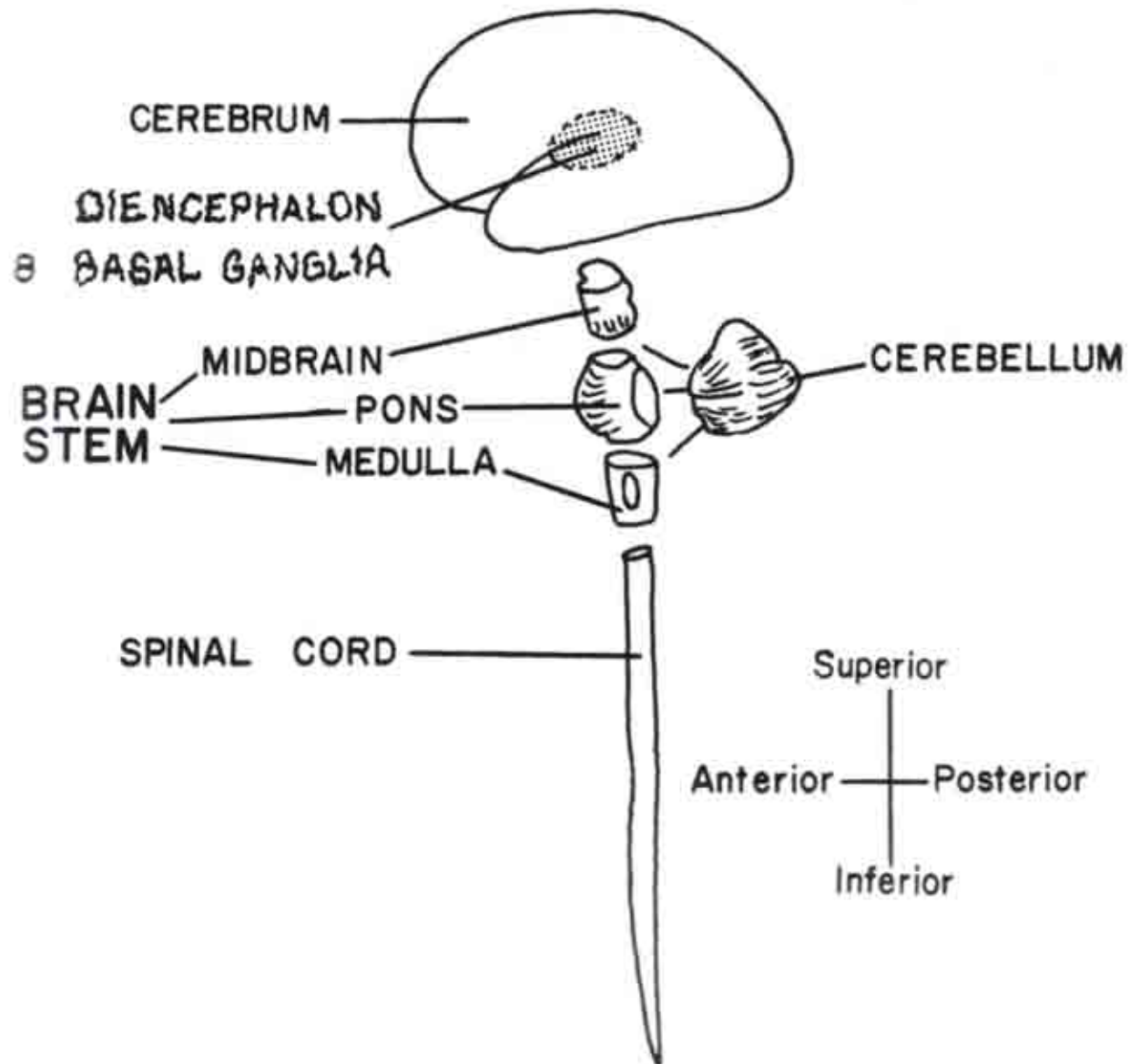


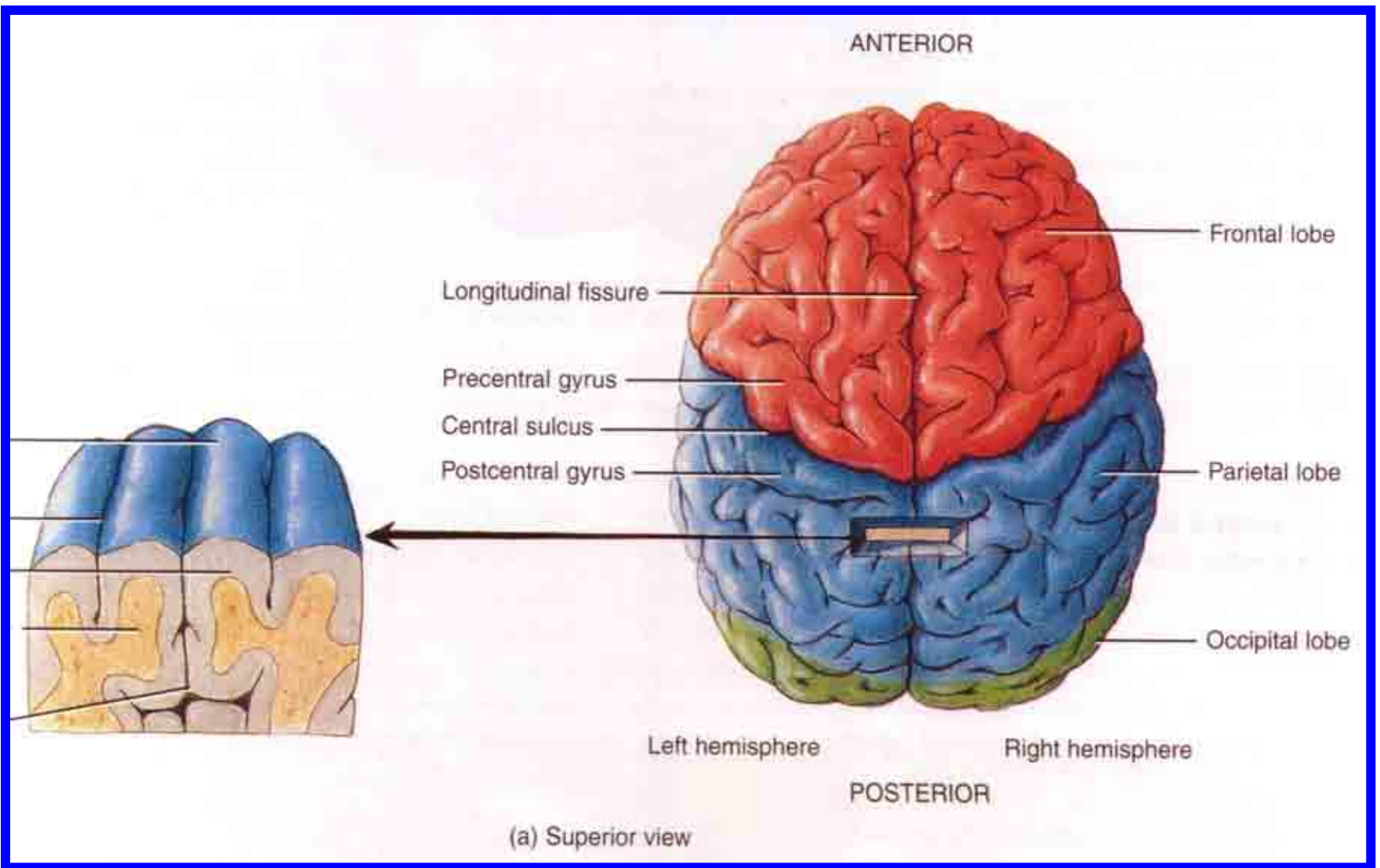
Stroke

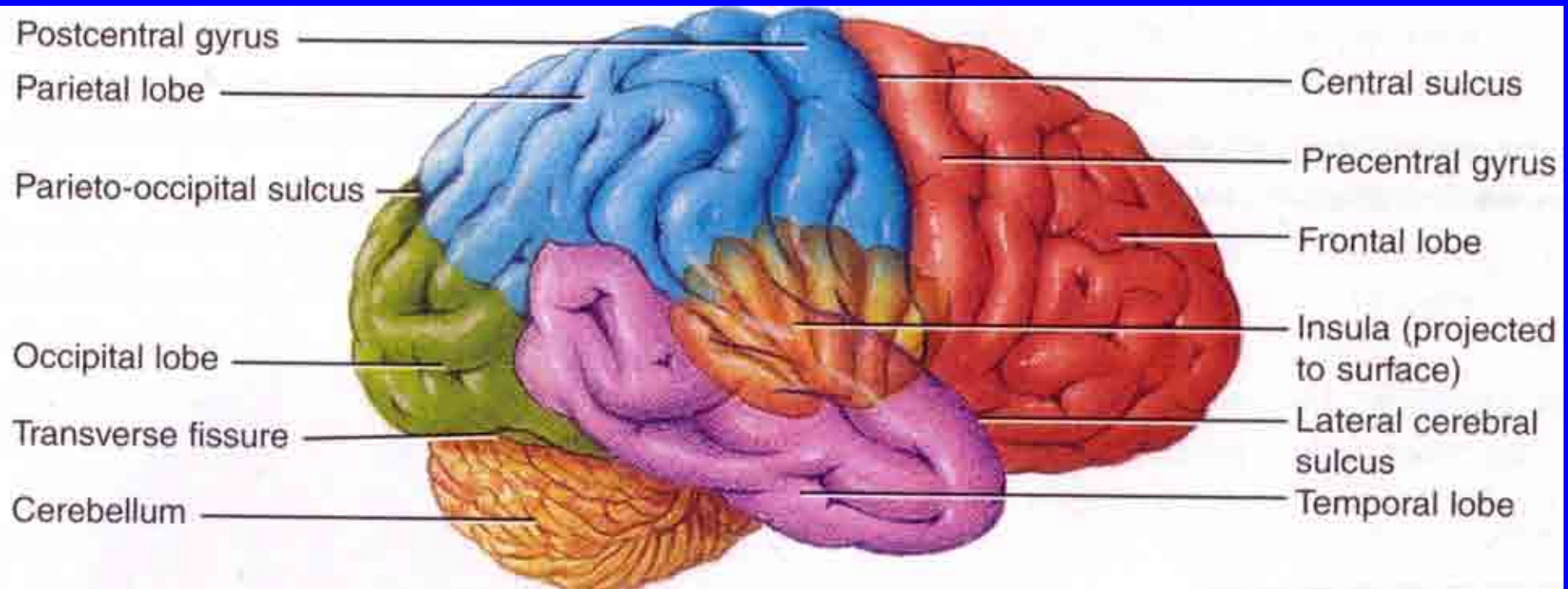
Brain Anatomy and Physiology

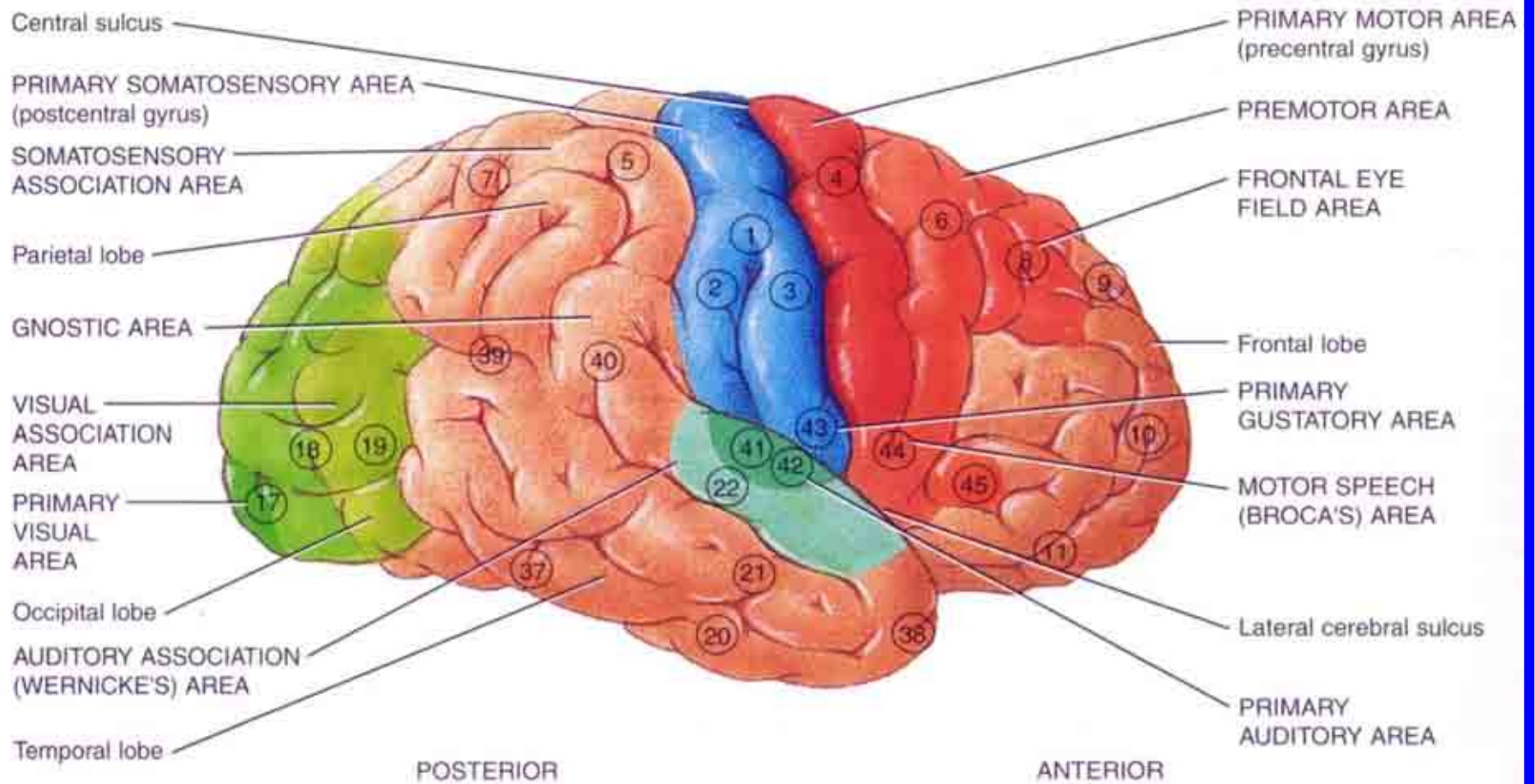


Dr. Wiebren Duim – Sep 2011









Lateral view of right cerebral hemisphere

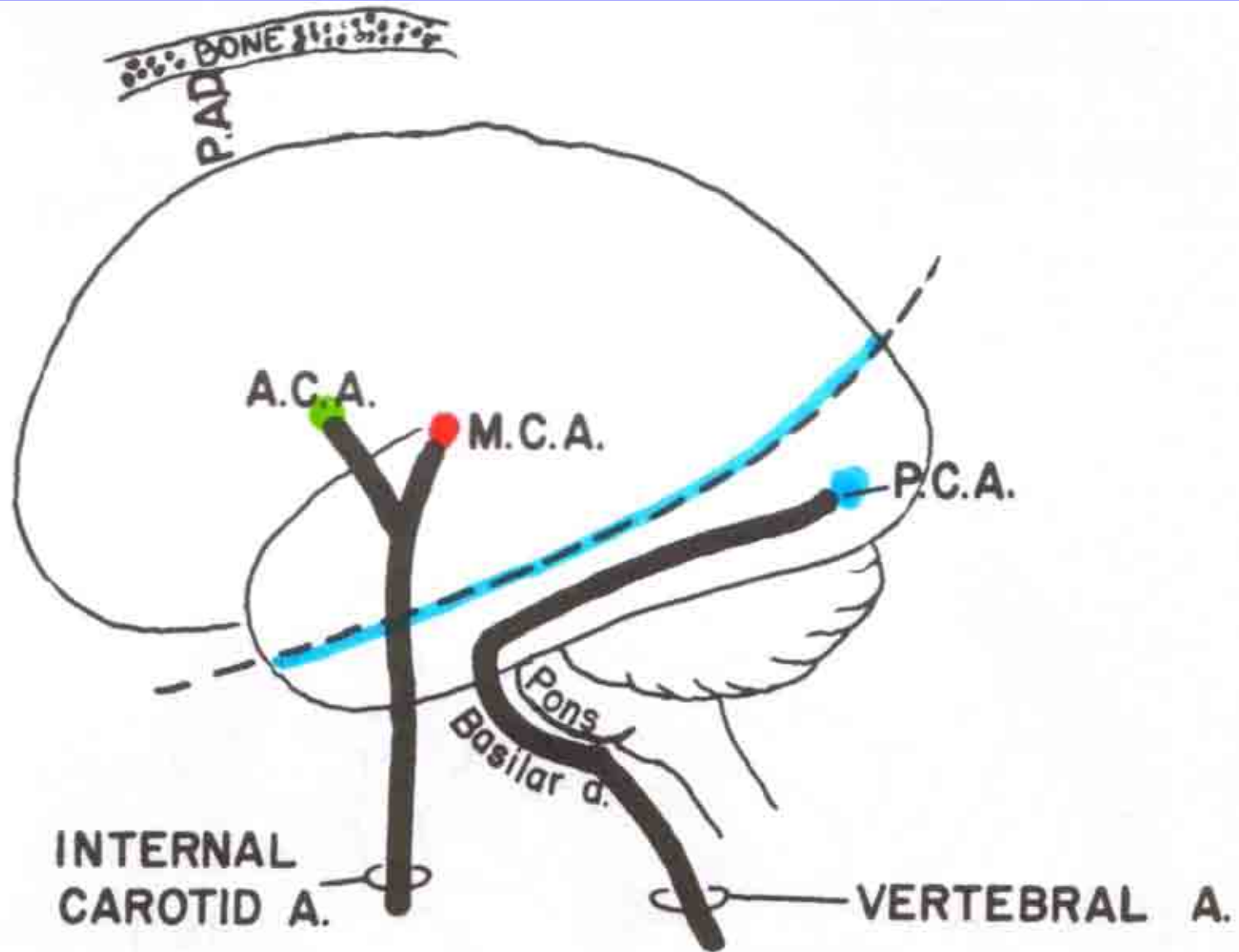
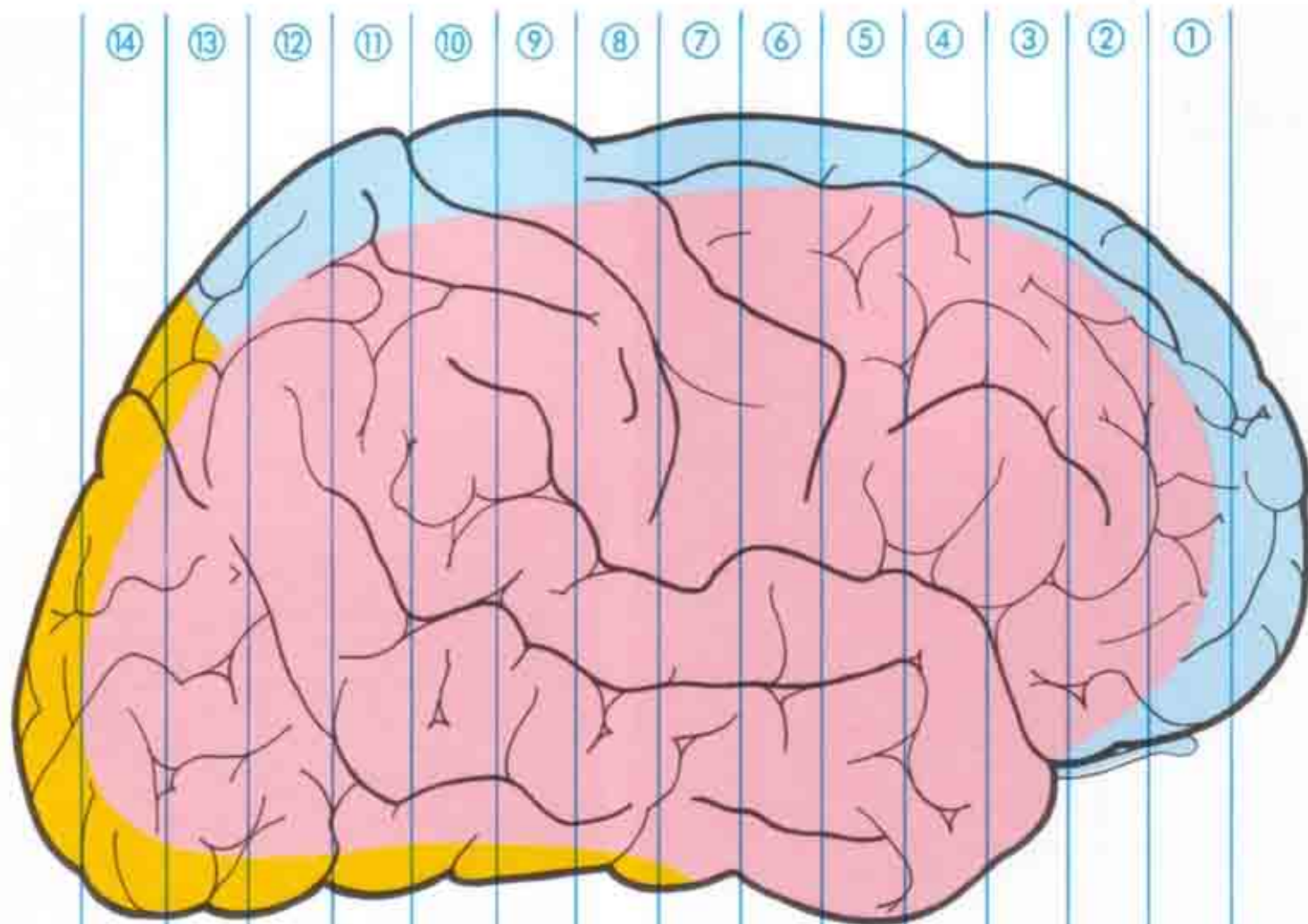
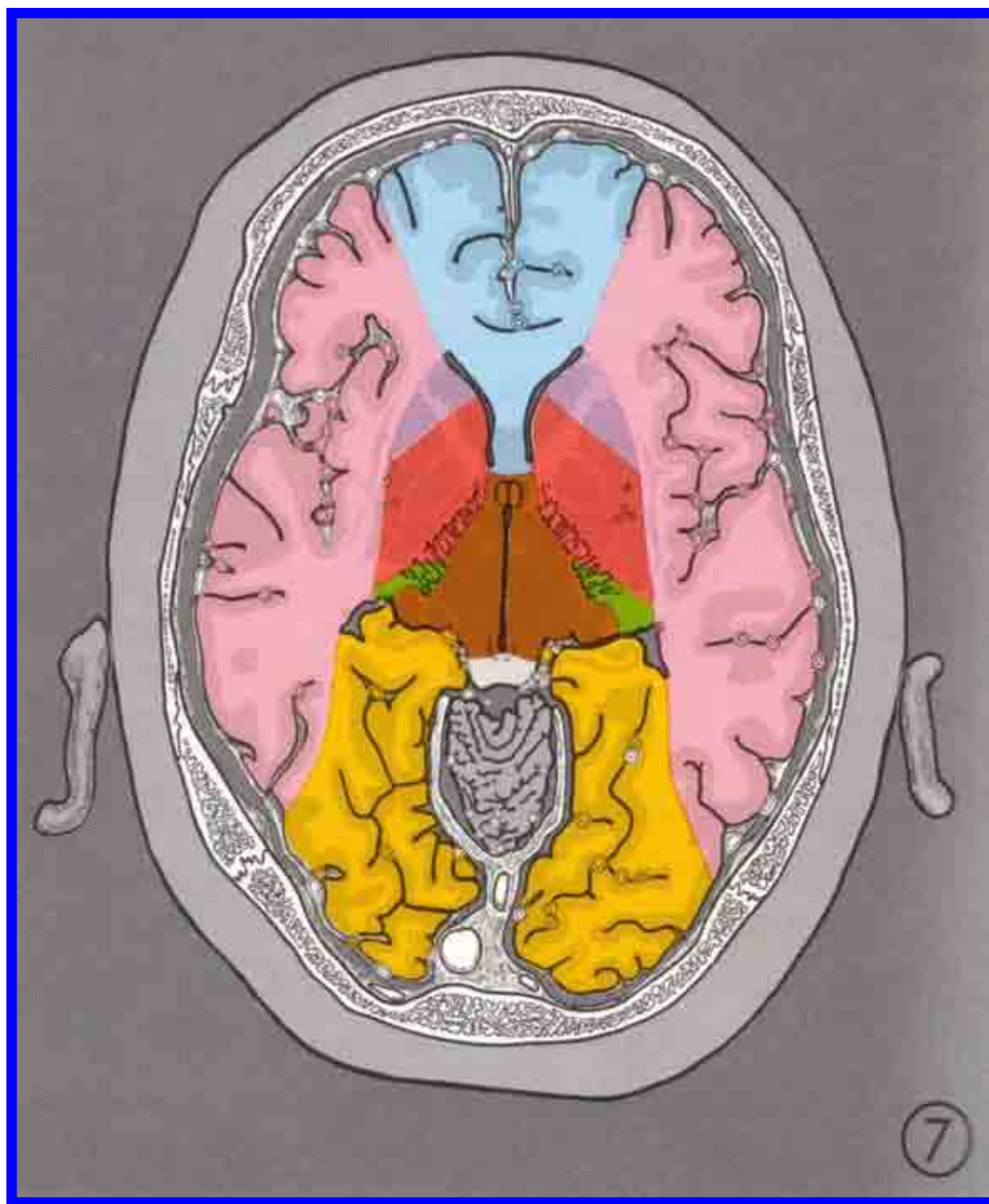
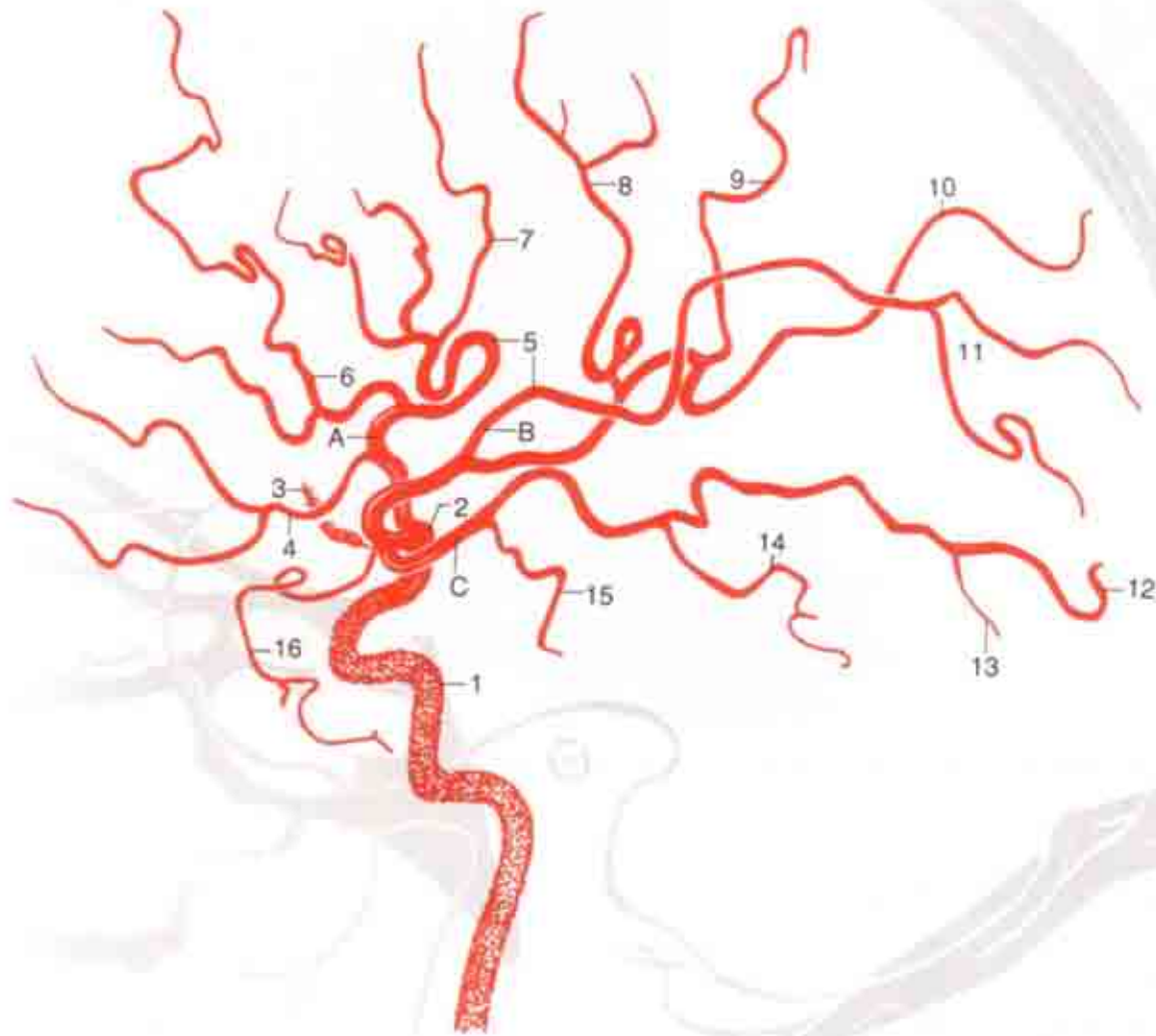


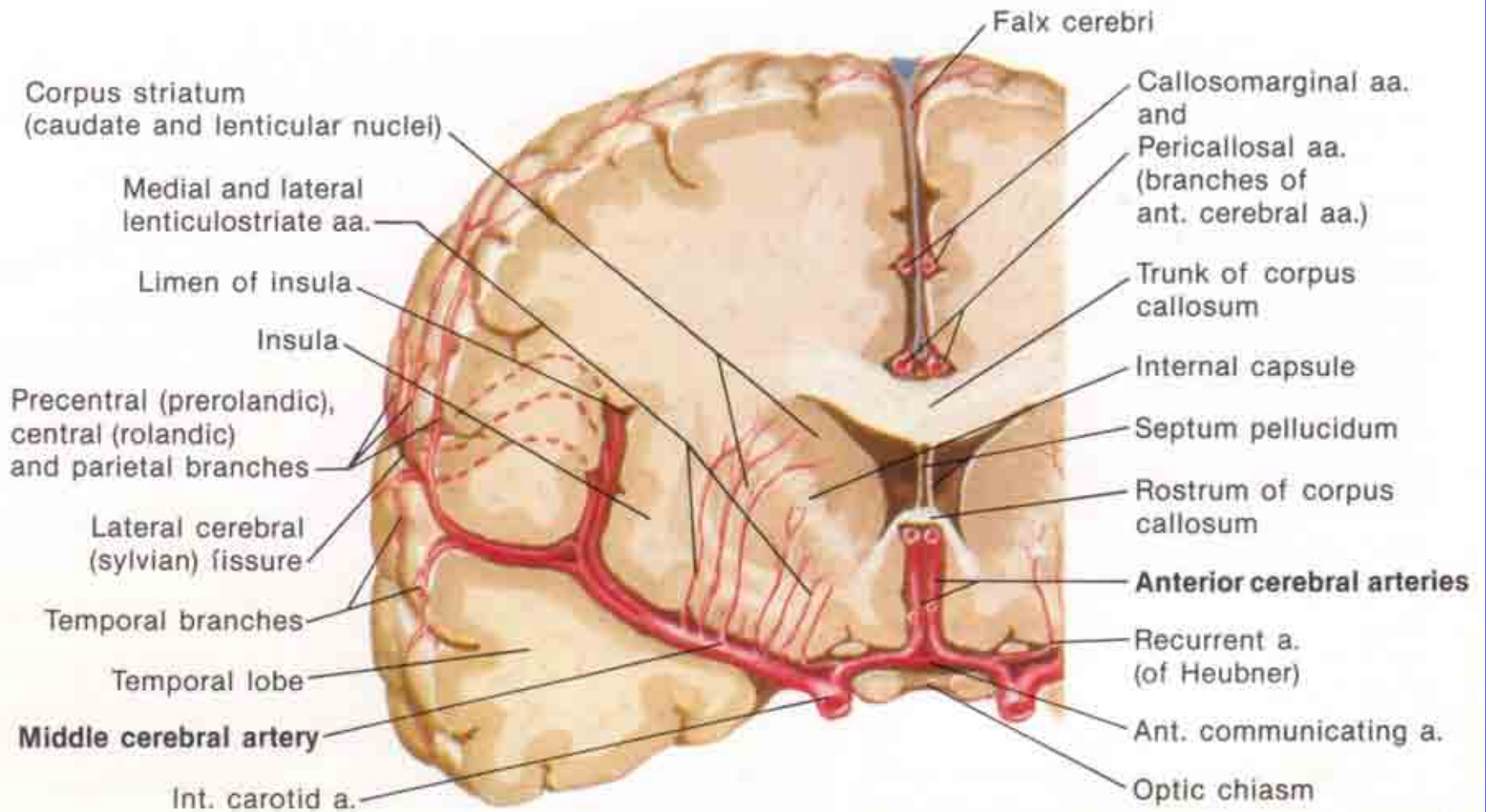
Fig. 6 The major arterial supply to the brain. ACA, anterior cerebral artery; MCA, middle cerebral artery; PCA, posterior cerebral artery; PAD, pia, arachnoid, dura.

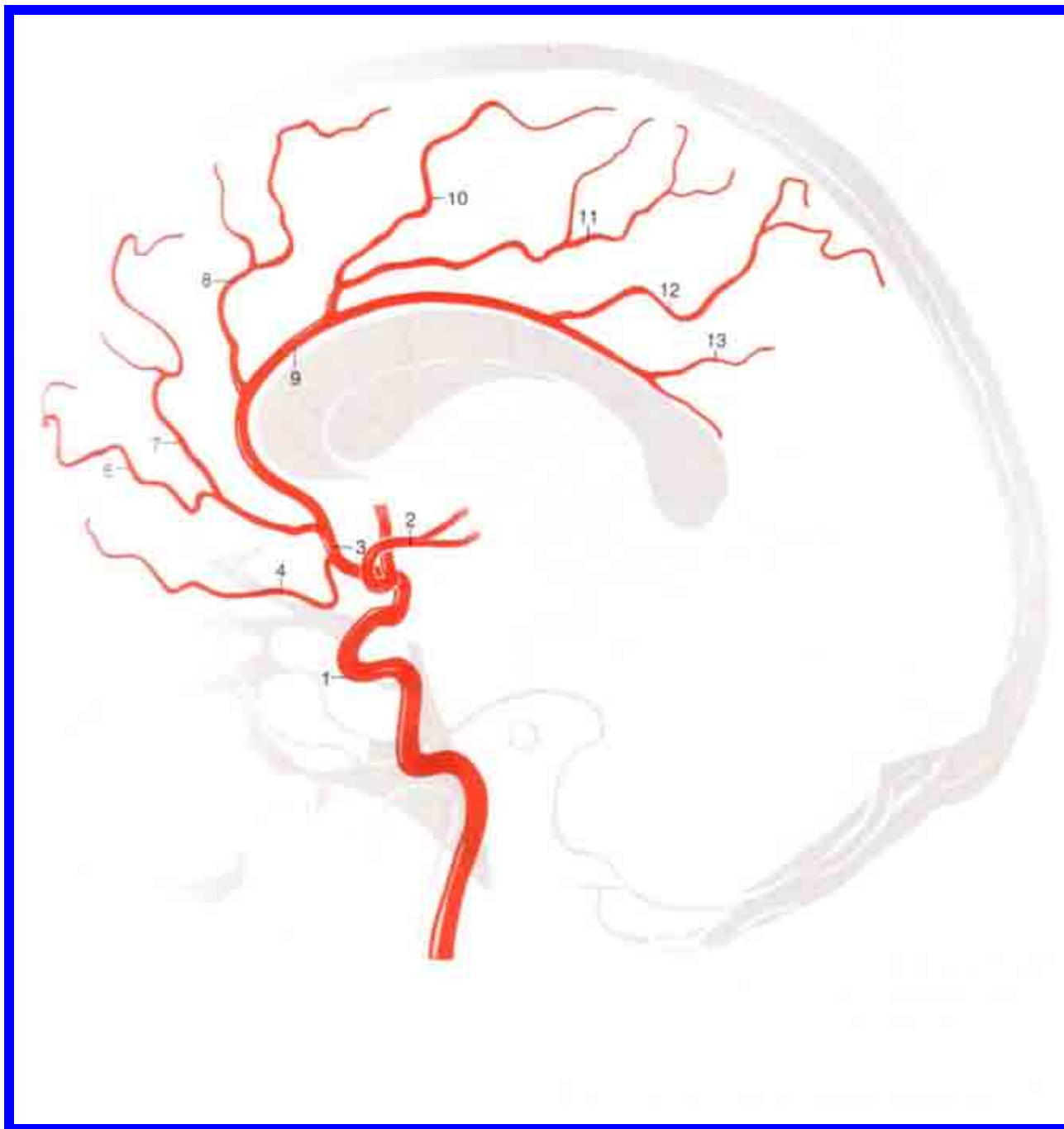


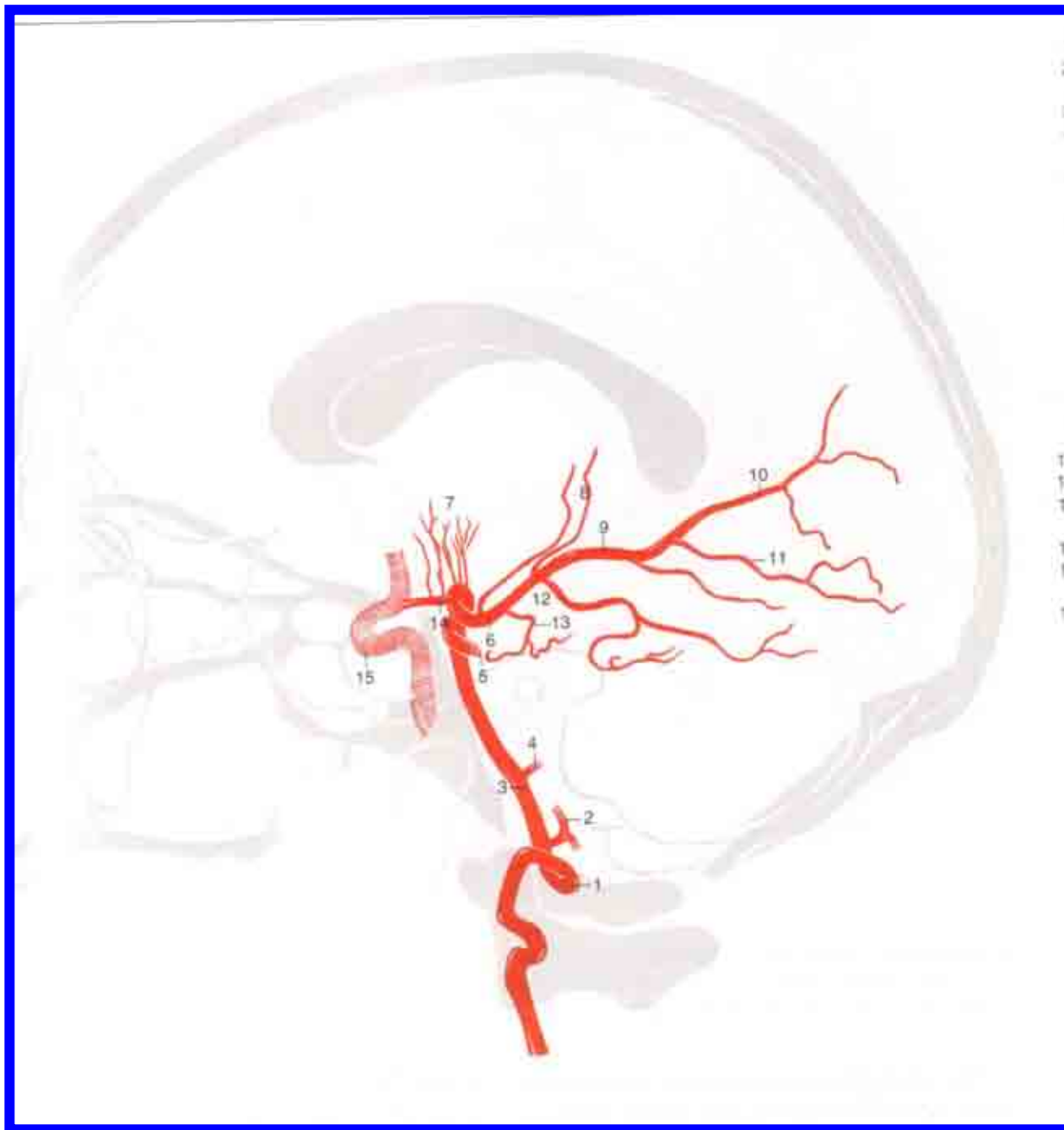
DH

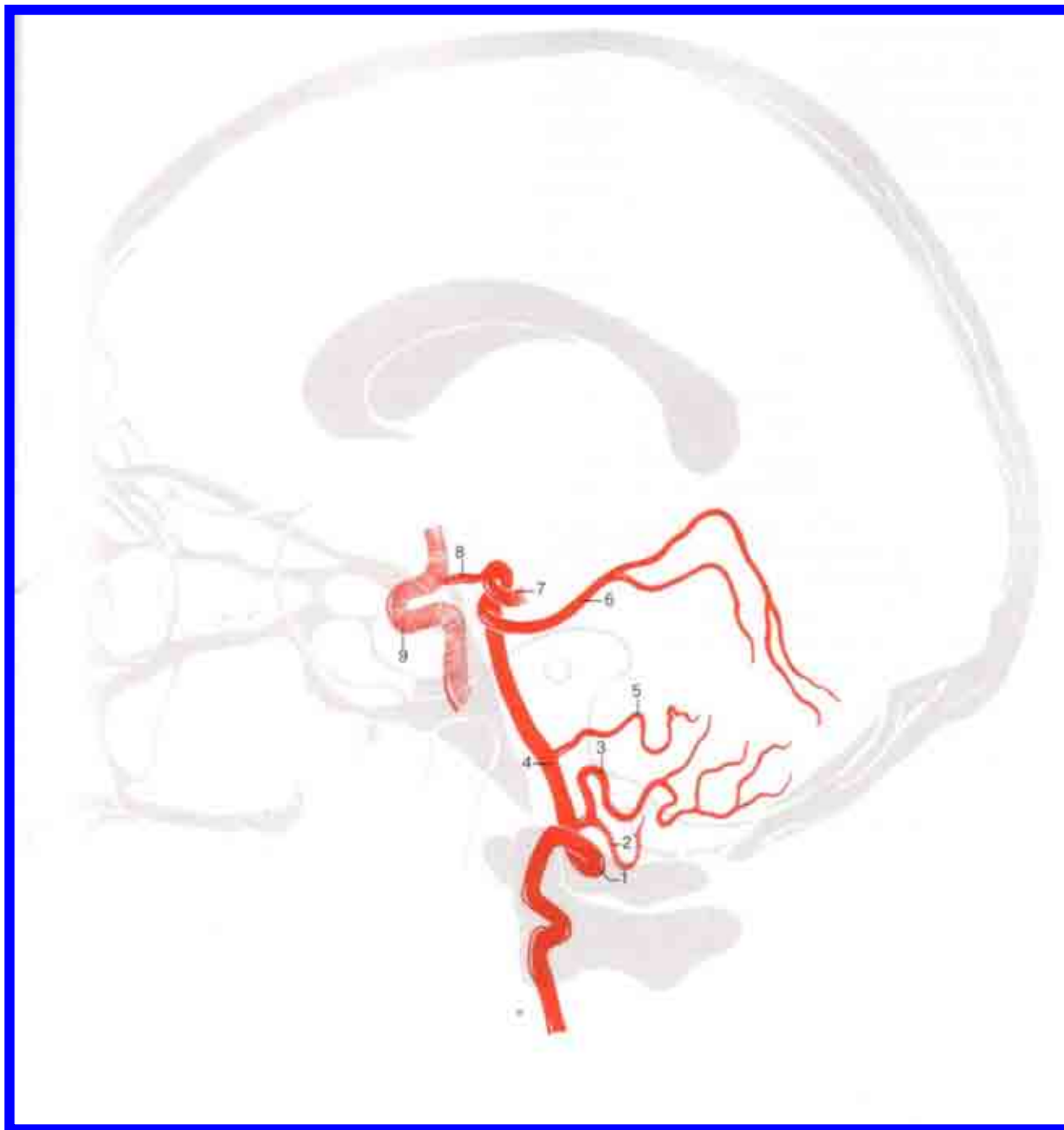












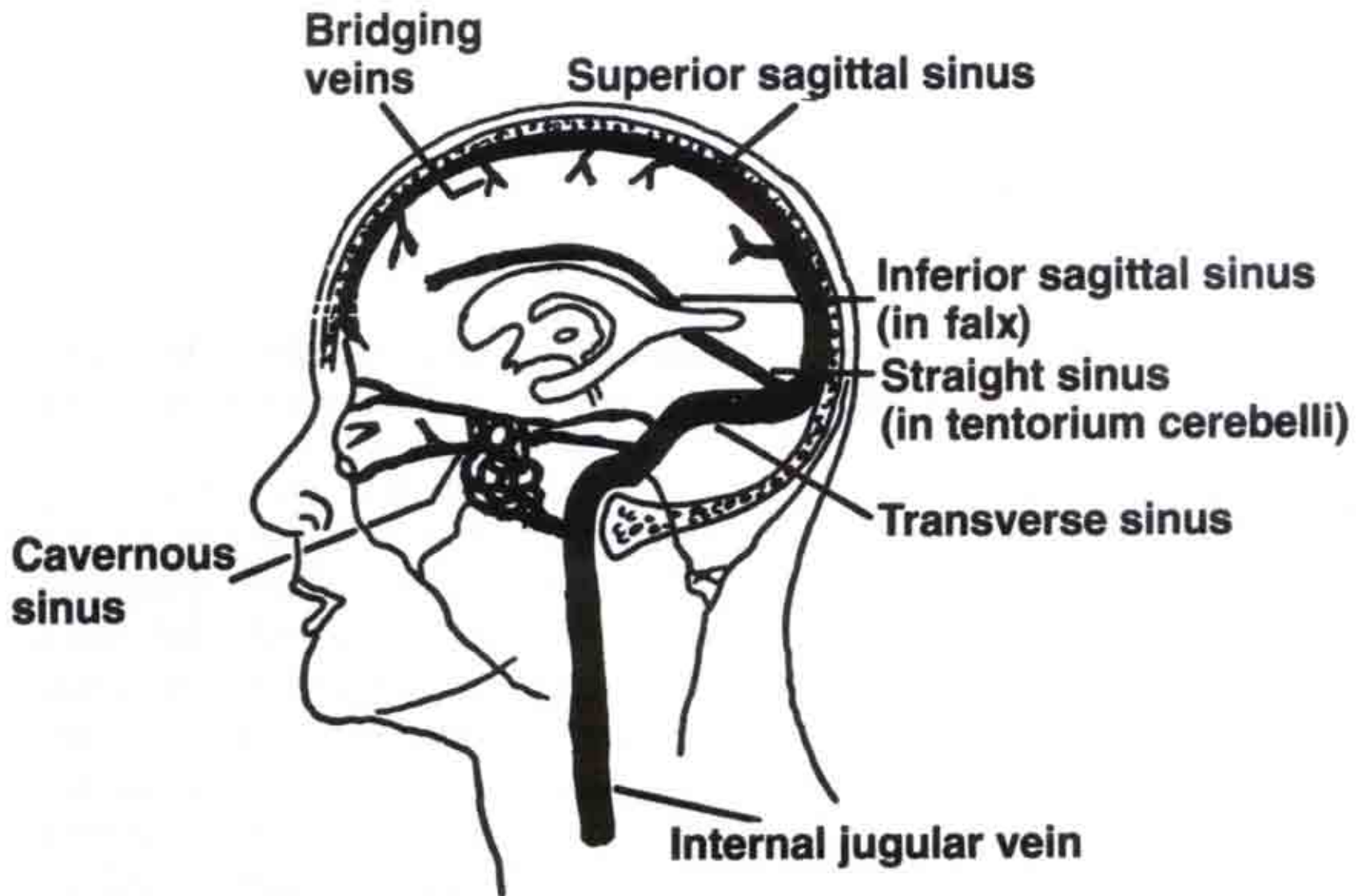
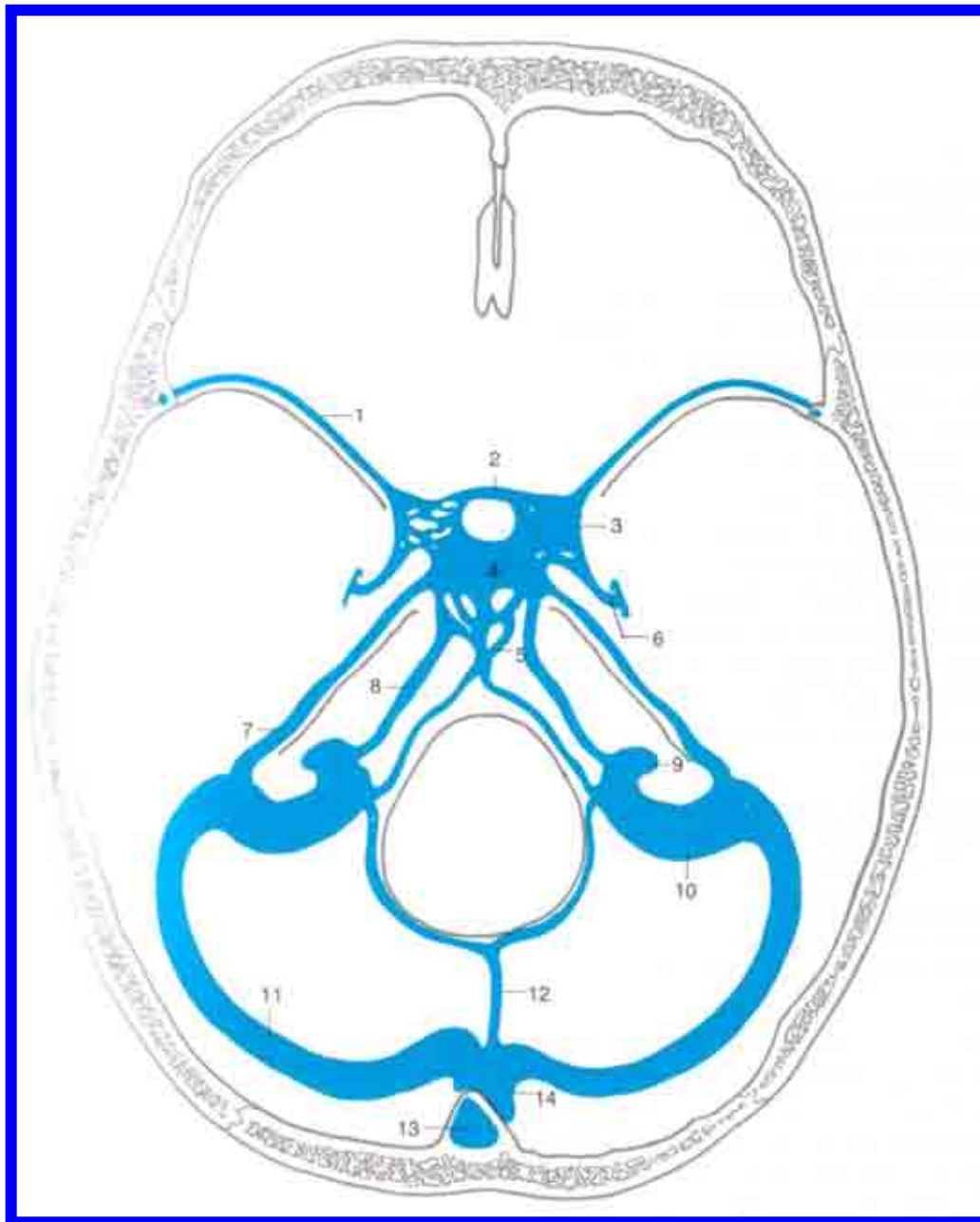
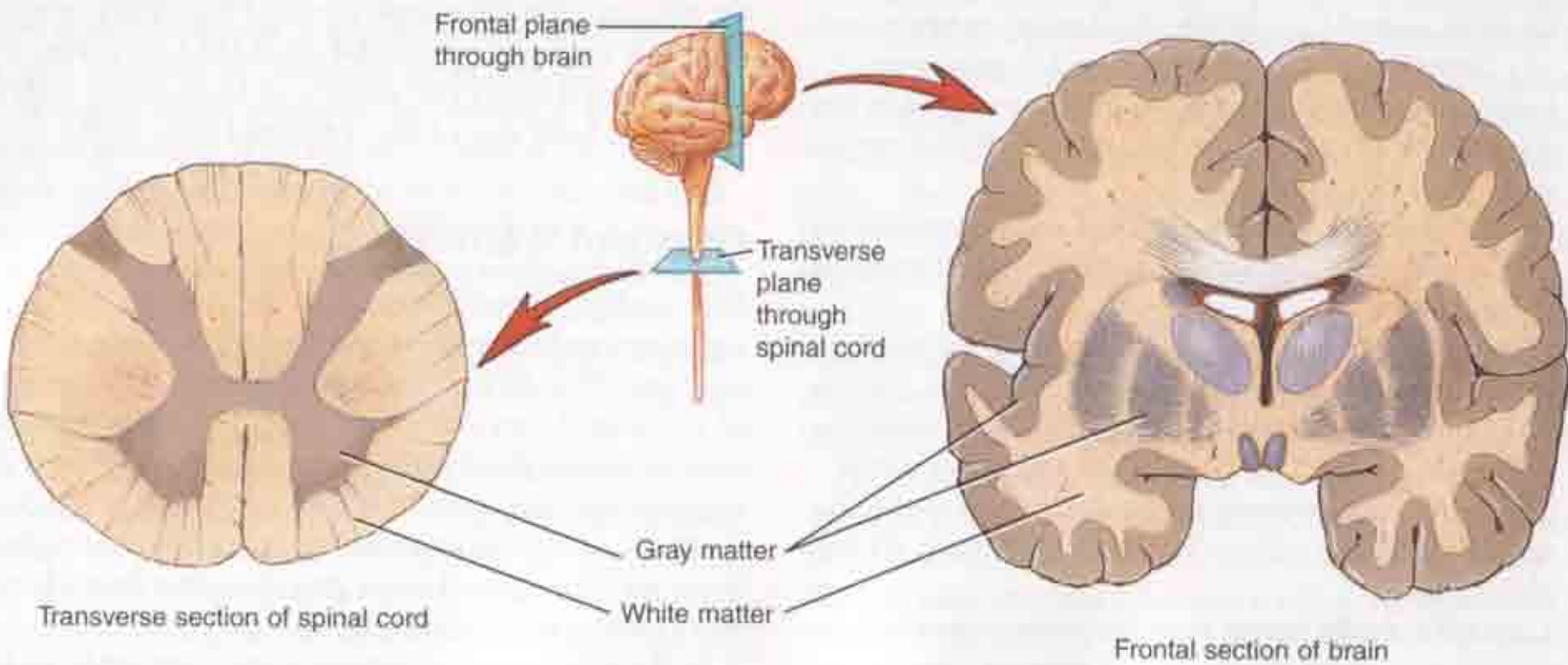
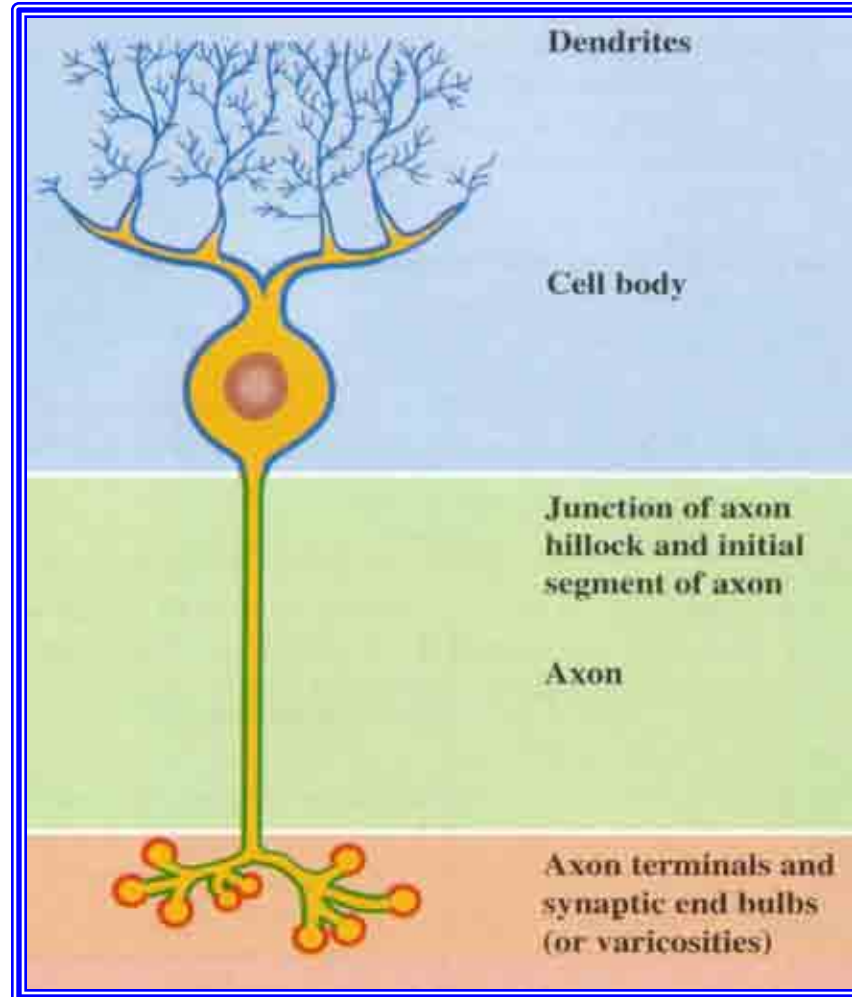


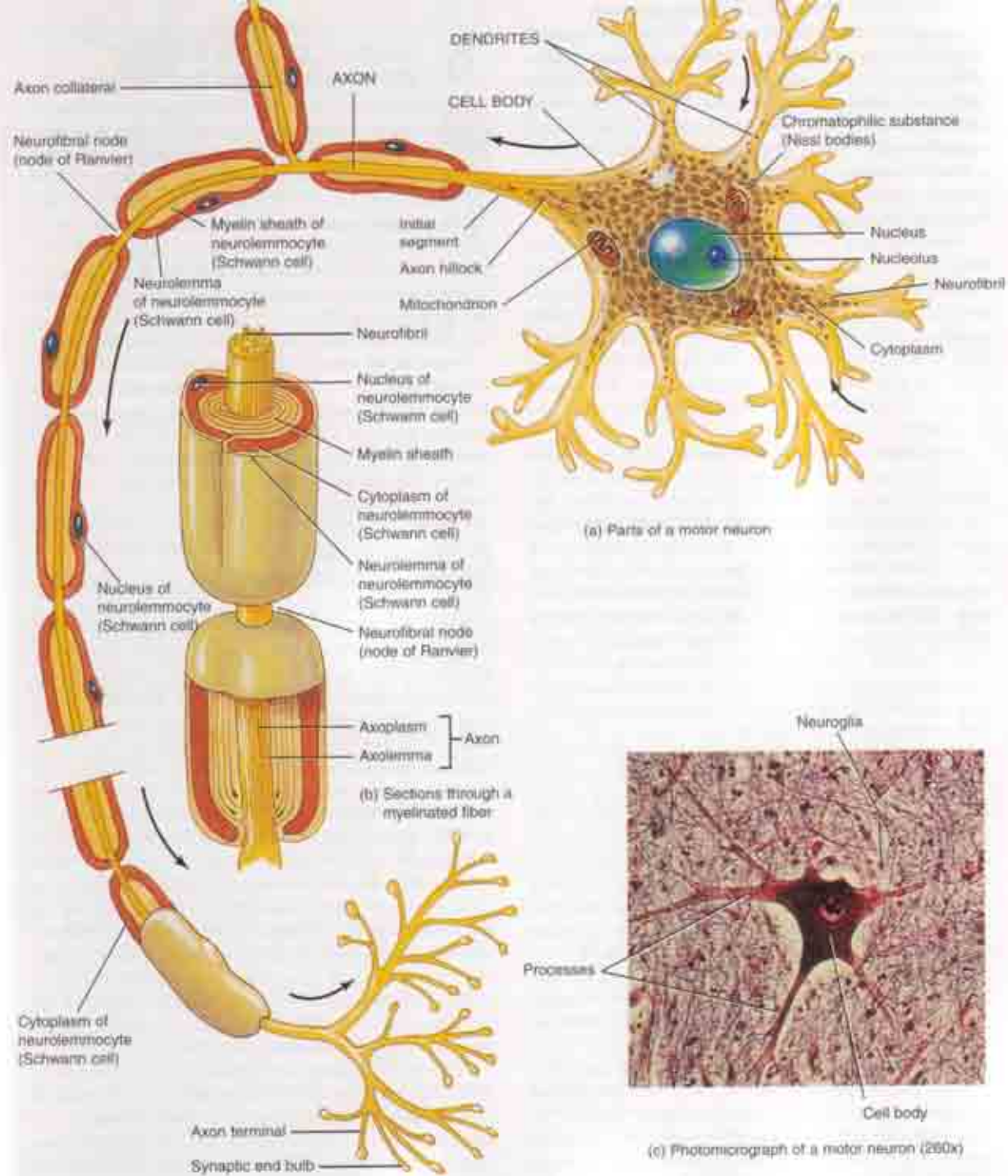
Fig. 11 The major venous circulation of the brain.





The Neuron



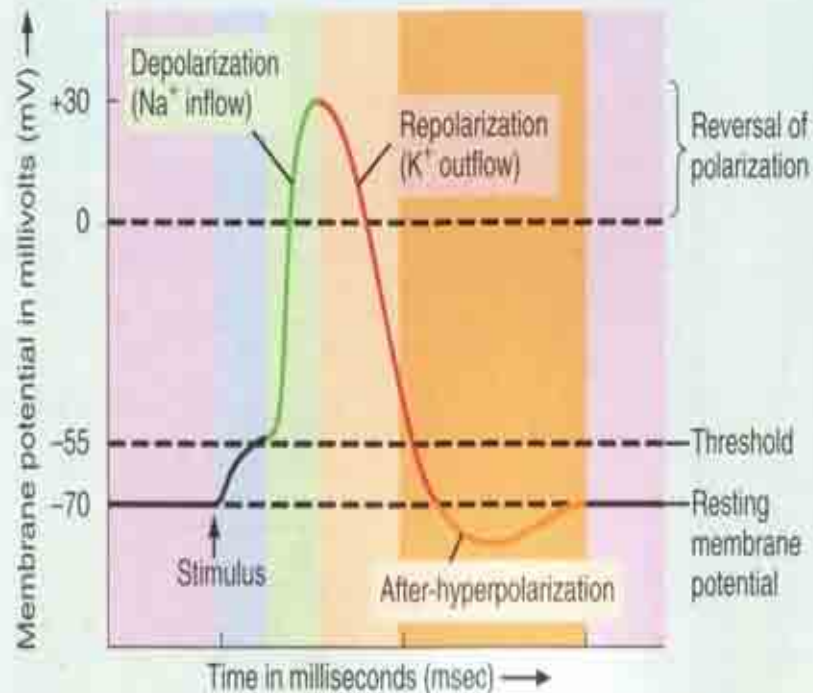


(c) Photomicrograph of a motor neuron (250x)

Action Potential



An action potential consists of depolarization and repolarization.



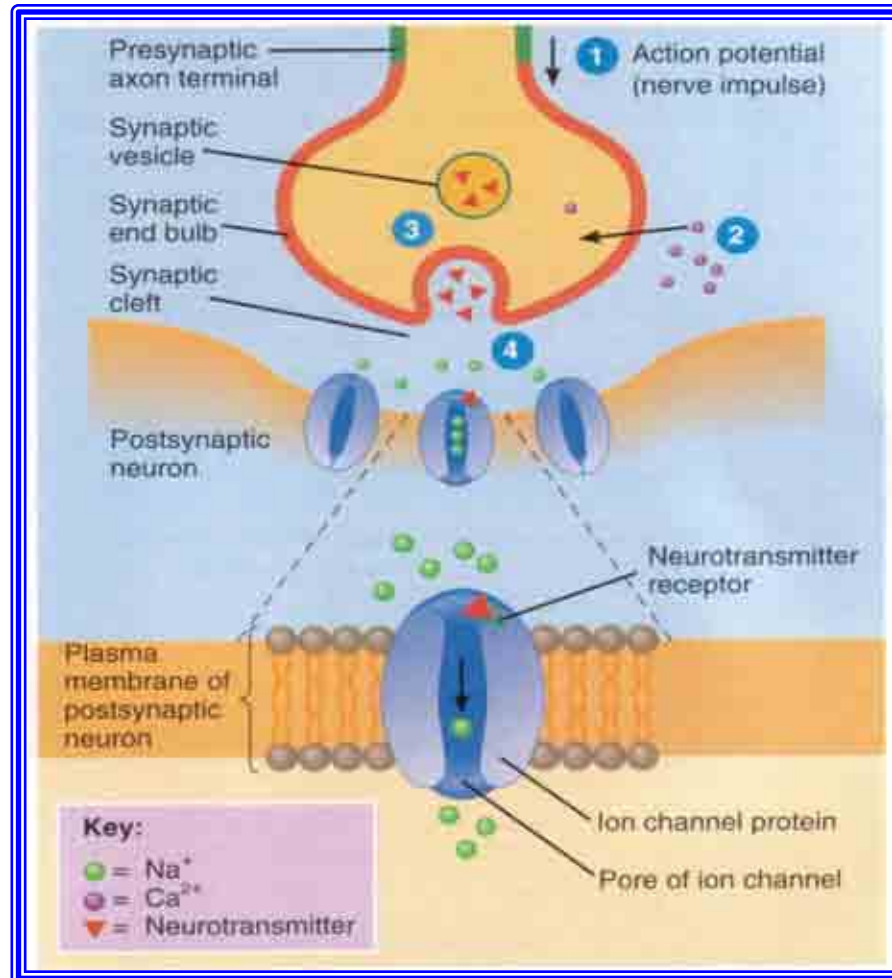
Key:

- Resting membrane potential: Voltage-gated Na⁺ channels are in the resting state and voltage-gated K⁺ channels are closed.
 - Stimulus causes depolarization to threshold
 - Voltage-gated Na⁺ channel activation gates are opening
 - Voltage-gated K⁺ channels are opening; Na⁺ channels are inactivating
 - Voltage-gated K⁺ channels are still open; Na⁺ channels are in the resting state
- Absolute refractory period
- Relative refractory period



Which channels are open during depolarization? During repolarization?

Synapse (GABA)



Florence Nightingale (1820 — 1910)





Stroke

Stroke is

- A clinical syndrome:
of acute loss of focal cerebral function (symptoms
lasting > 24H00)
due to (presumed ?) vascular pathology
- 3rd leading cause of death
- Most common reason for adult disability

Natural History

- \pm 5 Million stroke deaths/year worldwide
- Age adjusted incidence rates
100-300/ 100 000 population
- Stroke mortality - 20-25% in 1st month
- Risk of being disabled after stroke \pm 50%
- Risk of recurrent stroke - 10% in 1st year
- 5 % / year

Stroke Pathology

- 70 – 80 % - Ischaemia
- 15 – 20 % - Haemorrhage
- 5 – 10 % - Undefined

Stroke Types

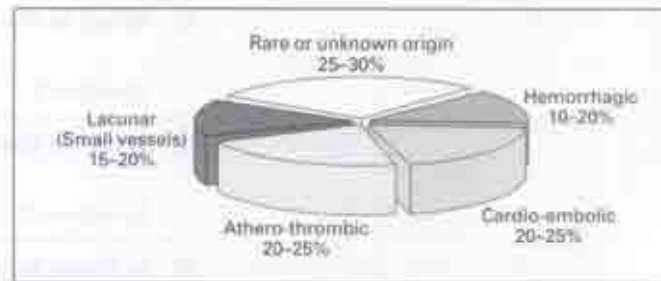
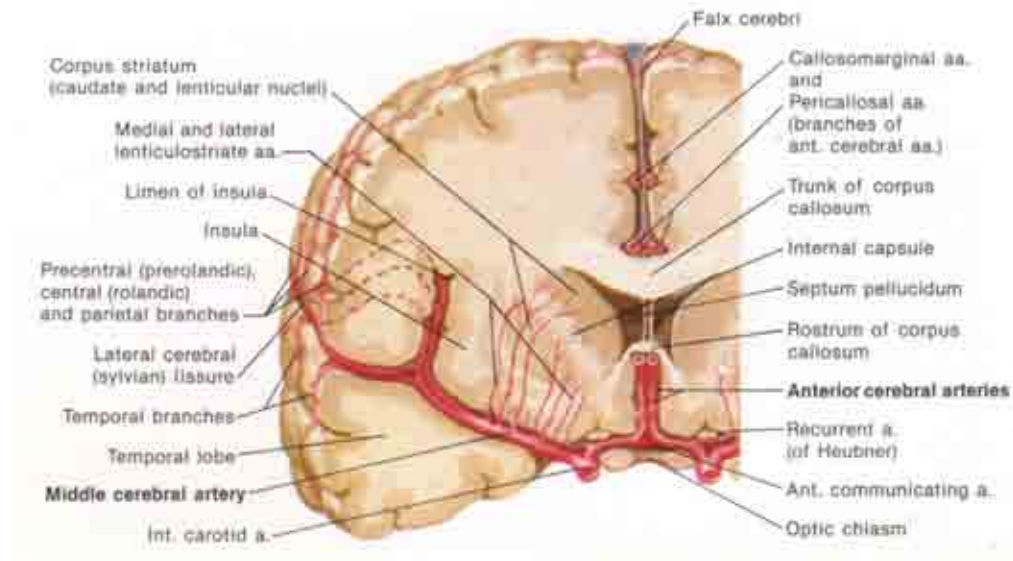


Fig. Frequency of different types of strokes.

Types of stroke

- 80% Ischaemic
 - -40% Large artery disease (atherosclerosis)
 - -30% Cardio-embolic
 - -10% Small vessel disease (Lacunes)
- 20% Haemorrhagic
 - - 15% Intracerebral
 - -5% Sub Arachnoid



The LifeTime Risk of stroke

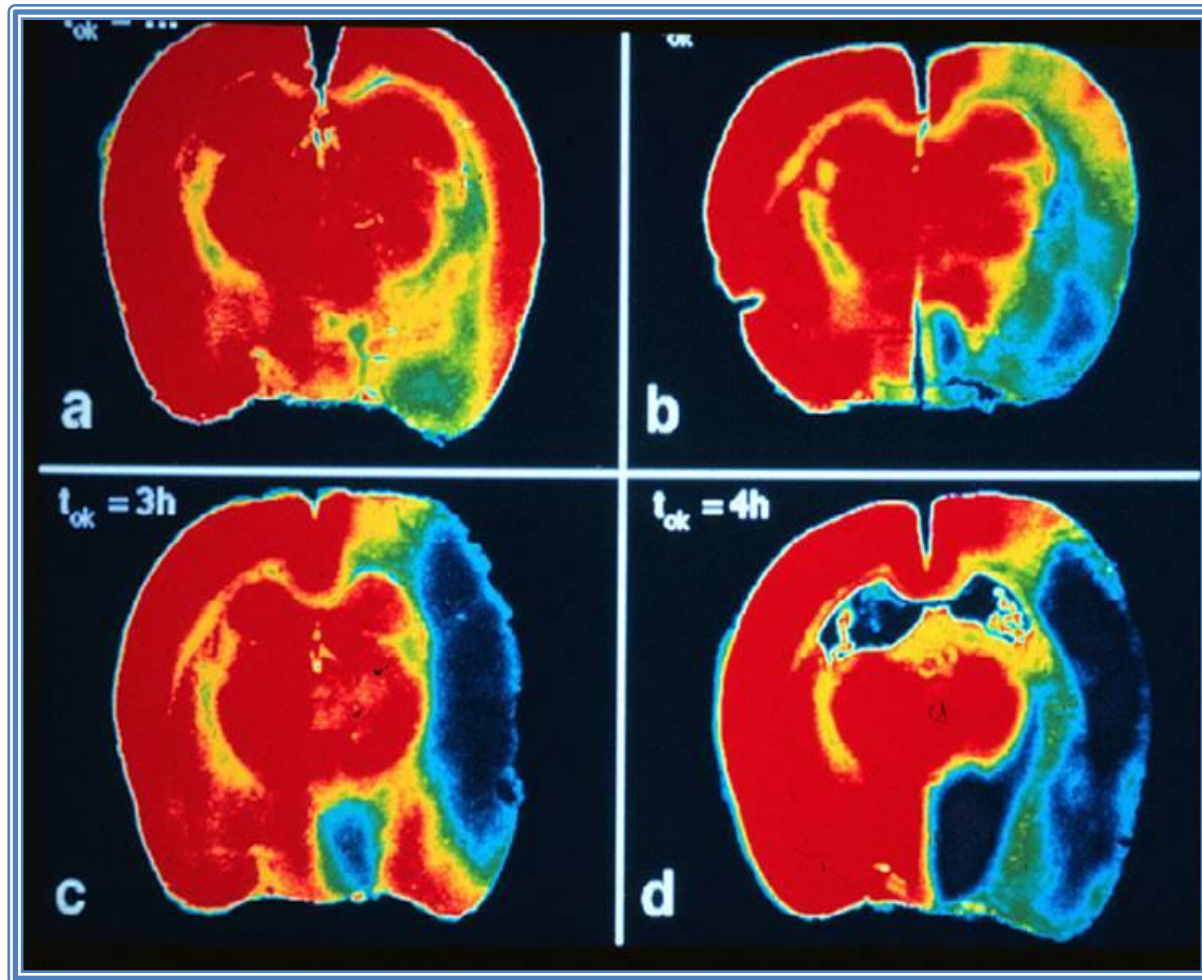
Framingham Study

- Cohort of 4897, stroke free at age 55
- Followed up to 51 years(115,146 person yrs)
- LTR of stroke = 1 in 5 woman
= 1 in 6 men
- Similar at age 55, 65 and 75
- If normal BP(<120/80) – 50% less risk

Transient Ischaemic Attacks

- TIA's are mimics of acute ischemic stroke Focal deficit *resolves* in less than 24 hours
- The majority (80%) of TIA's last only 7-10 min
- TIA's carry a 30% 5 year stroke risk
 - 15% in the first 14 days

Time = Brain



Florence Nightingale (1820 — 1910)



Warning signs of Stroke/TIA

“Brain attack”

- Sudden weakness/numbness of the face, arm or leg on one side of the body
- Sudden dimness or loss of vision, particularly in one eye
- Loss of speech or trouble talking or understanding speech
- Sudden, severe headaches without known cause
- Sudden dizziness, unsteadiness or falls

Pre-Hospital / FIELD

- Last *known well* time – normal function
 - Maximum time = 4.5 hours
- Identify stroke – warning signs
- Call 911/EMS
- Load & Go



FAST / FIELD / ER

BOX 1 FAST (Face, Arm, Speech Test)¹⁸

Face—ask patient to smile or show teeth:

Look for NEW lack of symmetry—tick 'Yes' if there is an unequal smile or grimace, or obvious facial asymmetry

Arm movements—lift the patient's arms together to 90° if sitting, 45° if supine and ask them to hold the position for 5 s then let go

Does one arm drift on its own or fall rapidly?

Speech—if the patient attempts a conversation, look for NEW disturbance of speech

Check with companion

Look for slurred speech

Look for word finding difficulties. This can be confirmed by asking the patient to name commonplace objects that may be nearby, such as a cup, chair, table, keys, pen

If there is a severe visual disturbance, place an object in the patient's hand and ask them to name it

FAST / FIELD / ER



Emergency Medical Services Response

From first response to arrival at hospital...



EMS Response: Vital Functions

- Airway
 - intubate if:
 - coma
 - hypoventilation
 - risk of aspiration
- Breathing
 - pulse oxymetry
 - aim for normoventilation
- Circulation
 - i.v. line, Normal saline, no glucose
 - ECG
 - BP
- Check blood glucose to exclude hypoglycaemia
- No hypotensives, except in extreme situations
- Treat hypotension/dehydration and fever

EMS Response: Neurostatus*

- Glasgow coma scale if reduced consciousness
- FASTest
 - Facial droop or gaze deviation
 - Arm/leg weakness or drift
 - Speech clarity and accuracy
 - Hemianopia or major sensory deficit
- Are symptoms improving or deteriorating?
- Evidence of seizures, trauma or stiff neck?
**Allow 2 minutes maximum for making this assessment*

EMS Response: Preparation for Transfer (1)

Do:

- Document onset of stroke symptoms (timing, progression, preceding factors)
- Stabilise for immediate transport
- Notify receiving team at stroke unit/ER



EMS Response: Preparation for Transfer (2)

Do not:

- Declare low priority in cases of doubt
- Sedate unnecessarily
- Lower blood pressure
- Delay transportation to stroke centre
- Give glucose (except in hypoglycaemia)
- Allow anoxia or hypoventilation
- Allow arterial hypotension
- Administer large amounts of fluids
- Neglect family members - they will be needed at stroke unit/ER



EINDE
EERSTE
SESSIE