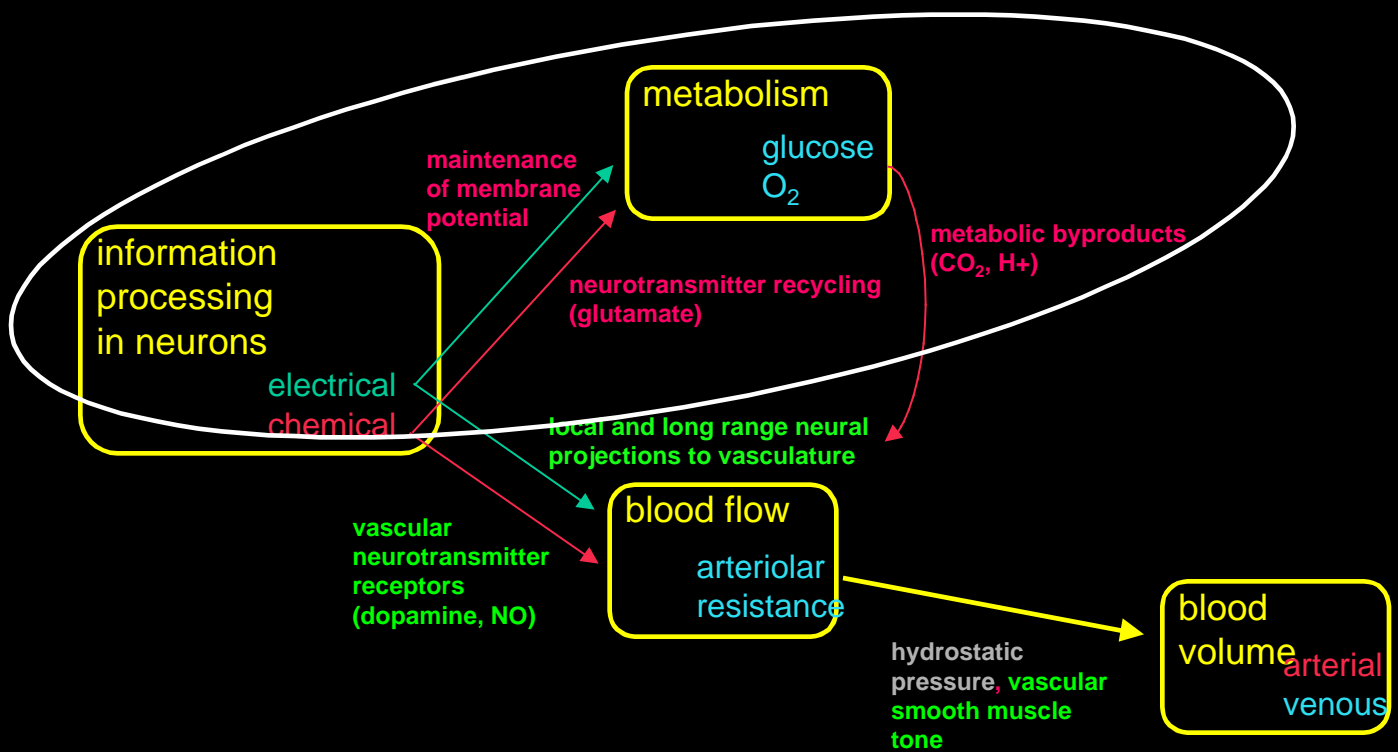
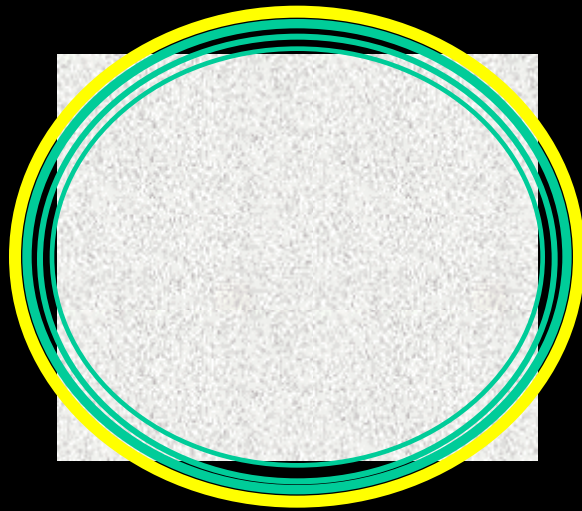


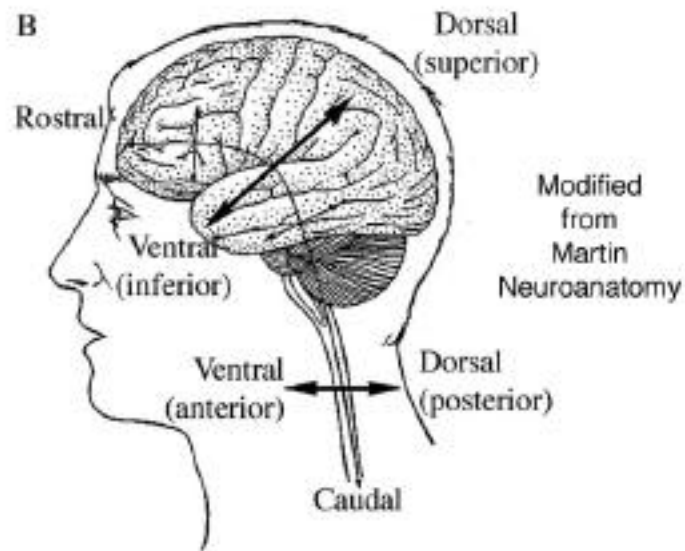
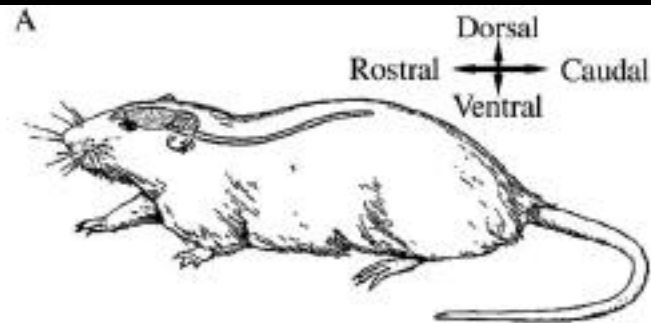
Physiological Events Accompanying Neuronal Activation



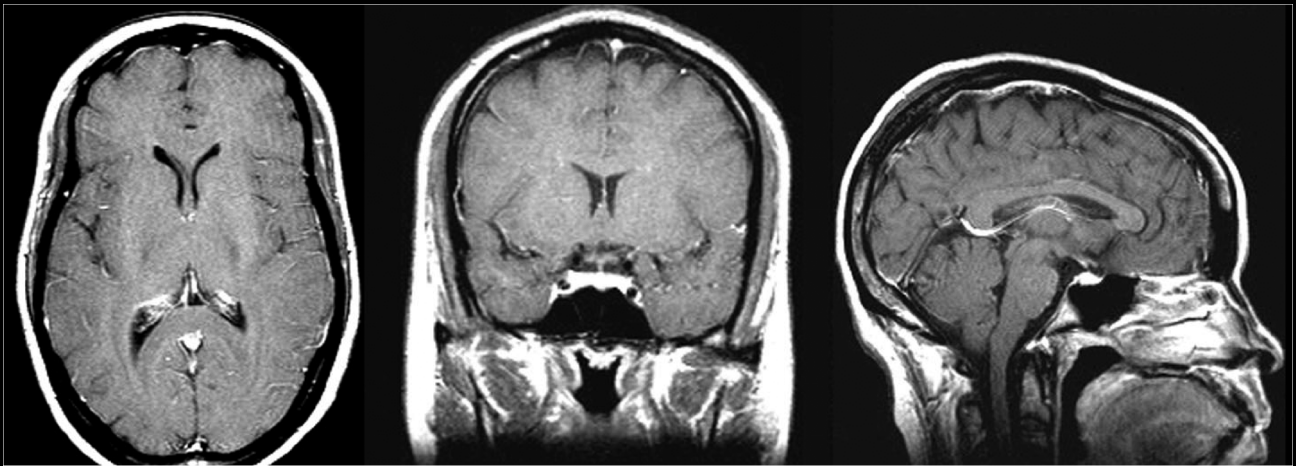
Compartments of the Head



Orienting to the Brain



Planes of View



A



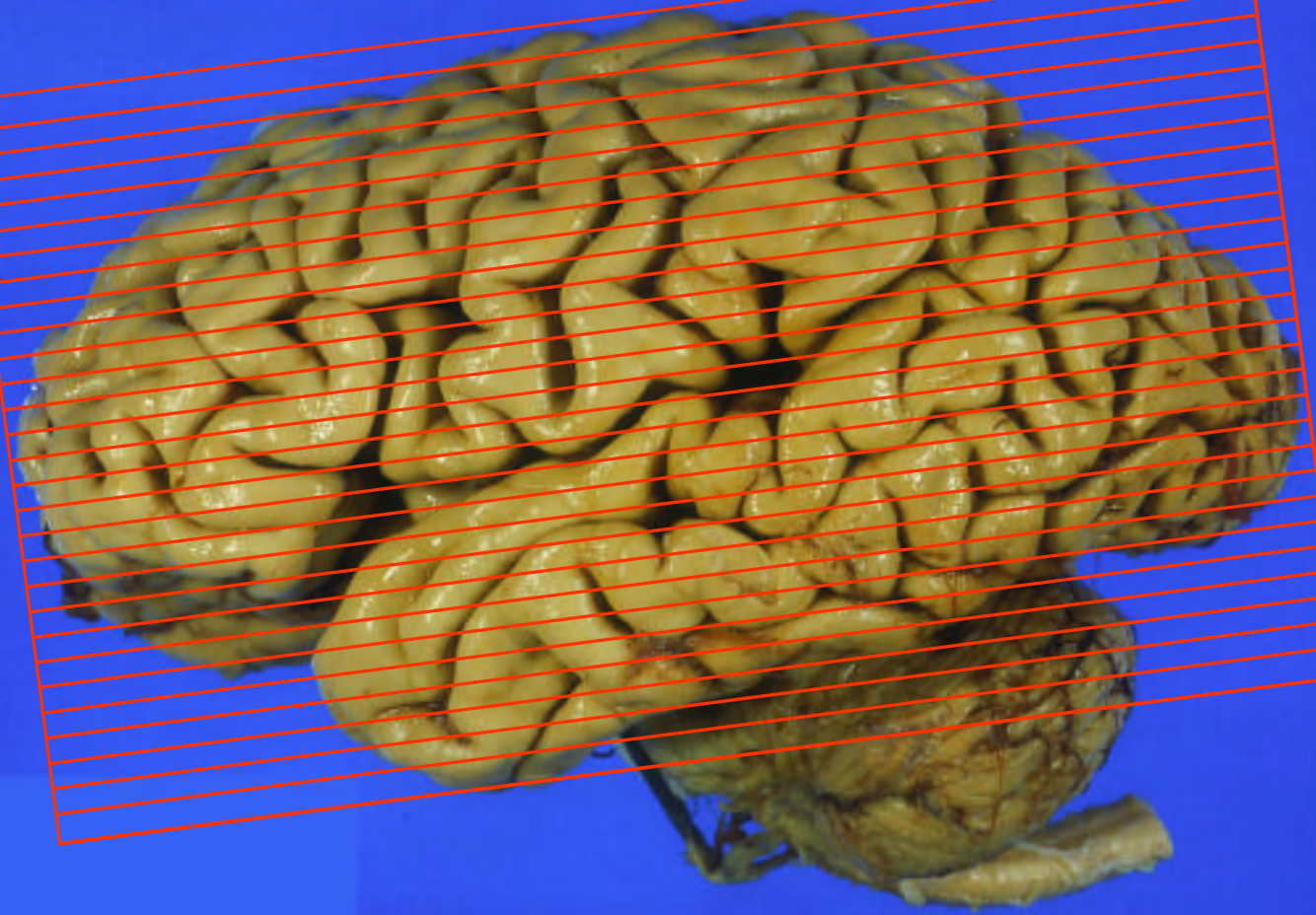
B



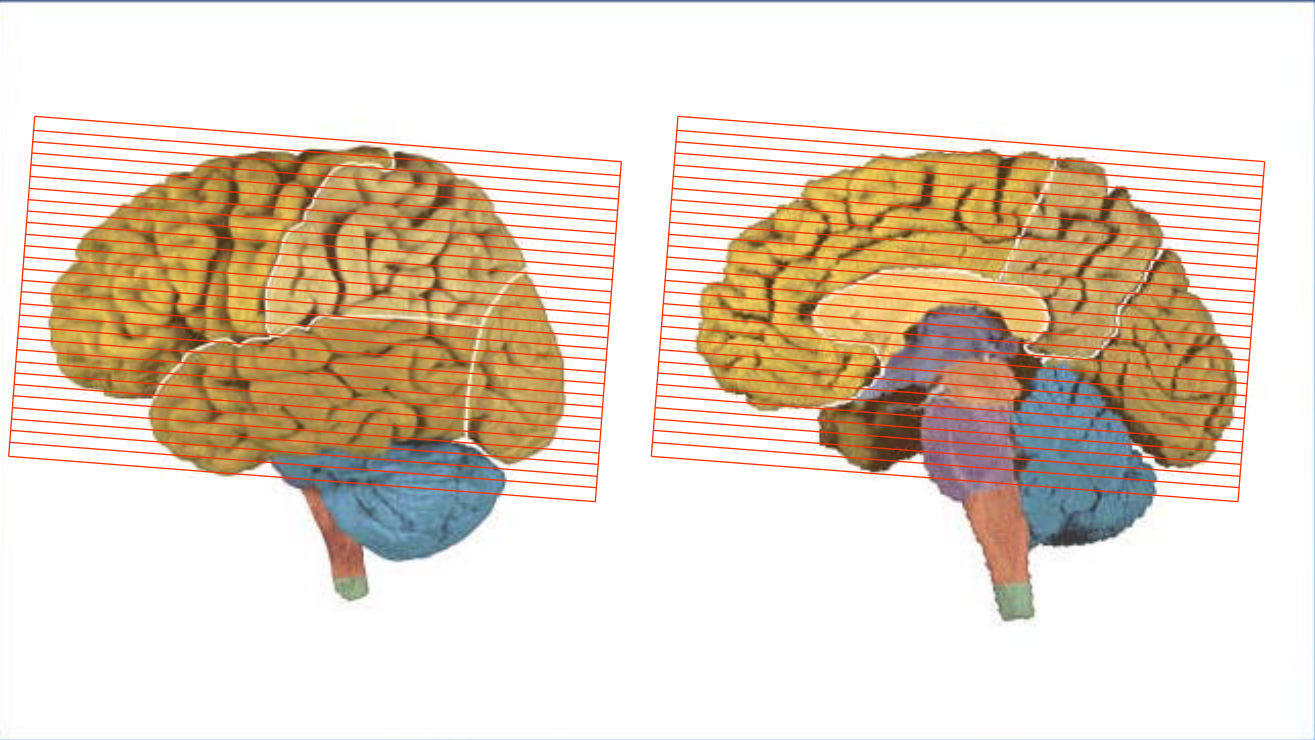
C

Modified from Martin Neuroanatomy

Lateral view: 5 mm slices



Principal Divisions of Brain

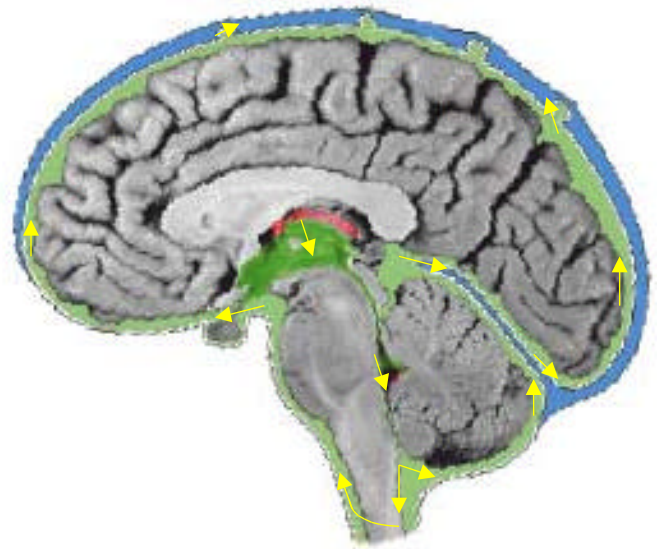
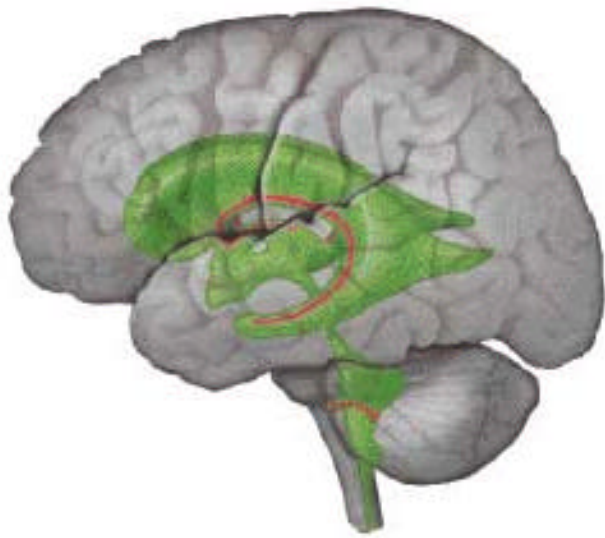


The Brain Atlas:
A Visual Guide to the Human Central Nervous System
Hanaway, Woolsey, Gado & Roberts

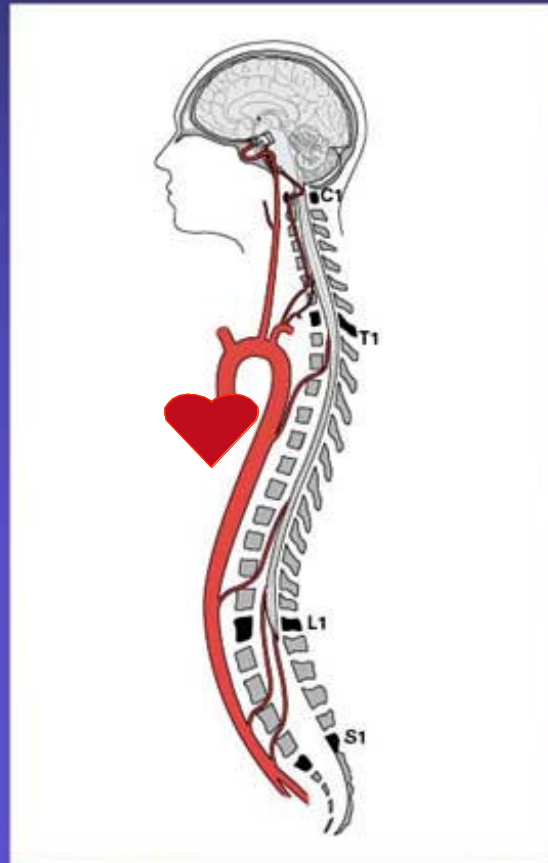


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Flow of CSF



Arteries to Spinal Cord (Diagrammatic)



The Brain Atlas:

A Visual Guide to the Human Central Nervous System
Hanaway, Woolsey, Qado & Roberts

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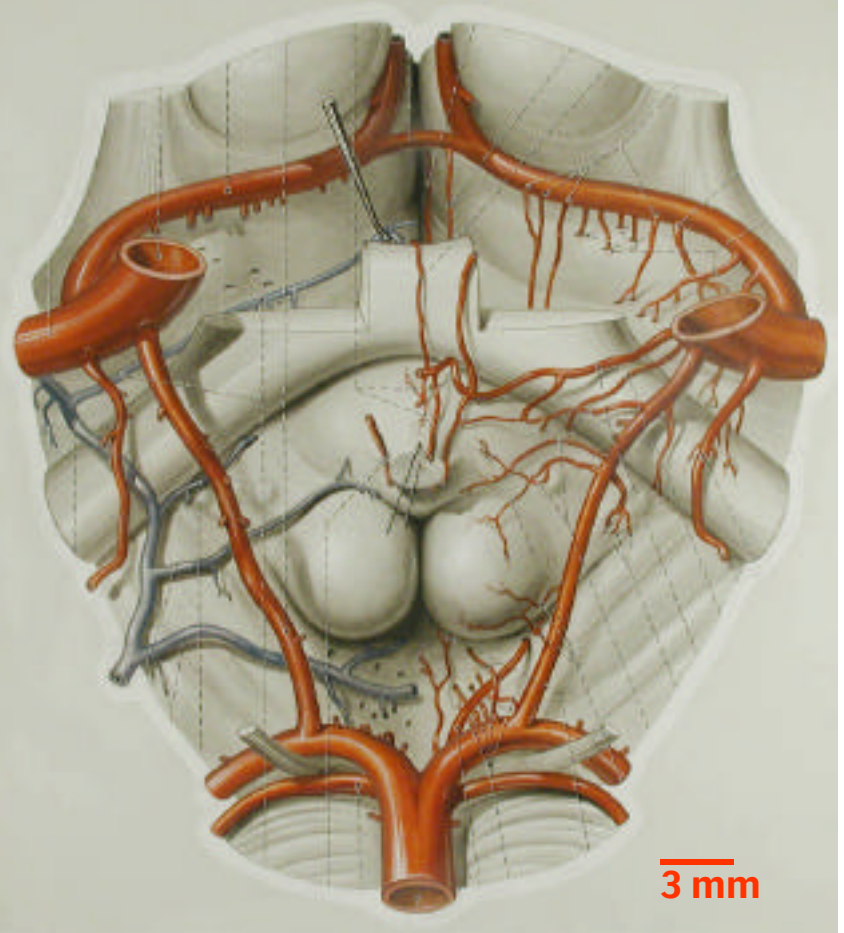
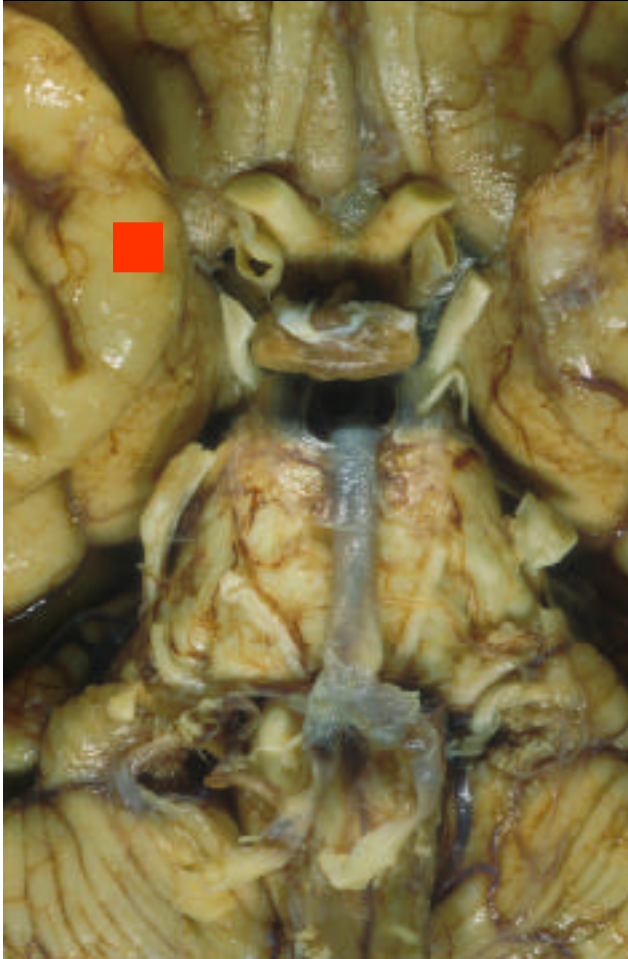


Circle of Willis

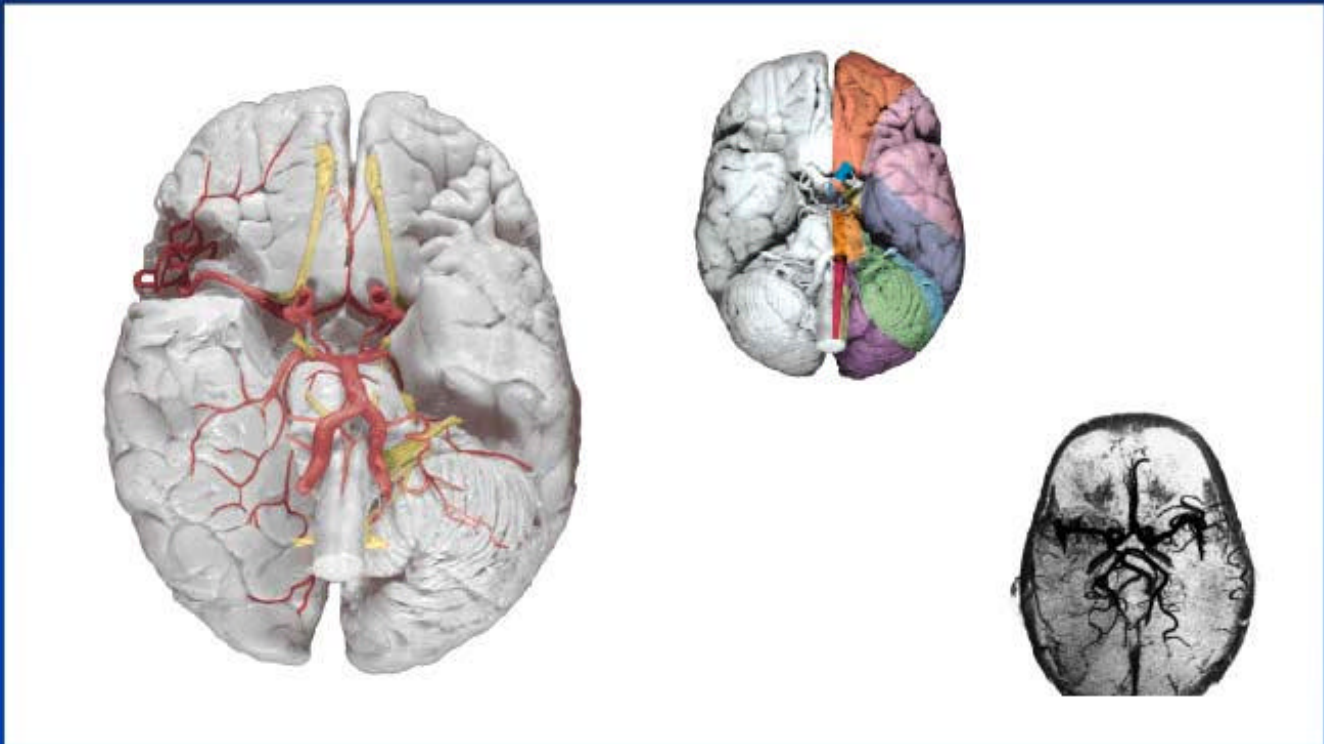


10 mm

Willis Circles Hypothalamus



Cerebral Hemispheres and Brain Stem Ateries (1X); Arterial Territories (0.7X)–Inferior Aspect; Axial MRA (0.6X)

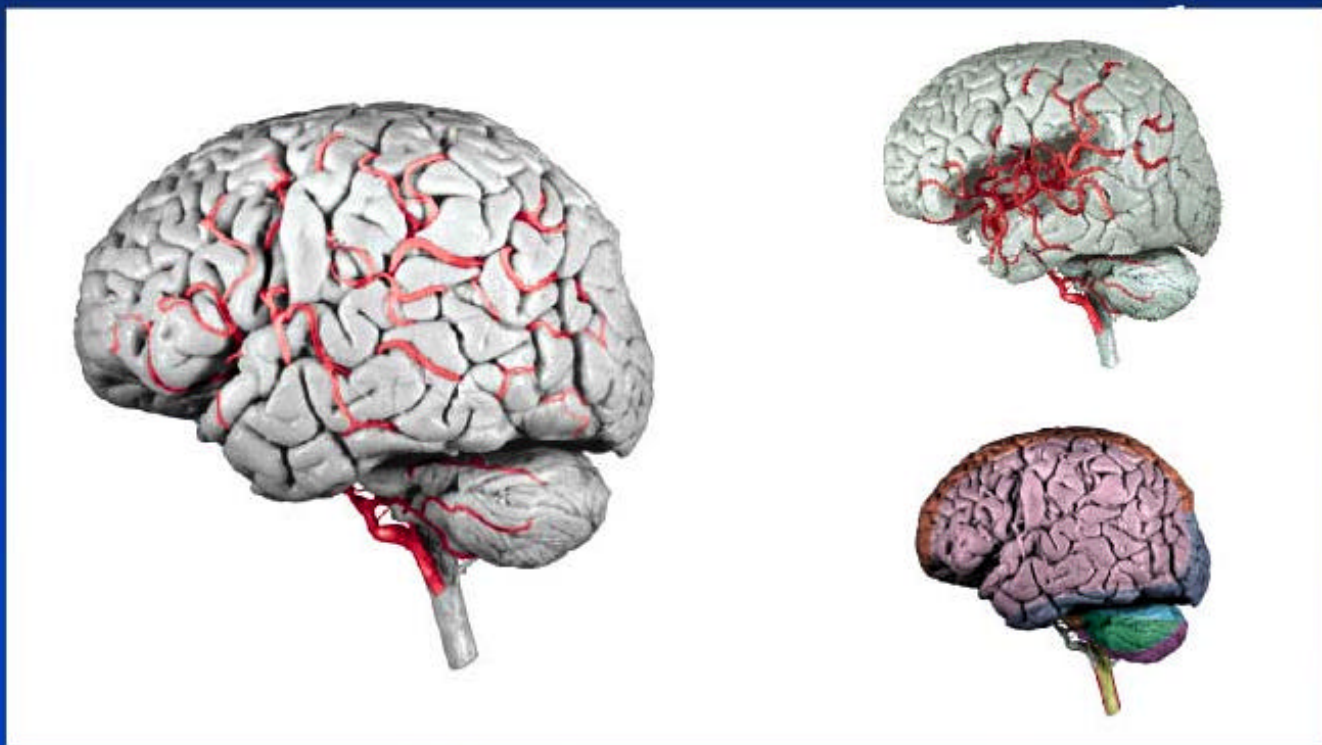


Hippocampal Vasculature

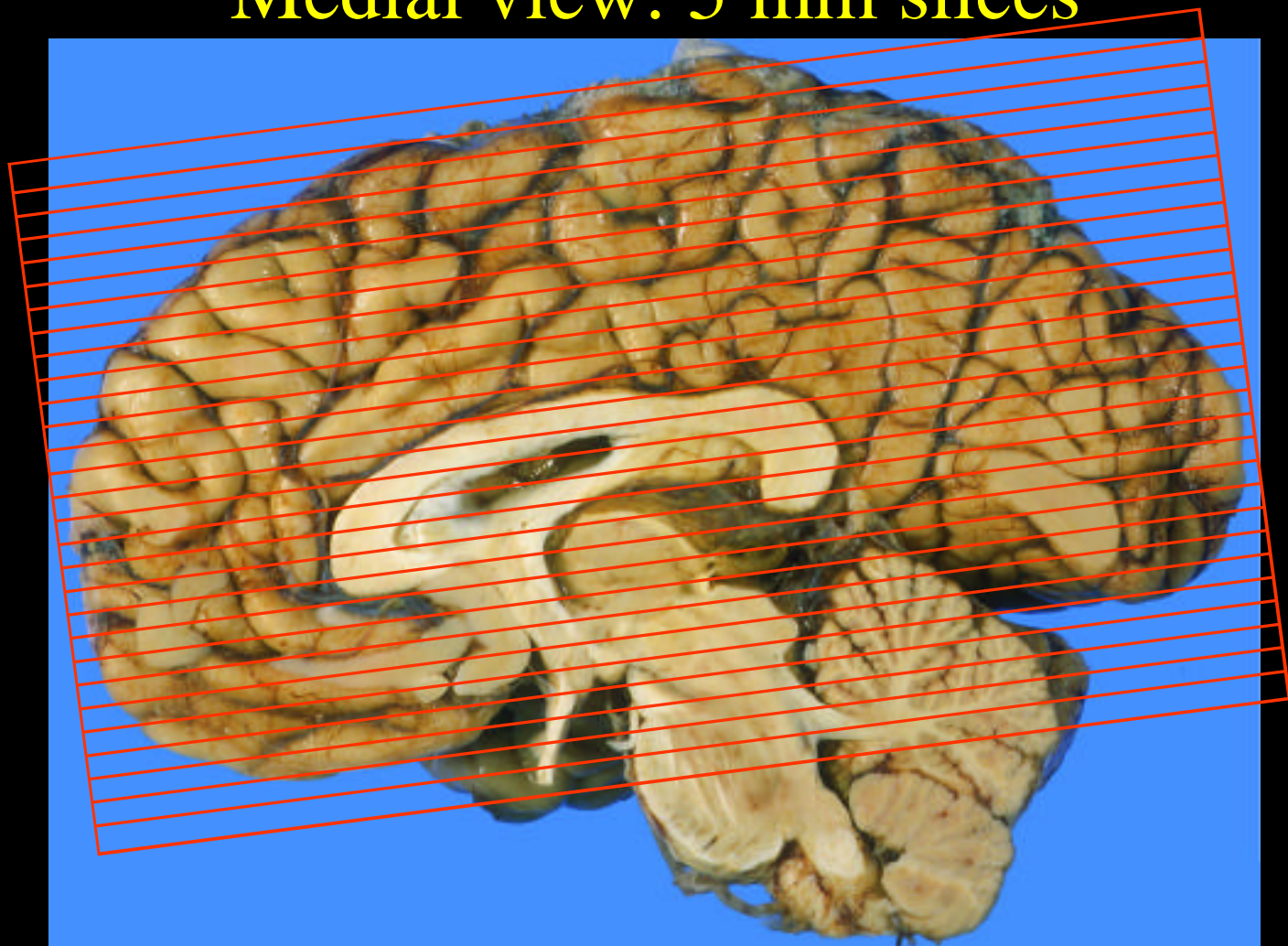


From Duvernoy, 1995

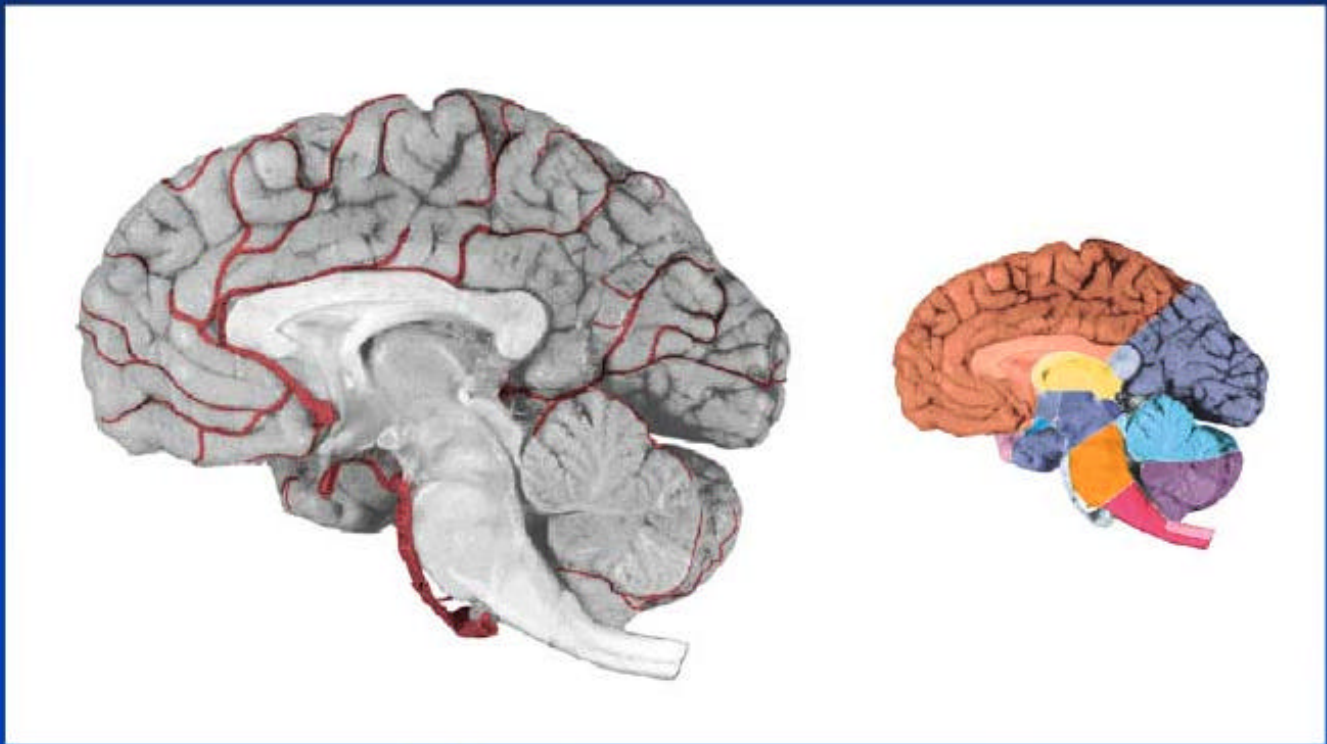
Cerebral Hemisphere and Brain Stem Arteries (1X); Arteries of the Insula and Lateral Sulcus (0.7X); Arterial Territories (0.6X)—Lateral Aspect



Medial view: 5 mm slices



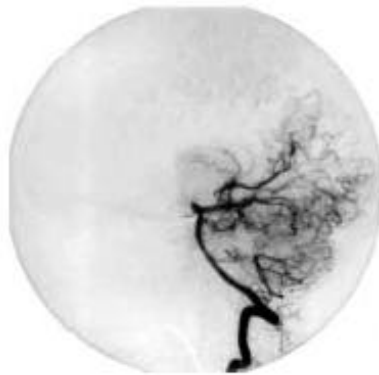
Cerebral Hemisphere and Brain Stem Arteries (1X); Arterial Territories (0.6X)–Mesial Aspect



Cerebral Hemisphere and Brain Stem Arteries by Conventional Radiography (0.7X); by MRA (1X)–Lateral Projection



Right Internal Carotid
Artery Injection



Left Vertebral Artery
Injection



MRA

1.03 s



2.63 s

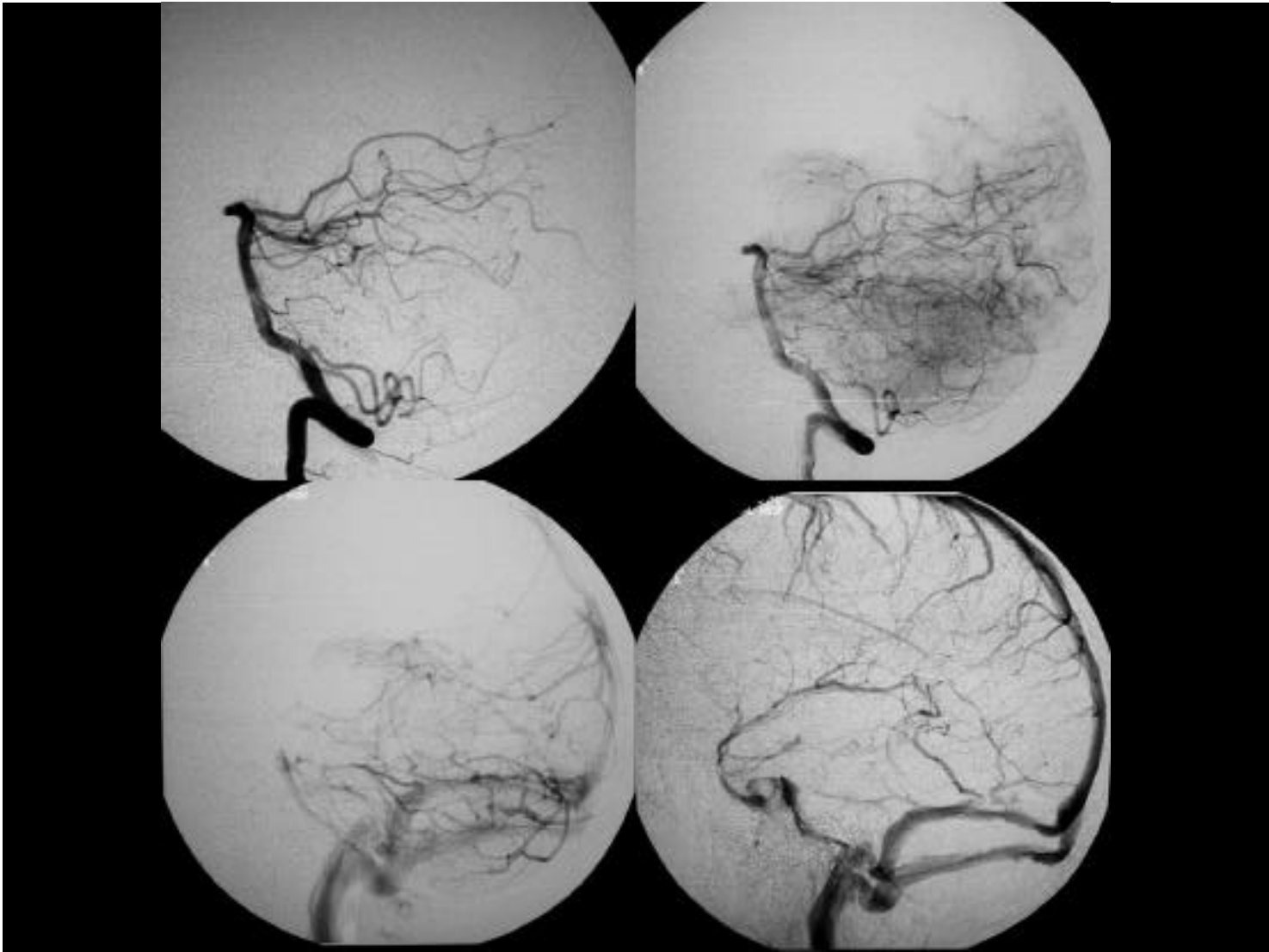


4.23 s



7.83 s



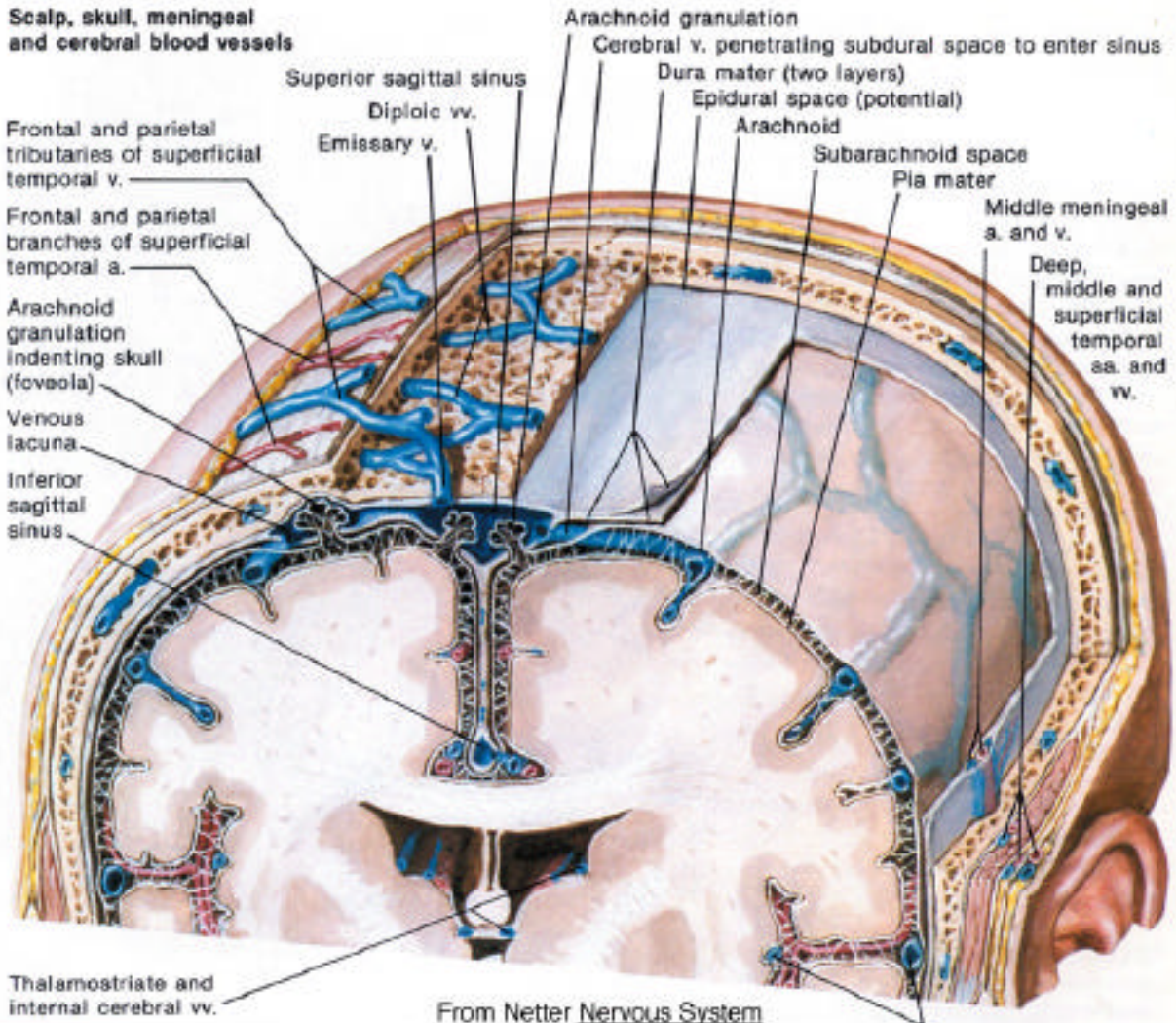


AP view: Vertebral artery angiogram



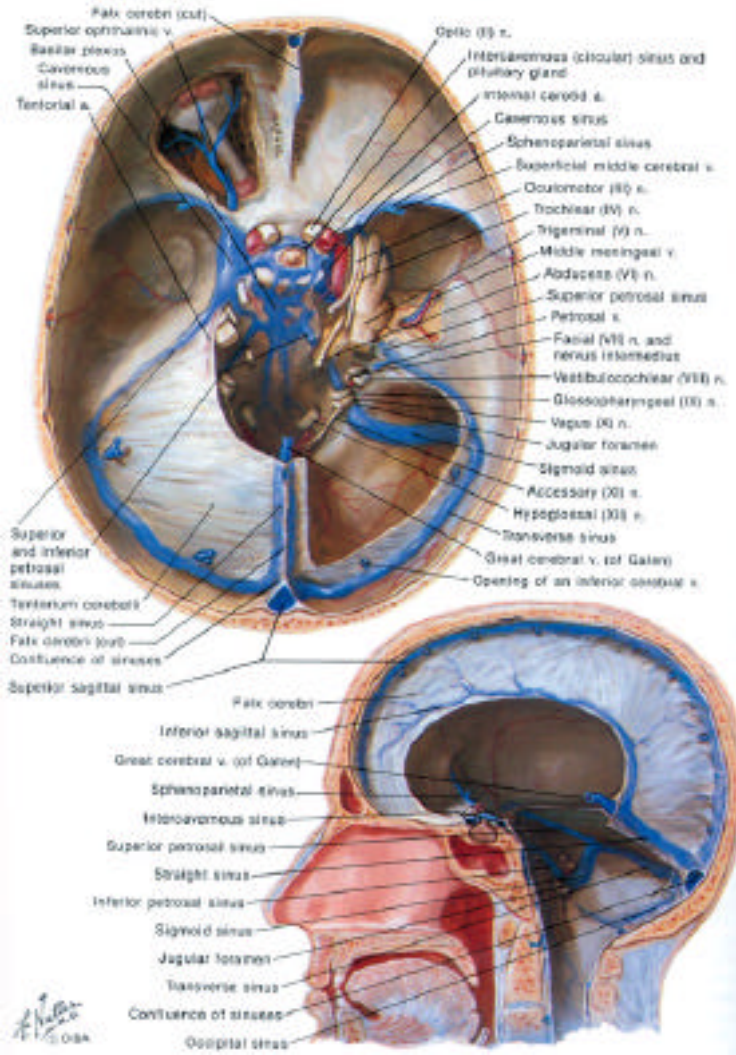
Meninges (continued) and Diploic Veins

Scalp, skull, meningeal and cerebral blood vessels

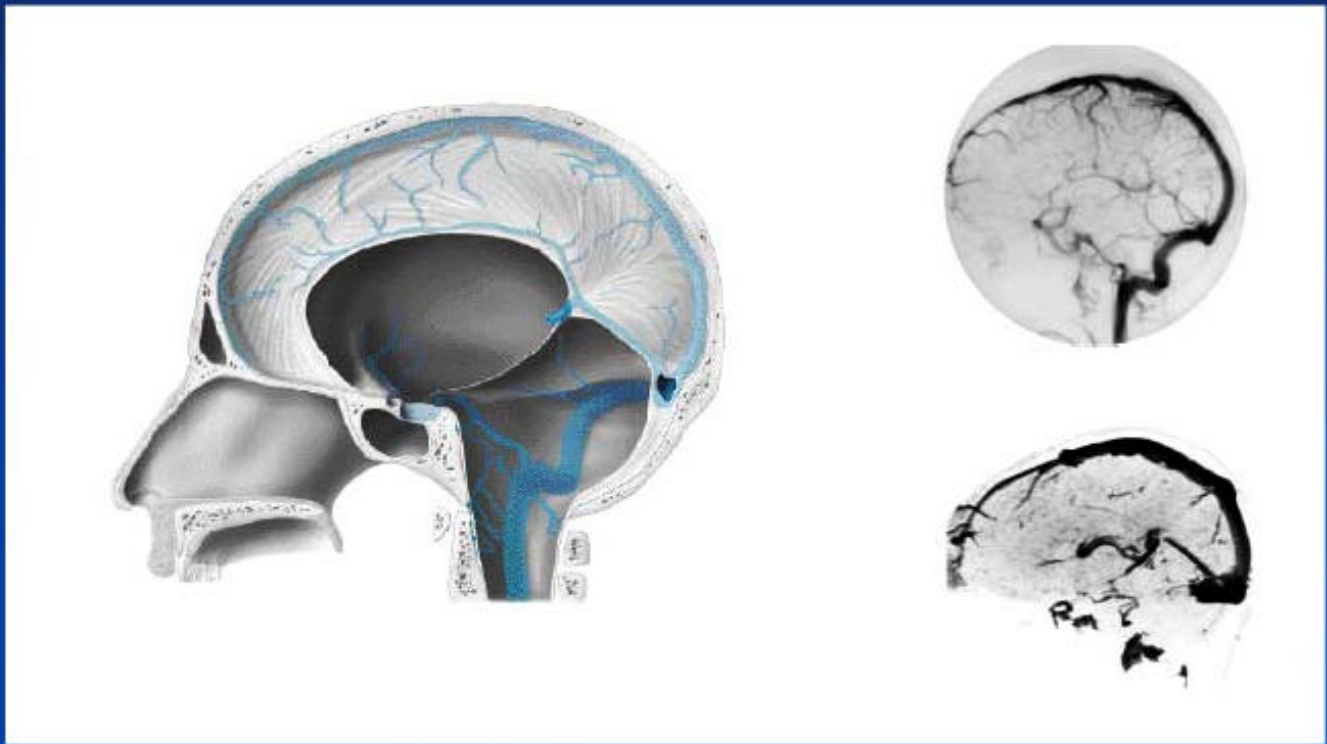


From Netter Nervous System

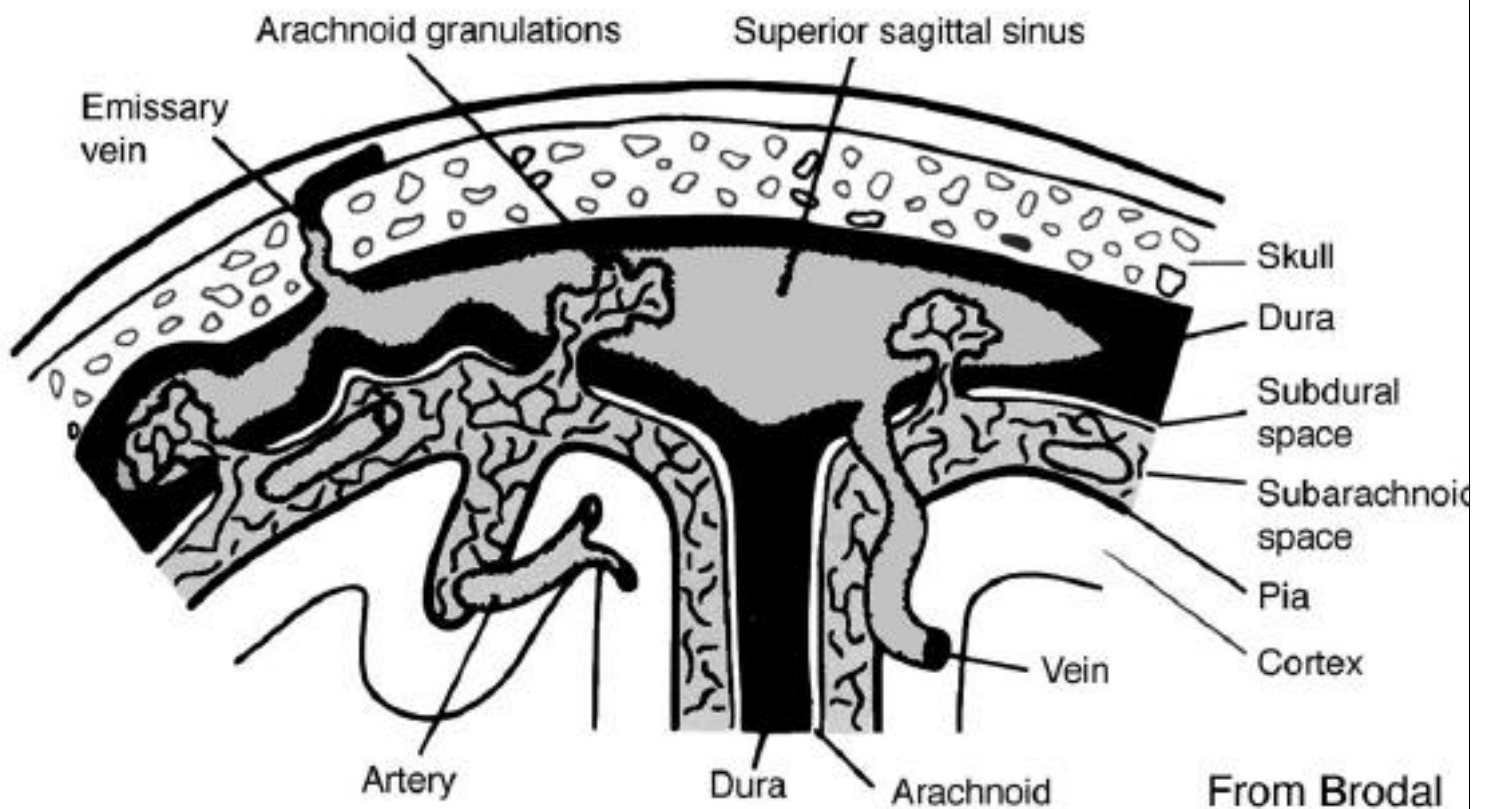
Venous Sinuses of Dura Mater



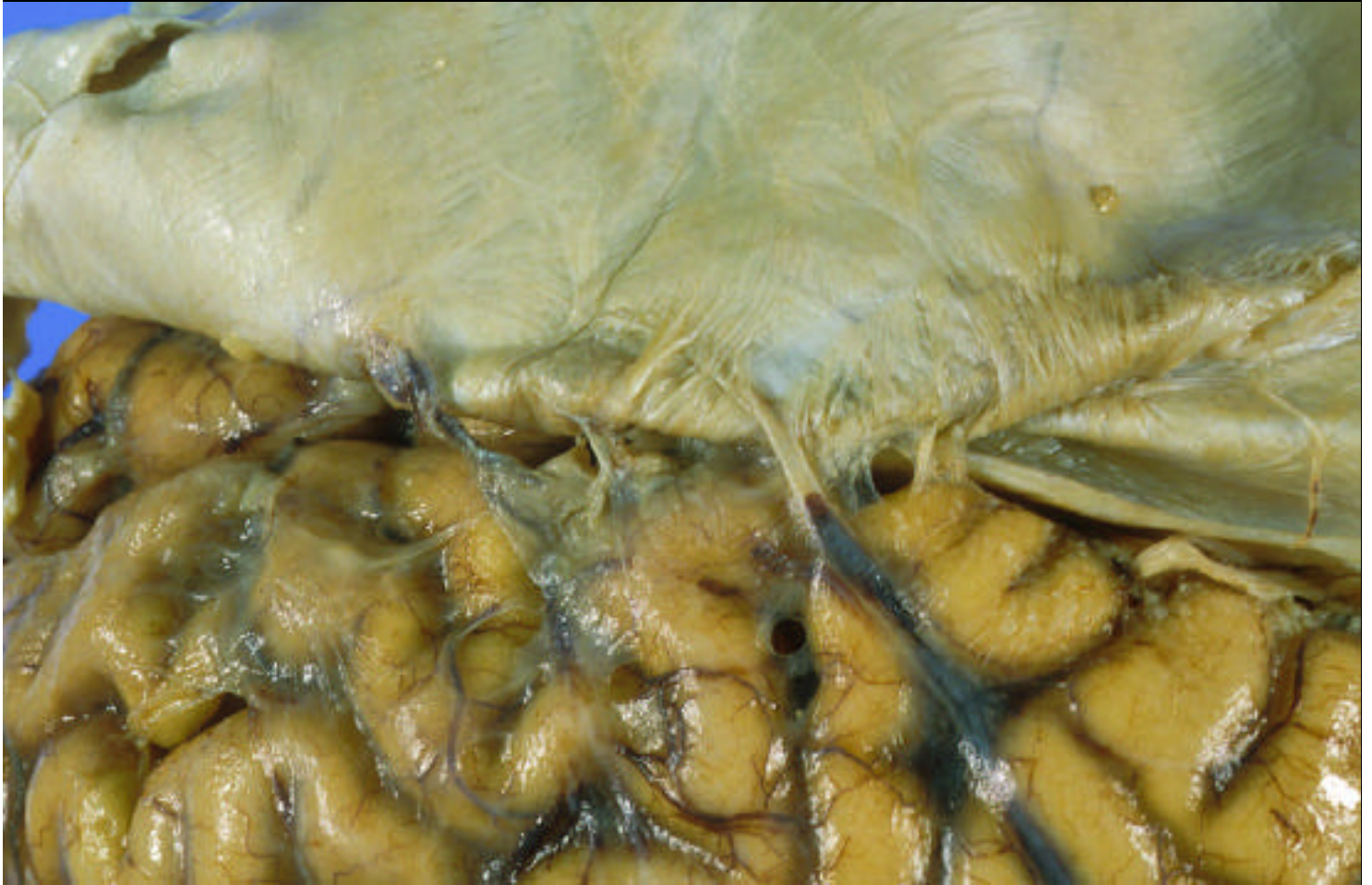
Dural Venous Sinuses and Folds (Diagrammatic , 0.7X); by
Conventional Radiography (0.7X); by MRV (1.7X)–Lateral Projection



CSF return to venous blood



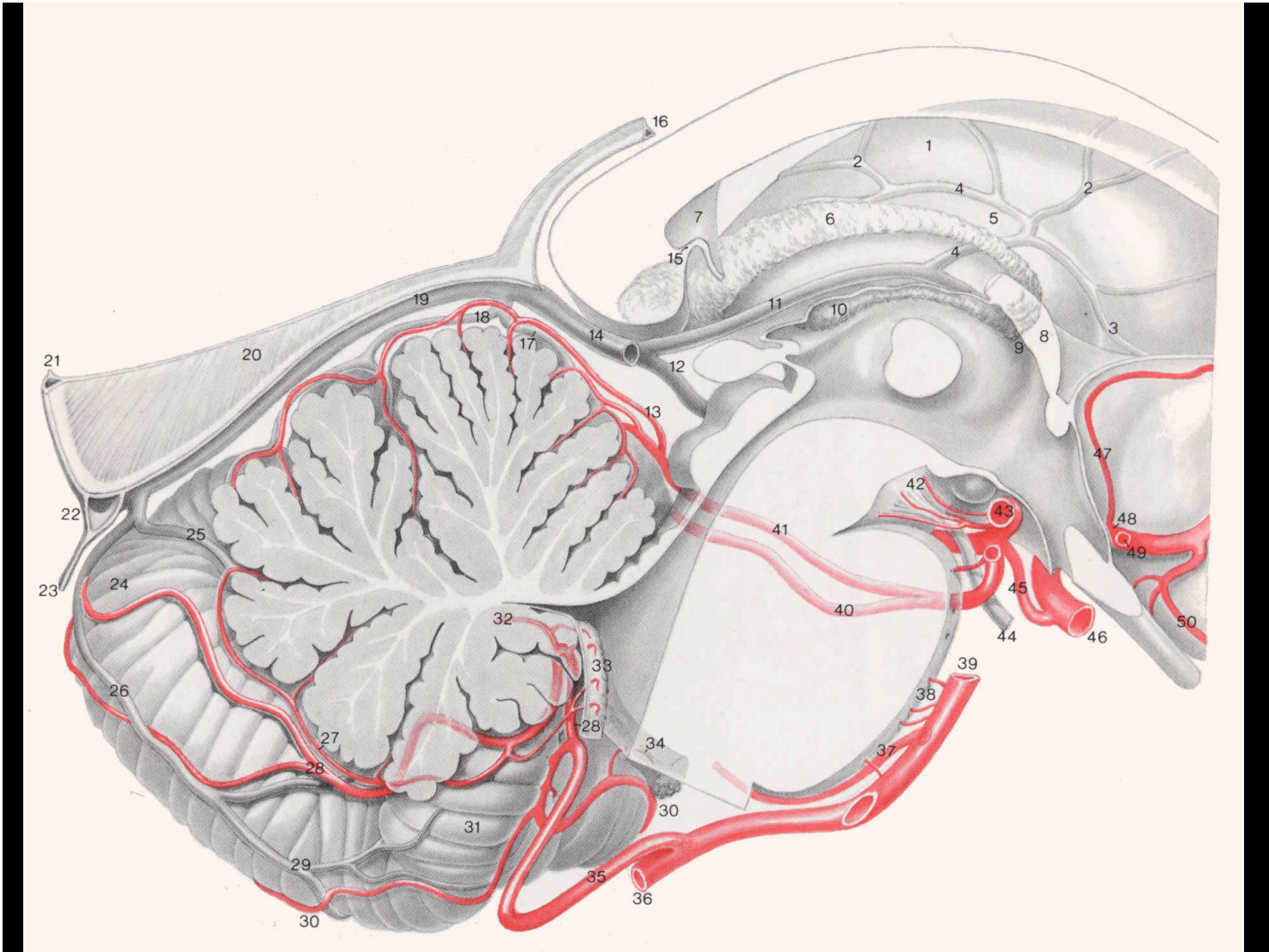
Large vessels in subarachnoid space



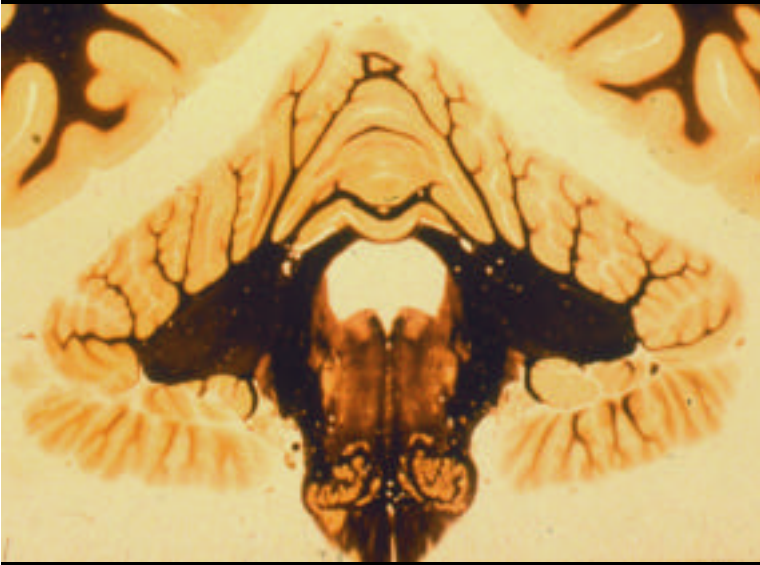
Pial arteriolar anastomoses



From Edvinsson, 1993

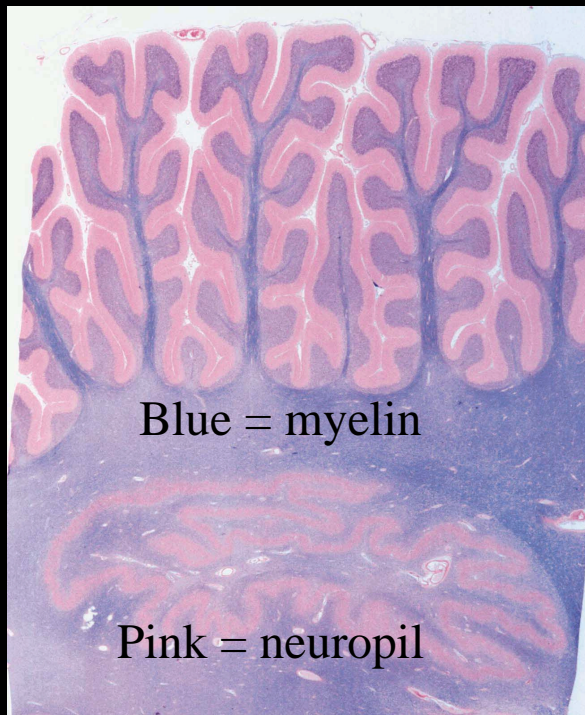


Inferior
Olivary
Nucleus and
Inferior
Cerebellar
Peduncle

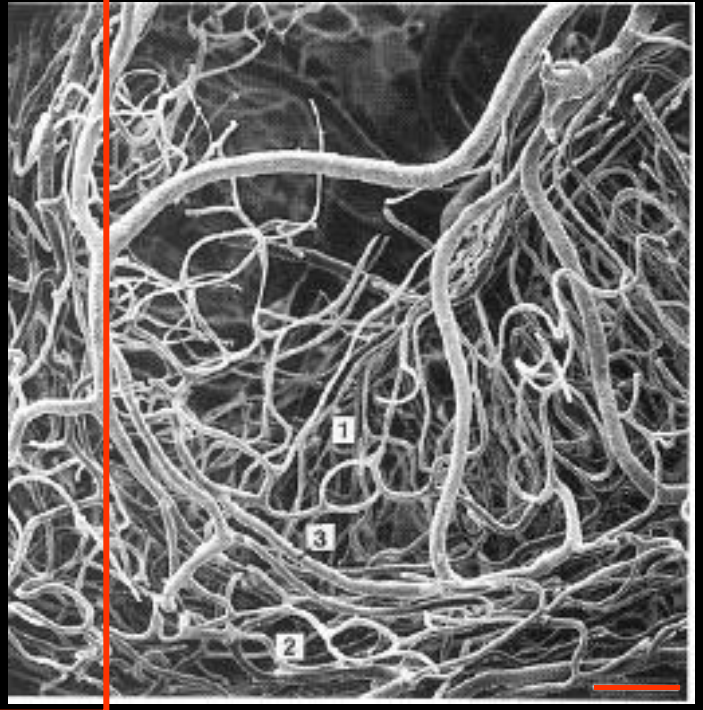
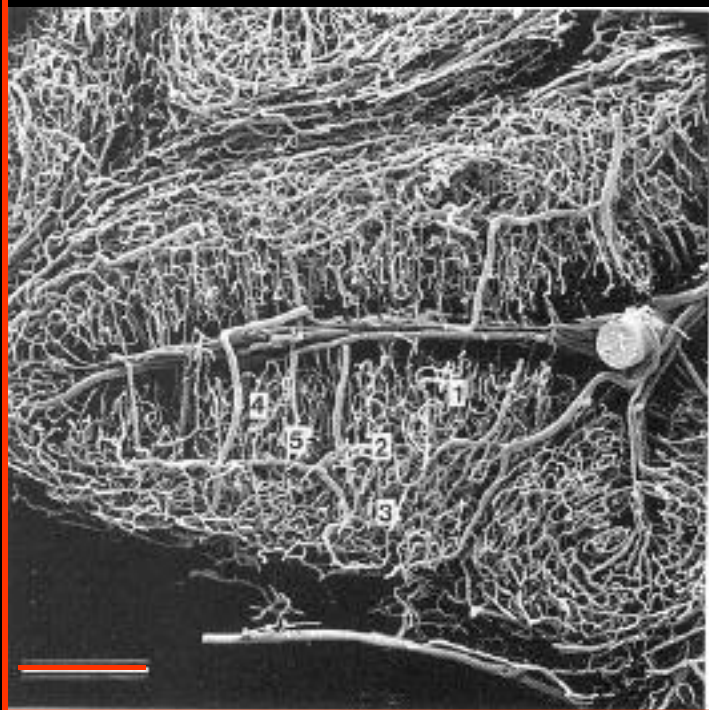


From Duvernoy, 1995

Cerebellar
Histology



From Duvernoy, 1995

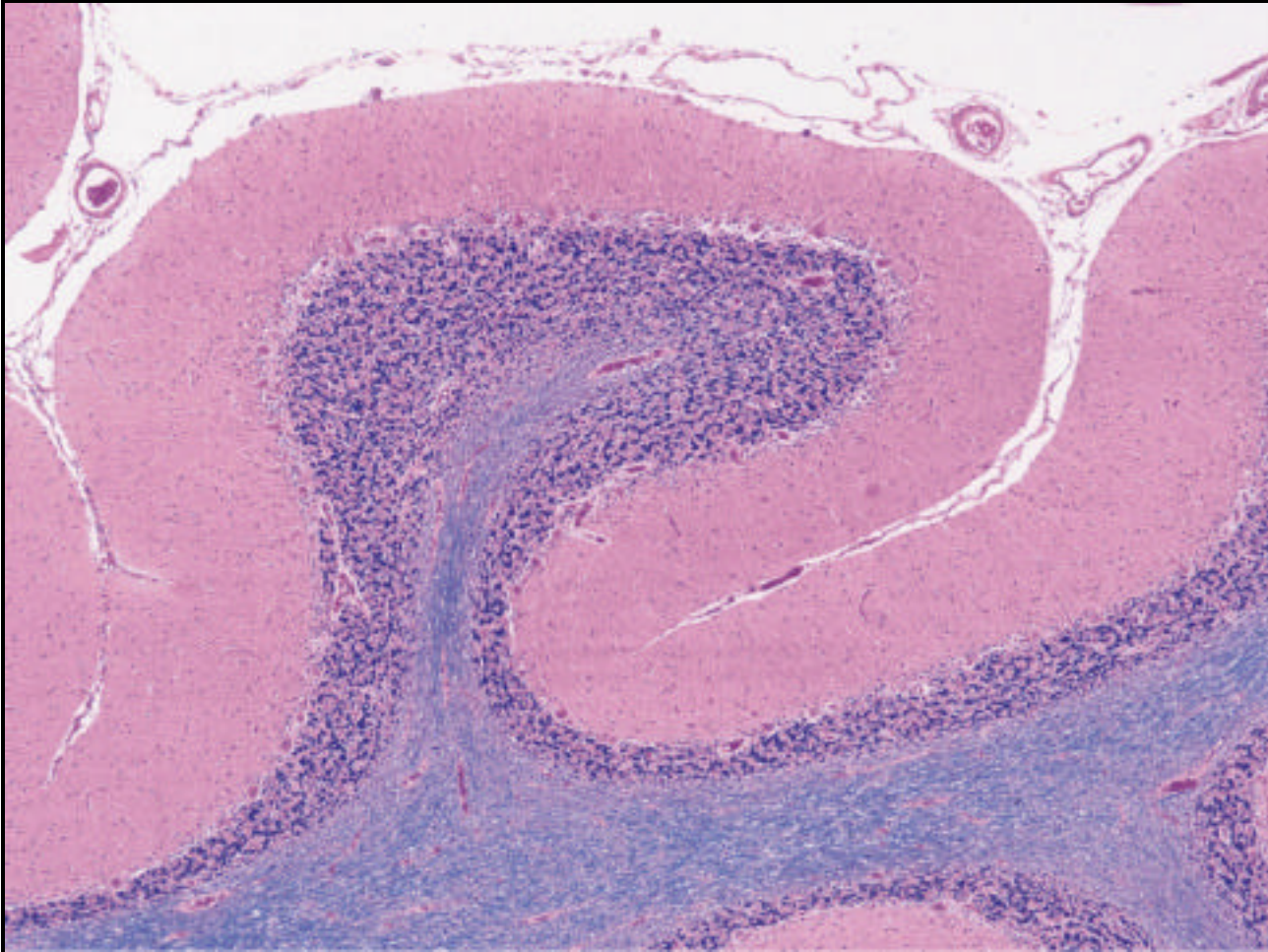


μ

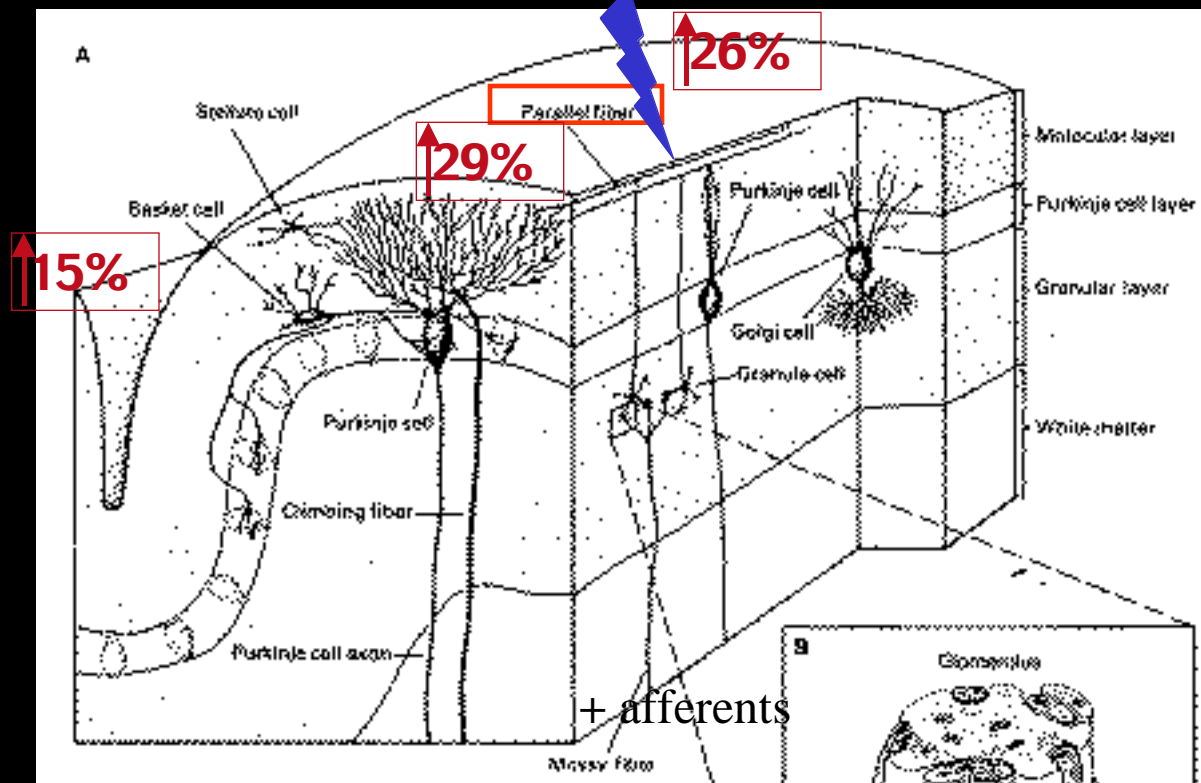
From Duvernoy, 1995

μ

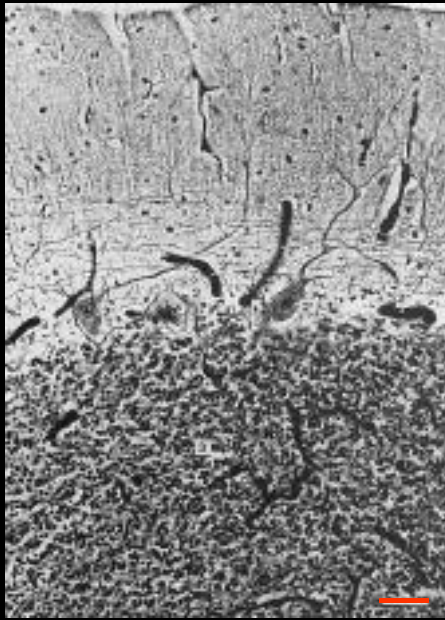
Cerebellar Cortical Histology



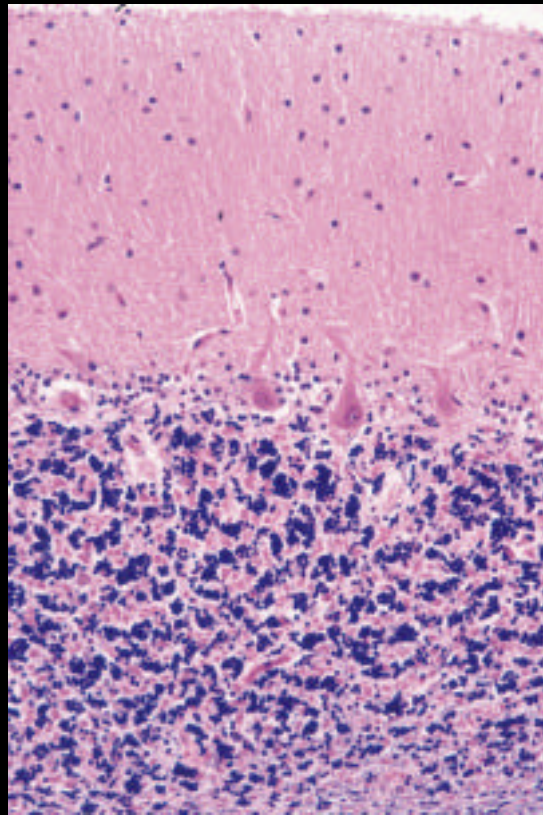
Cerebellar circuit diagram with summary of PF stimulation induced ↑ in CBF



Cerebellar histology and vascularization



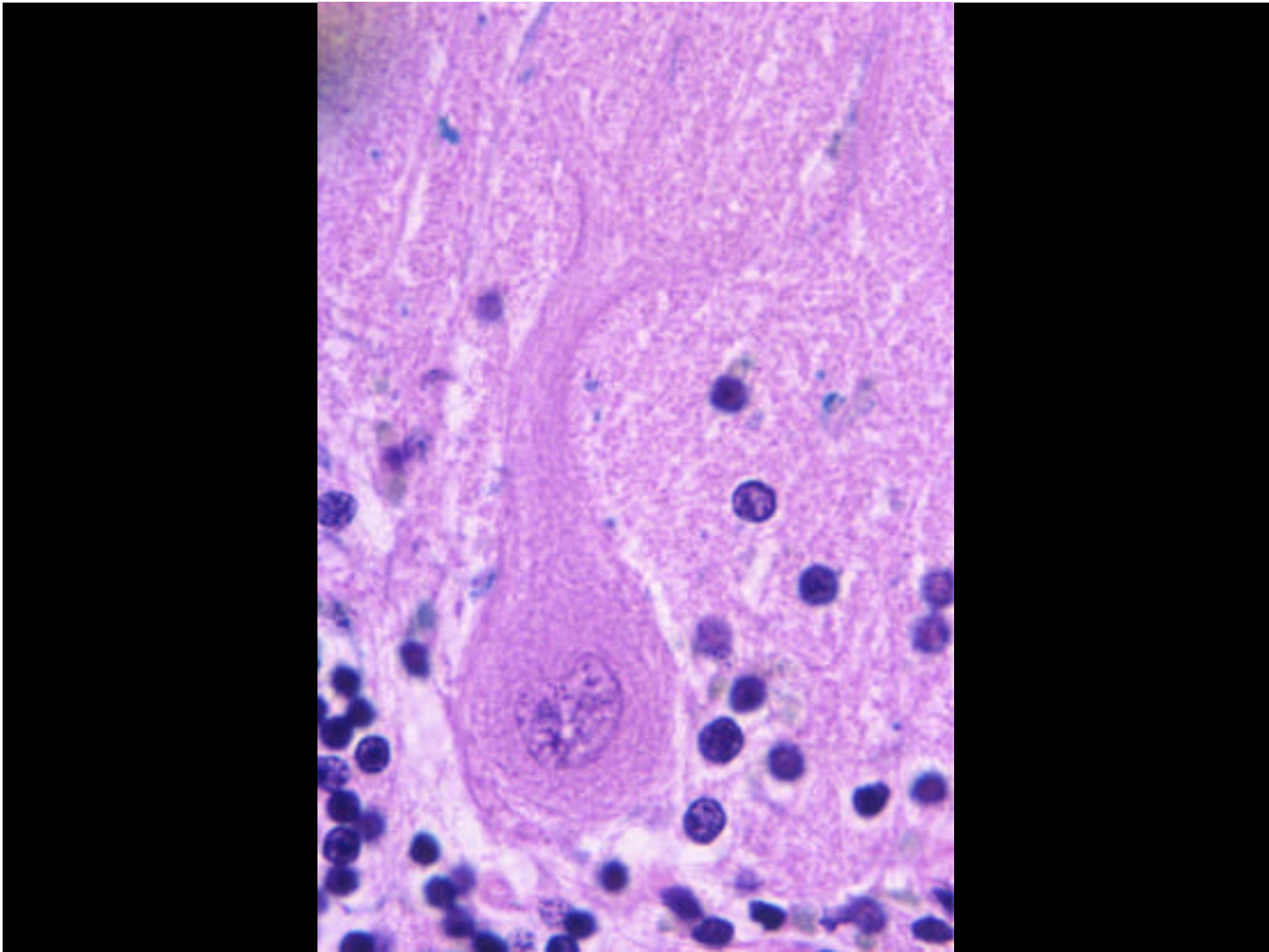
μ
From Duvernoy, 1995

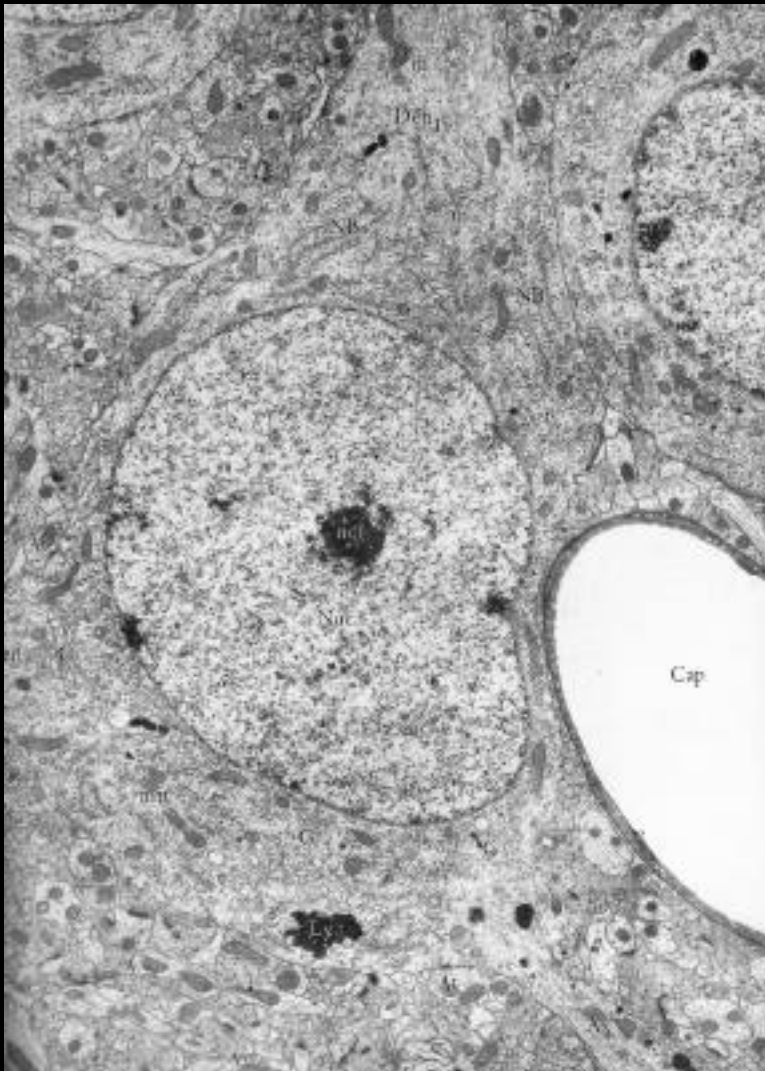


Molecular
Layer

Purkinje Cells

Granular
Layer





40 μm

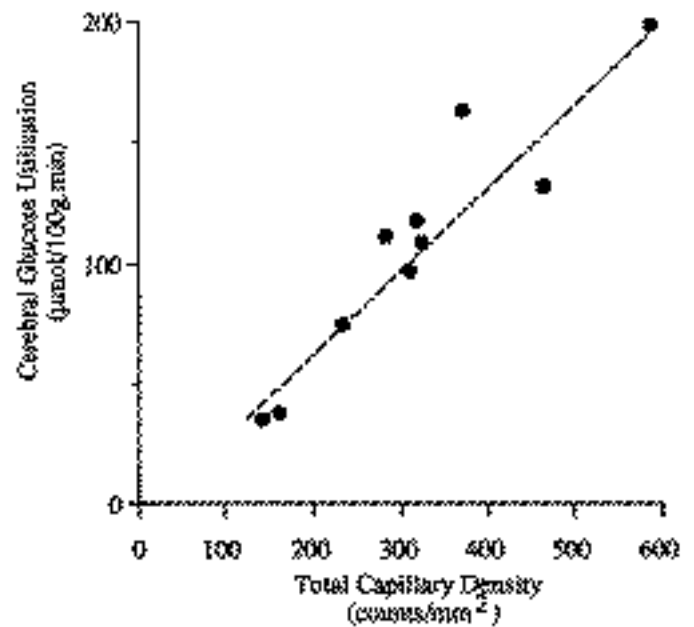
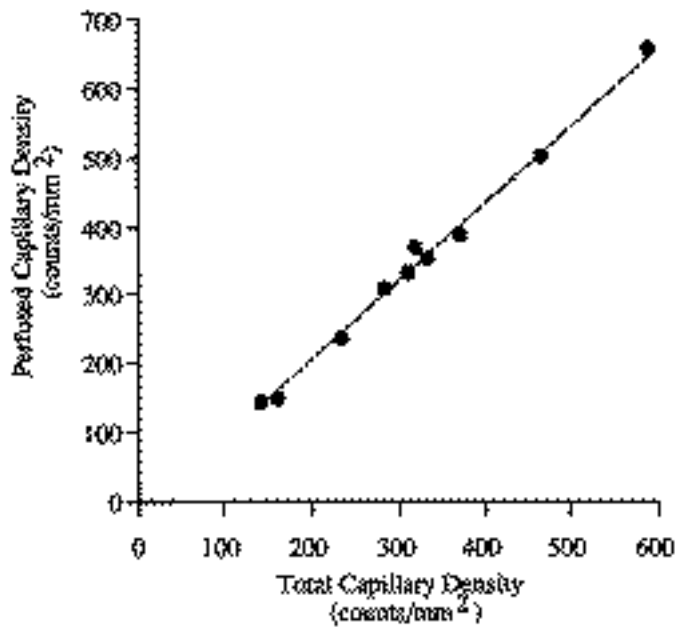
From Peters, 1976



10 μ m

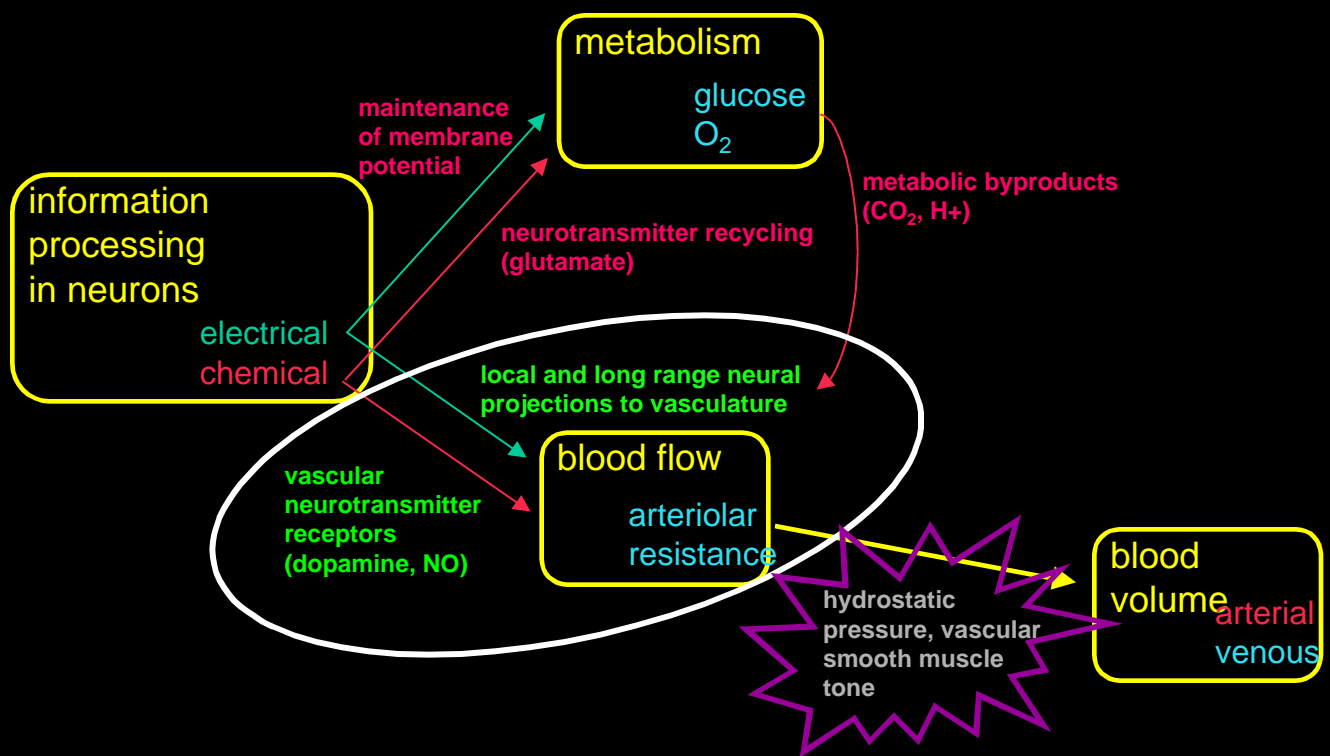
From Peters, 1976

Capillary density in rat brain is proportional to metabolic rate



From Edvinsson, 1993

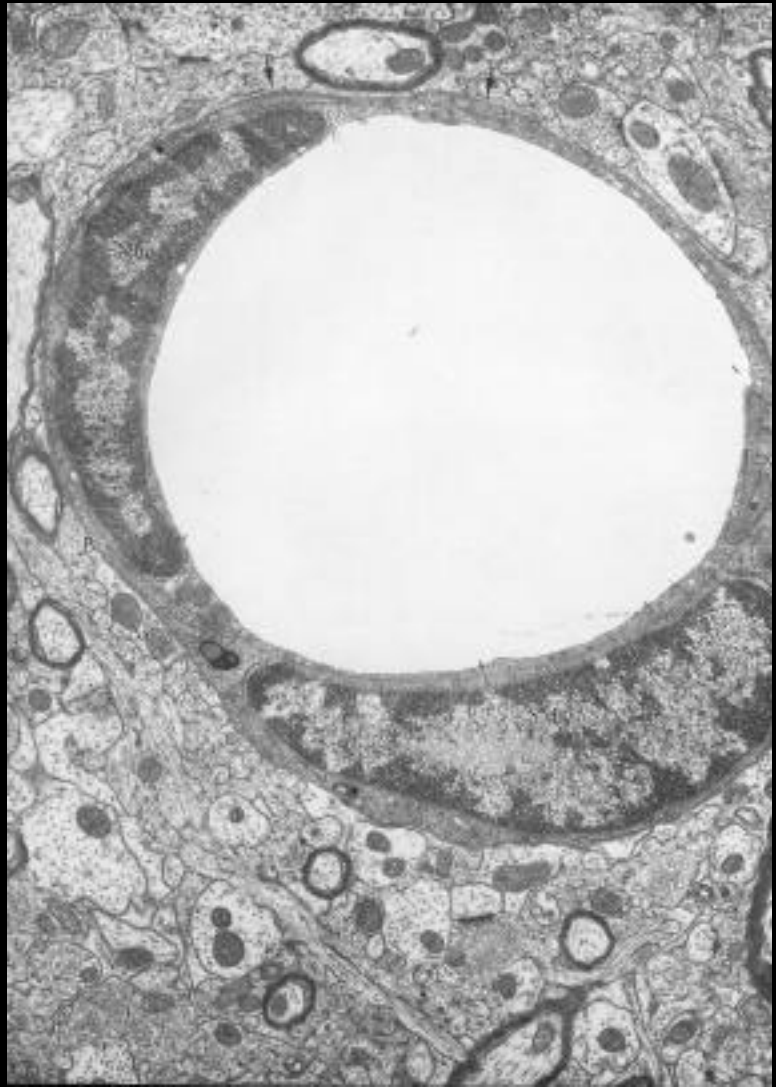
Physiological Events Accompanying Neuronal Activation



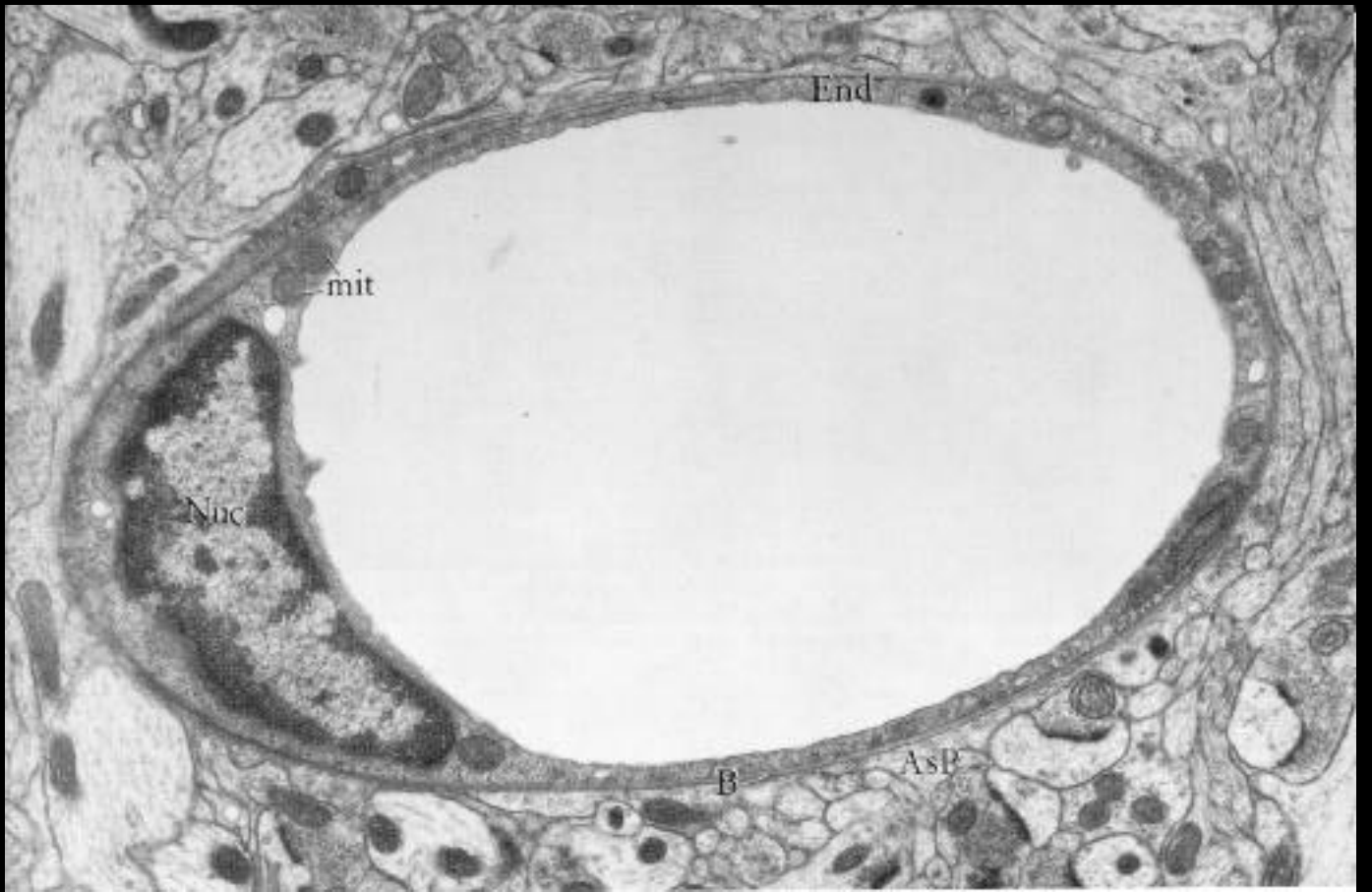
Blood Brain Barrier

- What **cerebral** capillaries have:
 - Tight continuous quintuple-layered intercellular junctions
 - low wall thickness (0.2 μm)
 - higher mitochondrial content
 - thick basement membrane
- What **cerebral** capillaries don't have:
 - fenestrations
 - lots of vesicles
 - fluid-filled bulk transport channels

Cortical
arteriole
or venule



From Peters, 1976



From Peters, 1976

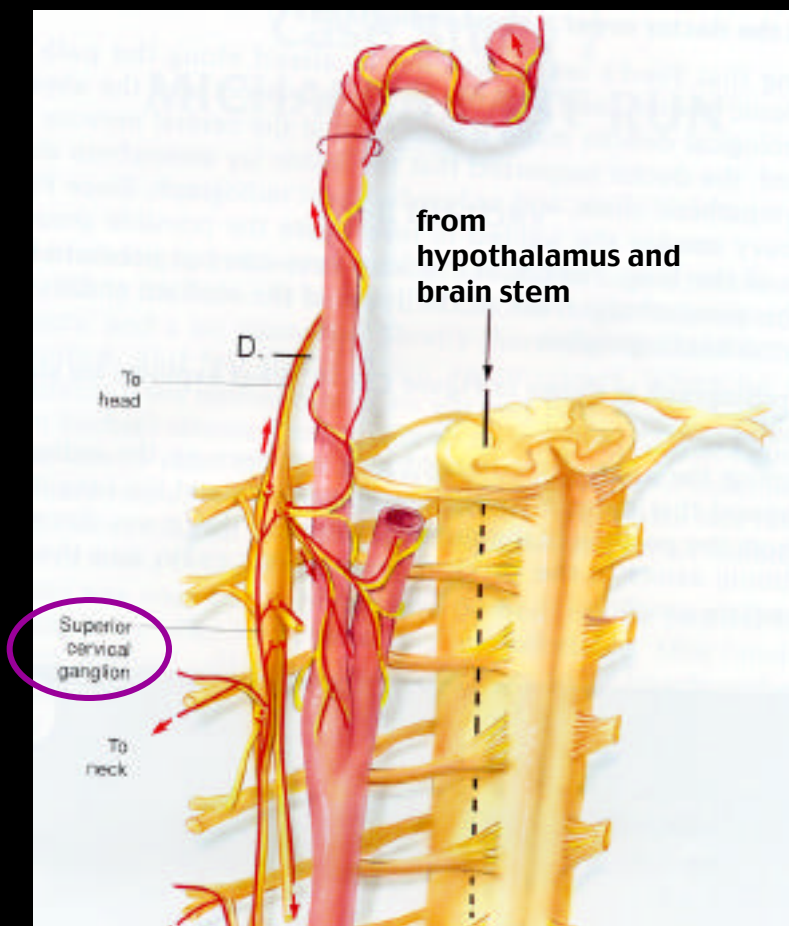
Sites of CBF Regulation

- Large diameter vessels (ANS)
- Smaller diameter arterioles, venules (neurogenic)
 - Must have smooth muscle with appropriate innervation and receptor site to act upon
 - If signaling is at capillary level, message must move upstream to supplying arteriole

Vasoactive Substances

- ANS
 - Sympathetic (NE, Neuropeptide Y)
 - Parasympathetic (ACh, VIP)
- Trigeminal Ganglion
 - Substance P, calcitonin gene-related peptide (CGRP), neurokinin A, and cholecystokinin (CCK)
- Neuronal Projection Systems
 - ACh, 5-HT, Histamine
- Miscellaneous- e.g. amyloid- peptide

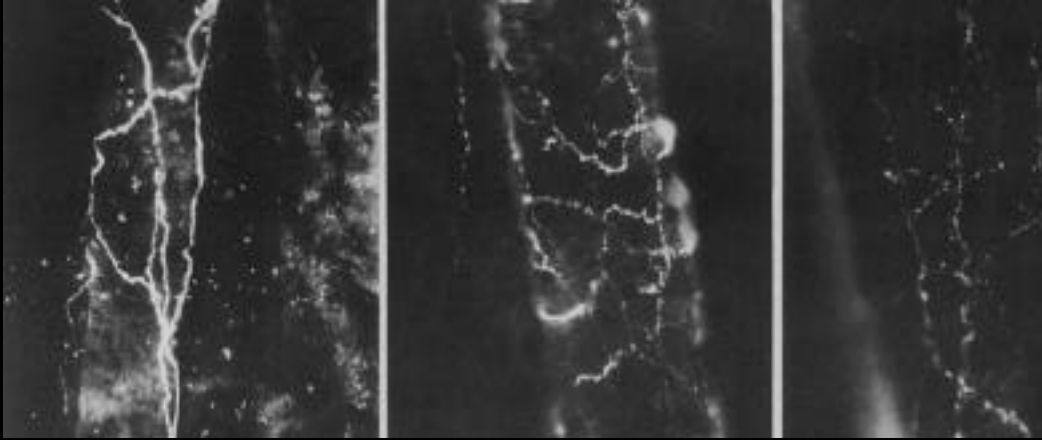
Sympathetic Innervation of CNS Blood Vessels



NE (fast, short acting)
&
NPY (slow, longer lasting)

From Wilson-Pauwels, 1997

Artery

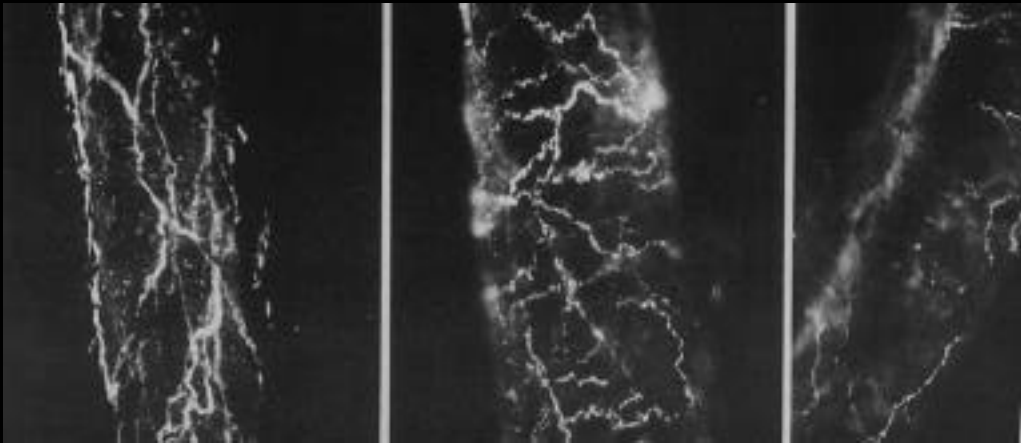


NE

VIP

SP

Vein



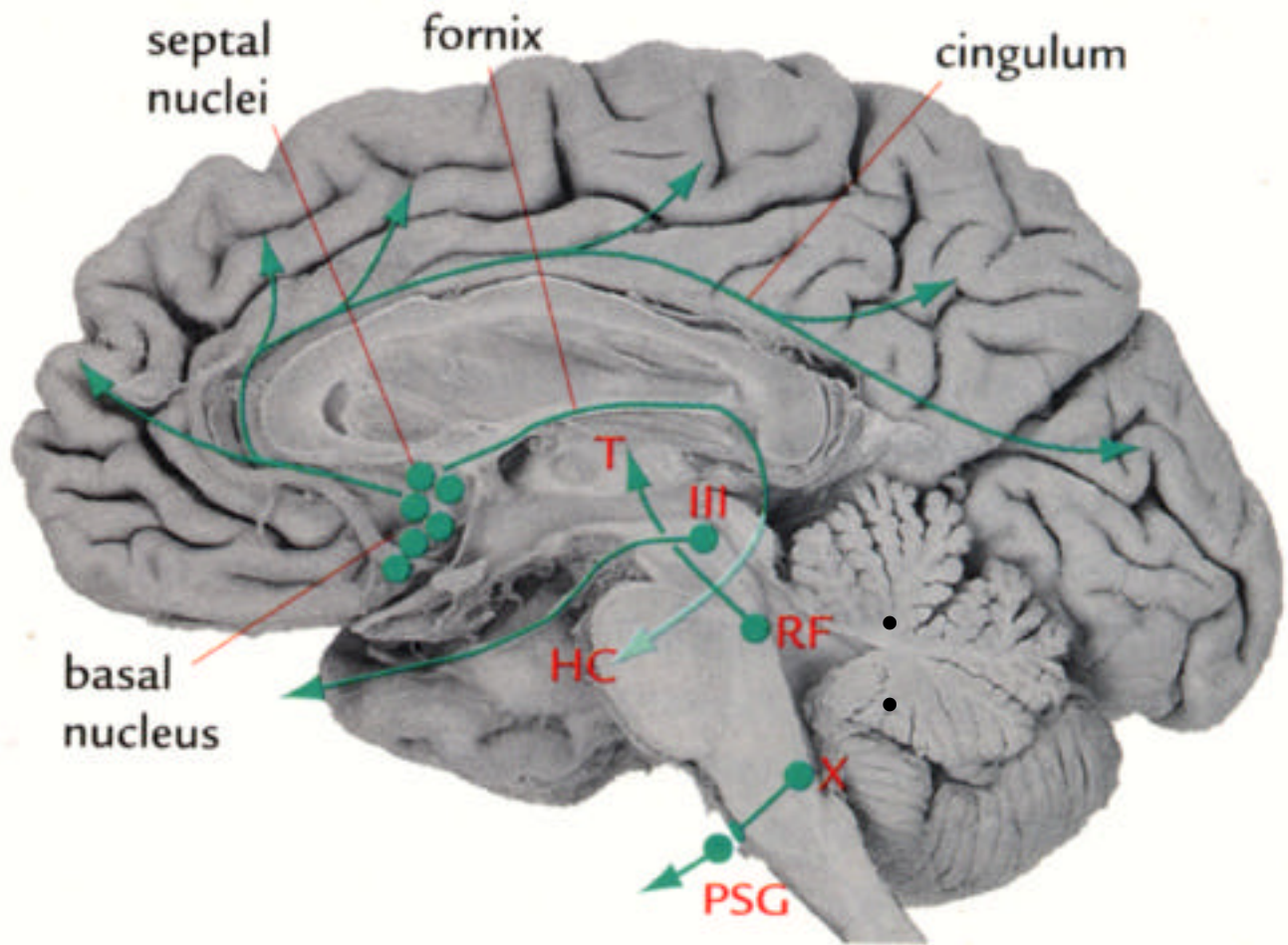
NE

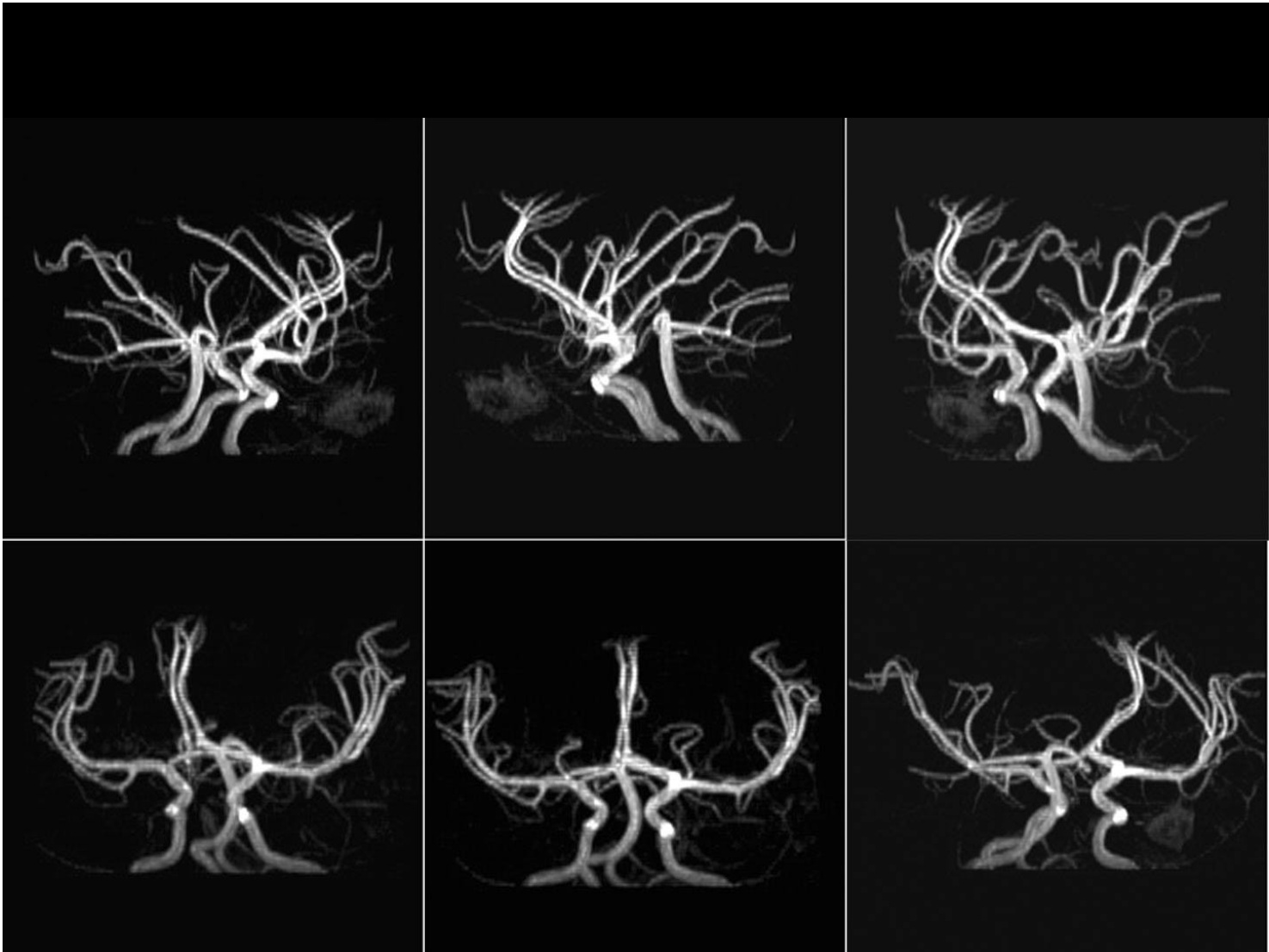
VIP

SP

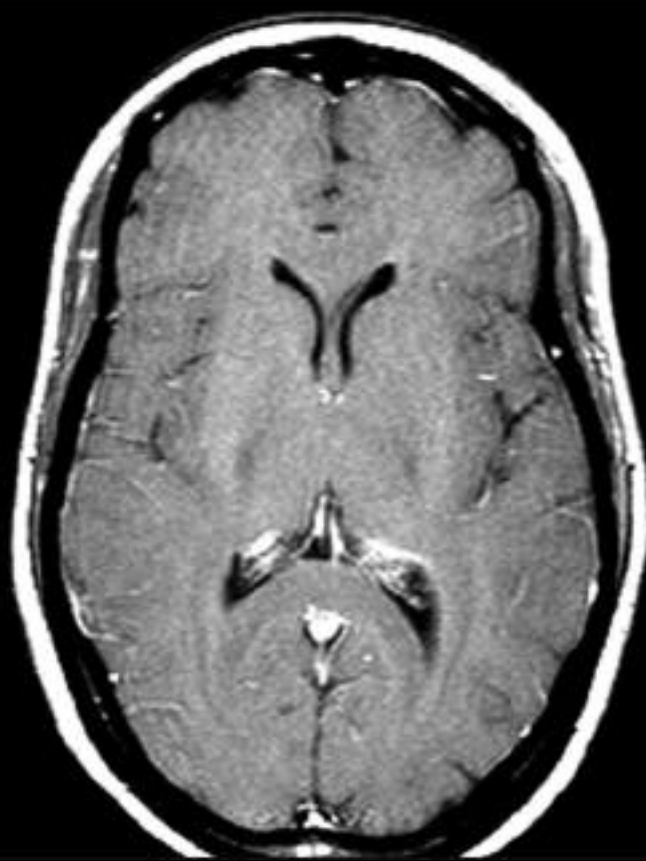
From Edvinsson, 1993

Cholinergic Nuclei and Projections





T1



T2

