

BLOOD SUPPLY OF THE HUMAN BRAIN AND SPINAL CORD

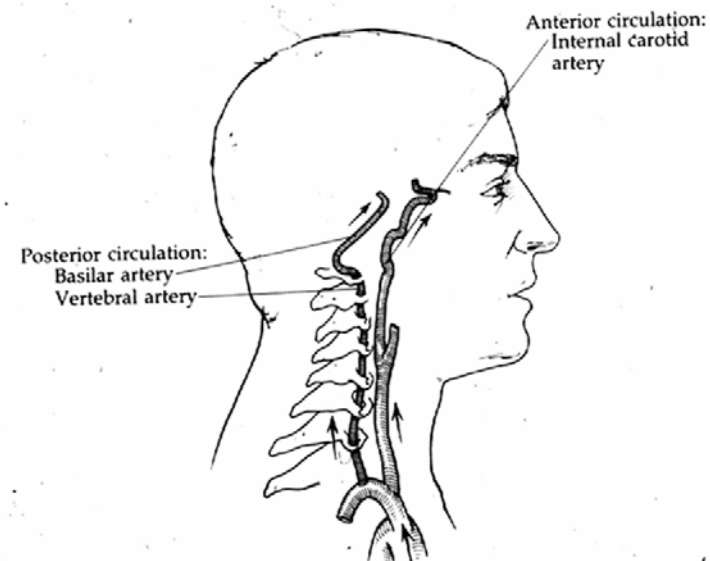
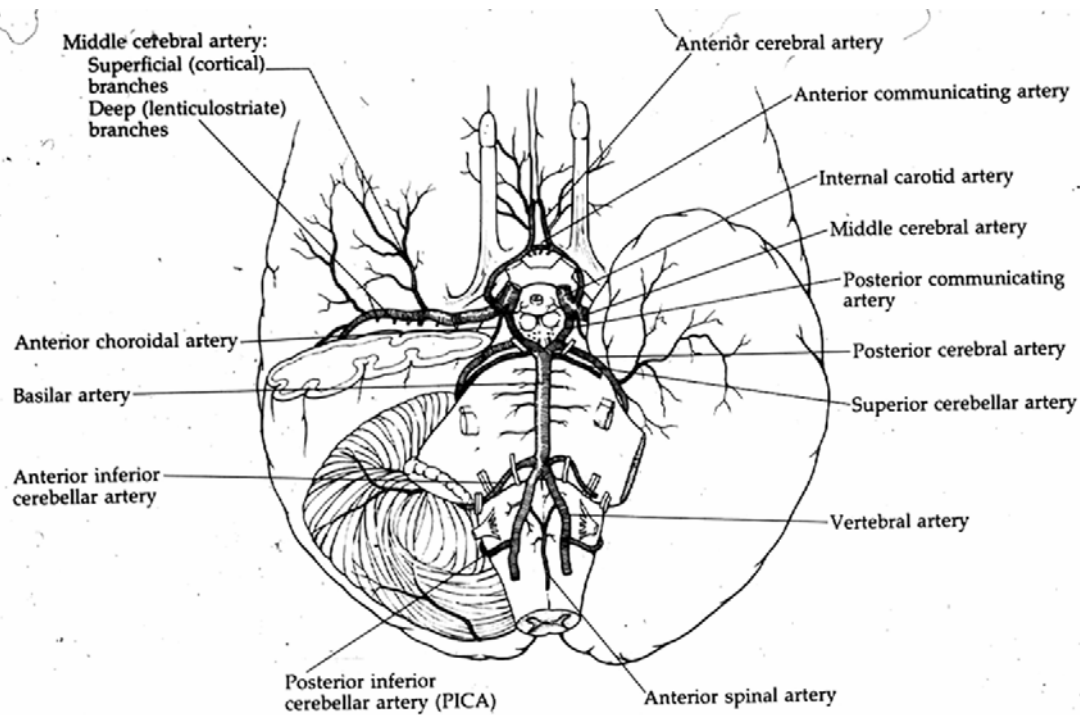
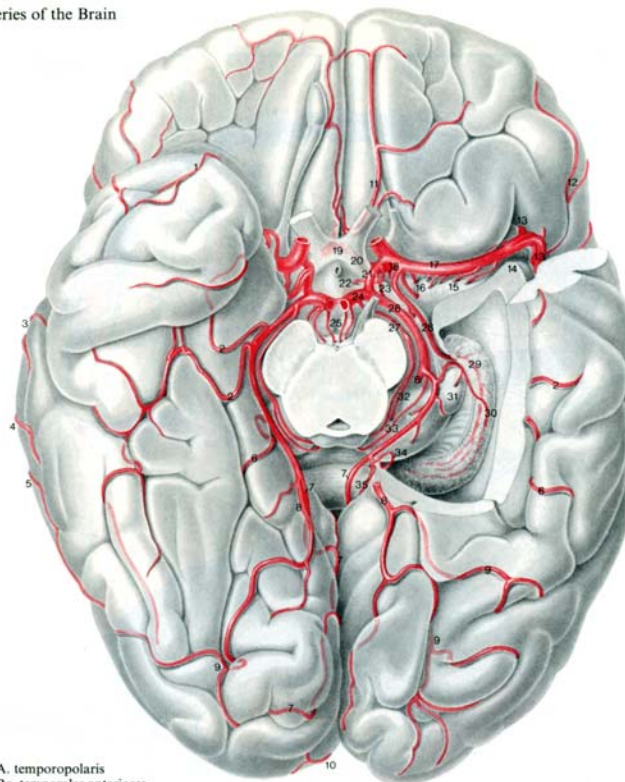


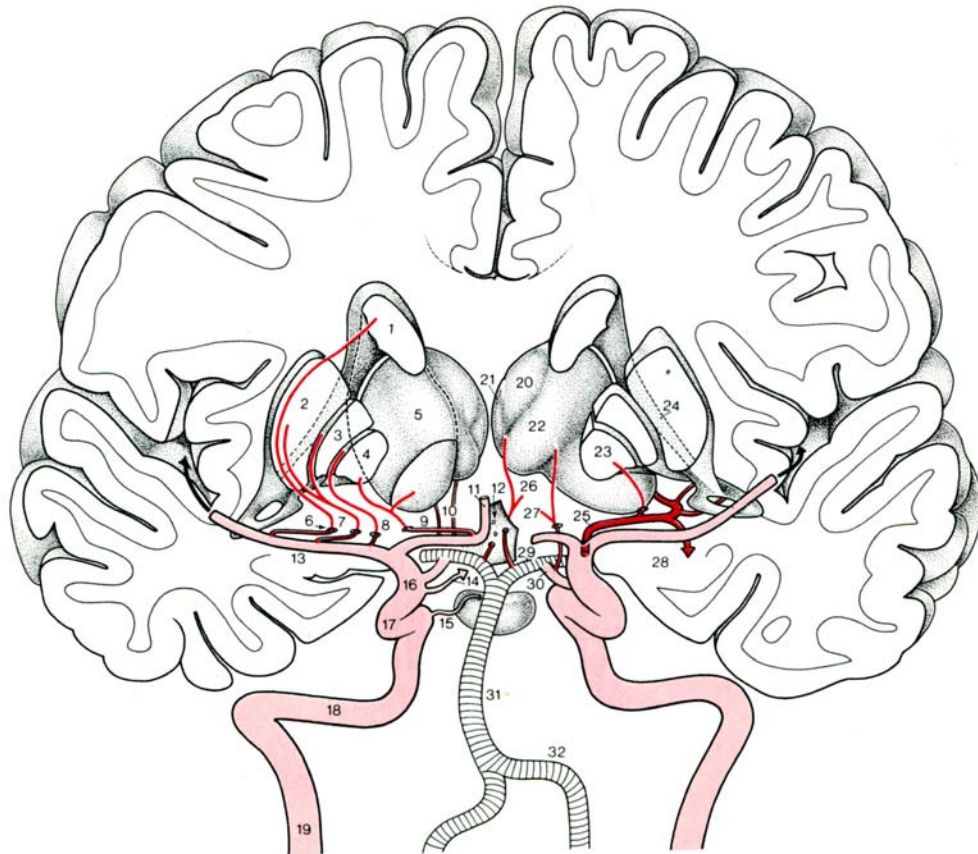
Figure 4.1 Diagram of the ventral surface of brain stem and cerebral hemispheres illustrating the key components of the anterior (carotid) circulation and the posterior (vertebral-basilar) circulation. The anterior portion of the temporal lobe is removed to illustrate the course of the middle cerebral artery through the lateral (Sylvian) fissure and the penetrating branches (lenticulostriate arteries). The circle of Willis is formed by the anterior communicating artery, the two posterior communicating arteries, and the three cerebral arteries. Inset shows the extracranial and cranial courses of the vertebral, basilar, and carotid arteries.

Arteries of the Brain



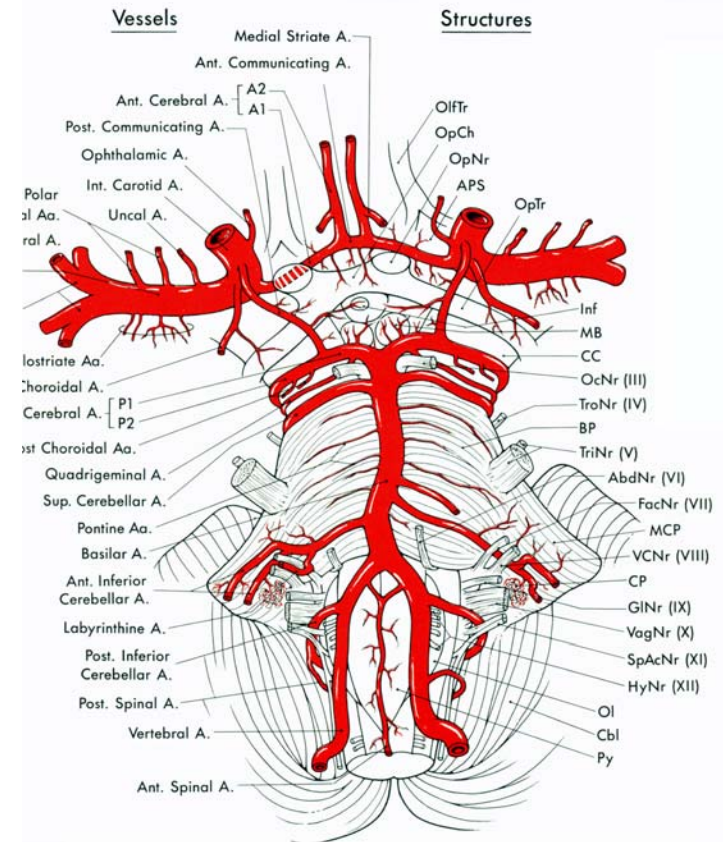
- 1 A. temporopolaris
- 2 Rr. temporales anteriores
- 3 A. temporalis anterior
- 4 A. temporalis intermedia
- 5 A. temporalis posterior
- 6 R. temporalis intermedialis medialis
- 7 A. occipitalis medialis
- 8 A. occipitalis lateralis
- 9 Rr. temporales posteriores
- 10 R. calcarinus (Ae. occipitalis medialis)
- 11 A. frontobasalis medialis
- 12 A. frontobasalis lateralis
- 13 A. cerebri media, pars insularis
- 14 Limen insulae
- 15 Aa. centrales anterolaterales, Rr. laterales
- 16 Aa. centrales anterolaterales, Rr. mediales
- 17 A. cerebri media, pars sphenoidalis
- 18 Aa. centrales anteromediales
- 19 A. communicans anterior
- 20 A. cerebri anterior, pars precommunicalis

- 21 A. communicans posterior
 - 22 R. hypothalamicus
 - 23 R. thalamicus (anteroinferior)
 - 24 A. cerebri posterior, pars precommunicalis
 - 25 Aa. centrales posteromediales
 - 26 A. cerebri posterior, pars postcommunicalis
 - 27 R. choroidea posterior medialis
 - 28 A. choroidea anterior
 - 29 Rr. choroidei Ae. choroideae anteriores
 - 30 R. choroidea posterior lateralis
 - 31 Corpus geniculatum laterale
 - 32 R. thalamicus (inferior)
 - 33 R. thalamicus (posterior)
 - 34 R. thalamicus (superior)
 - 35 R. corporis callosi dorsalis
- 19 + 20 + 21 + 24 Circulus arteriosus (left half)



- 1 Nucleus caudatus
- 2 Putamen
- 3 Globus pallidus, pars lateralis
- 4 Globus pallidus, pars medialis
- 5 Thalamus
- 6 Substantia perforata anterior
- 7 Aa. centrales anterolaterales, Rr. laterales
- 8 Aa. centrales anterolaterales, Rr. mediales
- 9 A. centralis longa (Heubneri)
- 10 Aa. centrales anteromediales
- 11 A. cerebri anterior
- 12 Substantia perforata posterior
- 13 A. cerebri media, pars sphenoidalis
- 14 A. hypophysialis superior
- 15 A. hypophysialis inferior
- 16 A. carotis interna, pars cerebralis
- 17 A. carotis interna, pars cavernosa (carotissiphon)
- 18 A. carotis interna, pars petrosa
- 19 A. carotis interna, pars cervicalis

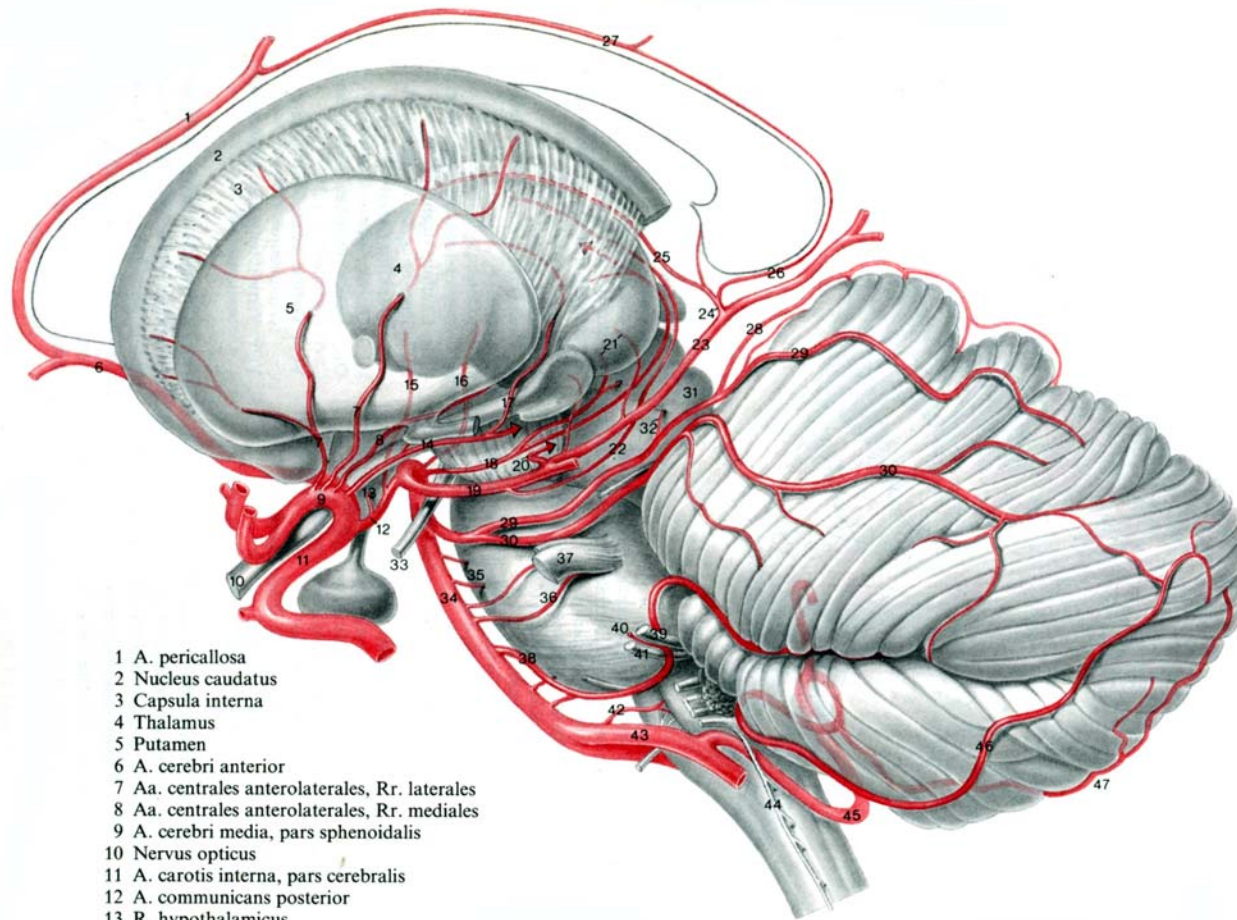
- 20 Nucleus dorsomedialis thalami
- 21 Nucleus medialis thalami
- 22 Nucleus anterior thalami
- 23 Globus pallidus, pars medialis
- 24 Cauda nuclei caudati
- 25 A. choroidea anterior
- 26 Subthalamic area;
Aa. centrales posteromediales
- 27 Hypothalamic area;
R. hypothalamicus
- 28 Corpus amygaloideum
- 29 A. cerebri posterior
- 30 A. communicans posterior
- 31 A. basilaris
- 32 A. vertebralis



- Vessels**
- A Artery
 - a Arteries
 - r Abducens Nerve (Cranial Nerve VI)
 - S Anterior Perforated Substance
 - P Basilar Pons
 - l Cerebellum
 - Cr Crus Cerebri
 - f Choroid Plexus
 - r Facial Nerve (Cranial Nerve VII)
 - r Forx
 - r Glossopharyngeal Nerve (Cranial Nerve IX)
 - r Hypoglossal Nerve (Cranial Nerve XII)
 - Inf Inferior Colliculus
 - f Infundibulum
 - l Lateral Geniculate Body
 - S Lateral Olfactory Stria
 - M Mammillary Body
 - P Middle Cerebellar Peduncle (Brachium Pontis)
 - l Medial Geniculate Body

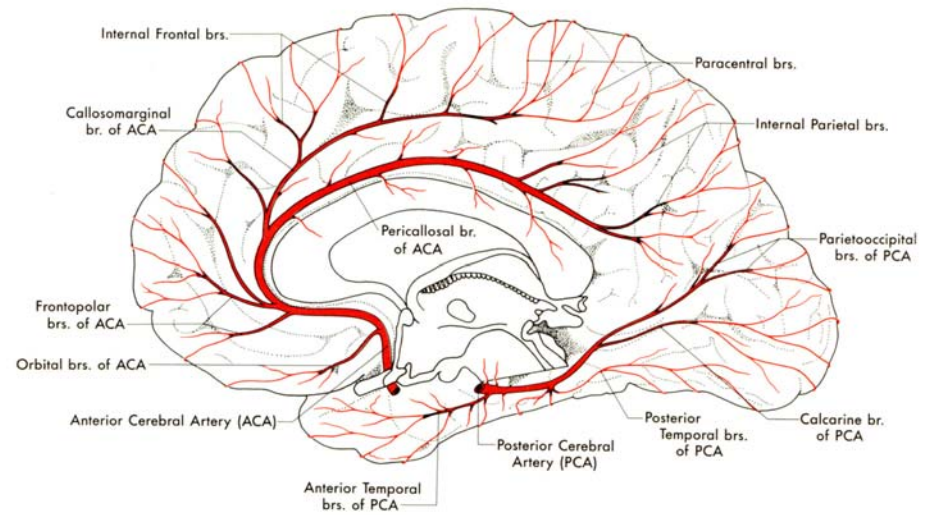
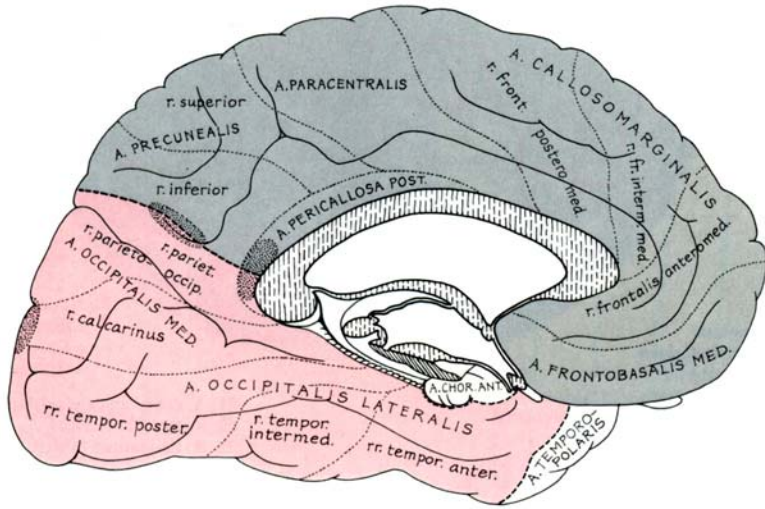
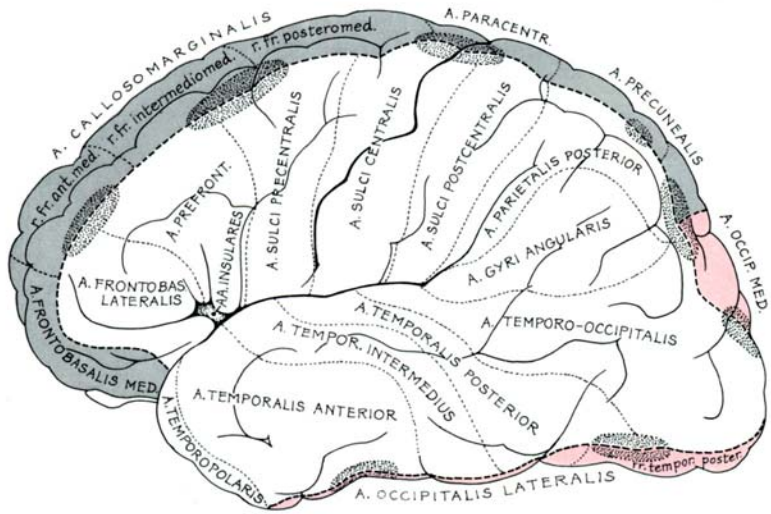
Abbreviations

- Structures**
- OcNr Oculomotor Nerve (Cranial Nerve III)
 - OI Olive (Inferior)
 - OlfTr Olfactory Tract
 - OpCh Optic Chiasm
 - OpNr Optic Nerve (Cranial Nerve II)
 - OpTr Optic Tract
 - Py Pyramid
 - RB Restiform Body
 - SC Superior Colliculus
 - SCP Superior Cerebellar Peduncle (Brachium Coniunctivum)
 - SpAcNr Spinal Accessory Nerve (Cranial Nerve XII)
 - TrNr Trigeminal Nerve (Cranial Nerve V)
 - TroNr Trochlear Nerve (Cranial Nerve IV)
 - TubCu Tuberculum Cuneatum (Cuneate Tubercle)
 - TubGr Tuberculum Gracile (Gracile Tubercle)
 - VagNr Vagus Nerve (Cranial Nerve X)
 - VCNr Vestibulocochlear Nerve (Cranial Nerve VIII)
 - Ven Ventricle

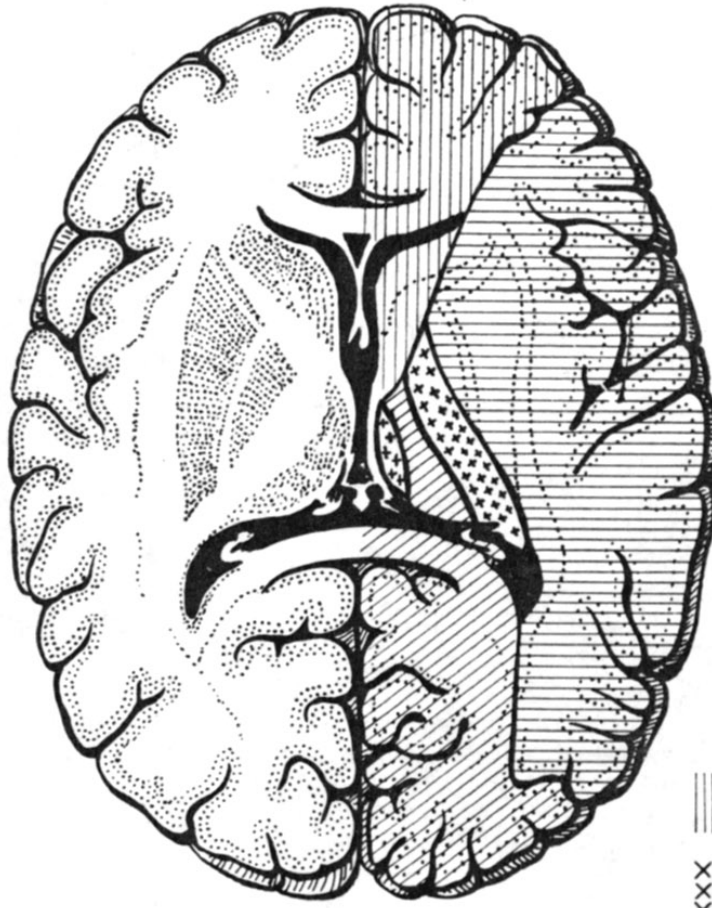


- 1 A. pericallosa
- 2 Nucleus caudatus
- 3 Capsula interna
- 4 Thalamus
- 5 Putamen
- 6 A. cerebri anterior
- 7 Aa. centrales anterolaterales, Rr. laterales
- 8 Aa. centrales anterolaterales, Rr. mediales
- 9 A. cerebri media, pars sphenoidalis
- 10 Nervus opticus
- 11 A. carotis interna, pars cerebralis
- 12 A. communicans posterior
- 13 R. hypothalamicus
- 14 A. choroidea anterior
- 15 R. thalamicus (anteroinferior)
- 16 Aa. centrales posteromediales

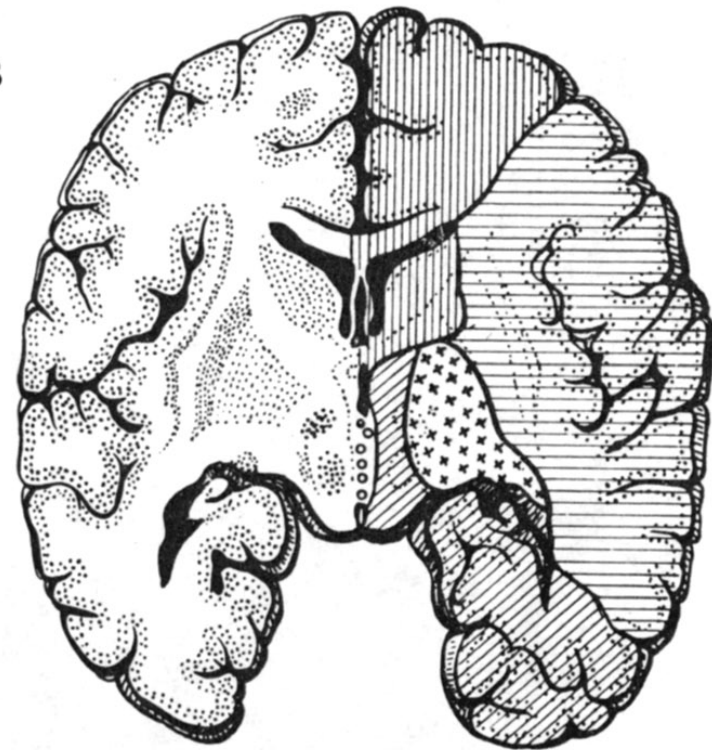
- 17 R. capsulae internae (R. thalamicus lateroinferior)
- 18 R. choroideus posterior medialis
- 19 A. cerebri posterior, pars postcommunicalis
- 20 R. choroideus posterior lateralis
- 21 Rr. thalamici (posteroinferiores)
- 22 R. thalamicus (posterior)
- 23 A. occipitalis medialis
- 24 A. cingulothalamica
- 25 R. thalamicus (superior)
- 26 R. corporis callosi dorsalis (anastomosing with 27)
- 27 A. pericallosa, R. posterior
- 28 A. vermis superior
- 29 A. cerebelli superior, R. medialis
- 30 A. cerebelli superior, R. lateralis
- 31 Colliculus inferior
- 32 R. mesencephalicus
- 33 Nervus oculomotorius
- 34 A. basilaris
- 35 Aa. pontis mediales
- 36 Aa. pontis laterales
- 37 Nervus trigeminus
- 38 A. cerebelli inferior anterior
- 39 Nervus vestibulocochlearis
- 40 A. labyrinthi
- 41 Nervus facialis
- 42 Rr. medullares
- 43 A. vertebralis
- 44 Radix spinalis nervi accessorii
- 45 A. cerebelli inferior posterior
- 46 A. cerebelli inferior posterior, R. lateralis
- 47 A. cerebelli inferior posterior, R. medialis



A



B

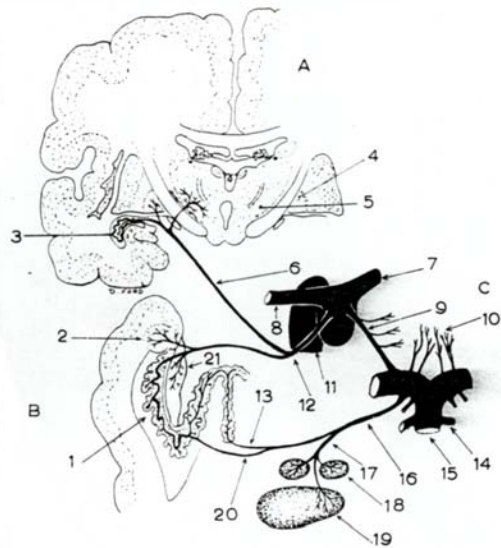


	<i>a. cerebri ant.</i>	≡≡≡	<i>a. cerebri media</i>	////	<i>a. cerebri post.</i>
xxx	<i>chorioideal</i>			ooo	<i>a. basilaris</i>
xxx	<i>(a. cerebri med. et. post.)</i>				

Blood supply of the forebrain in horizontal (A) and a posterior coronal section (B)

ARTERIA CHOROIDEA ANTERIOR

ARTERIA CHOROIDEA POSTERIOR



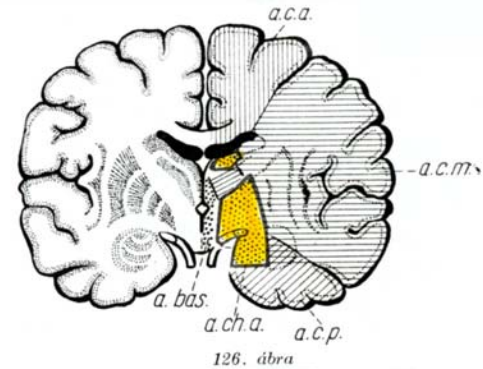
Diagrammatic representation of the distribution of the various branches of arteria choroidea anterior.

A, Coronal section through the brain at the level of nucleus ventralis thalami intermedius.
 B, Horizontal section through the lobus temporalis to demonstrate the vascular branches of arteria choroidea anterior to the amygdala (2), choroid plexus in the inferior cornu of Ventriculus lateralis (1) and gyrus parahippocampalis (21).

C, Arterial stems for vascular supply.

D, Thalamus.

1, Cornu inferius of Ventriculus lateralis with choroid plexus; 2, Amygdala; 3, Cornu inferius of ventriculus lateralis with choroid plexus; 4, Medial division of globus pallidus; 5, Nucleus ventralis thalami intermedius; 6, Branch of arteria choroidea anterior to choroid plexus, medial division of globus pallidus, nucleus ventralis thalami intermedius and the nuclei interlaminares thalami; 7, Arteria cerebri anterior; 8, Arteria cerebri media; 9, Proximal stem of arteria cerebri posterior (arteria communicans posterior) with thalamic perforators; 10, Posteromedial perforators to the tegmentum mesencephali; 11, Arteria carotis interna; 12, Arteria choroidea anterior; 13, Branch of arteria choroidea posterior to the choroid plexus of ventriculus tertius; 14, Arteria cerebelli superior; 15, Arteria basilaris; 16, Choroidal-diencephalic artery giving rise to the arteria choroidea posterior (13) as well as rami to the diencephalon; 17, Diencephalic ramus going to the geniculate bodies and caudal thalamus; 18, Metathalamus (corpus geniculatum mediale et corpus geniculatum laterale); 19, Caudal thalamus (nucleus ventralis posterior and the pulvinar); 20, Branch of arteria choroidea posterior to the choroid plexus of ventriculus lateralis; 21, Gyrus parahippocampalis.



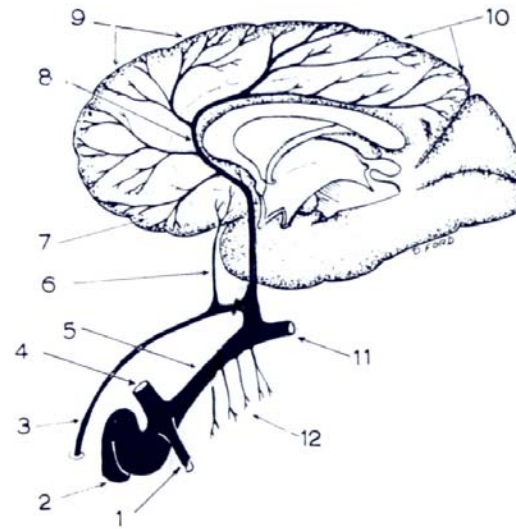
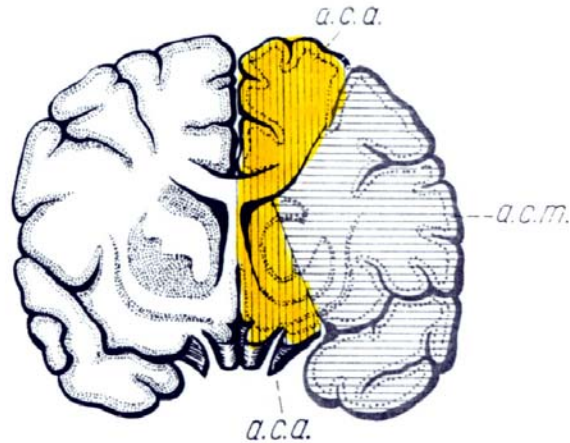
DAMAGE

int. capsule, thalamus (ventrolat), CGL, fasc. geniculocooc.

SYNDROMS

hemiparesis (c),
 hemihypesth. (c),
 hyperpathia, upper
 quadrant hemianopsia

ARTERIA CEREBRI ANTERIOR



ARTERY

a. cerebri ant.
 enda. calloso-
 marginal

a. rec. Heubner

DAMAGED STRUCTURES

lobulus paracentr.
 corpus call., int.
 capsule, frontopolar r.

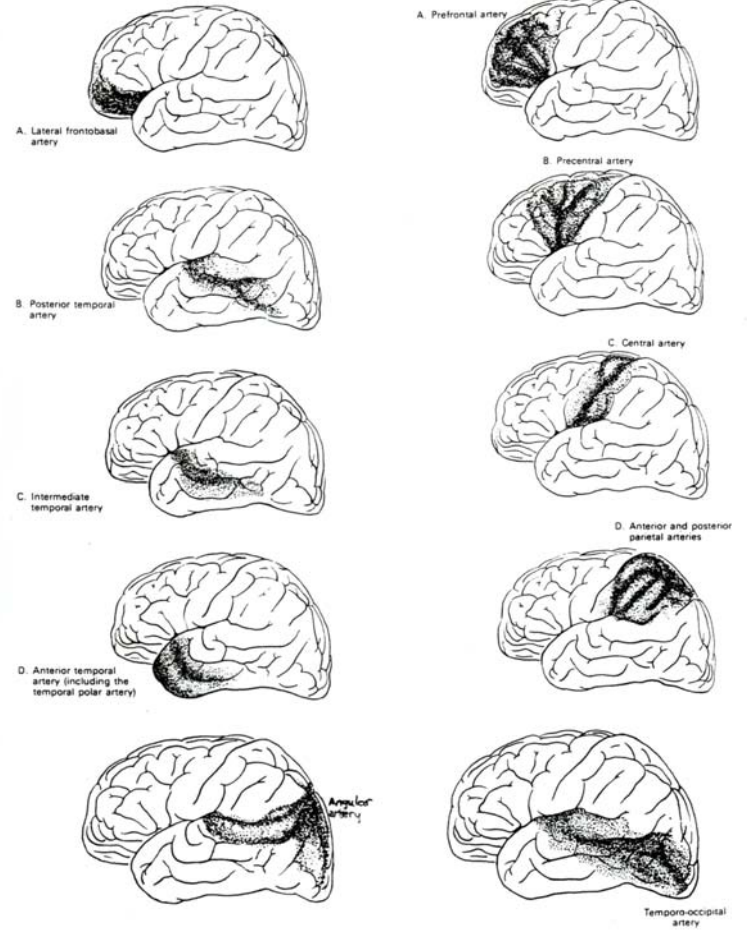
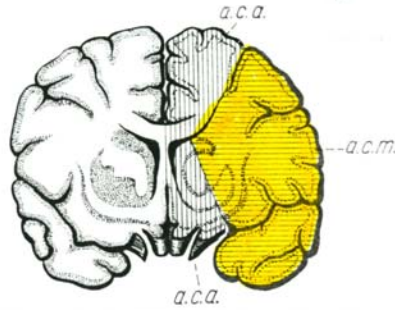
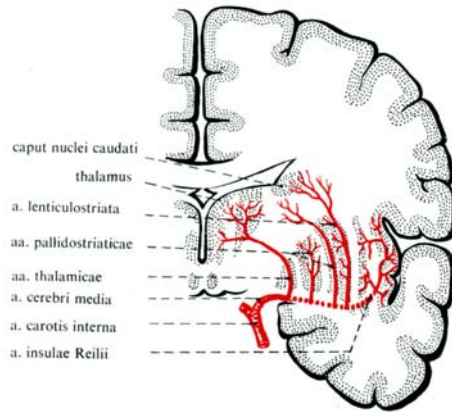
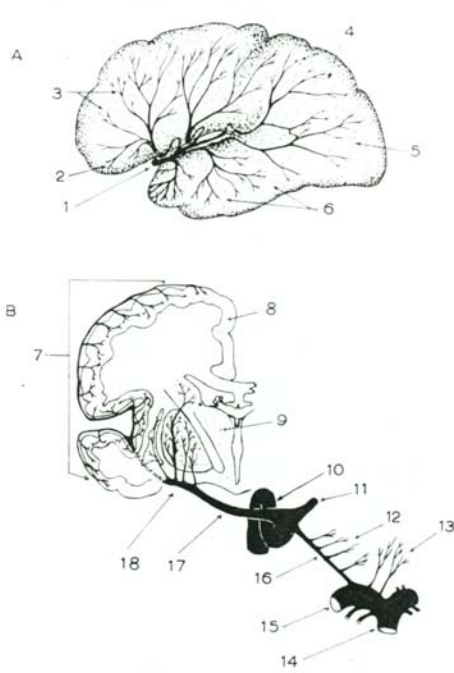
head of n. caudate, ant.
 p. int. capsule, mediorostral
 r. of putamen and pallidum

SYMPTOMS

lower extrem. paresis (c)
 anuria, apraxia, mental
 confusion, slowness of thoughts

1. proximal stem a. cer. post. (a. comm. post); 2. a. carotis int.; 3. a. striatica med. (Heubner); 4. a. cerebri med.; 5. a. cerebri ant.; 6. r. a. striata med. to septum; 7. rr. orbitales; 8. pericallosal stem of the rami corticales; 9. rr. frontales; 10. rr. parietales; 11. a. communicans ant.; 12. proximal perf. to preoptic area

ARTERIA CEREBRIA MEDIA



ARTERY

DAMAGE

cortical	prerolandica	Broca area	motor aphasia (d)
	Rolandica	g. cent. ant.	faciobrachial paresis (c)
deep	parietalis ant.	g. centralis ant.	deep and sup. sensation (c)
	parietal post.	g. angularis	alexia, agraphia, acalc. (d)
	temp. ant.	Wernicke area	sensory aphasia (d)
	lenticulostr.	internal capsule	hemiplegia (c)
	pallidal. ext.		*Gerstmann's syndrome

Sketch depicting the distribution of the various branches of arteria cerebri media.

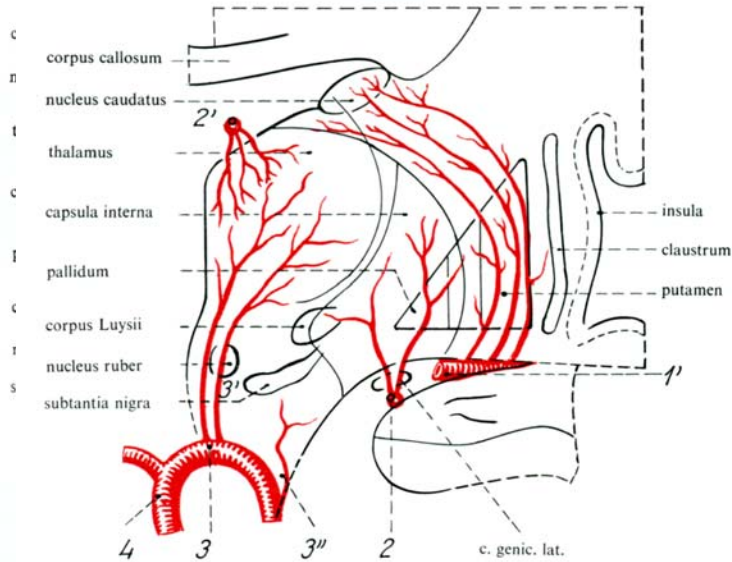
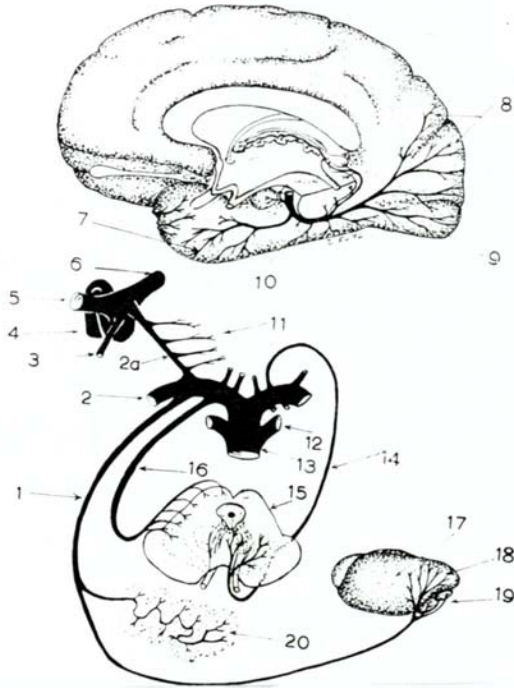
A. Lateral view of the cerebral hemisphere illustrating the distribution of the rami corticales of arteria cerebri media.

1, Arteria cerebri media; 2, Rami orbitales; 3, Rami frontales; 4, Rami parietales; 5, Rami occipitales; 6, Rami temporales.

B. Coronal section through the cerebrum to demonstrate the deep nuclear distribution of vessels arising from arteria cerebri media.

7, Rami corticales, terminating as functional end arteries; 8, Cerebral cortex; 9, Diencephalon; 10, Arteria carotis interna; 11, Arteria cerebri anterior (stem); 12, Diencephalic perforators arising from the proximal stem of arteria cerebri posterior (arteria communicans posterior); 13, Posteromedial perforators to the tegmentum mesencephali; 14, Arteria basilaris, rostral end only; 15, Arteria cerebri posterior; 16, Proximal stem of arteria cerebri posterior (arteria communicans posterior); 17, Arteria cerebri media; 18, Rami striati (lenticulostr. arteries).

ARTERIA CEREBRI POSTERIOR



ARTERY

parieto-occip.
calcarina
temp. post.

thalamoperf.
retromammillarica
chorioidea post.
thalamogeniculate

DAMAGE

cuneus, praecuneus
g. lingualis

thalamus (posteromed)
hypothalamus

SYNDROMS

homonym hemianopsia (c)
agraphia (d) optic agnosia (d)
alexia (d)

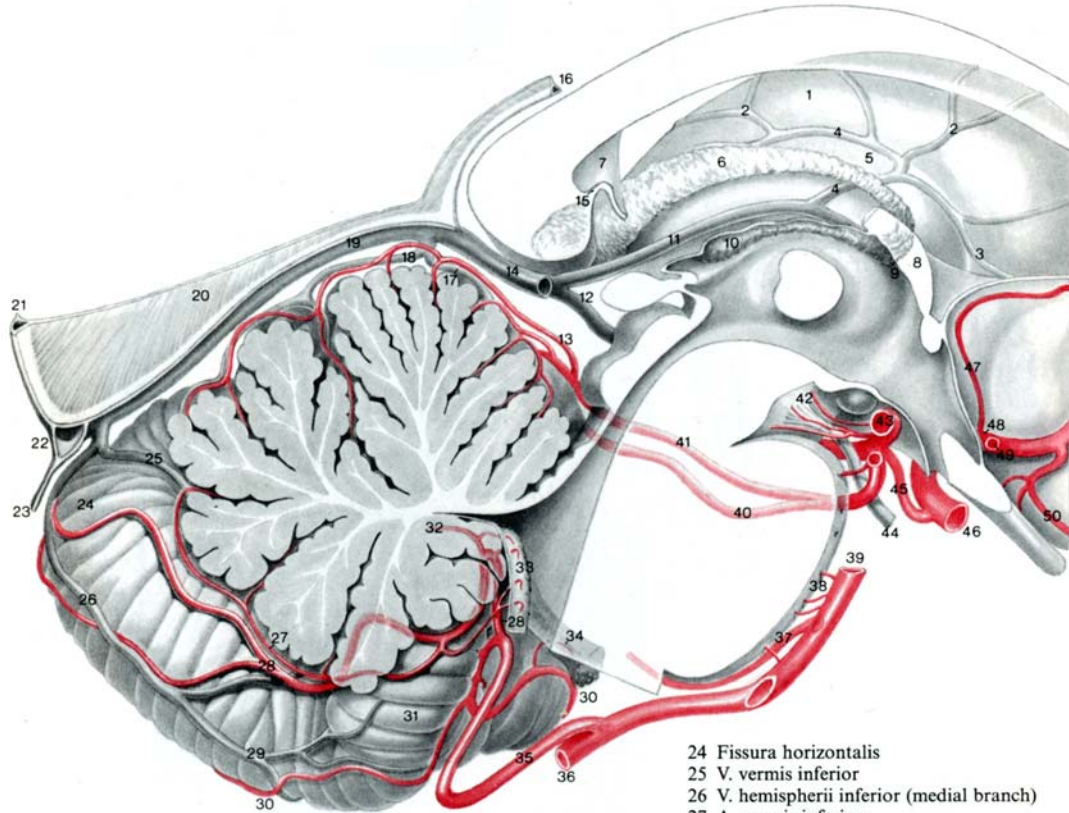
hemihyesthesia (c) hyper-
pathia (c) ataxia (c),
thalamus syndrome
hemiparesis (c)

Diagrammatic representation of the distribution of arteria cerebri posterior.

1, Choroidal-diencephalic artery to the choroid plexus and thalamus; 2, Arteria cerebri posterior; 2a, Proximal stem of arteria cerebri posterior (arteria communicans posterior); 3, Arteria chorioidea anterior; 4, Arteria carotis interna; 5, Arteria cerebri media; 6, Arteria cerebri anterior; 7, Rami temporales; 8, Rami parieto-occipitales; 9, Rami occipitales; 10, Arteria cerebri posterior; 11, Perforators from the proximal stem of arteria cerebri posterior to the ventral aspect of the diencephalon; 12, Arteria cerebelli superior; 13, Arteria basilaris; 14, Posteromedial perforators from the arteria mesencephalica to the tegmentum mesencephali; 15, Mesencephalon (coronal plane); 16, Ramus ad tectum mesencephali with branches to the lateral aspect of the mesencephalon (may be more than one branch); 17, Diencephalon; 18, Pulvinar of diencephalon; 19, Geniculate bodies; 20, Choroid plexus.

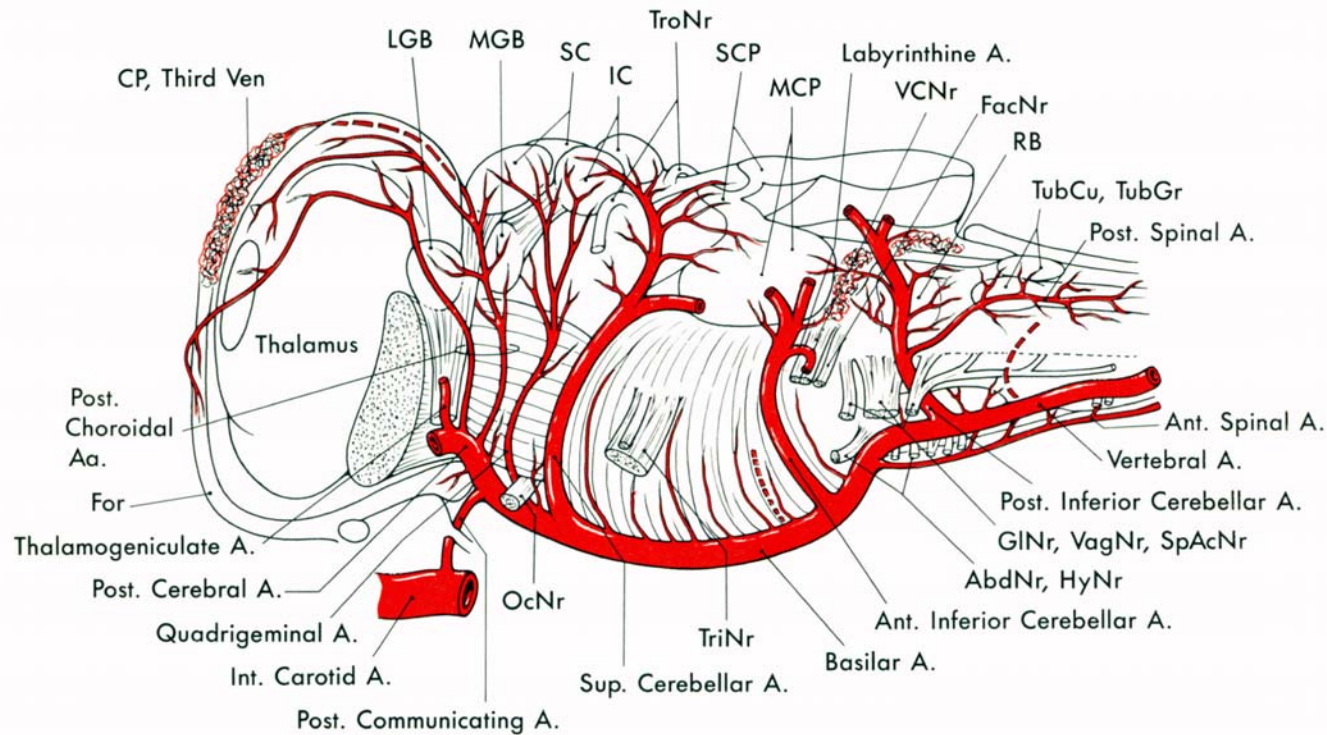
Schematic representation
of the blood supply of the basal ganglia.

1: a. cer. med.; 2,2': a. chorioidea ant.;
3: a. cerebri post.; 3' a. thalamoperforans;
3'': a. thalamogeniculata; 4: a. basilaris



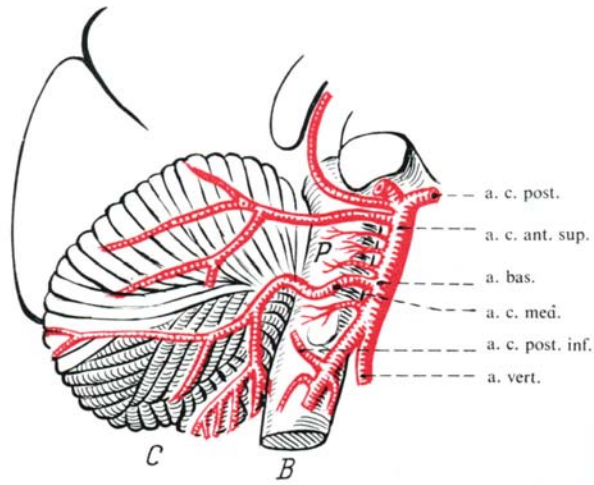
- 1 Nucleus caudatus (ventricular surface)
- 2 Vv. nuclei caudati
- 3 V. septi pellucidi anterior
- 4 V. thalamostriata superior
- 5 Lamina affixa
- 6 Plexus choroideus ventriculi lateralis
- 7 Septum pellucidum
- 8 Fornix
- 9 Foramen interventriculare
- 10 Plexus choroideus ventriculi tertii
- 11 V. cerebri interna
- 12 V. basalis
- 13 A. vermis superior
- 14 V. cerebri magna
- 15 Commissura fornicis
- 16 Sinus sagittalis inferior
- 17 V. precentralis cerebelli
- 18 V. vermis superior
- 19 Sinus rectus
- 20 Falx cerebri
- 21 Sinus sagittalis superior
- 22 Confluens sinuum
- 23 Sinus occipitalis

- 24 Fissura horizontalis
- 25 V. vermis inferior
- 26 V. hemispherii inferior (medial branch)
- 27 A. vermis inferior
- 28 A. cerebelli inferior posterior, R. medialis
- 29 Retrotonsillar veins
- 30 A. cerebelli inferior posterior, Rr. laterales
- 31 Tonsilla cerebelli
- 32 R. tonsillae (of 35)
- 33 Rr. choroidei ventriculi quarti (of 35)
- 34 R. recessus lateralis ventriculi quarti (of 35)
- 35 A. cerebelli inferior posterior
- 36 A. vertebralis
- 37 A. cerebelli inferior anterior
- 38 Aa. pontis, Rr. mediales
- 39 A. basilaris
- 40 A. cerebelli superior, R. lateralis
- 41 A. cerebelli superior, R. medialis
- 42 Aa. centrales posteromediales
- 43 A. cerebri posterior, pars precommunicalis
- 44 Nervus oculomotorius
- 45 A. communicans posterior
- 46 A. carotis interna
- 47 A. mediana corporis callosi
- 48 A. cerebri anterior, pars precommunicalis
- 49 A. communicans anterior
- 50 A. frontobasalis medialis

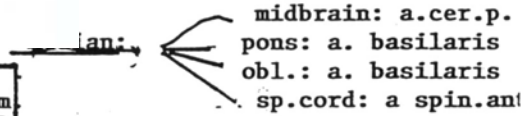


Abbreviations

A	Artery	OcNr	Oculomotor Nerve (Cranial Nerve III)
Aa	Arteries	OI	Olive (Inferior)
AbdNr	Abducens Nerve (Cranial Nerve VI)	OlfTr	Olfactory Tract
APS	Anterior Perforated Substance	OpCh	Optic Chiasm
BP	Basilar Pons	OpNr	Optic Nerve (Cranial Nerve II)
Cbl	Cerebellum	OpTr	Optic Tract
CC	Crus Cerebri	Py	Pyramid
CP	Choroid Plexus	RB	Restiform Body
FacNr	Facial Nerve (Cranial Nerve VII)	SC	Superior Colliculus
For	Fornix	SCP	Superior Cerebellar Peduncle (Brachium Conjunctivum)
GINr	Glossopharyngeal Nerve (Cranial Nerve IX)	SpAcNr	Spinal Accessory Nerve (Cranial Nerve XI)
HyNr	Hypoglossal Nerve (Cranial Nerve XII)	TriNr	Trigeminal Nerve (Cranial Nerve V)
IC	Inferior Colliculus	TroNr	Trochlear Nerve (Cranial Nerve IV)
Inf	Infundibulum	TubCu	Tuberculum Cuneatum (Cuneate Tubercle)
LGB	Lateral Geniculate Body	TubGr	Tuberculum Gracile (Gracile Tubercle)
LOlfS	Lateral Olfactory Stria	VagNr	Vagus Nerve (Cranial Nerve X)
MB	Mammillary Body	VCNr	Vestibulocochlear Nerve (Cranial Nerve VIII)
MCP	Middle Cerebellar Peduncle (Brachium Pontis)	Ven	Ventricle
MGB	Medial Geniculate Body		



Blood supply of the brainstem



paramedian

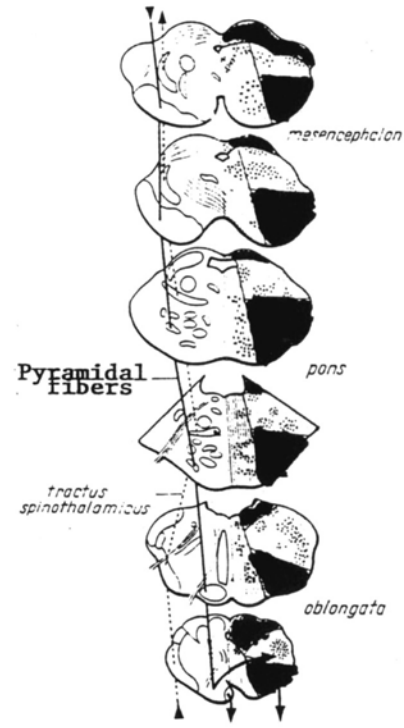
- midbrain - a. cer. post.
- pons - a. basilaris
- medulla - a. vertebralis
- sp. cord - a. spinalis ant.

lateral:

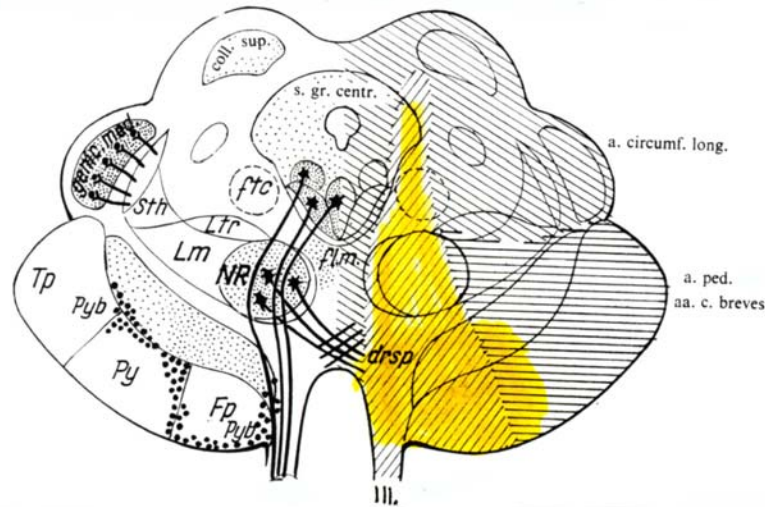
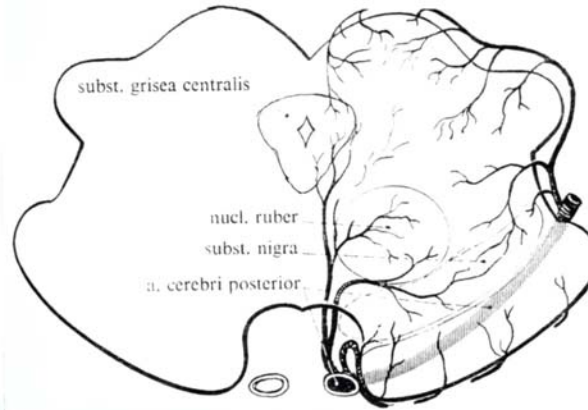
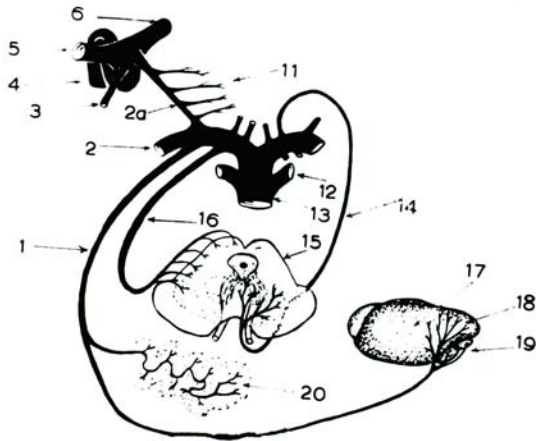
- midbrain - a. cer. post
- pons - aa. pontis (a. bas.)
- Medulla - rr. medullares (a. vert.)
- Spinal cord - a. spin. ant.

Dorsal

- midbrain - a. quadrigemina (a. cer. p)
- midbrain - r. chor. post (a. cer. pbs)
- pons - a. cerebelli sup; AICA
- medulla - r. medullares (a. vert)
- spinal cord - a. spinalis post.



ARTERIA CEREBRI POSTERIOR



ARTERY

paramed. rr.
to midbrain

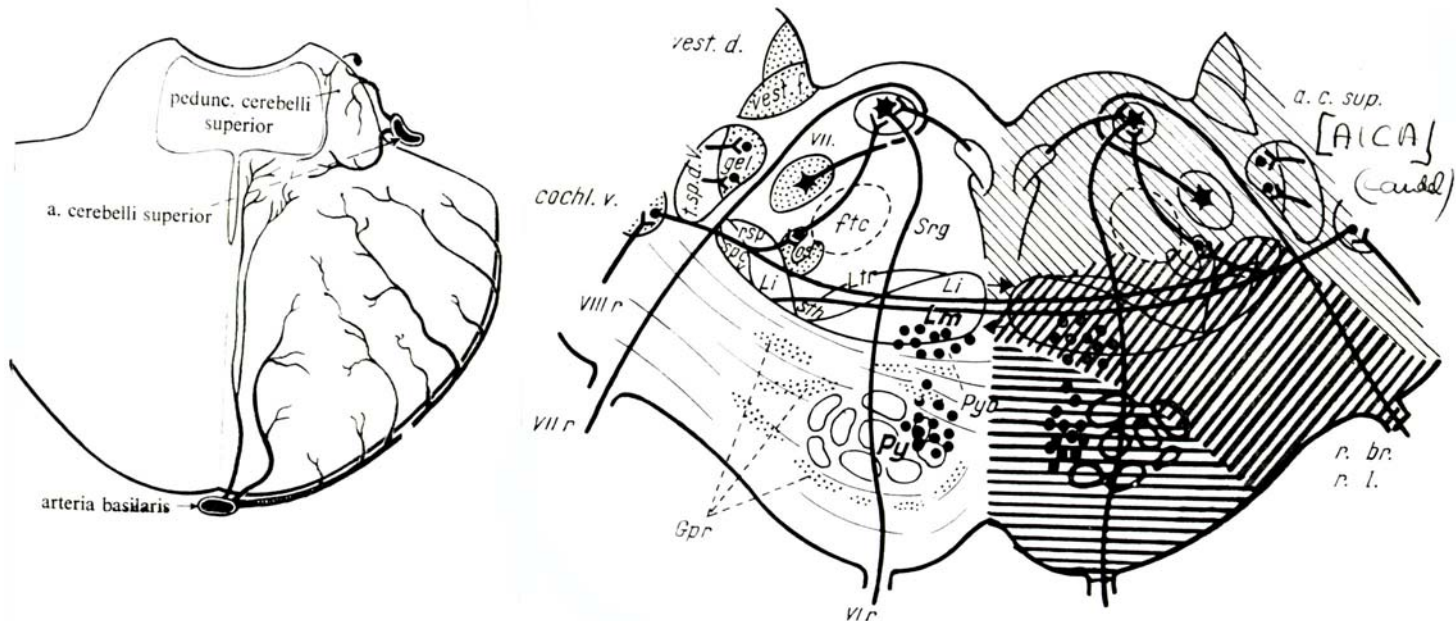
DAMAGE

pyramis, nIII., n. rub.
subst. nigra

SYNDROMS

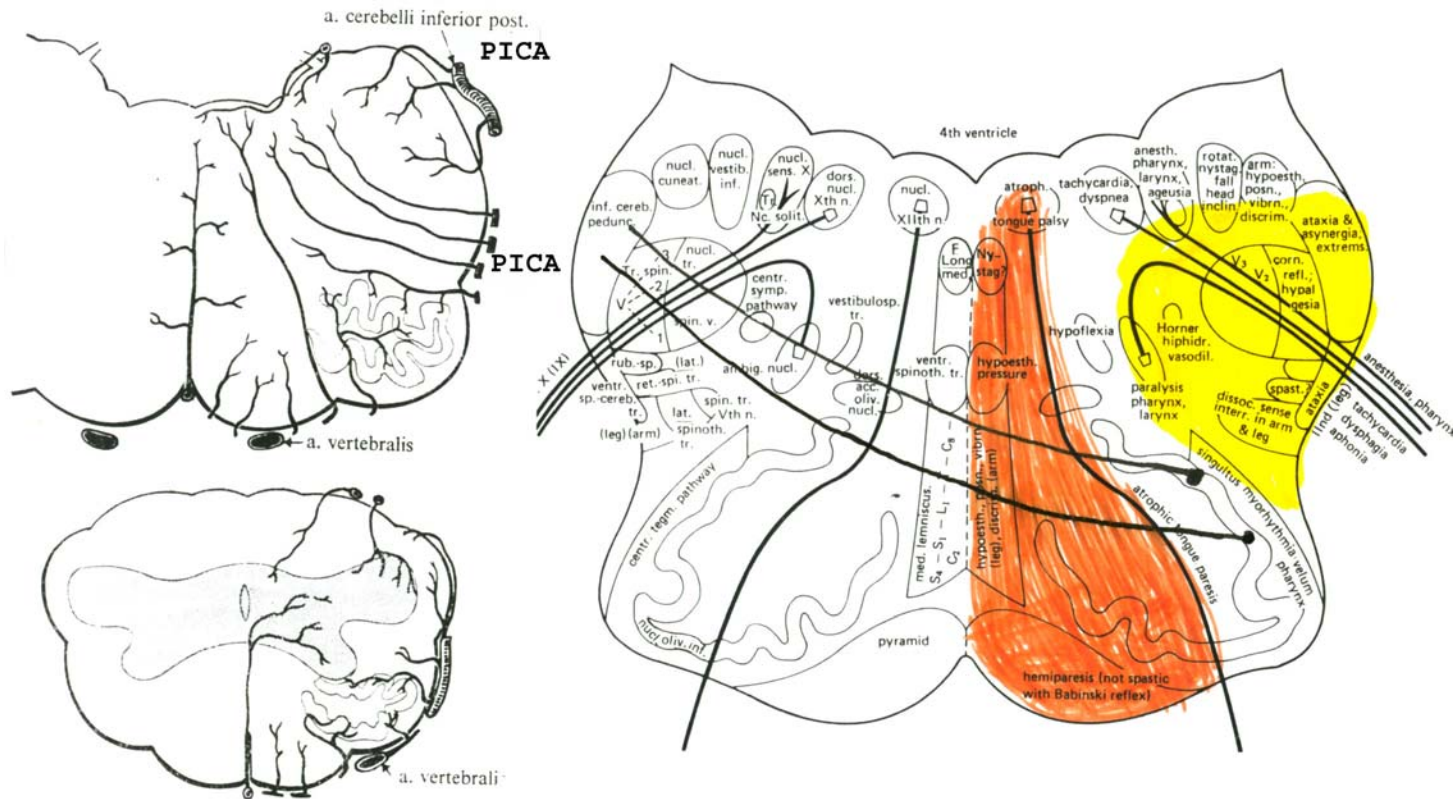
hemiplegia (c),
cerebellar ataxia,
akinesia (parkinsonism)
(i) with
ptosis, dilatation of pupil,
absent light reflex, outward
dev. of the eye
(Mediobasal mesencephalic syndrome of
Weber)

ARTERIA BASILARIS



ARTERY	DAMAGE	SYNDROMS
r. ad pontem (paramedian)	pyramis	hemiplegia (c)
r. ad pontem (circumf.)	tr. spinothalamicus medial lemniscus tr. spinocerebell.v. radix V.VI.VII.	hemihypaesthesia (c) hemiataxia (c) trigeminal, facial paresis (i) lateral pons syndrome
a. cereb. ant.inf. (AICA)	corpus restiforme (tr. spinocer.d) nucleus VI.	hemiataxia (i) atasia, hypotonia (i), int. tremor abducens paresis (i); par. conjugate gaze to the side of lesion; rostral ^{ponsine} tegmental syndrome
a. cereb.superior	corpus restiforme (tr. spinocer.d) nucleus VI., VII.	same as above, VI, VII paresis (i) caudal ^{ponsine} tegmental syndrome

ARTERIA VERTEBRALS



ARTERY

a. cerebelli
post. inf. (PICA)

a. spinalis ant.

DAMAGE

tr. desc. n. V., tr. spinoth.
corpus restiforme, n.
ambiguus., symp. praegang.
vestibular nuclei

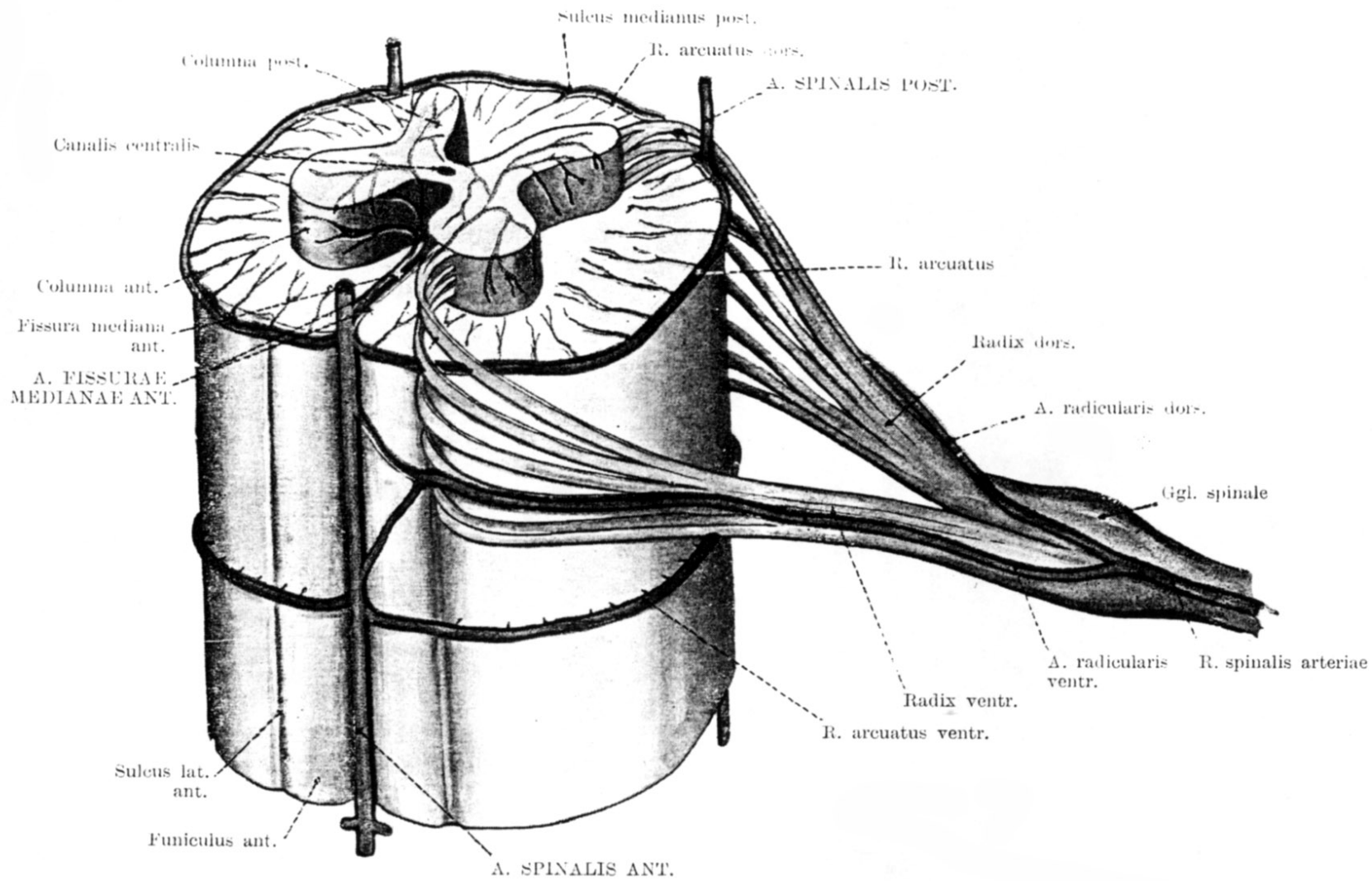
pyramis, medial lemniscus
nucleus or n. XII.

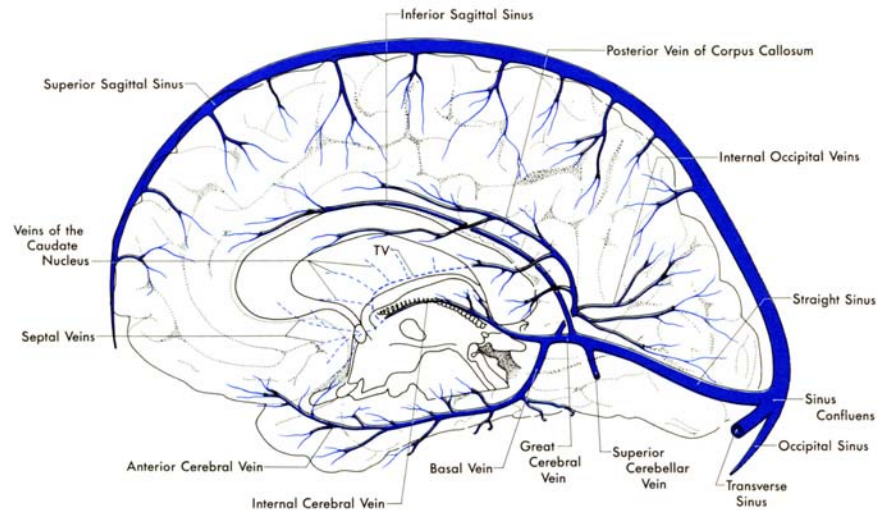
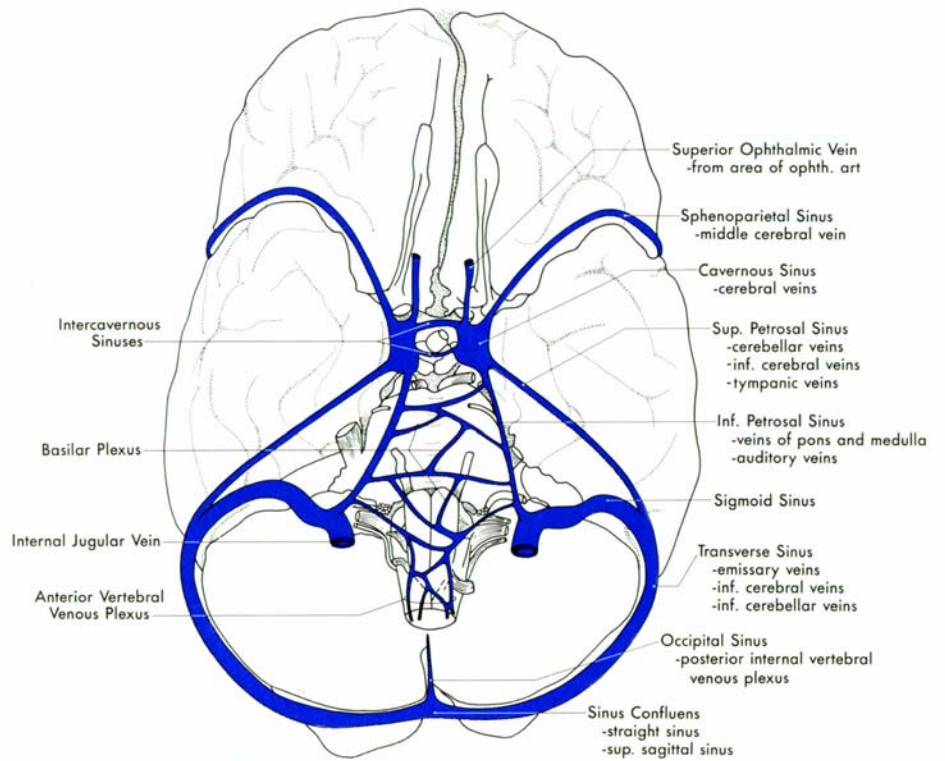
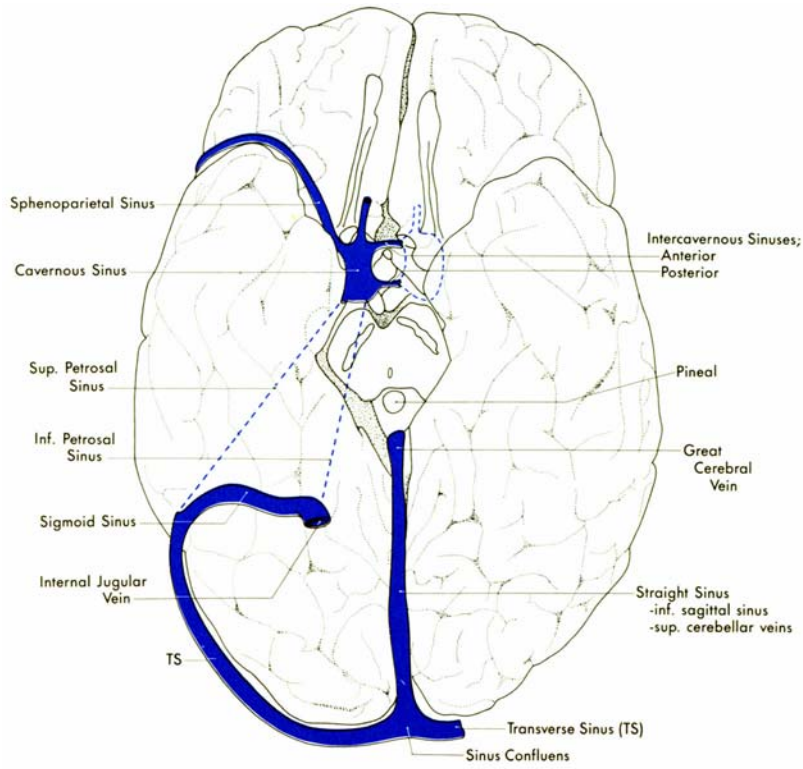
SYNDROMS

SYNDROMS

absent corneal reflex
hypesthesia for pain
and temp. (i for face,
c for trunk and extrem.)
Horner trias (miosis, ptosis,
decr. sweating), dysphagia,
dysarthria, vertigo, nausea,
nystagmus, limb ataxia (i)
(lateral medullary syndrome of Wallen-
berg;
hemiparesis (c), deep sense
dist (c) XII. paresis (i);
(medial medullary syndrome)

(Dejerine)





-Ophthalmic

Abbreviation: TV -Terminal Vein