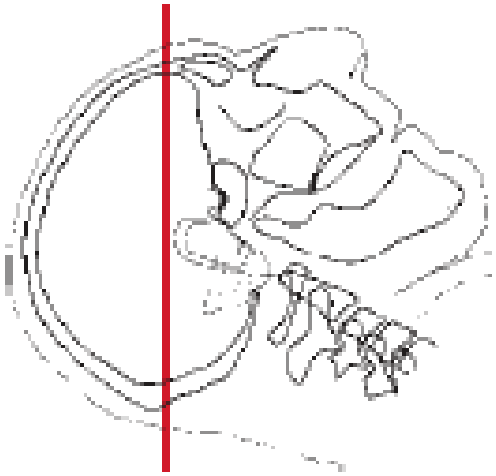

F
Lateral sulcus
C
N
I
L
N
Pineal gland
Vermis
T
T
C
O

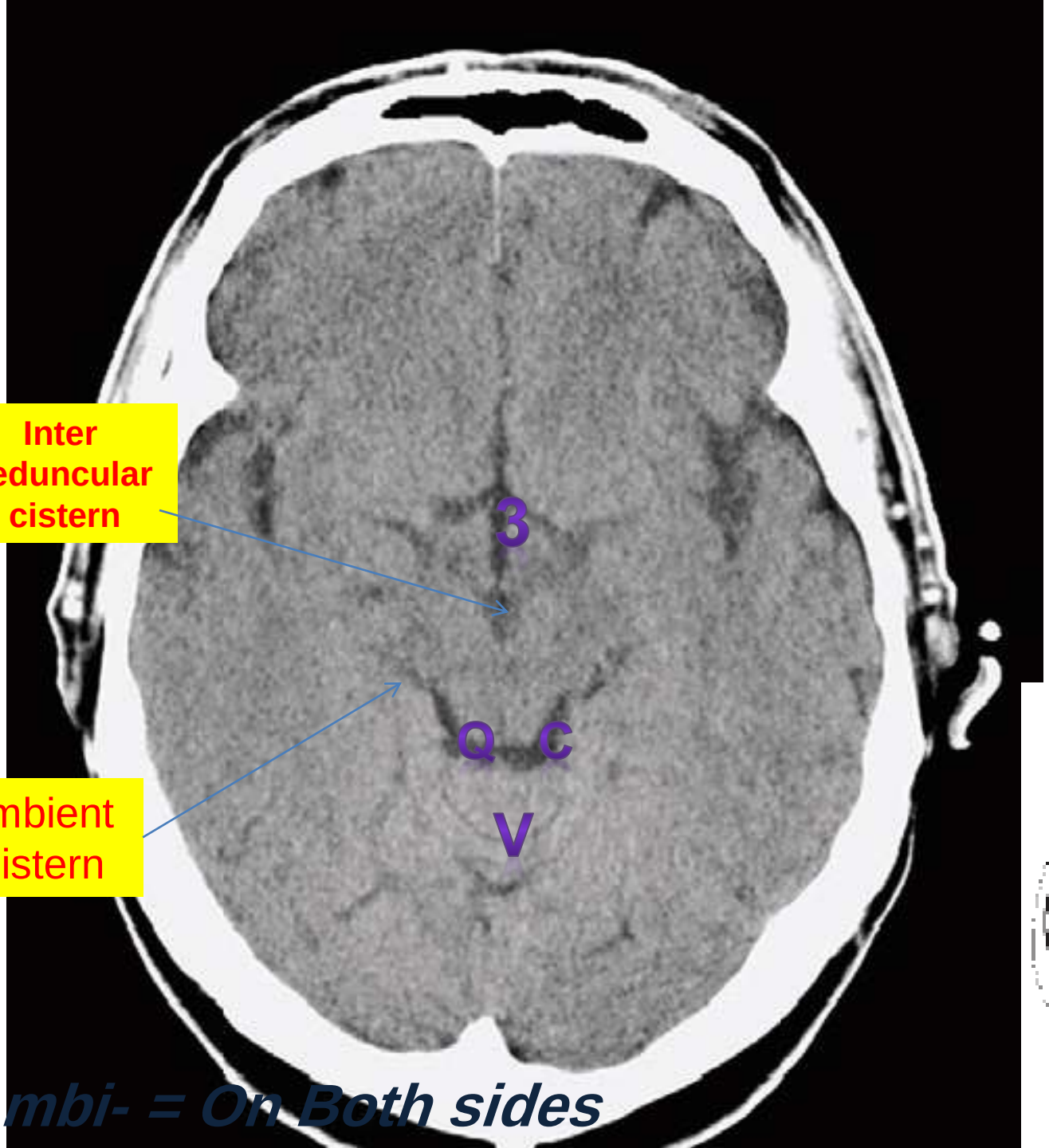


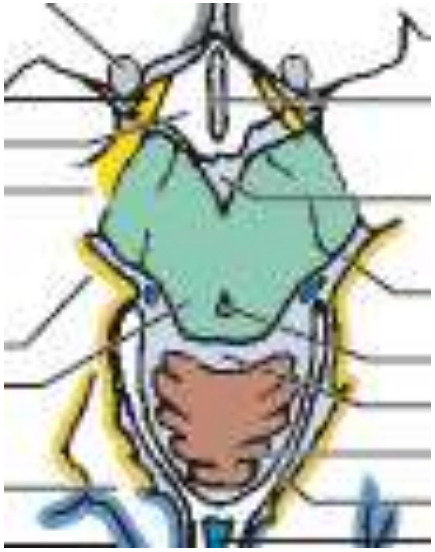


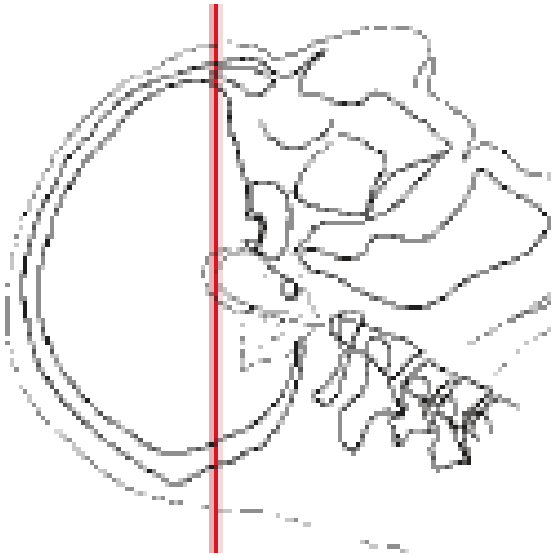

T
3
Q
C



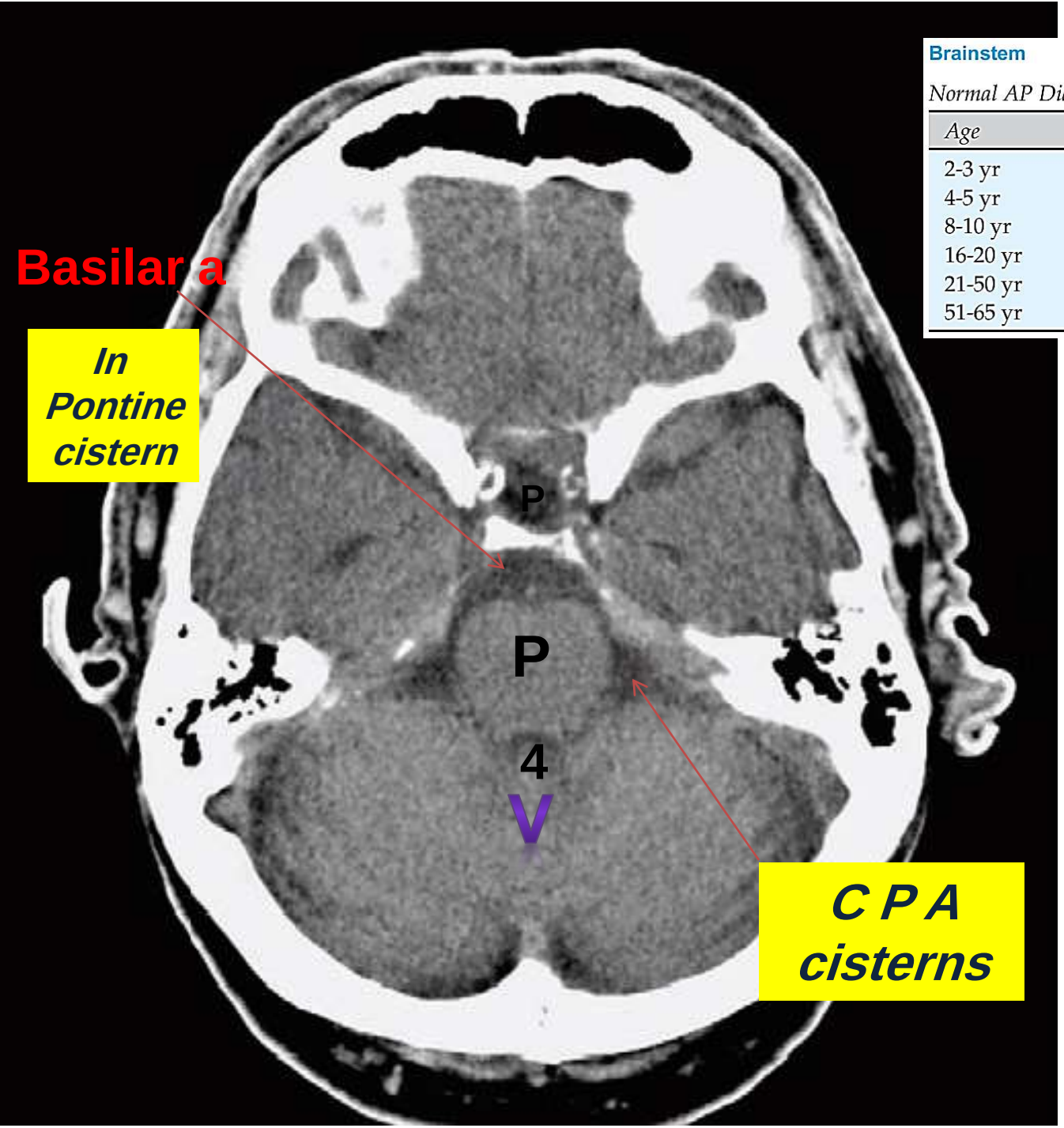








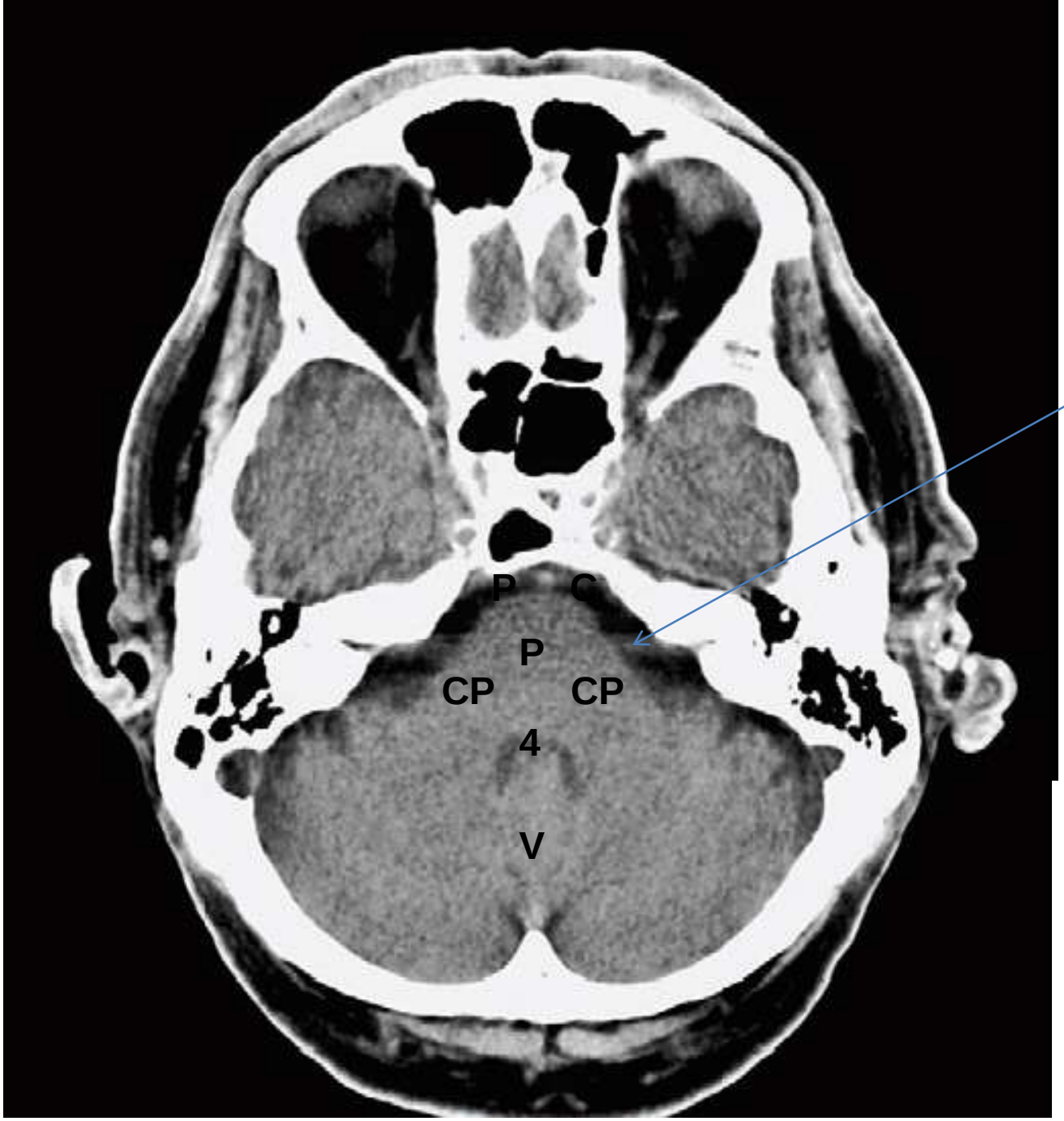
Ambi- = On Both sides



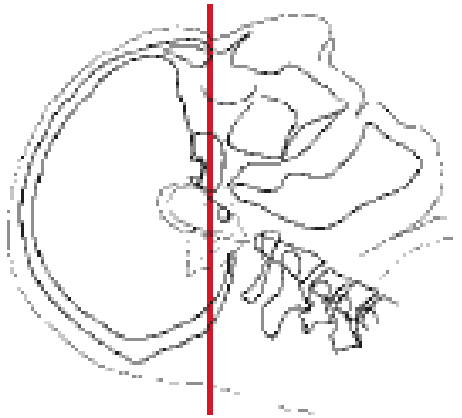
Brainstem

Normal AP Diameter (mm)

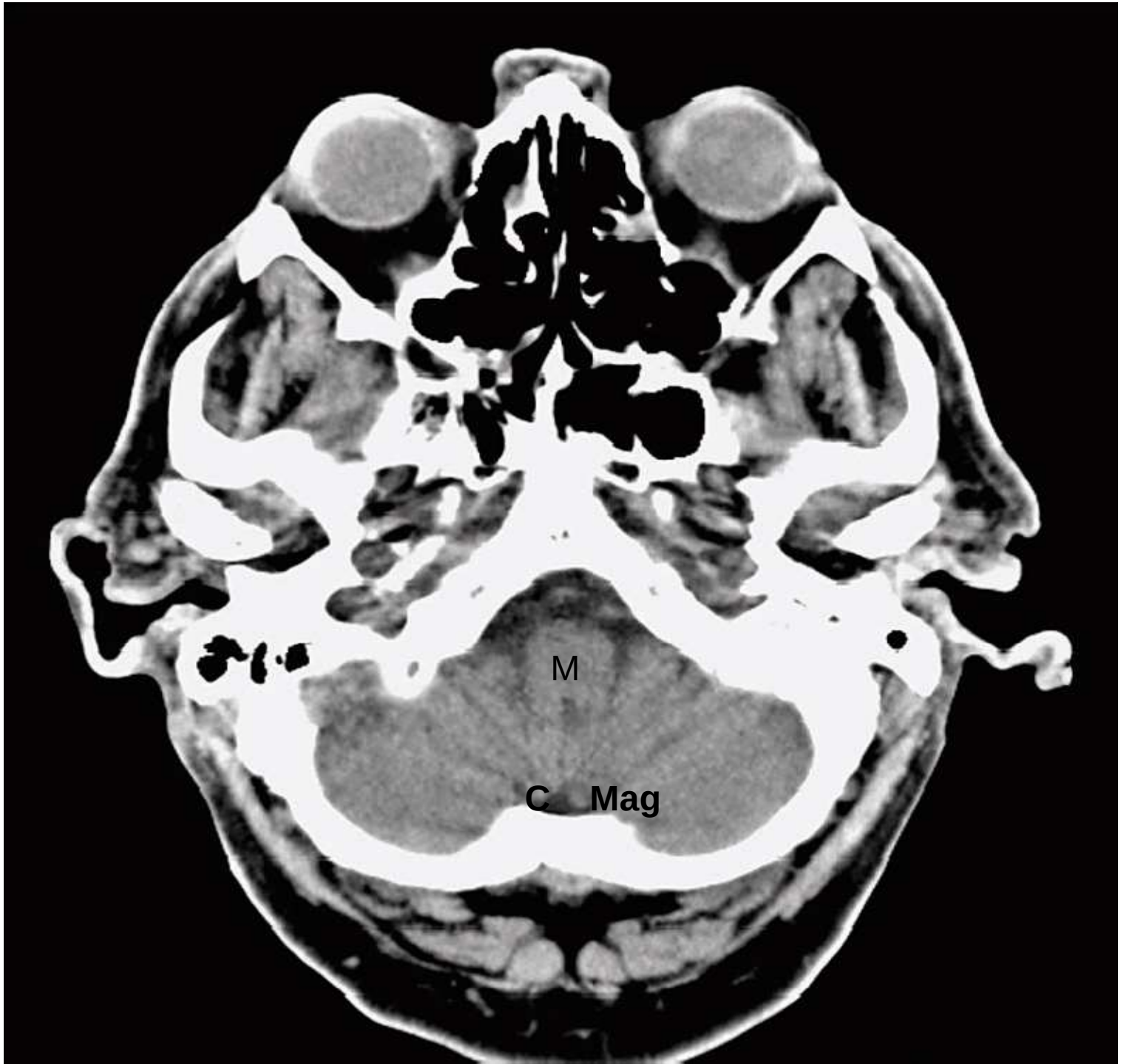
Age	*Midbrain*	*Pons*	*Medulla*
2-3 yr	14-17	17-21	8-13
4-5 yr	15-18	18-22	10-13
8-10 yr	16-19	18-24	11-14
16-20 yr	16-19	20-25	11-14
21-50 yr	16-19	21-25	11-14
51-65 yr	15-18	21-25	10-14

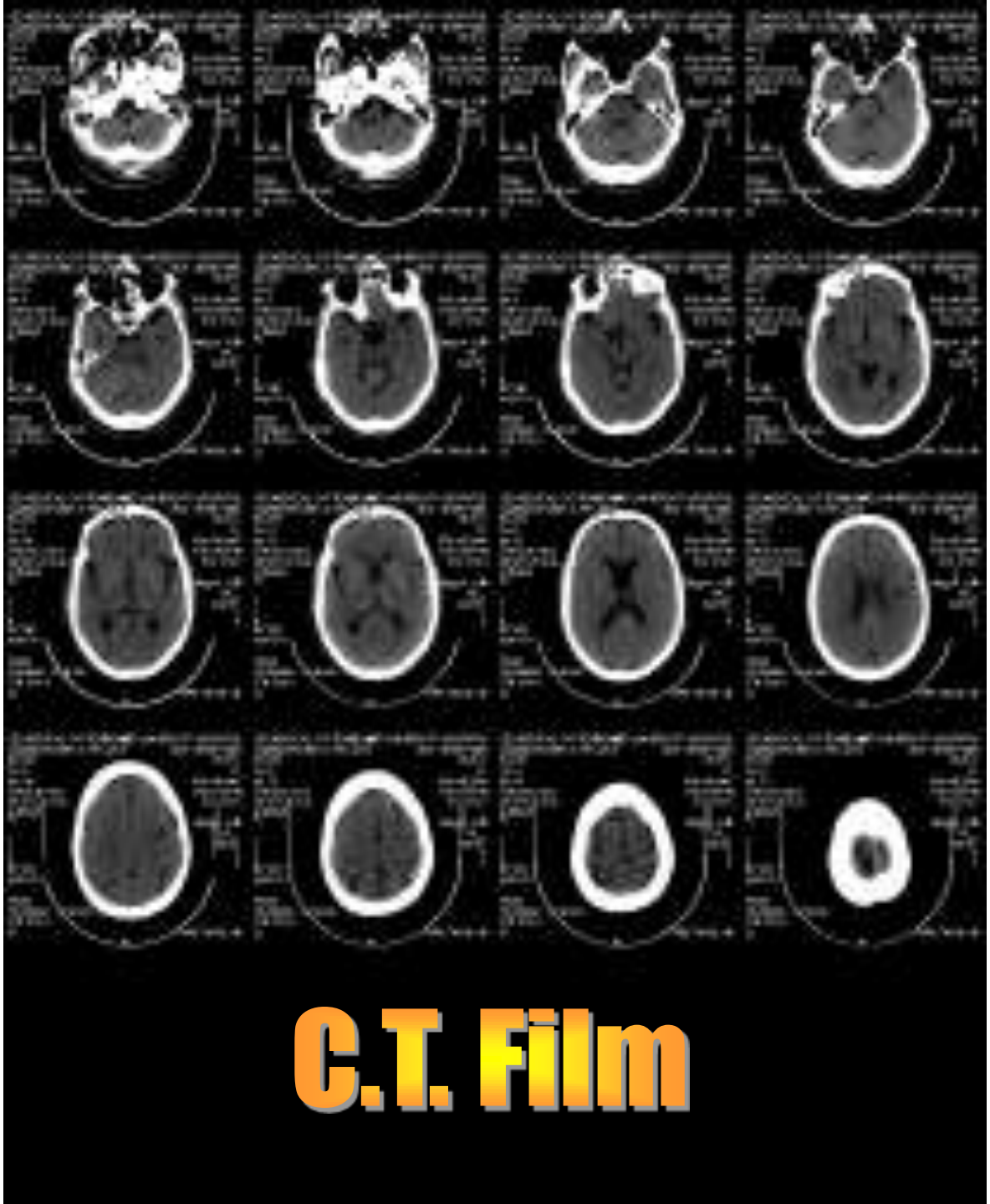


facial (VII) & vestibulocochlear (VIII) nerves




M


M
C Mag


C.T. Film

Brainstem

Normal AP Diameter (mm)

Age	*Midbrain*	*Pons*	*Medulla*
2-3 yr	14-17	17-21	8-13
4-5 yr	15-18	18-22	10-13
8-10 yr	16-19	18-24	11-14
16-20 yr	16-19	20-25	11-14
21-50 yr	16-19	21-25	11-14
51-65 yr	15-18	21-25	10-14

VENTRICULAR DIMENSIONS

CELLA INDEX

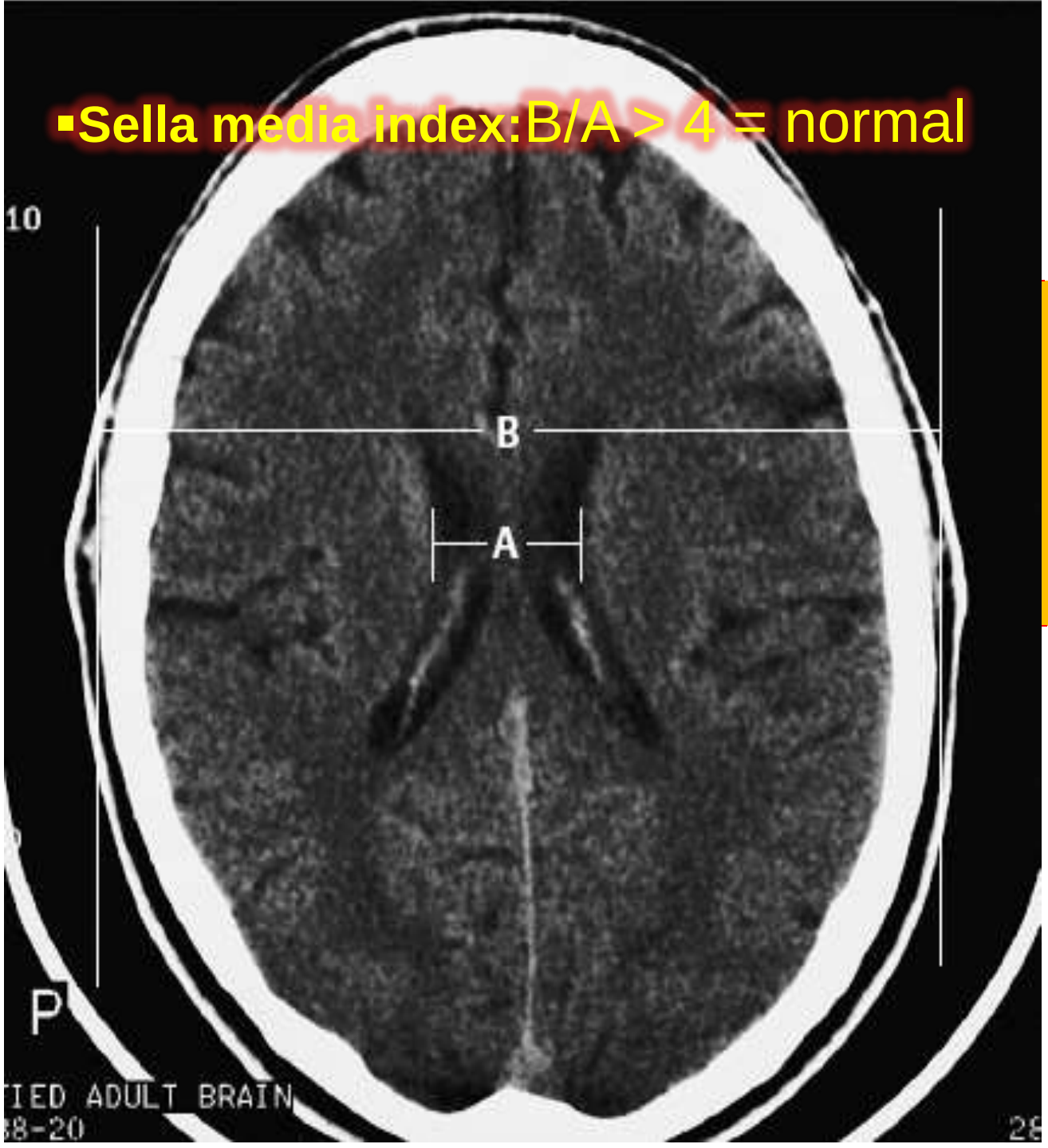
DIMENSIONS

➔ **Normal Values Newborn:**

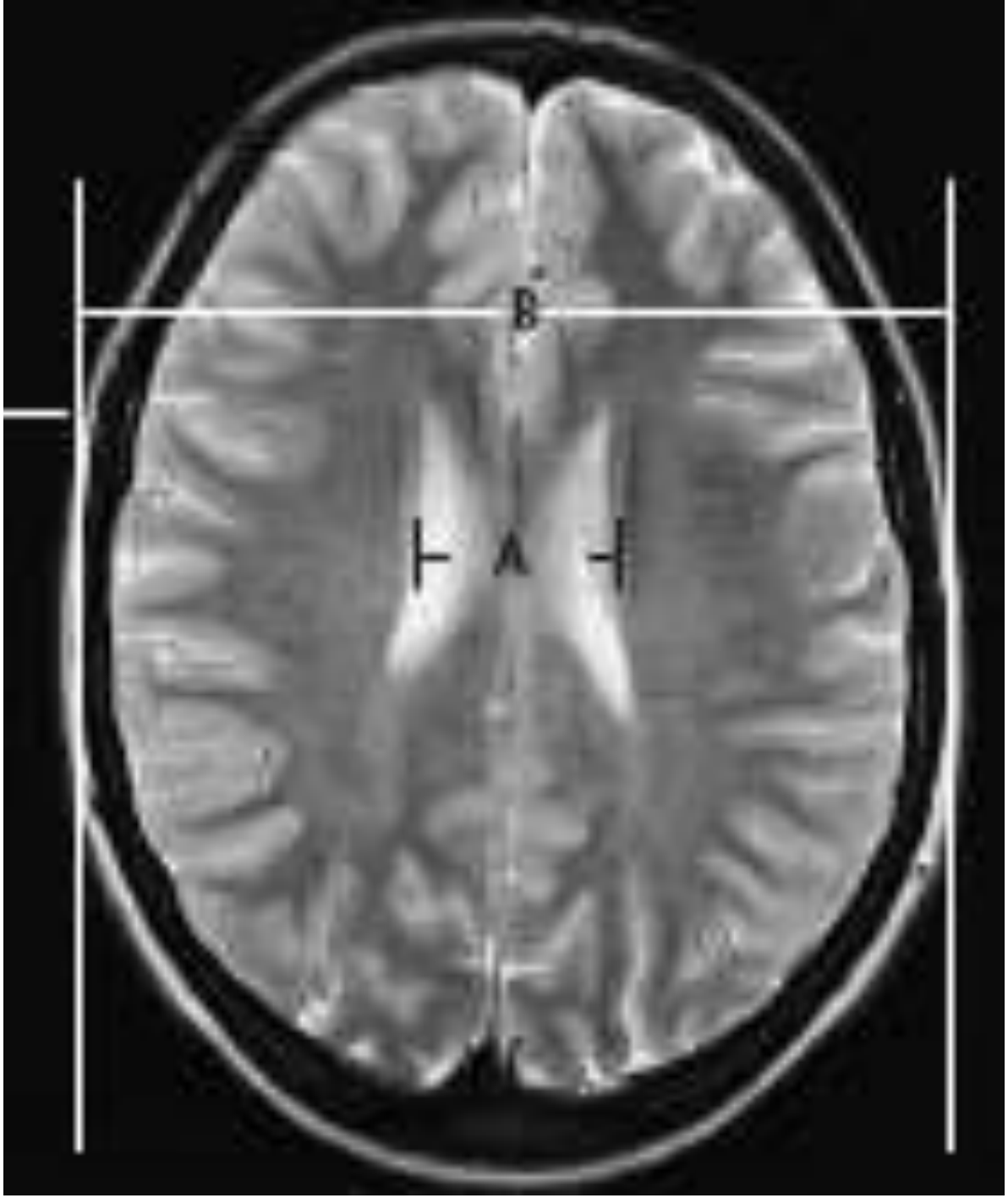
✓ Width of **3rd** ventricle **< 10 mm**

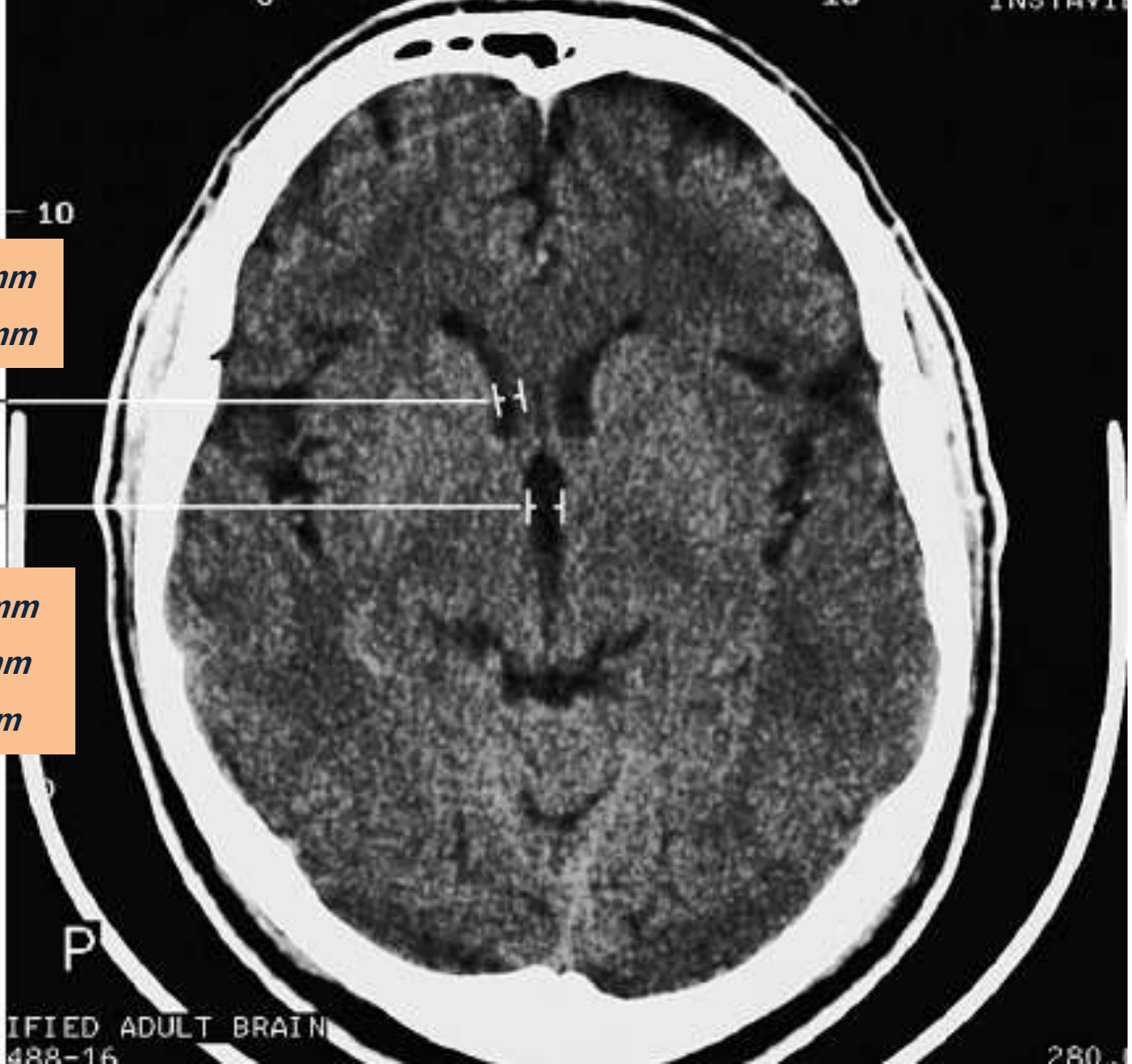
✓ Width of lateral ventricle, frontal horn **< 13 mm**

Structure	Age	Normal Size
Ant. Horns	Newborn	**< 13 mm**
	< 40 y	**< 12 mm**
	> 40 y	**< 15 mm**
3rd Ventricle	***Child***	**< 5 mm**
	< 60 y	**< 7 mm**
	> 60 y	**< 9 mm**



- **Cella media index:**
  B/A > 4
  = normal


B
A



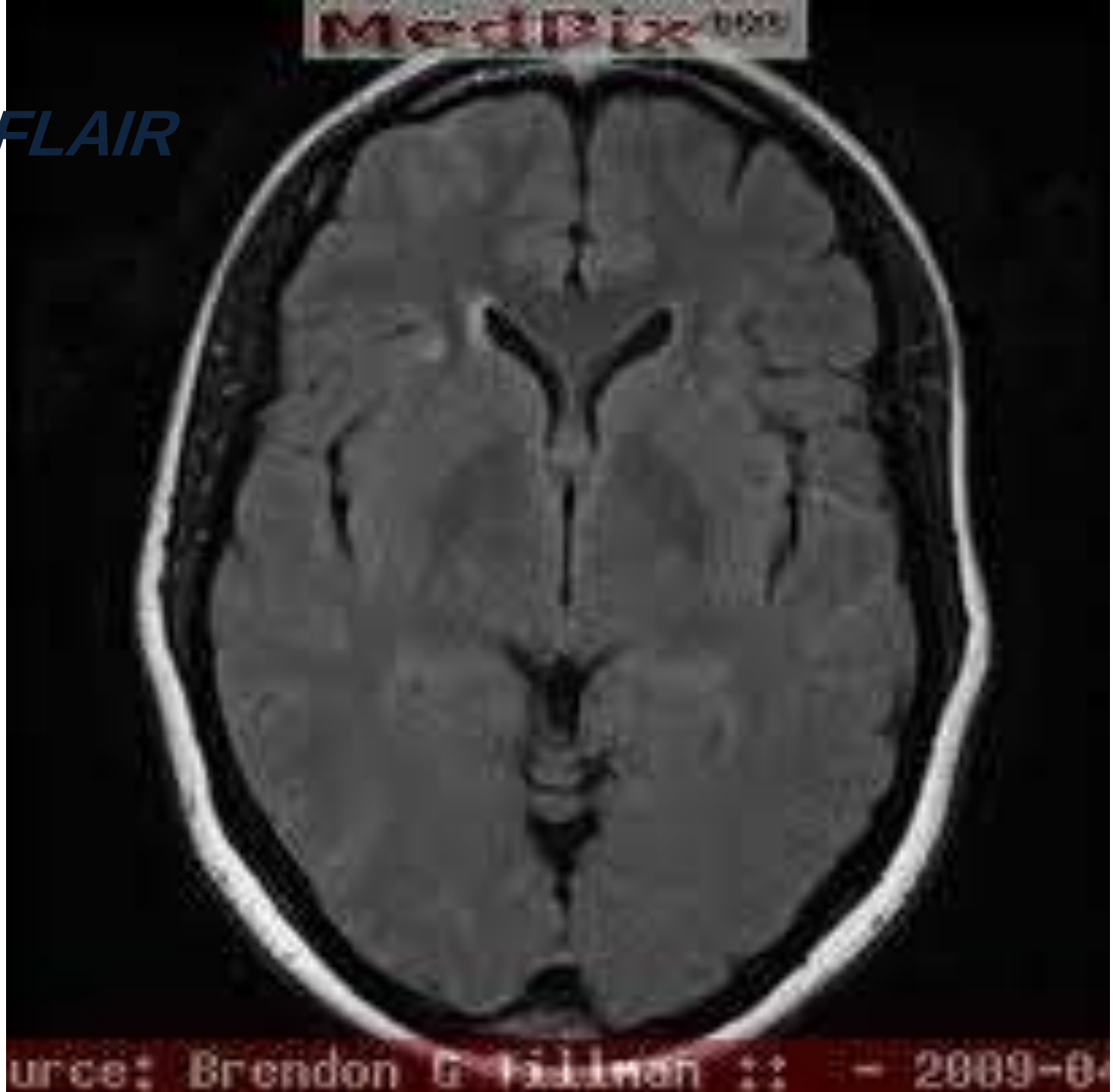
40 y < 12 mm

>40 < 15 mm

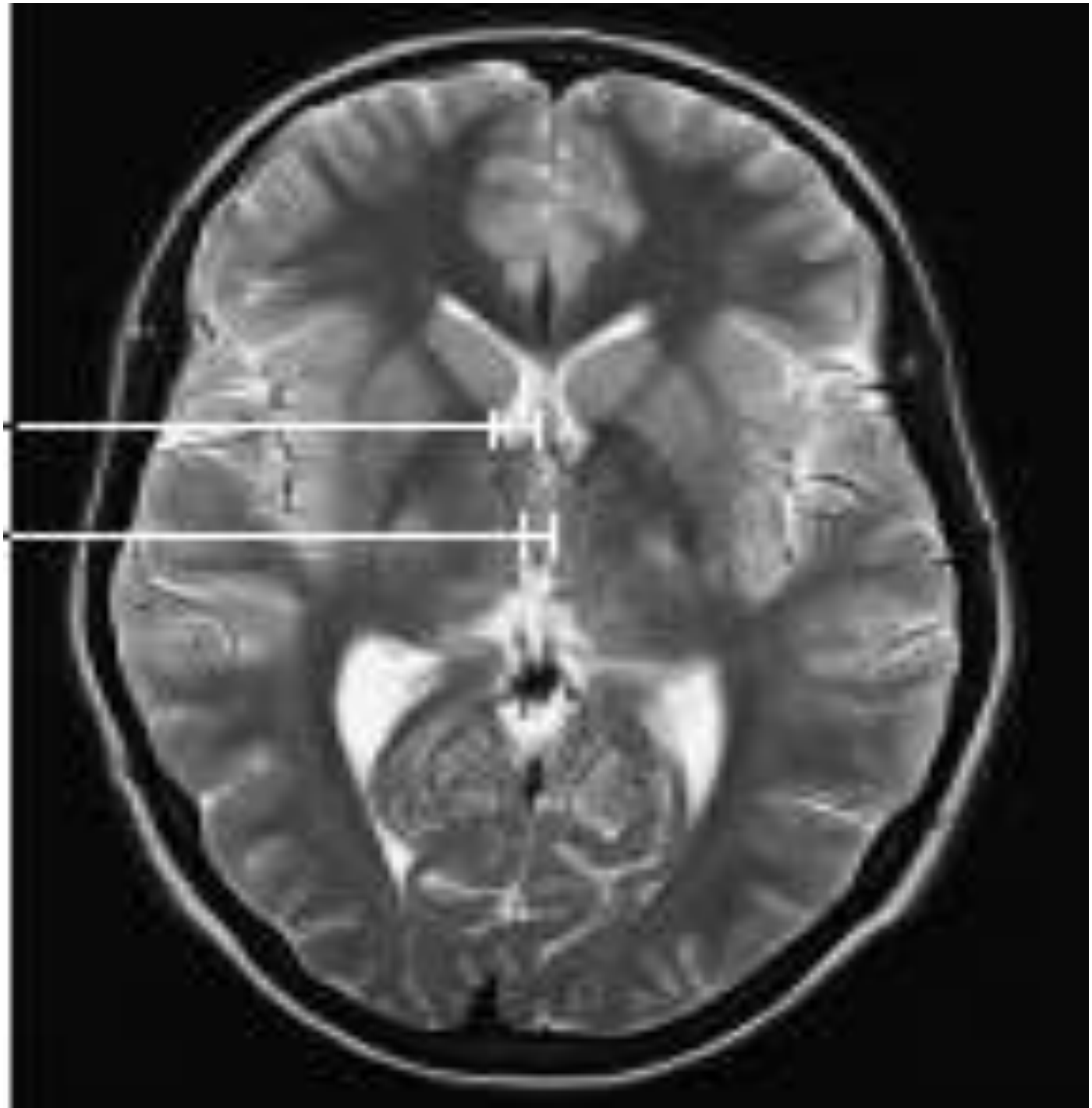
Child < 5 mm

<60 < 7 mm

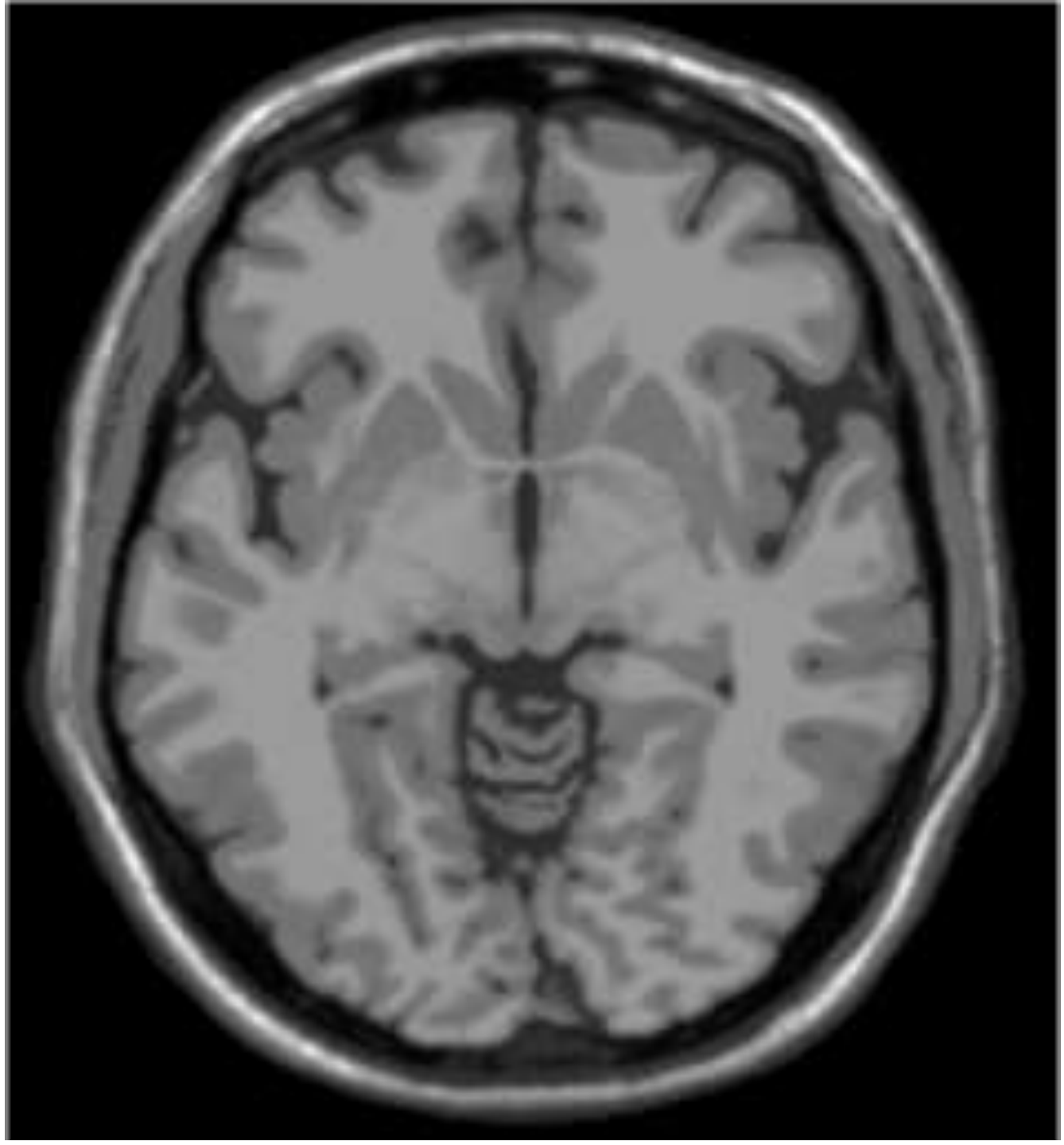
60 y < 9 mm


FLAIR

T 2

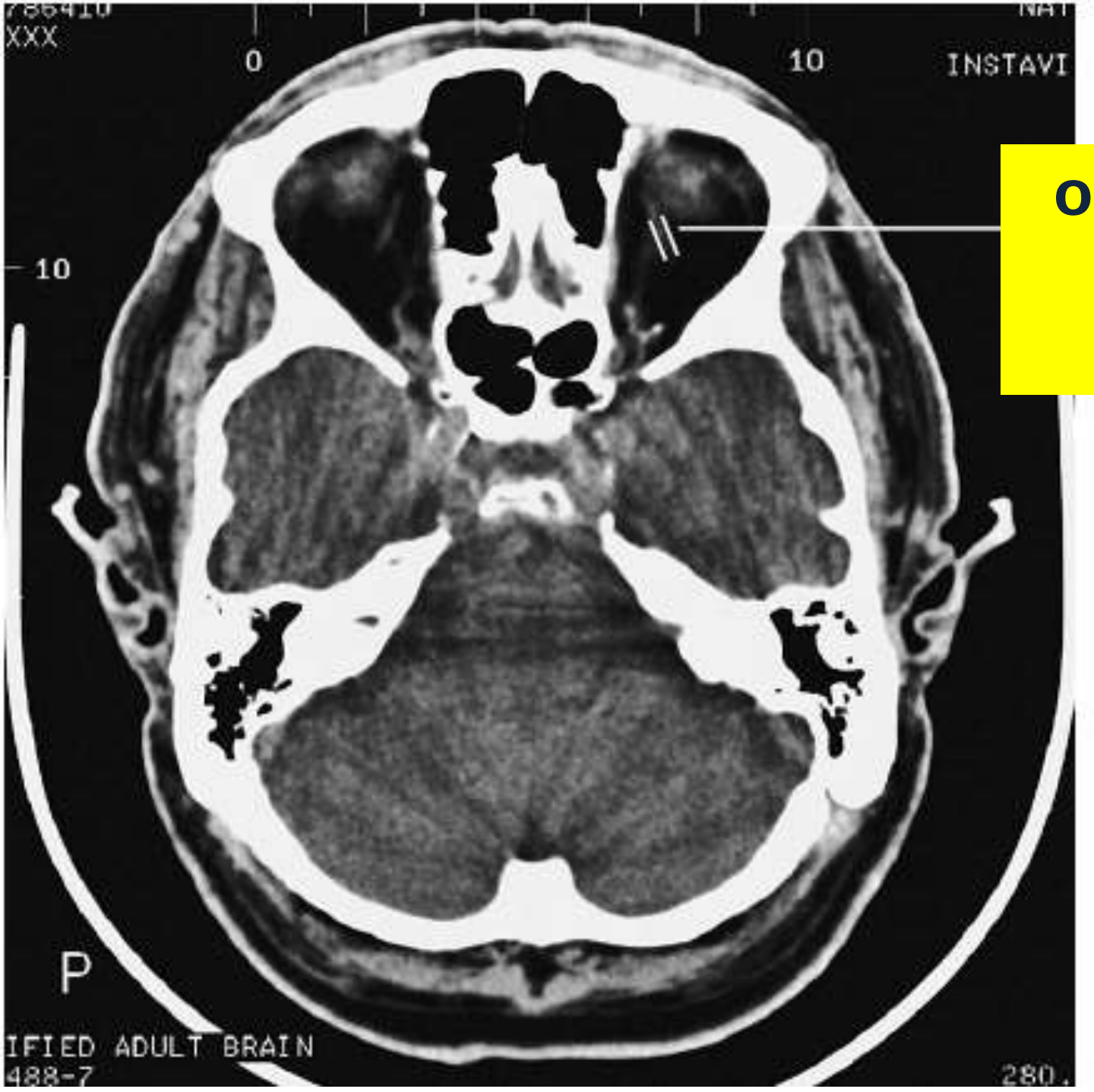


T 1

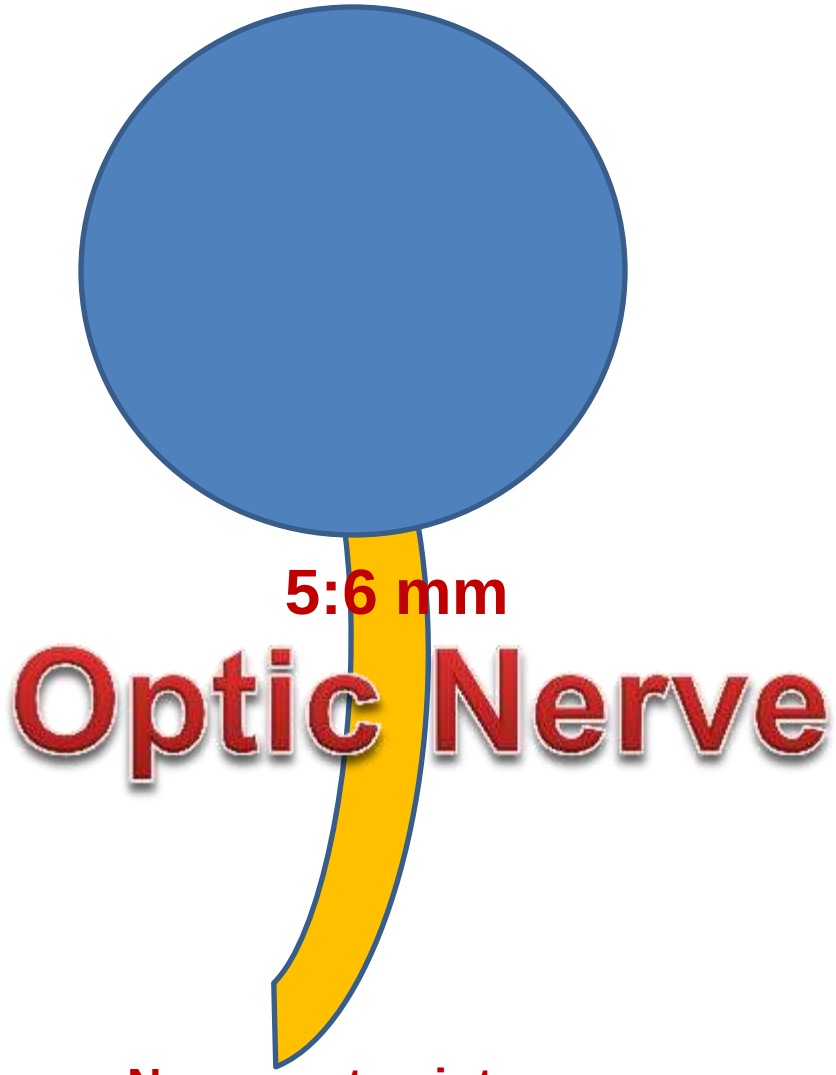


Ophthalmic Vein

3:4 mm



ophthalmic vein 3:4 mm


5:6 mm
Optic Nerve
Narrowest point
>= 3.5

Optic Nerve / Axial

Retrobulbar

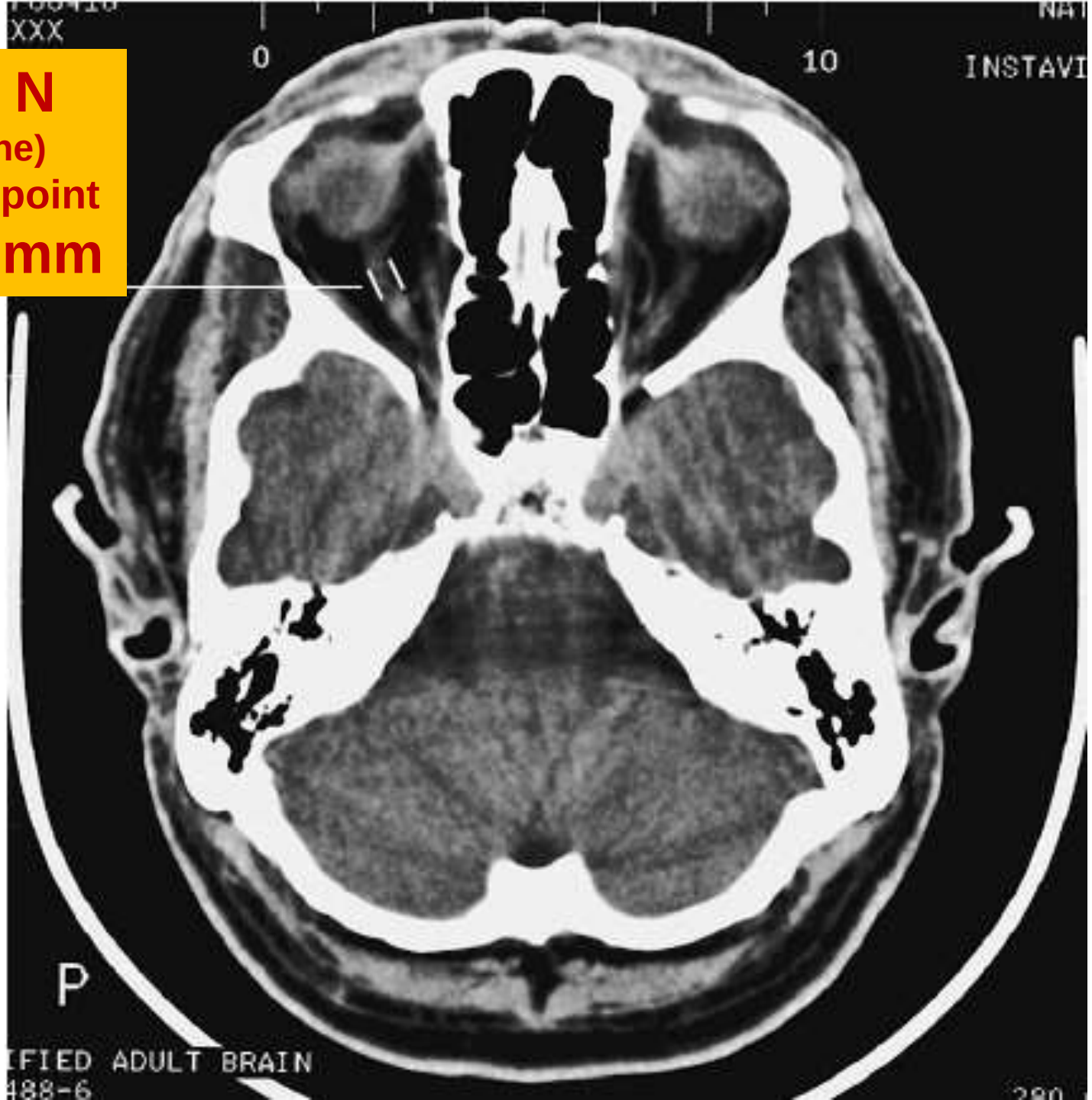
5:6 mm

OPTIC N

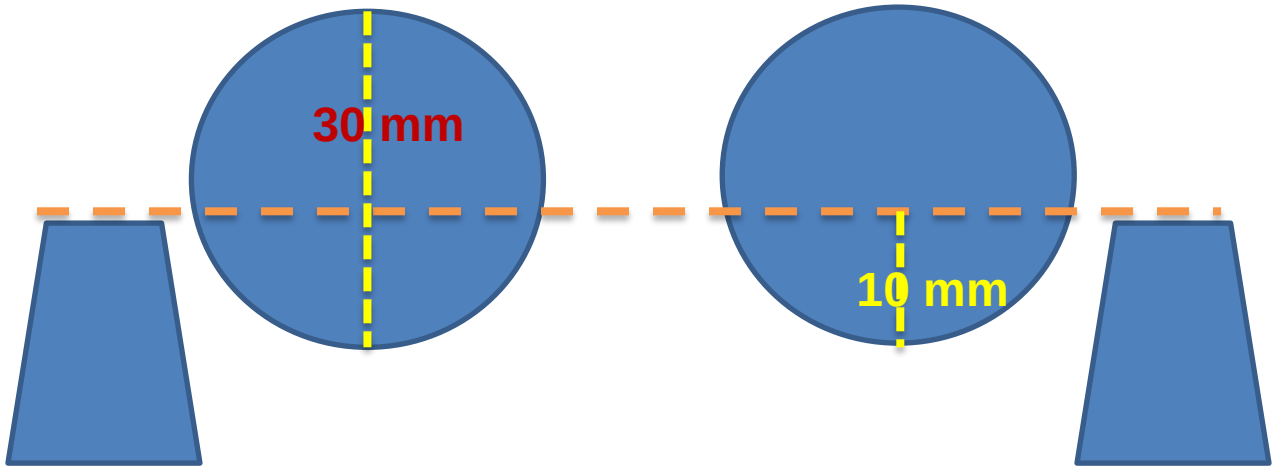
(axial plane)

Narrowest point

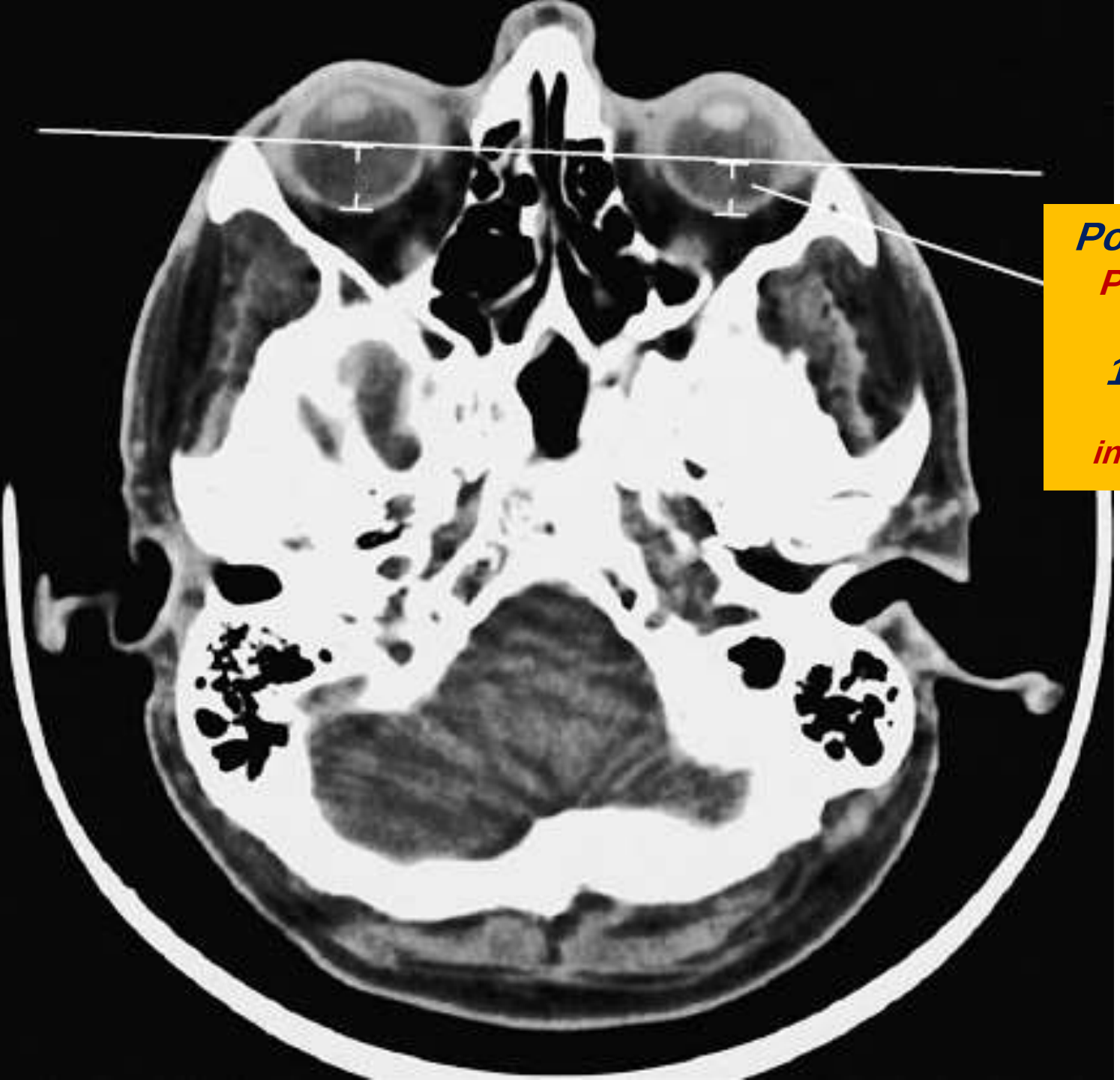
3.5 : 4.5 mm



Eye globe
Diameter & Position



NB. AORTA & GLOBE
SAME MAXIMAL DIAMETER



Position of globe:
Posterior margin of globe
10 mm ± 2 mm
behind inter-zygomatic line

Diameter of globe:

Axial plane

Rt: 28.5 ± 1. mm

Lt: 29.5 ± 1.5 mm

< 30 mm

Eye muscles

- a -Superior rectus: 3.8 mm ± 0.7 mm
- b -Oblique: 2.5 mm ± 0.4 mm
- C- Lateral rectus: 2.9 mm ± 0.6 mm
- d -Medial rectus: 4.1 mm ± 0.5 mm
- e -Inferior rectus: 5 mm ± 0.7 mm

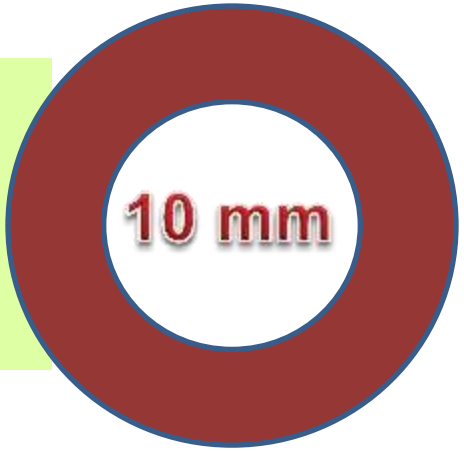

5a
5b
3a
5c
5e
5d
A

PITUITARY

Pituitary Gland

Normal size

- Height in adult females — range 4 to 10 mm
- Height in adult males — range 3 to 7 mm



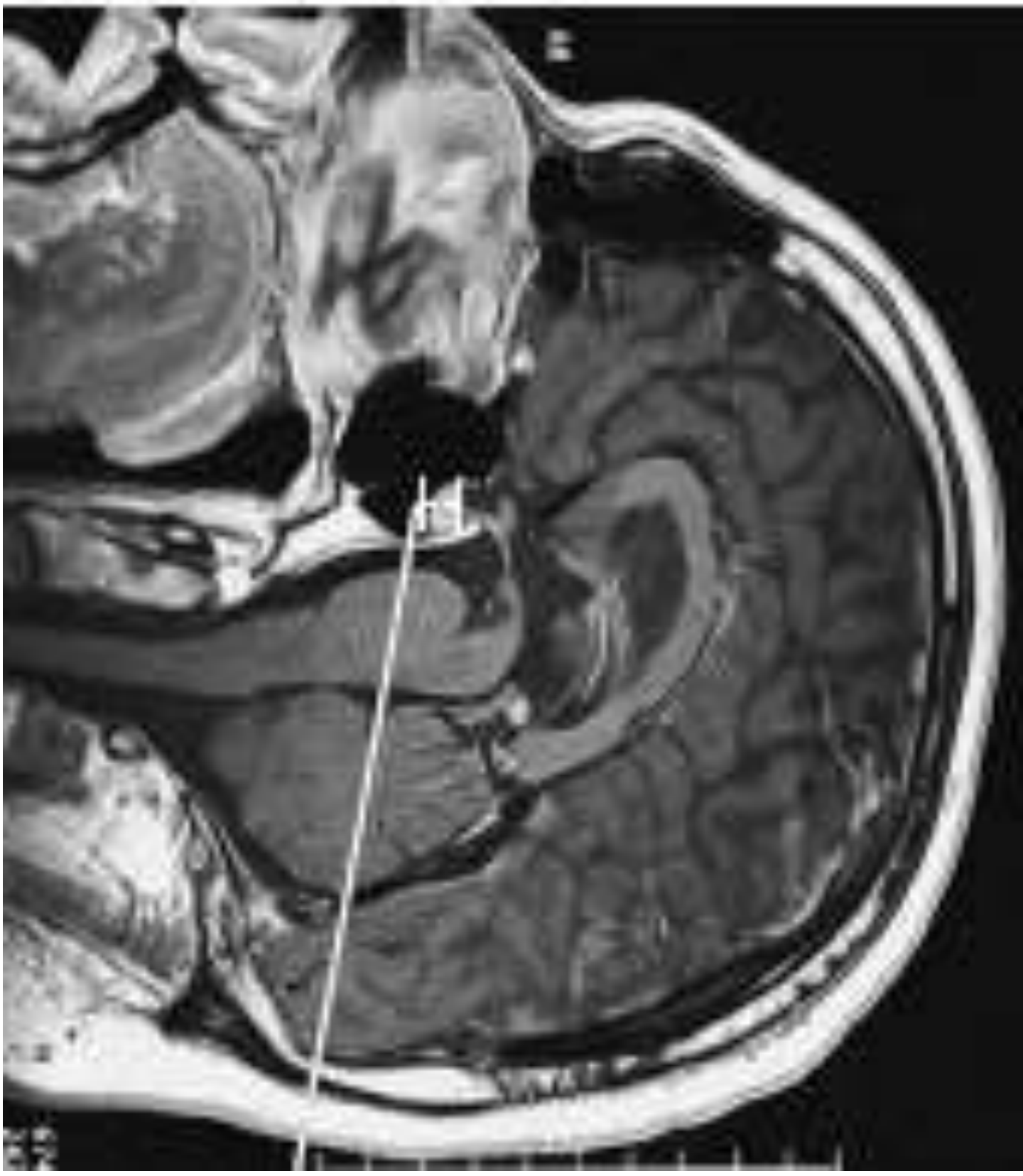
➔ **Pituitary stalk:** < 4 mm

Caution: *normal size variations:*
= **P**regnancy: up to **12 mm**
= **P**uberty:
up to 10 mm ← girls,
up to 8 mm ← boys

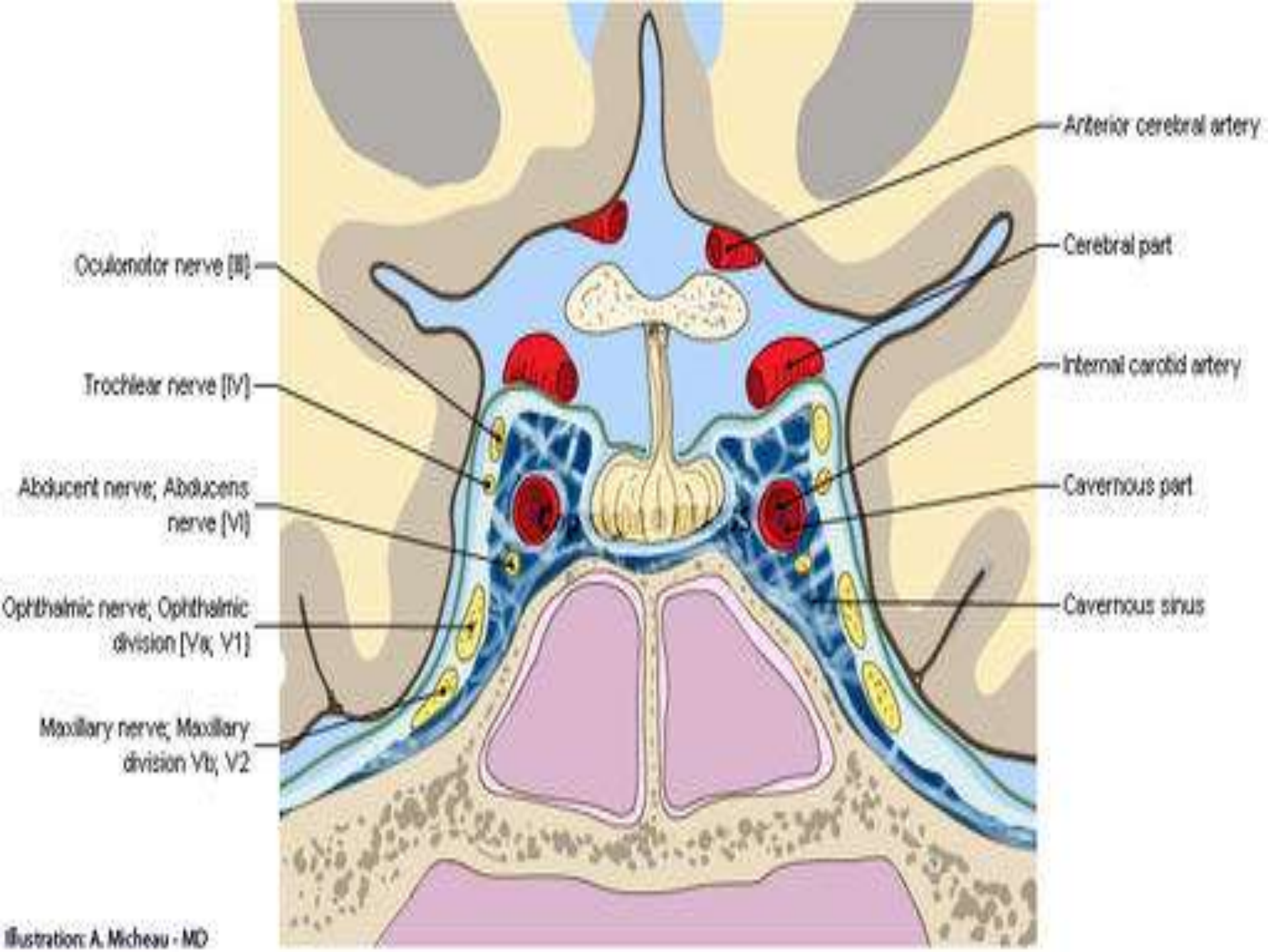
Area of the pituitary *in the coronal plane*

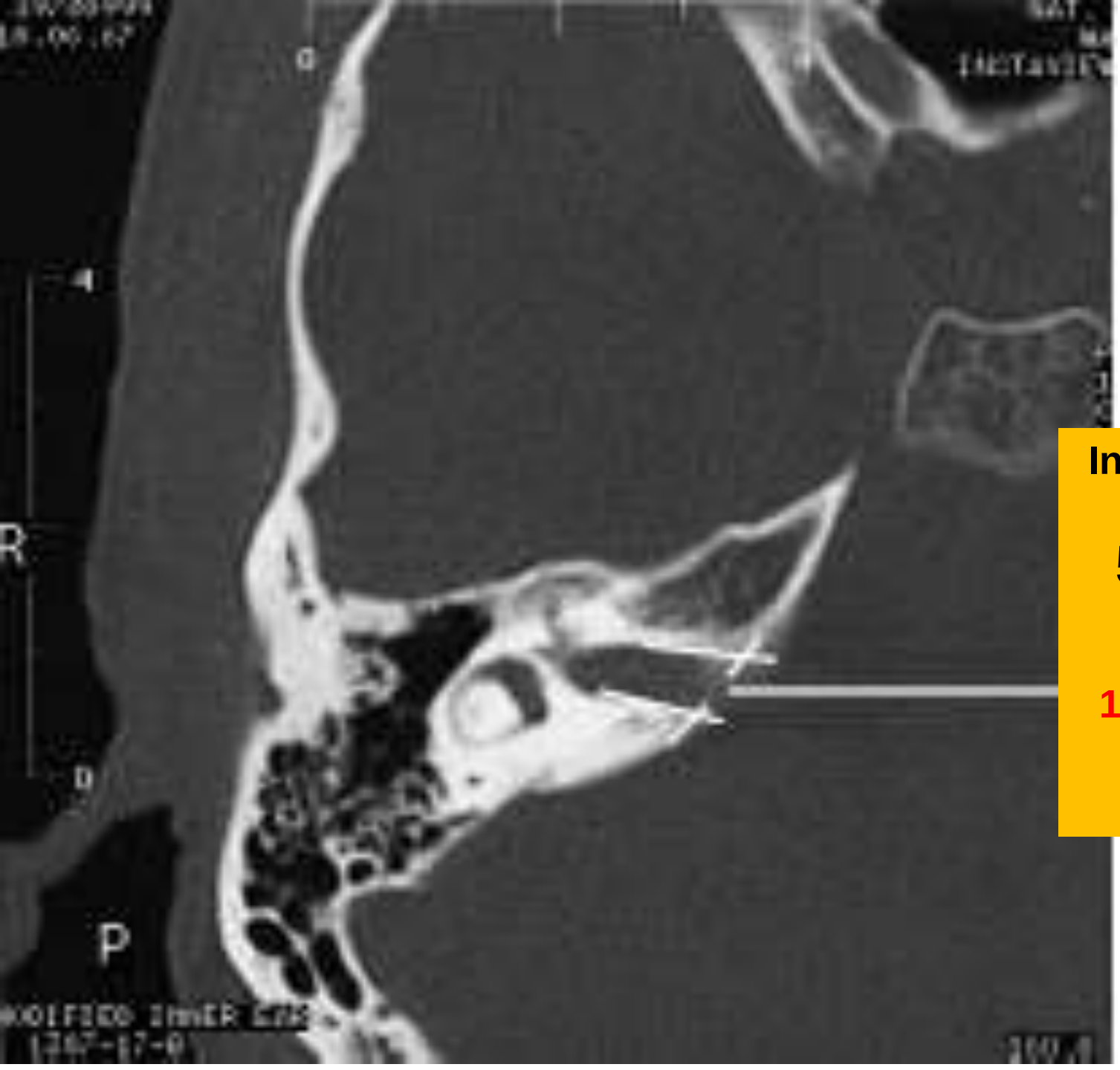
*(**height x width**,* women of childbearing age):

90 : 95 mm2




2b
2a
3
1b
1a
A
FIED ADULT BRAIN


Anterior cerebral artery
Cerebral part
Oculomotor nerve [III]
Internal carotid artery
Trochlear nerve [IV]
Abducent nerve; Abducens nerve [VI]
Cavernous part
Ophthalmic nerve; Ophthalmic division [Va; V1]
Cavernous sinus
Maxillary nerve; Maxillary division Vb; V2
Illustration: A. Micheau - MD

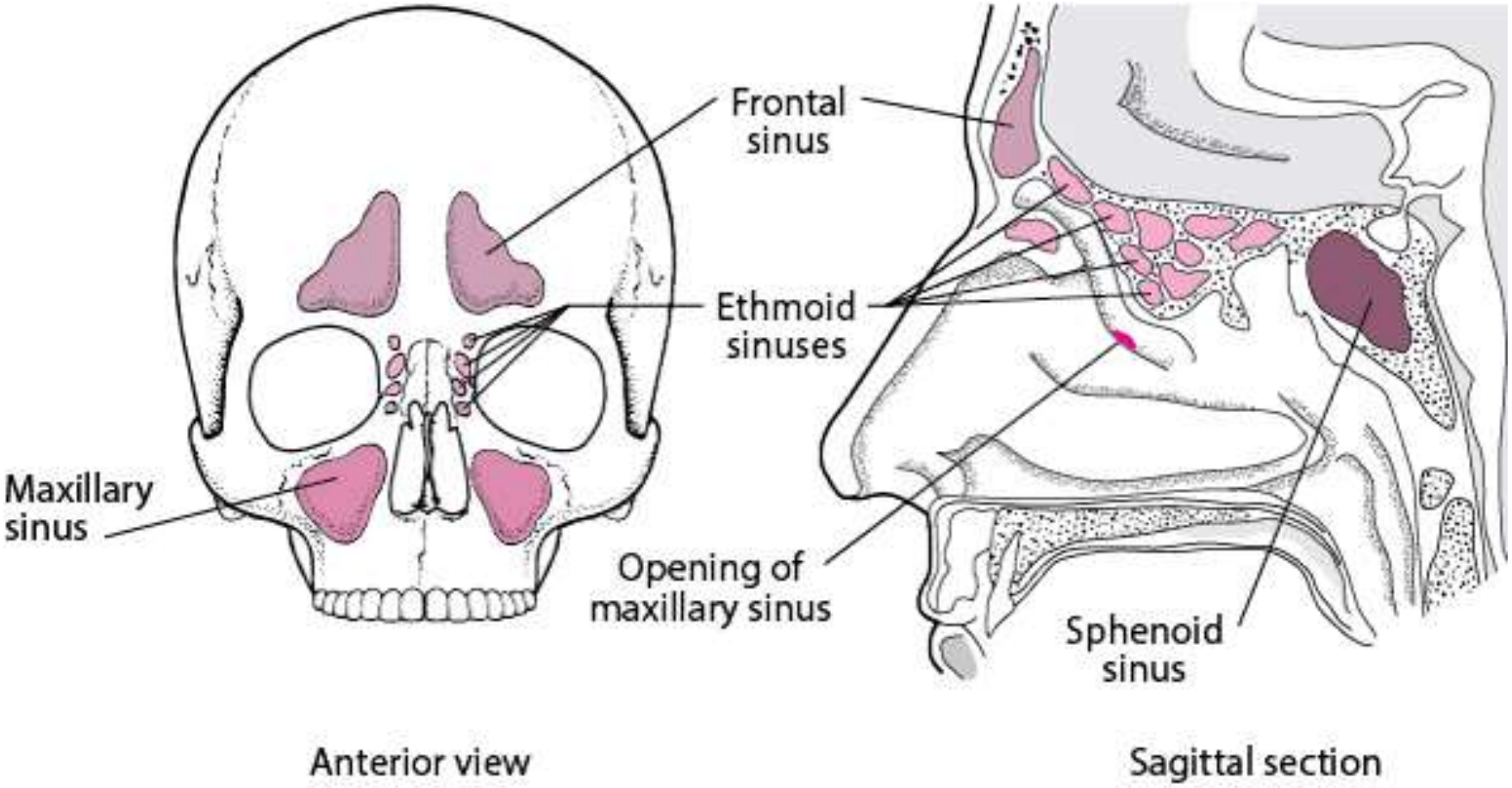


Internal auditory canal:

5–10 mm,

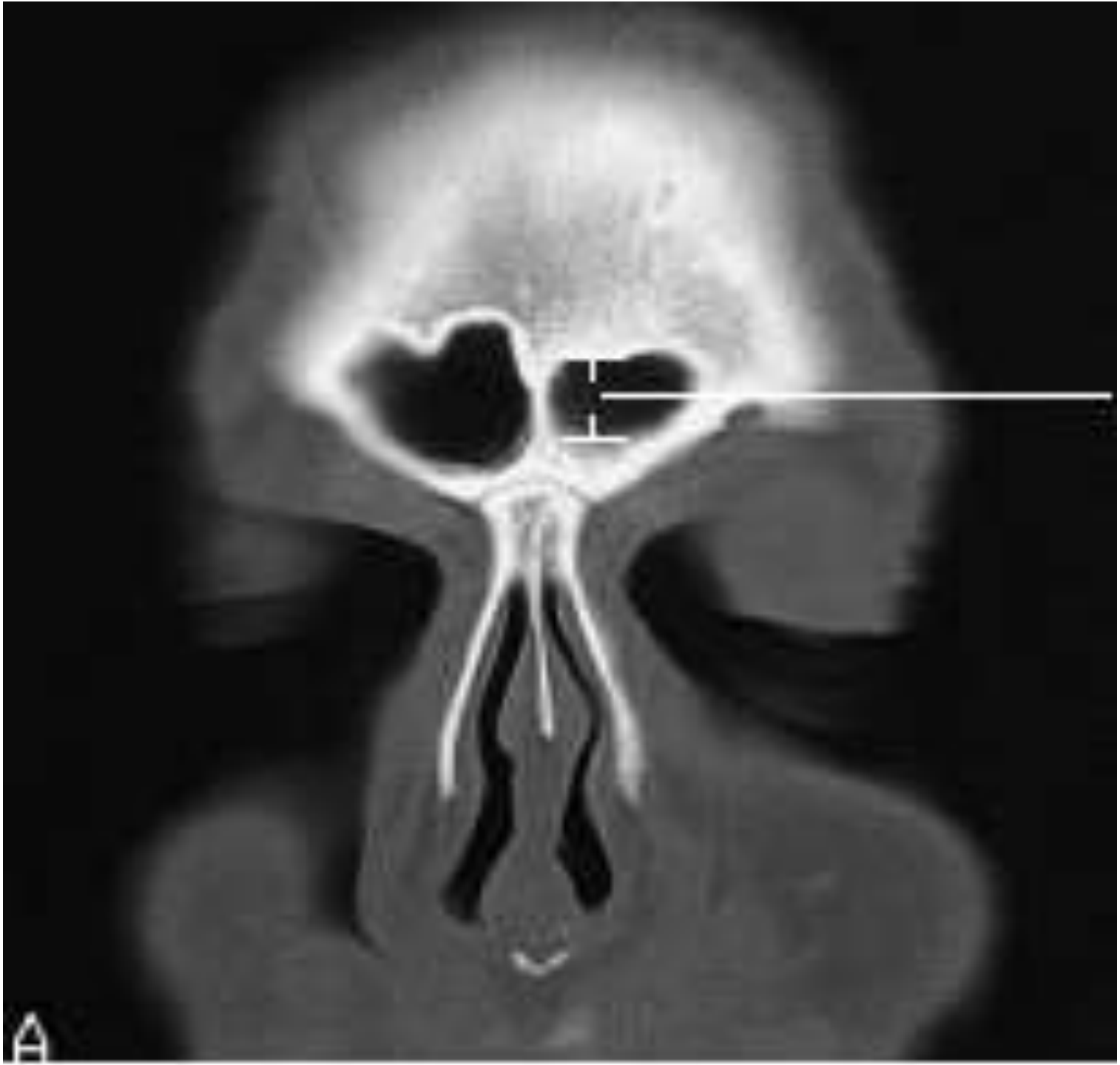
1 mm difference between Rt & Lt sides

PNS *Measures*

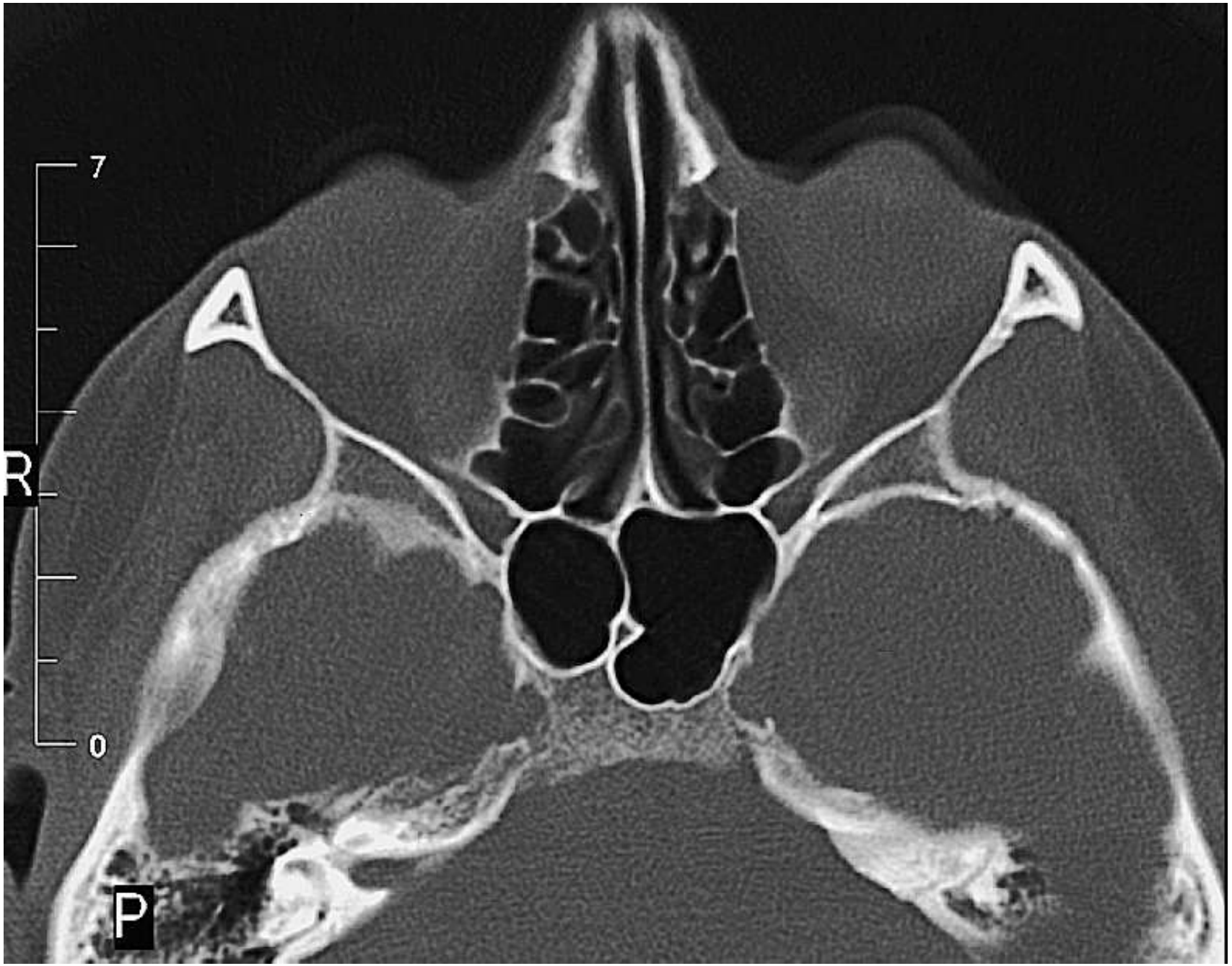

Frontal sinus
Ethmoid sinuses
Maxillary sinus
Opening of maxillary sinus
Sphenoid sinus
Anterior view
Sagittal section

P N S

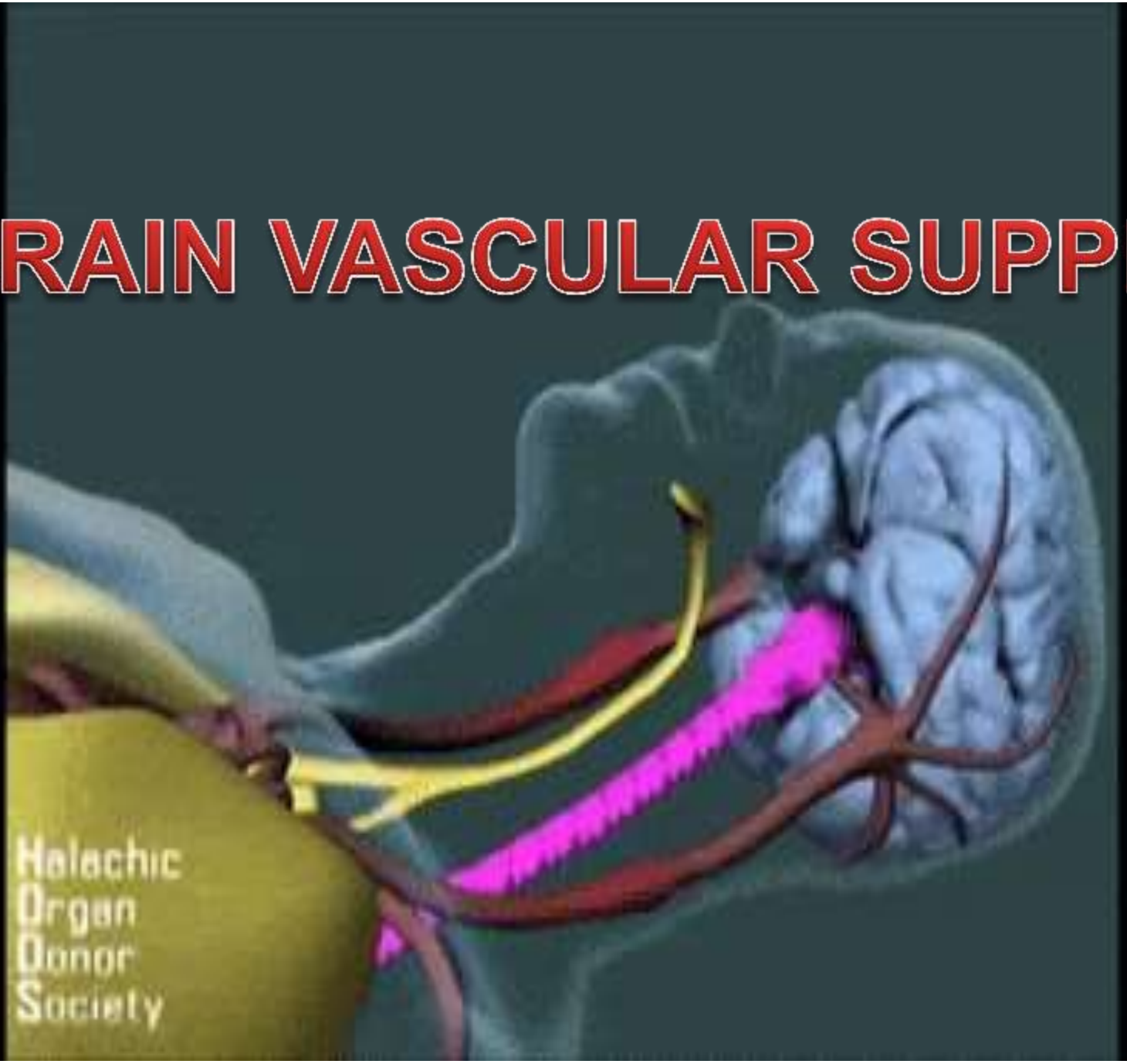
- **1 - Sphenoid sinus:**
  - Width 1–1.5 cm
- **2- Frontal sinus:**
  - Height 1.5–2 cm
- **3- Maxillary sinuses:**
  - **Width 2 cm**
  - **Height 2 cm**



7
R
0
P
PICKER - PQ6000

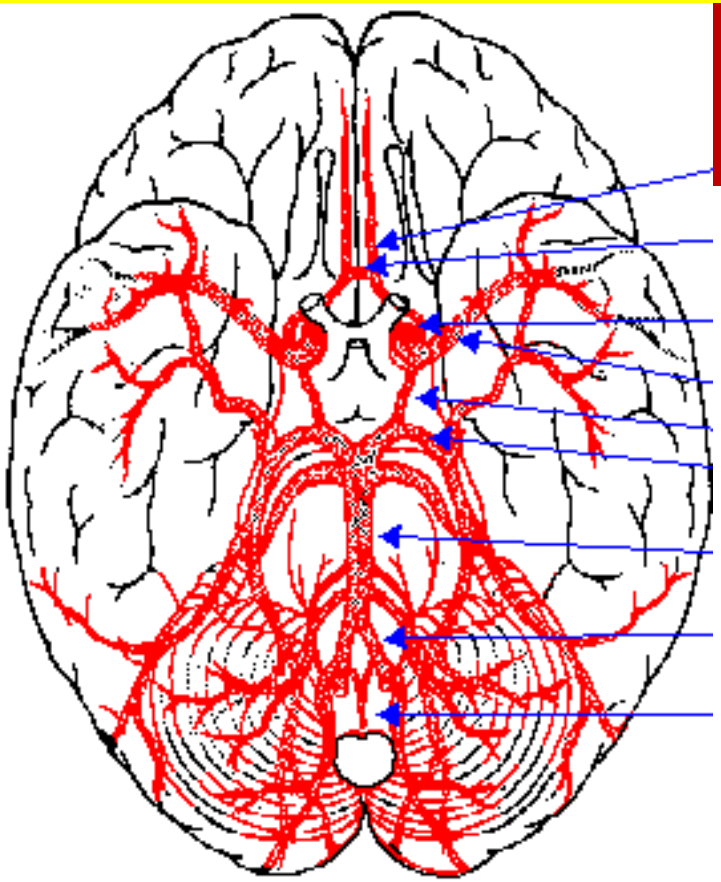

7
R
0
P

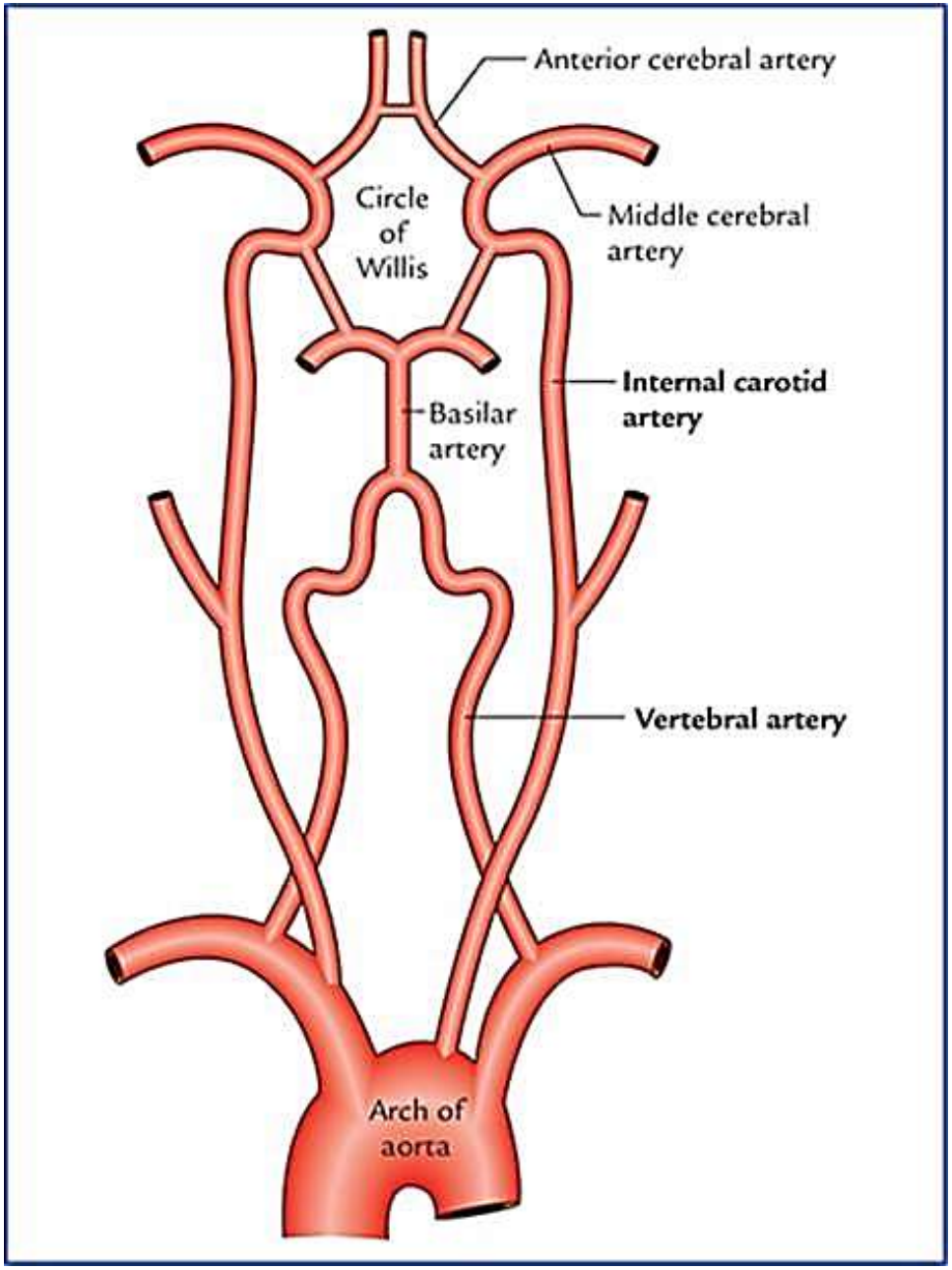
BRAIN VASCULAR SUPPLY

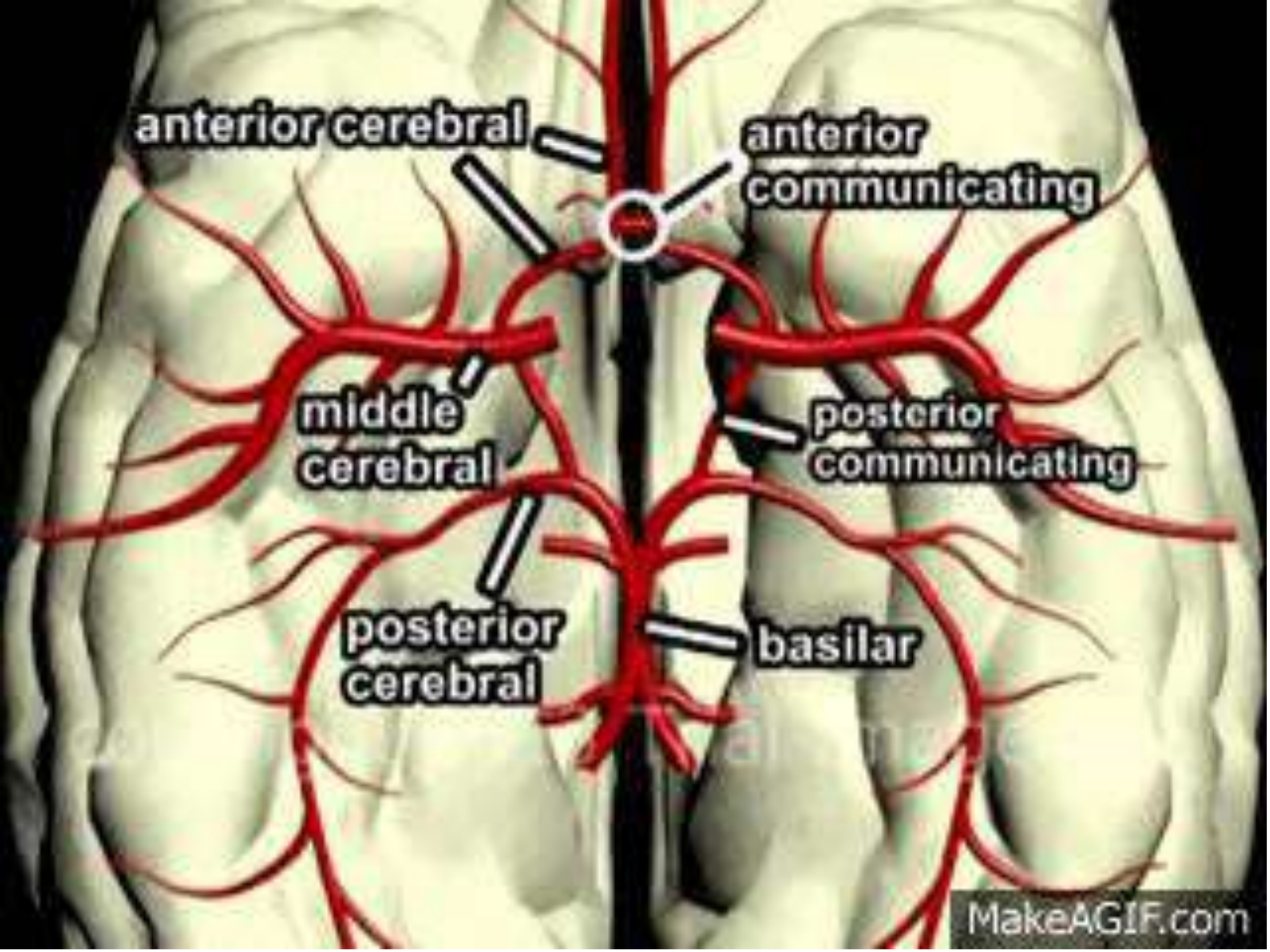


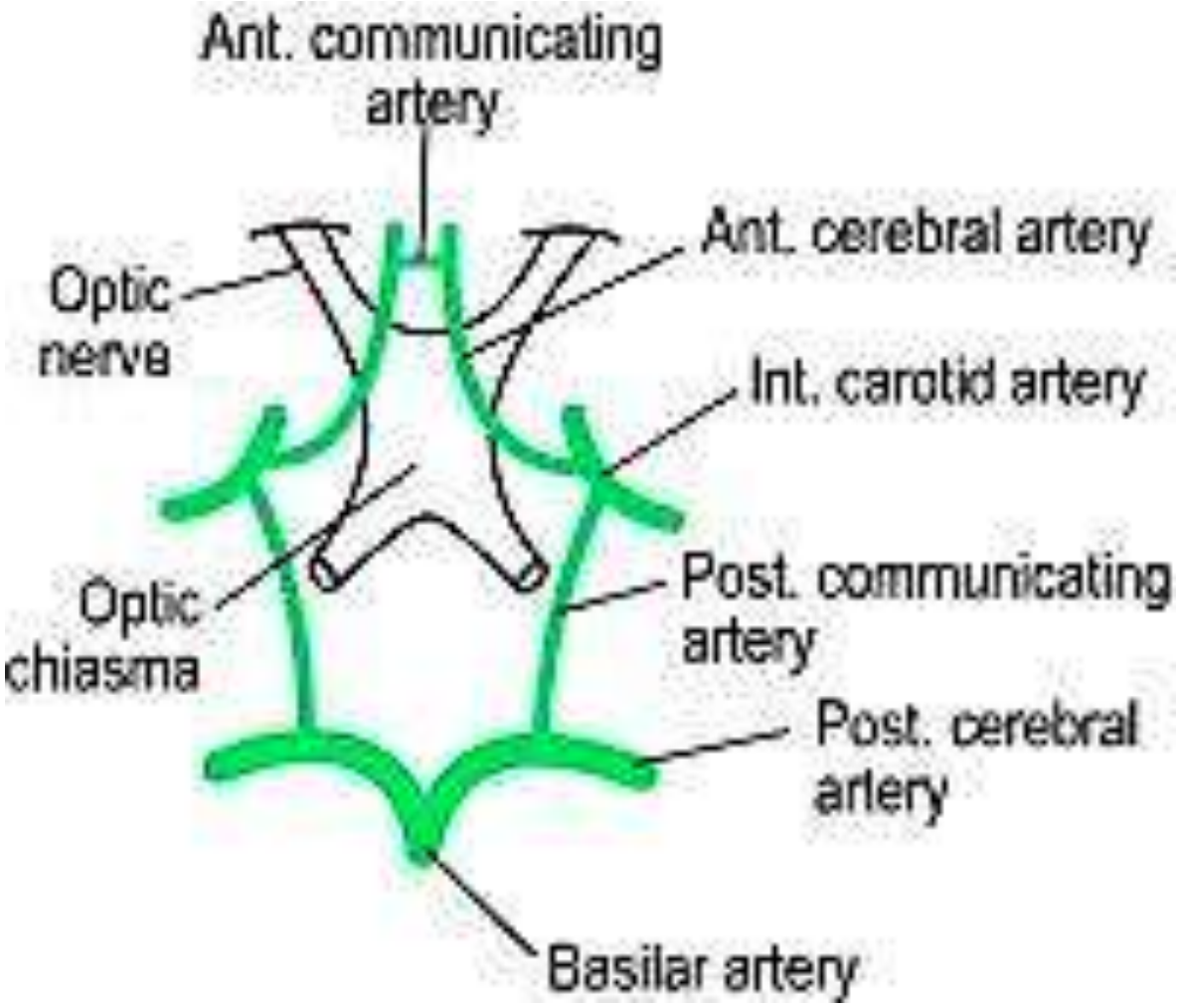
BRAIN Arterial Supply

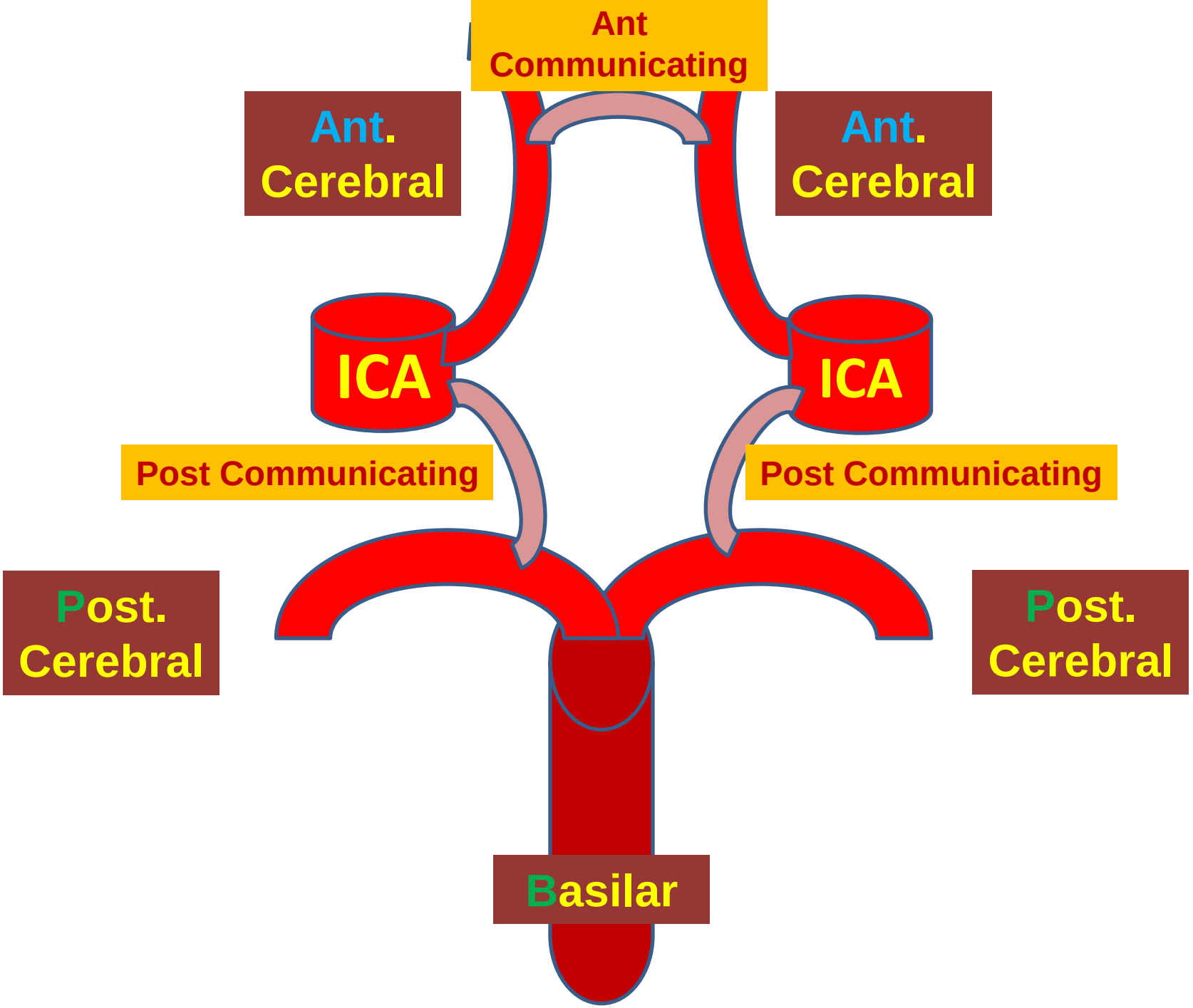
& Circle of Willis

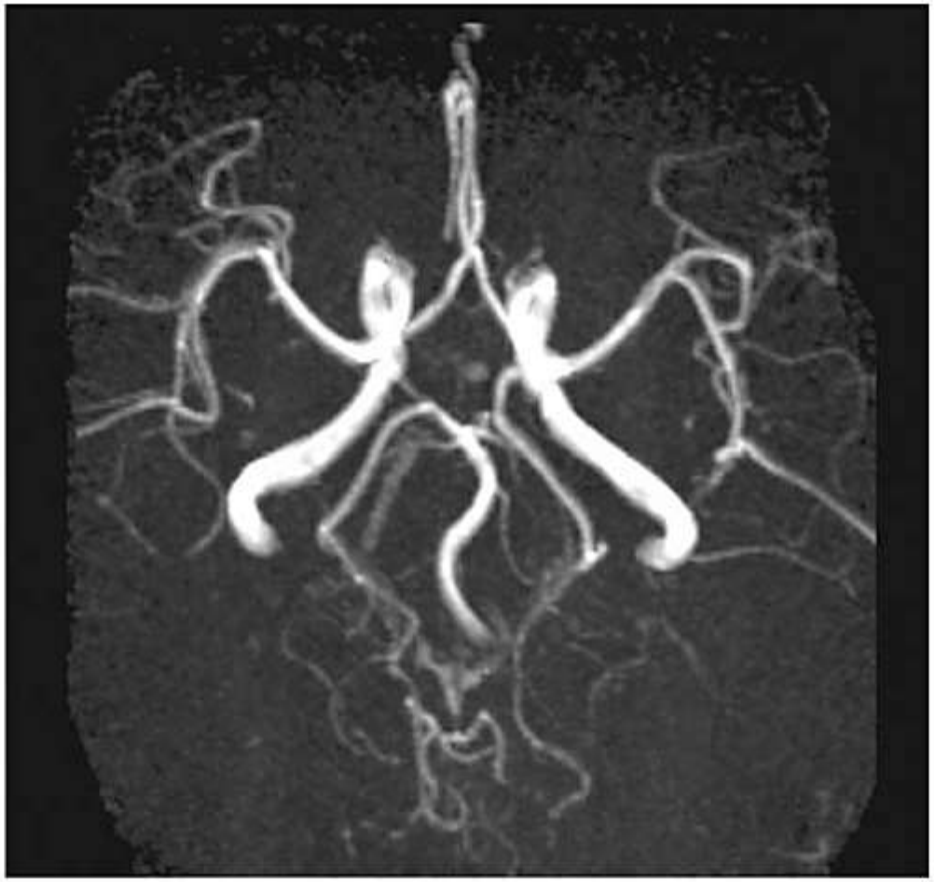



Anterior cerebral artery
Circle of Willis
Middle cerebral artery
Internal carotid artery
Basilar artery
Vertebral artery
Arch of aorta


anterior cerebral
anterior communicating
middle cerebral
posterior communicating
posterior cerebral
basilar
MakeAGIF.com


Ant. communicating artery
Ant. cerebral artery
Optic nerve
Int. carotid artery
Optic chiasma
Post. communicating artery
Post. cerebral artery
Basilar artery


Ant Communicating
Ant. Cerebral
Ant. Cerebral
ICA
ICA
Post Communicating
Post Communicating
Post. Cerebral
Post. Cerebral
Basilar



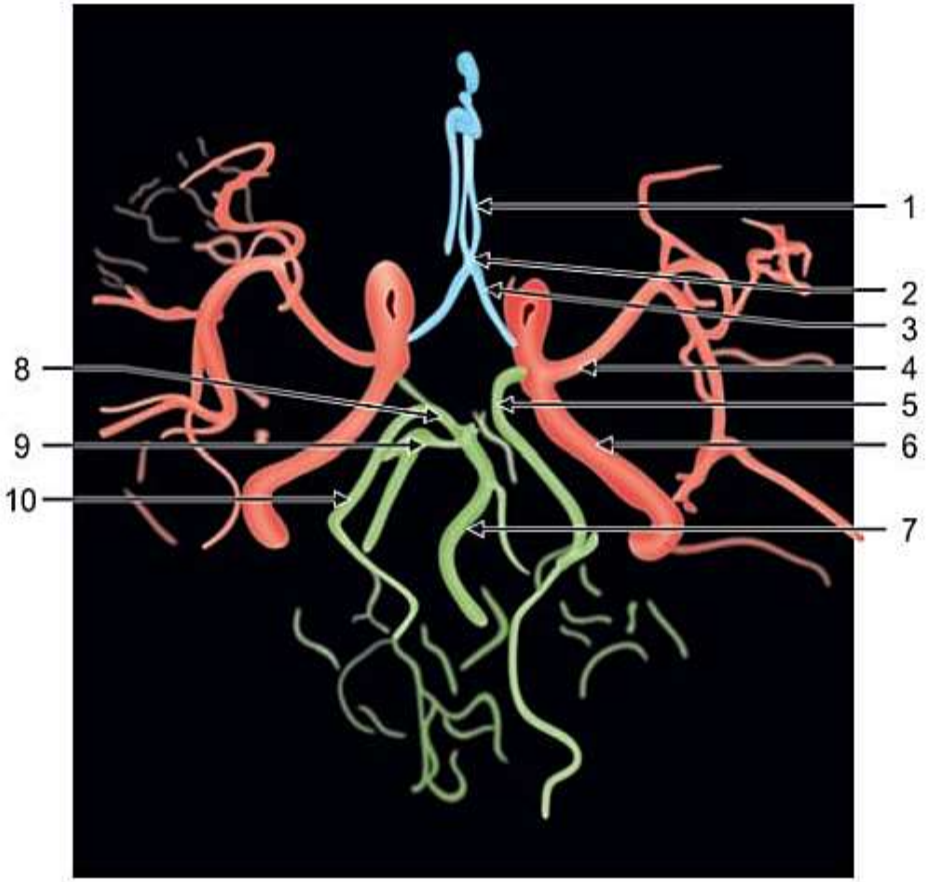
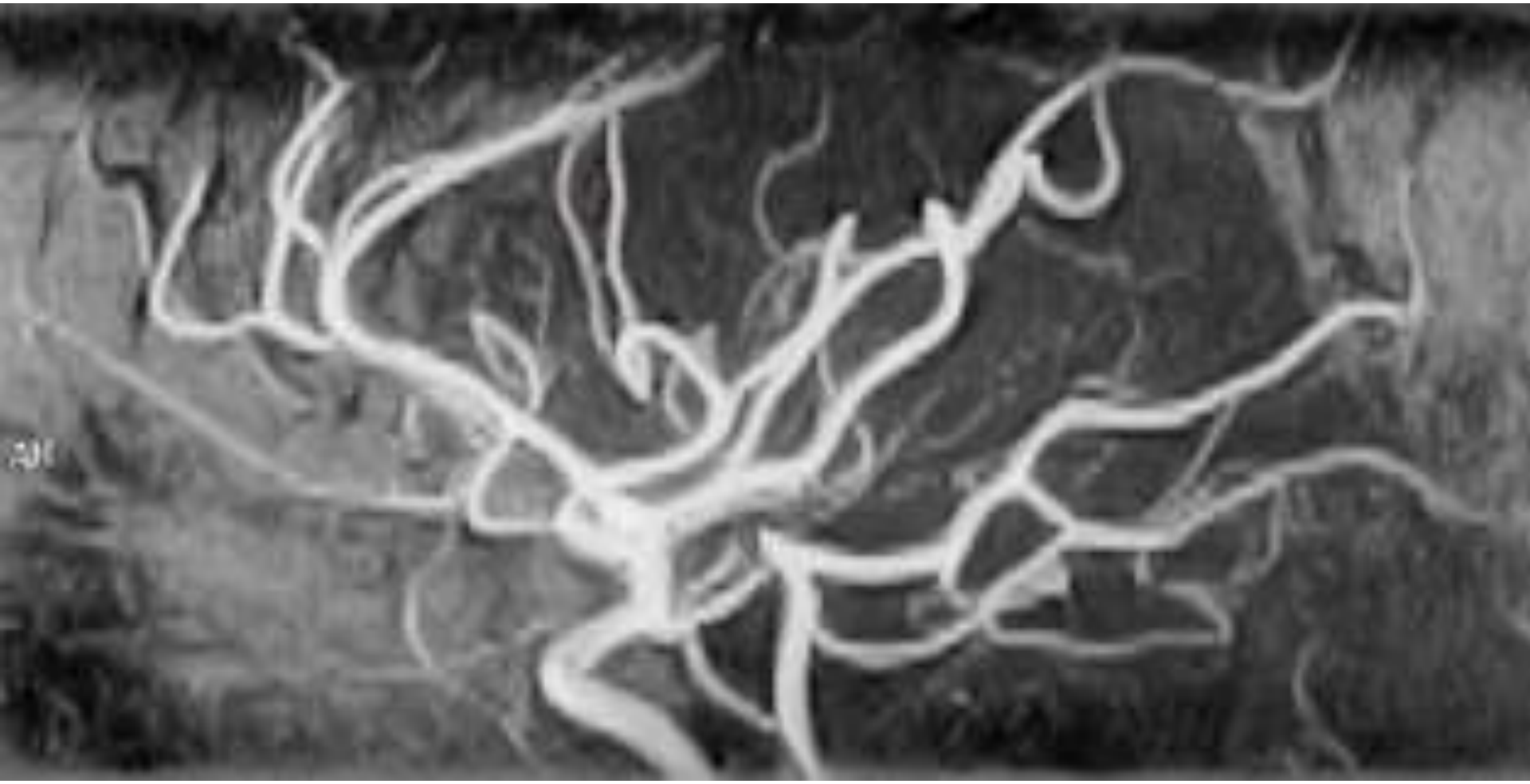


Figure 1.1

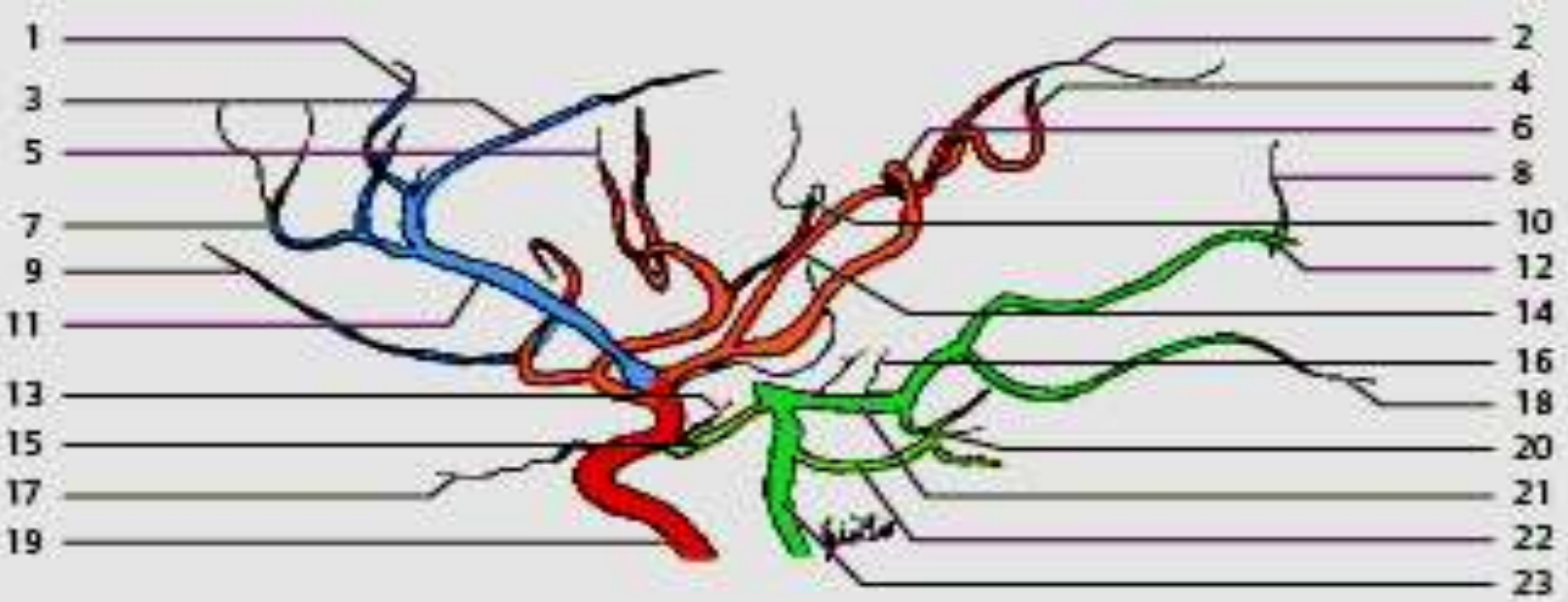
1. A2, anterior cerebral artery
2. Anterior communicating artery
3. A1 ACA
4. M1, Middle cerebral artery
5. Posterior communicating artery
6. Internal carotid artery
7. Basilar artery
8. P1, PCA
9. Superior cerebral artery
10. P2, Posterior cerebral artery



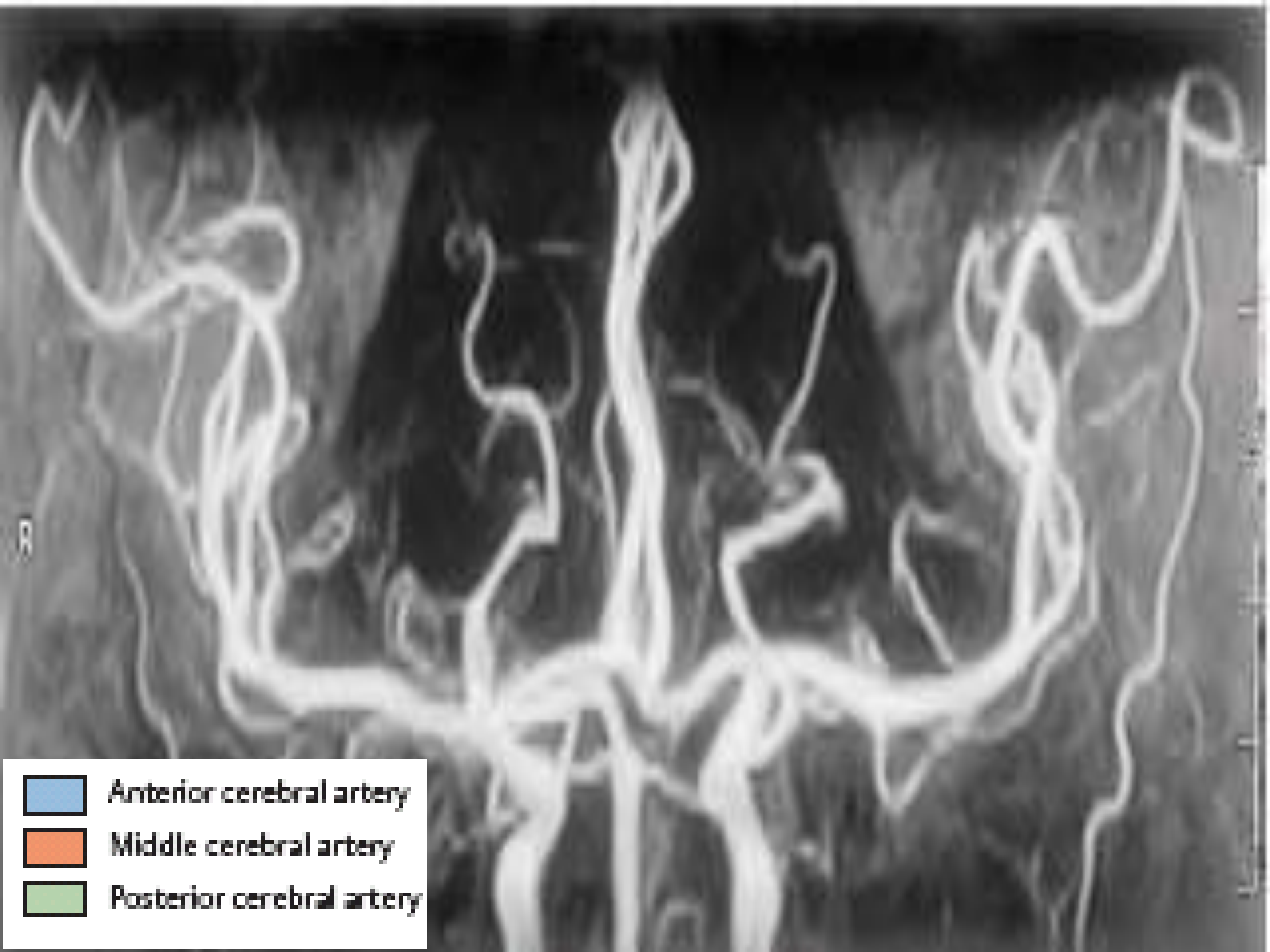
Anterior cerebral artery

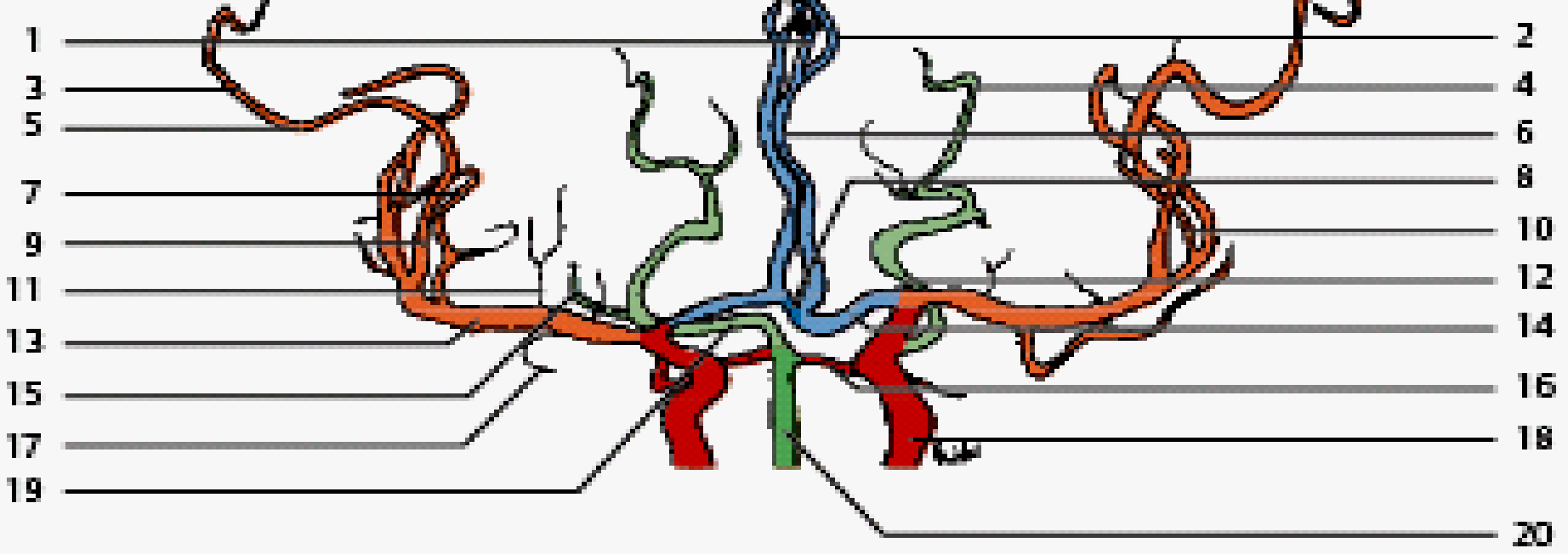
Middle cerebral artery

Posterior cerebral artery



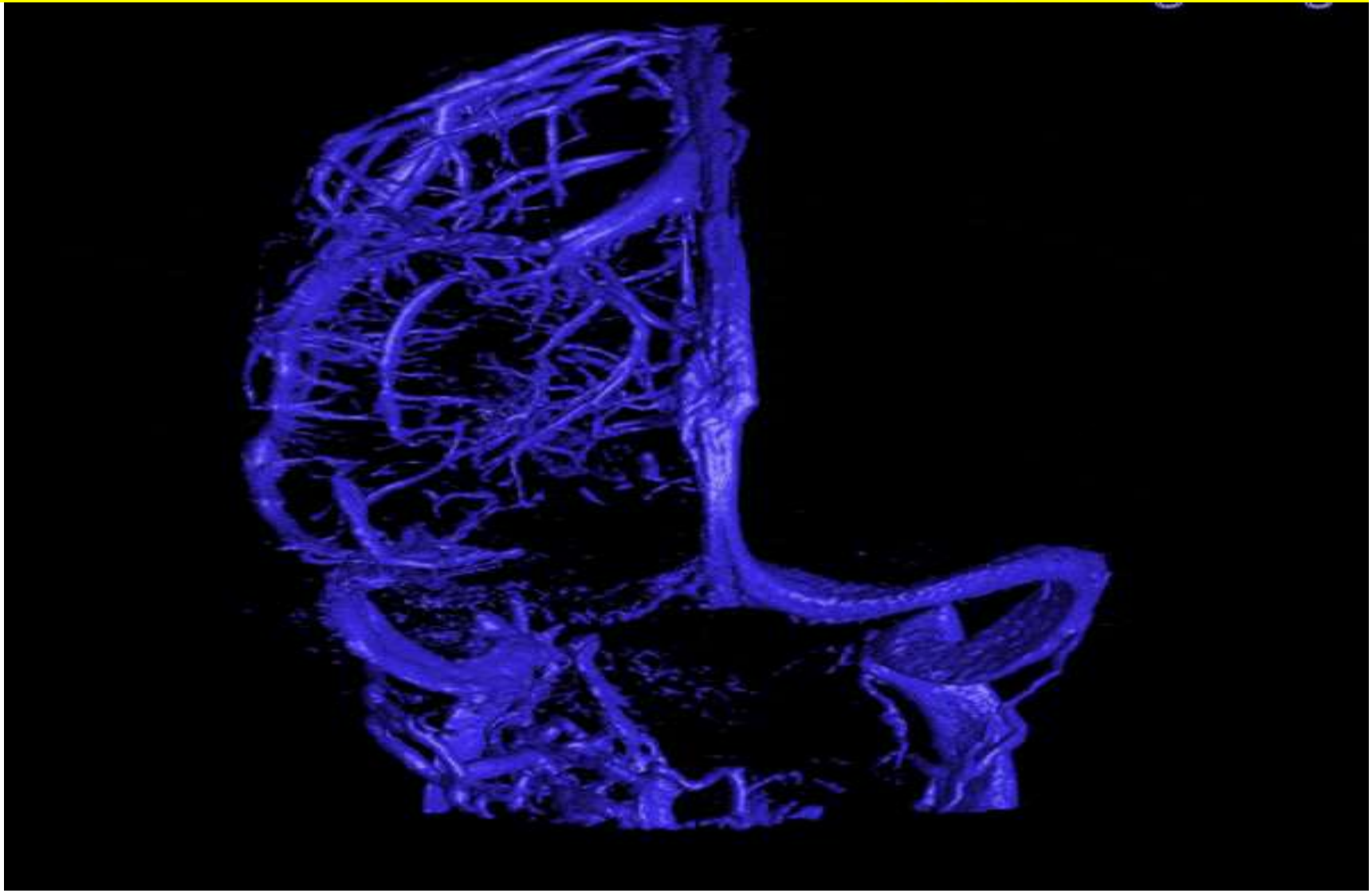
1 Callosomarginal artery
2 Parietal artery
3 Pericallosal artery
4 Artery of angular gyrus
5 Artery of precentral sulcus
6 Middle cerebral artery (opercular part)
7 Polar frontal artery
8 Parieto-occipital artery
9 Medial frontobasal artery
10 Artery of central sulcus
11 Anterior cerebral artery (postcommunicating segment, A2 segment)
12 Medial occipital artery
13 Anterior choroidal artery
14 Middle cerebral artery (M2 segment)
15 Posterior communicating artery
16 Posteromedial central arteries
17 Ophthalmic artery
18 Occipitotemporal branch
19 Internal carotid artery
20 Posterior temporal artery
21 Posterior cerebral artery
22 Superior cerebellar artery
23 Basilar artery

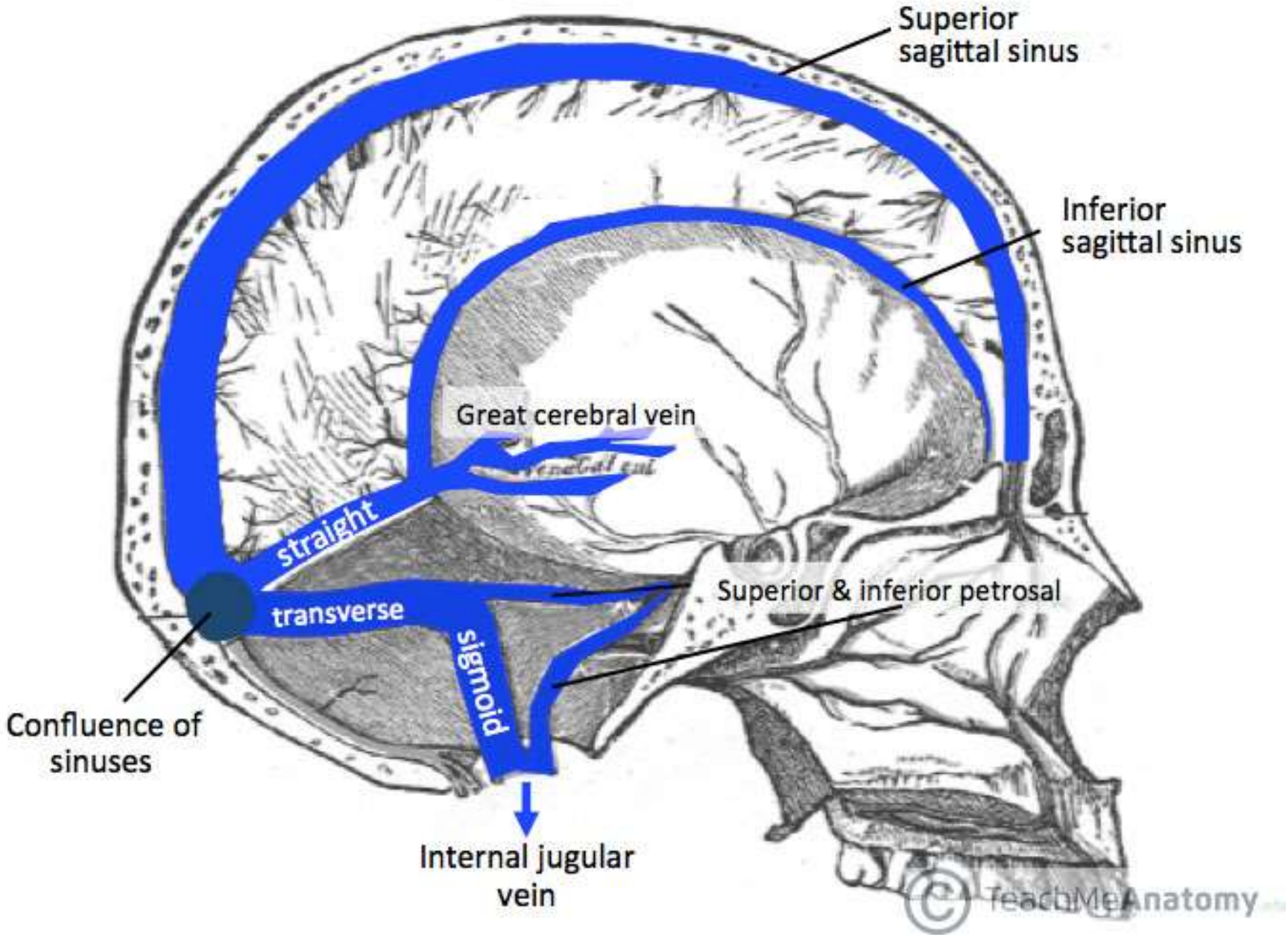

R
Anterior cerebral artery
Middle cerebral artery
Posterior cerebral artery

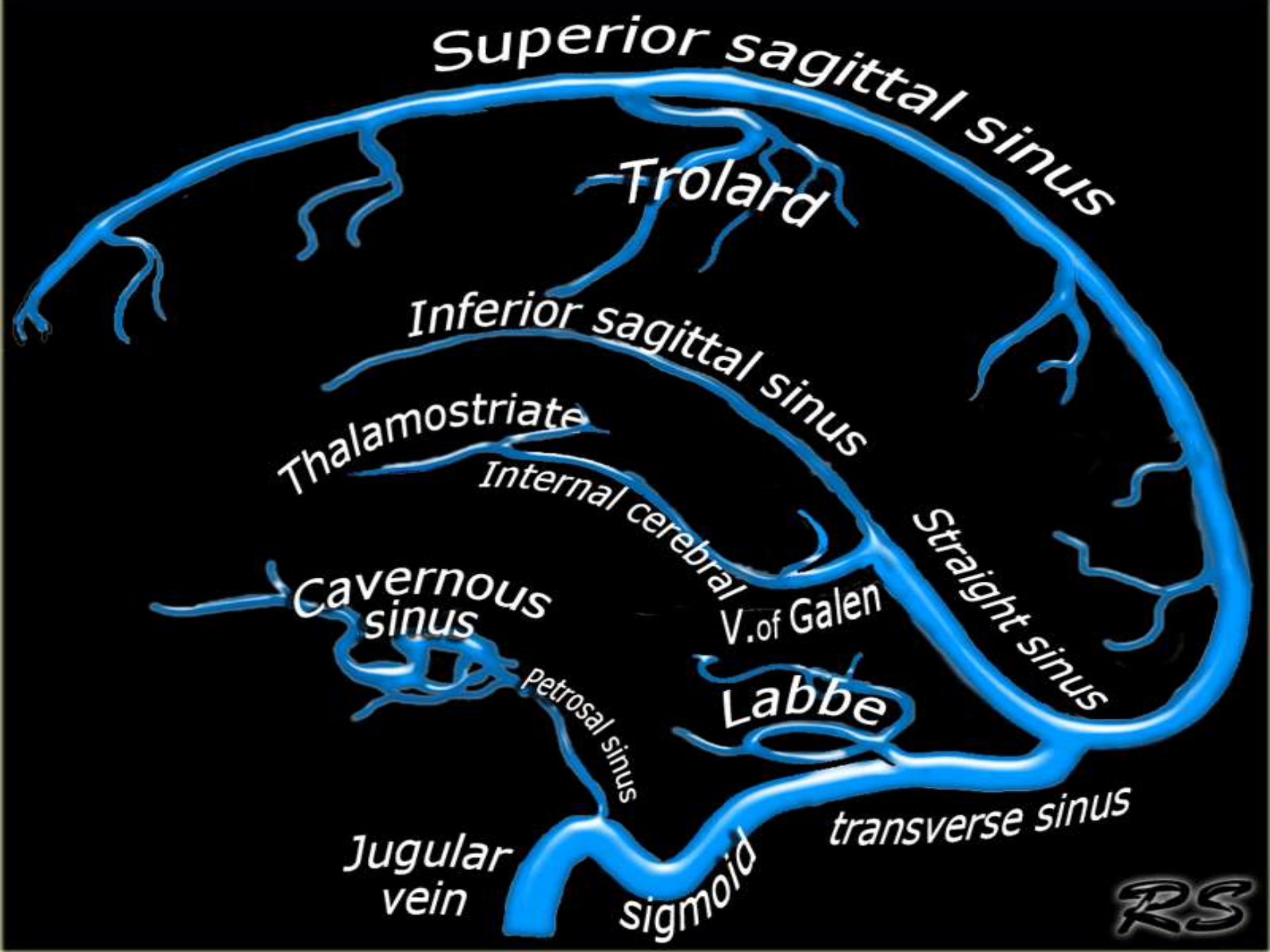


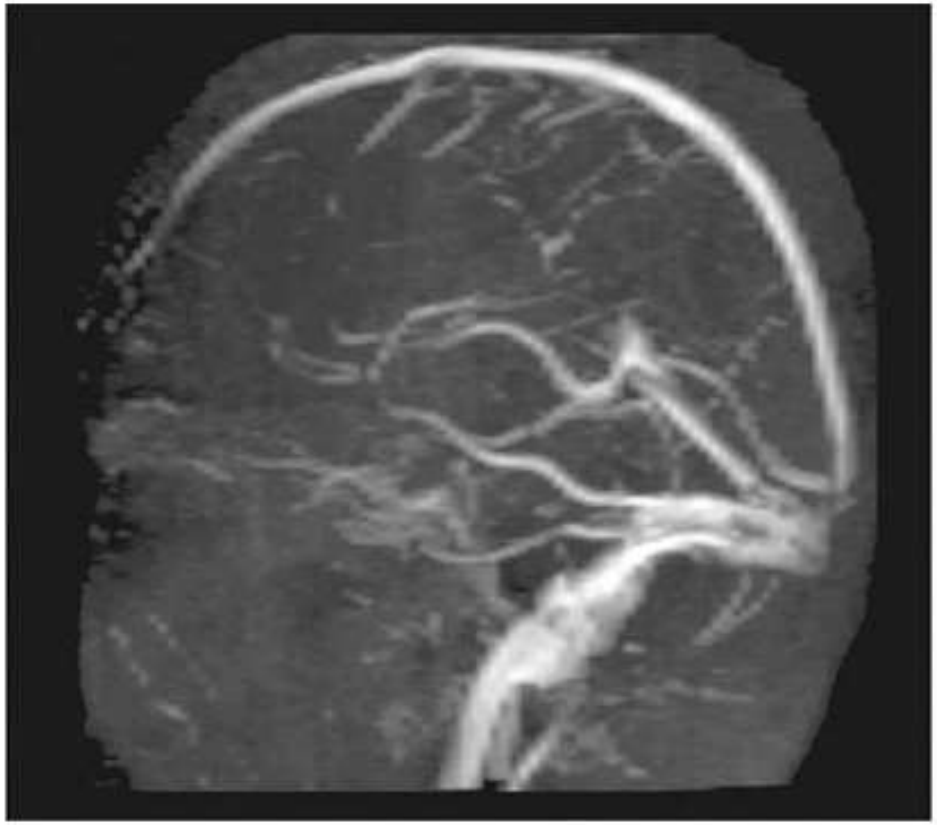
1 Callosomarginal artery
2 Pericallosal artery
3 Superior parietal artery
4 Posterior cerebral artery (parieto-occipital ramus)
5 Middle cerebral artery (opercular part, M3 segment)
6 Anterior cerebral artery (postcommunicating part)
7 Insular arteries
8 Anterior communicating artery
9 Middle cerebral artery (insular part, M2 segment)
10 Anterior temporal artery and middle temporal artery
11 Striate artery
12 Left posterior cerebral artery (from internal carotid artery, variant)
13 Middle cerebral artery (sphenoid part, M1 segment)
14 Anterior cerebral artery (precommunicating part)
15 Posterior cerebral artery (temporal and occipitotemporal branches)
16 Superior cerebellar artery
17 Polar temporal artery
18 Internal carotid artery
19 Right posterior cerebral artery
20 Basilar artery

BRAIN VENOUS DRAINAGE




Superior sagittal sinus
Inferior sagittal sinus
Great cerebral vein
straight
transverse
sigmoid
Superior & inferior petrosal
Confluence of sinuses
Internal jugular vein
© TeachMeAnatomy


Superior sagittal sinus
Trolard
Inferior sagittal sinus
Thalamostriate
Internal cerebral
Straight sinus
Cavernous sinus
V.of Galen
Petrosal sinus
Labbe
transverse sinus
Jugular vein
sigmoid
RS



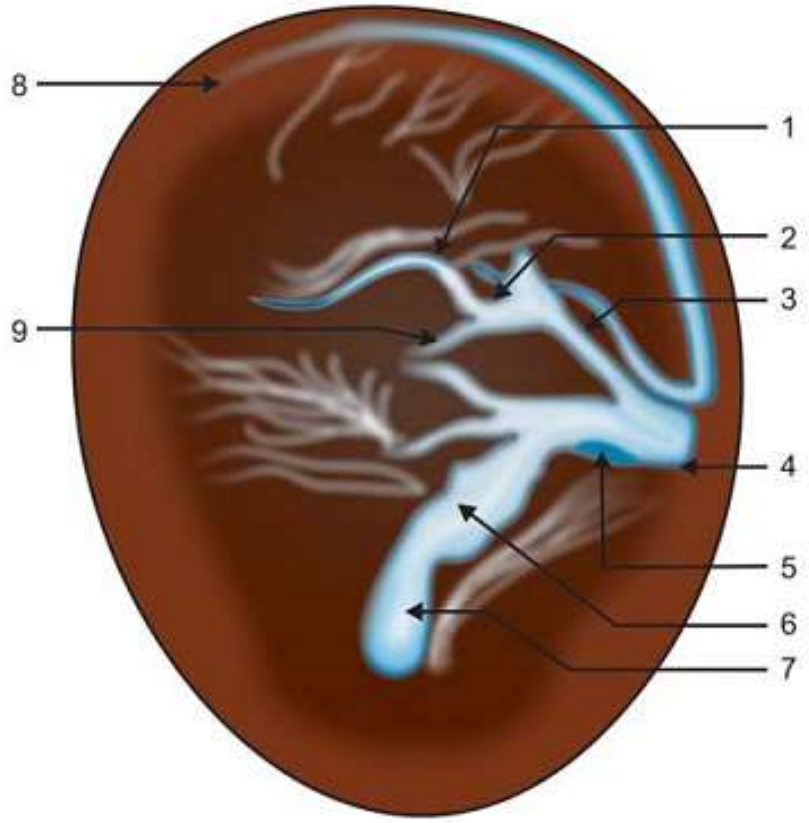
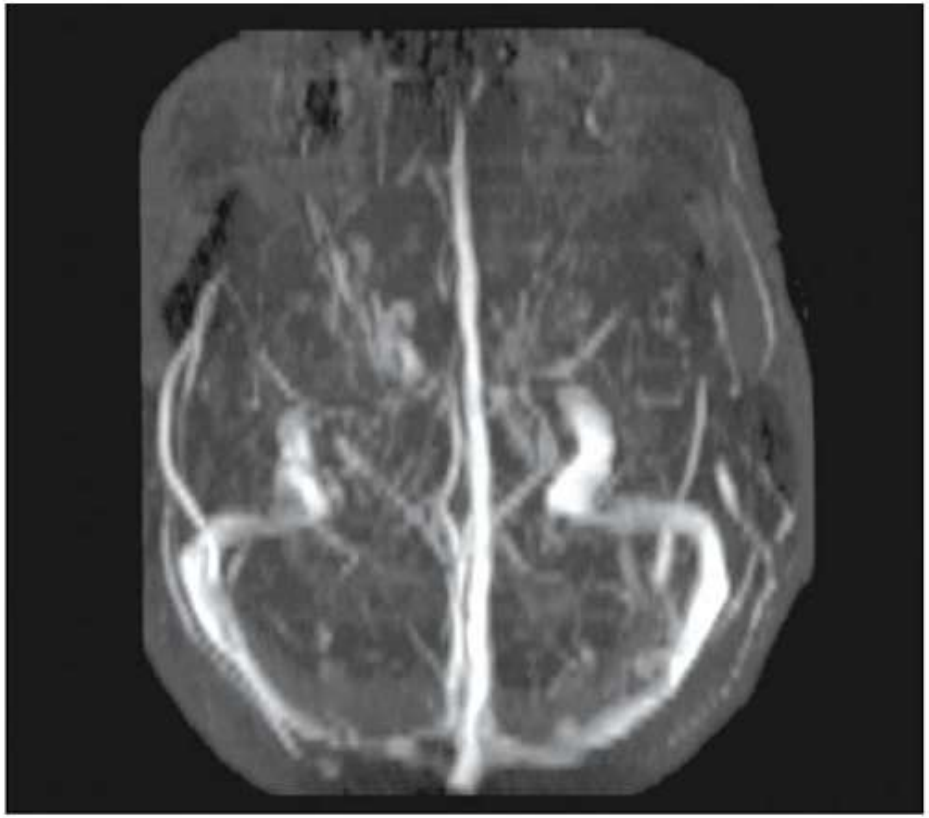


Figure 1.6

1. Internal cerebral vein
2. Vein of Galen
3. Straight sinus
4. Torcular herophili
5. Transverse sinus
6. Sigmoid sinus
7. Internal jugular vein
8. Superior sagittal sinus
9. Basal vein of Rosenthal



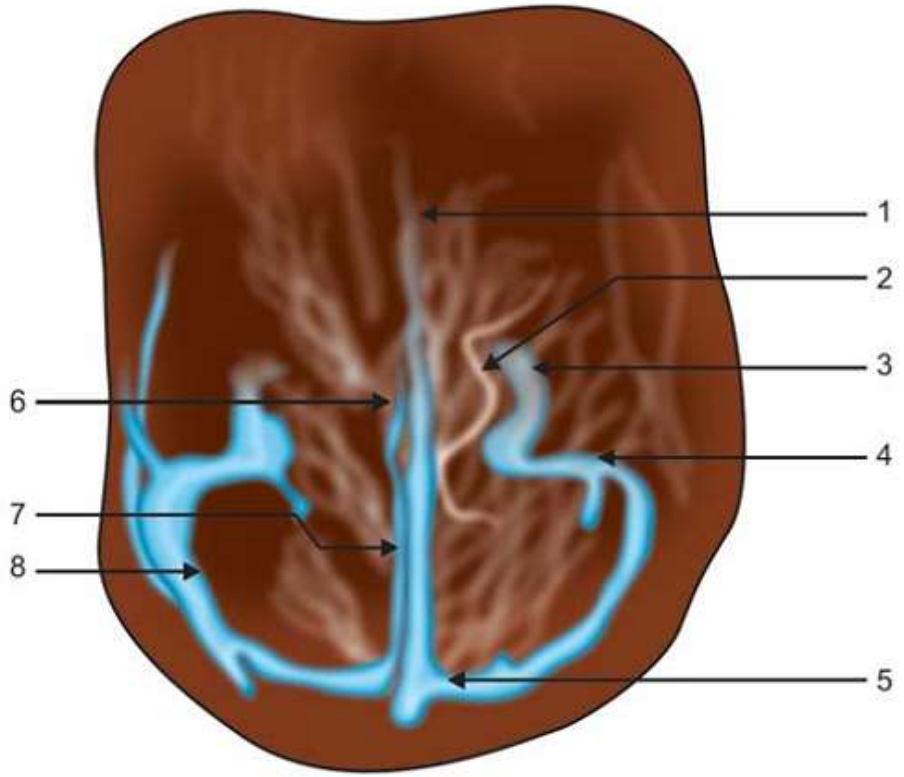
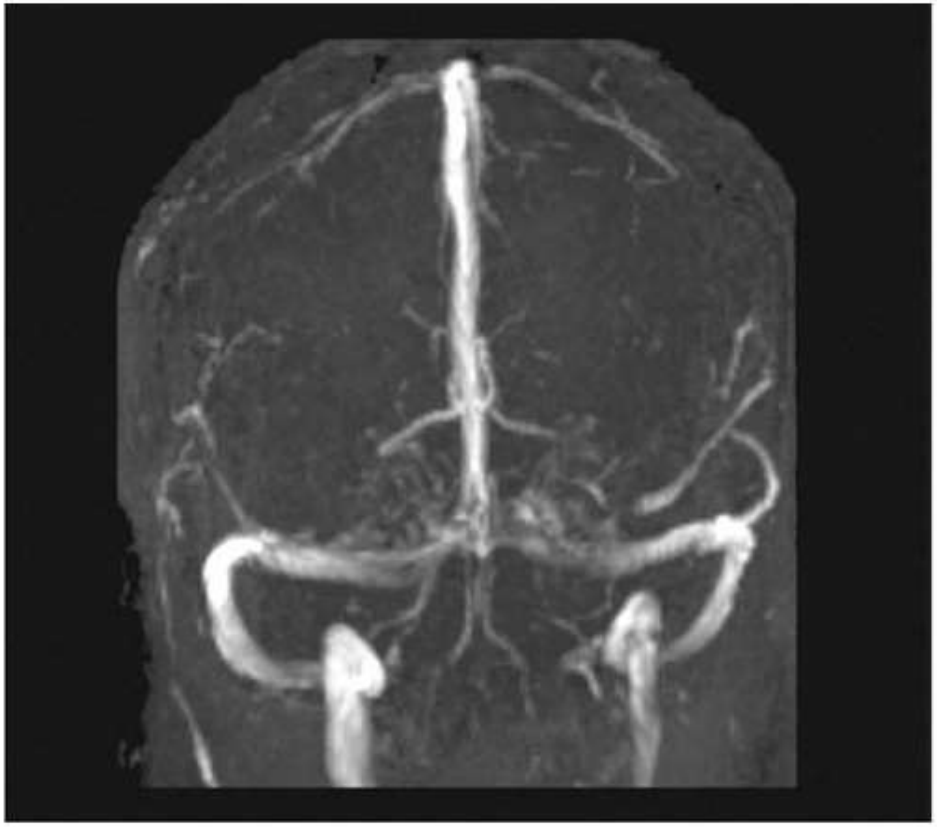


Figure 1.4

1. Superior sagittal sinus
2. Basal vein of Rosenthal
3. Internal jugular vein
4. Sigmoid sinus
5. Torcular herophili
6. Internal cerebral vein
7. Straight sinus
8. Transverse sinus



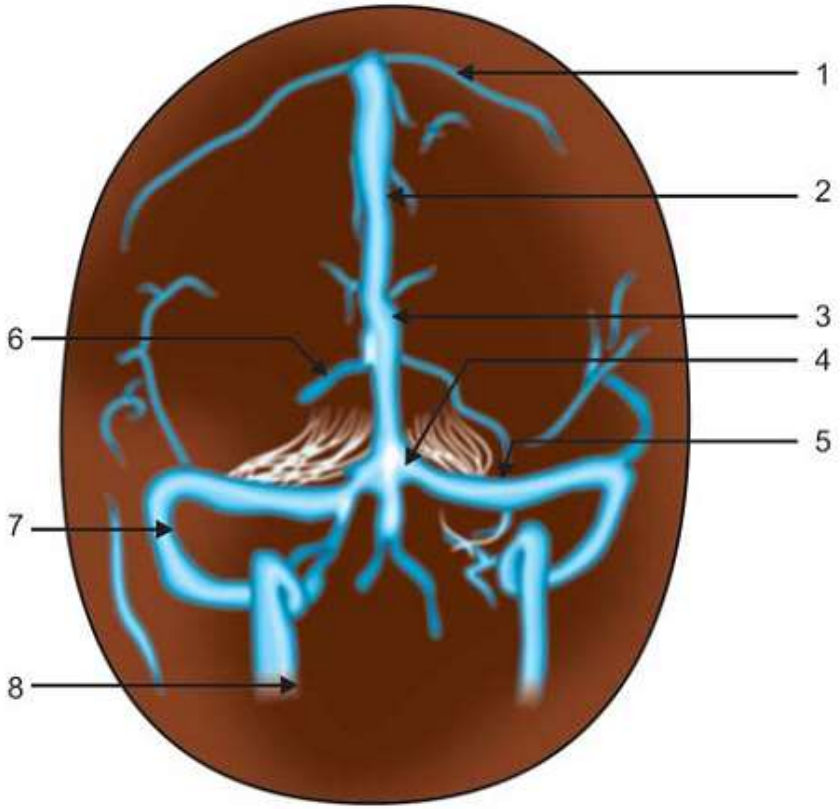


Figure 1.5

1. Cortical veins
2. Superior sagittal sinus
3. Internal cerebral vein
4. Torcular herophili
5. Transverse sinus
6. Basal vein of Rosenthal
7. Sigmoid sinus
8. Internal jugular vein

Sources & Further Reading

- ✓ ***MEASUREMENTS IN RADIOLOGY Made Easy*** - Vineet Wadhwa
- ✓ ***Lectures of Prof. Mamdouh Mahfouz***
- ✓ ***Normal Finding of CT & MRI***
- ✓ ***Cross Sectional ANATOMY CT and MRI - Govind Chavhan***
- ✓ ***https://radiologyassistant.nl/neuroradiology/sinus-thrombosis/cerebral-venous-thrombosis***

DR.AHMADABODAHAB@GMAIL.COM
✓YOUTUBE CHANNEL: https://goo.gl/oGtAlQ
✓https://staffsites.sohag-univ.edu.eg/ahmed_abodahab
✓https://www.linkedin.com/in/dr-ahmad-abodahab/

A M Abodahab, MD
Oct 2022