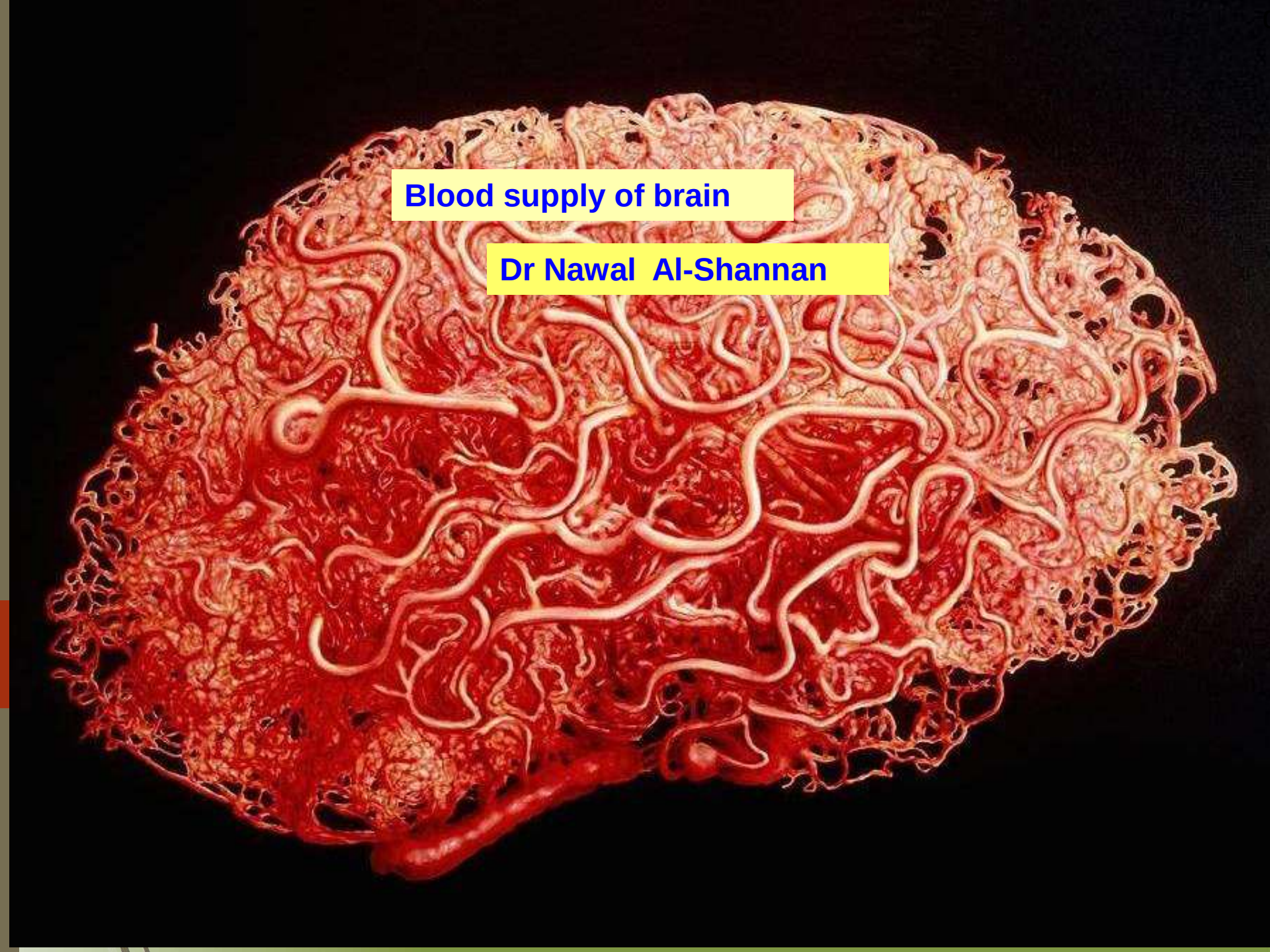

Blood supply of brain
Dr Nawal Al-Shannan

Blood supply of the brain

Dr Nawal M . Abdulla

Extremly high demand for oxygen and nutrients:

human brain represents 2% of the body weight,

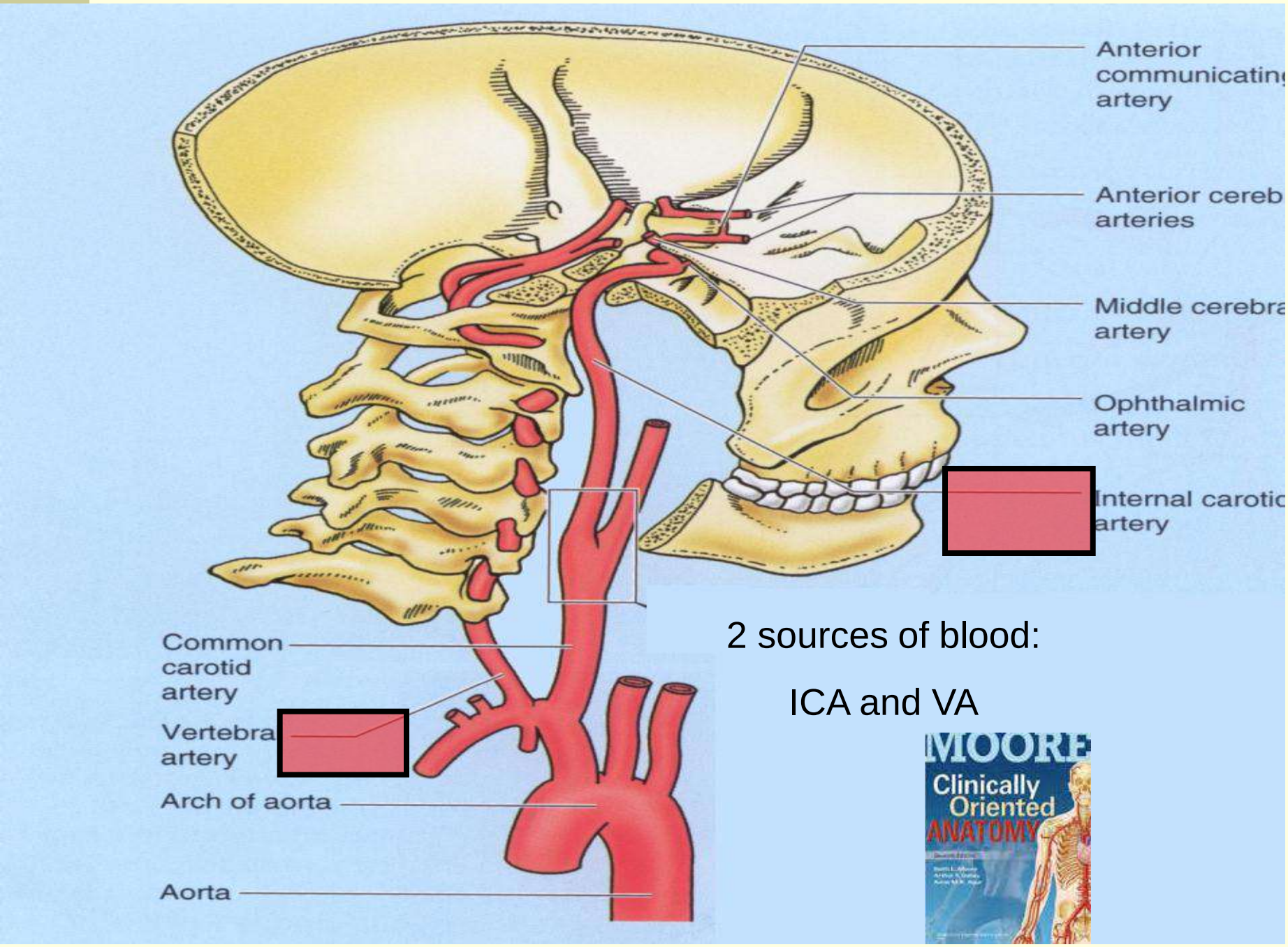
More than 2% of blood circulates in human brain at rest

but receives 15% of the cardiac output,

20% of total body oxygen consumption and 25% of total body glucose utilization.

1. Grey matter contains more capillaries than white matter because nerve cells need more O2 than nerve fibers

2. Cerebrovascular diseases (CVA)and stroke are among the major causes of Loss of consciousness occurs in less than 15 seconds after blood flow to the brain has stopped, and irreversible damage to the brain tissue occurs within 5 minutes death.



2 sources of blood:

ICA and VA

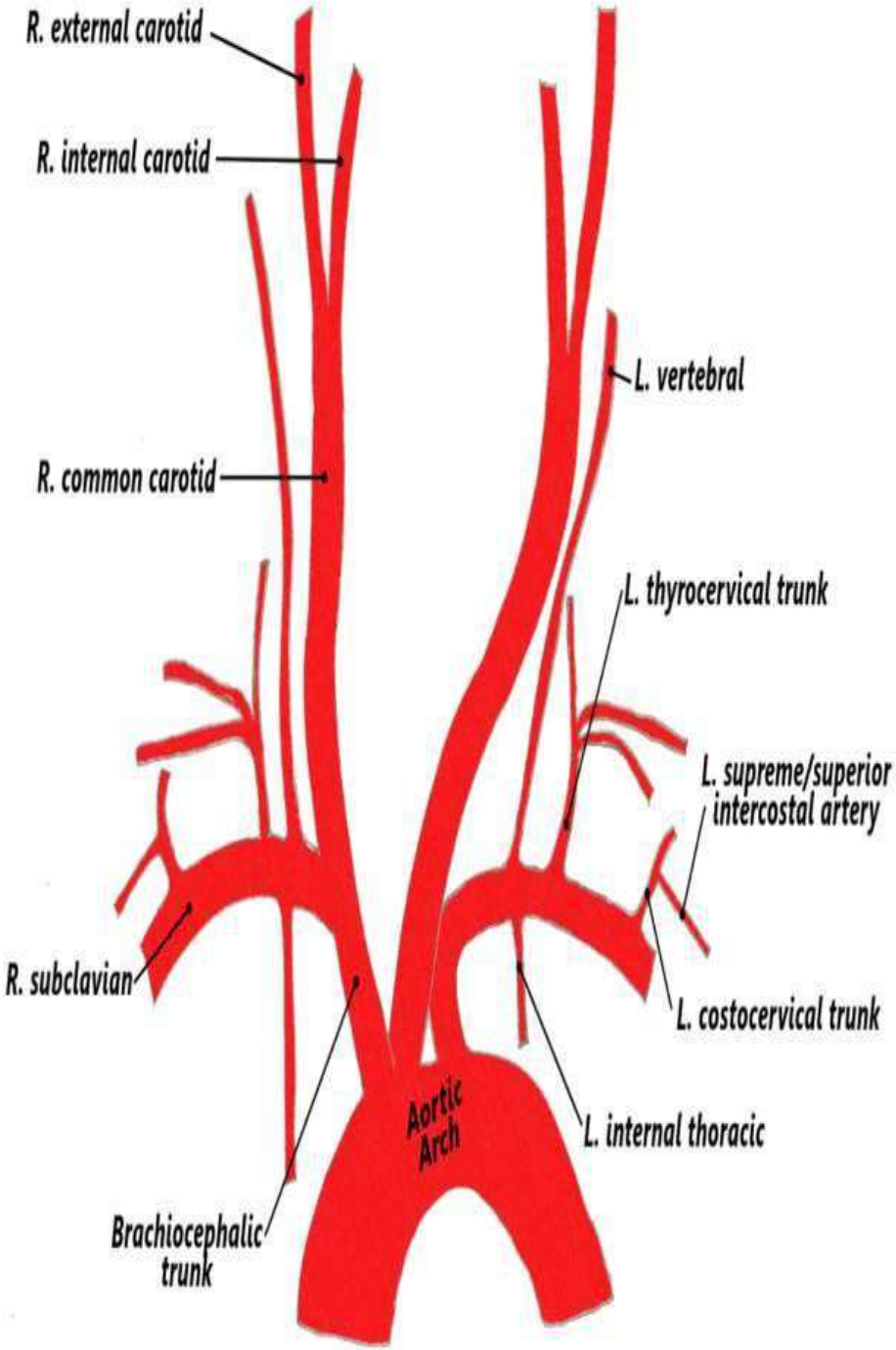
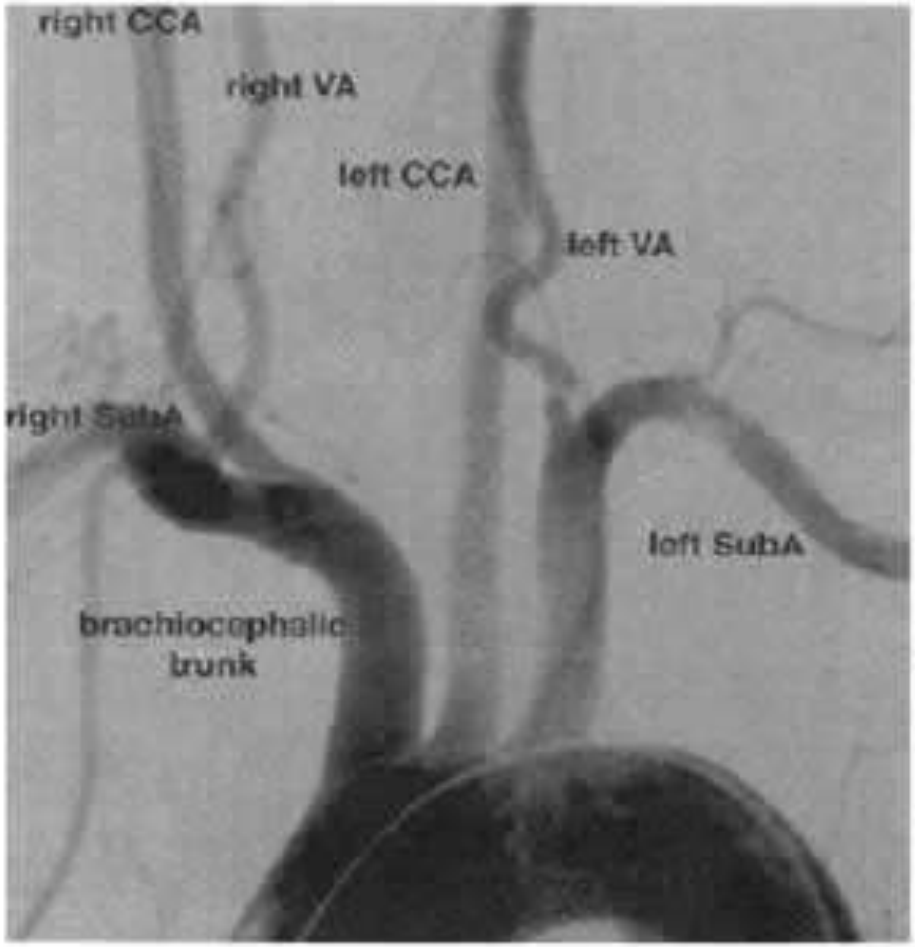


Figure 2: Great Vessel Anatomy



Arterial blood supply of the brain

-* **brain recieves its blood from 2 sources.**

Carotid System (80%)

Vertebrobasilar System (20%)

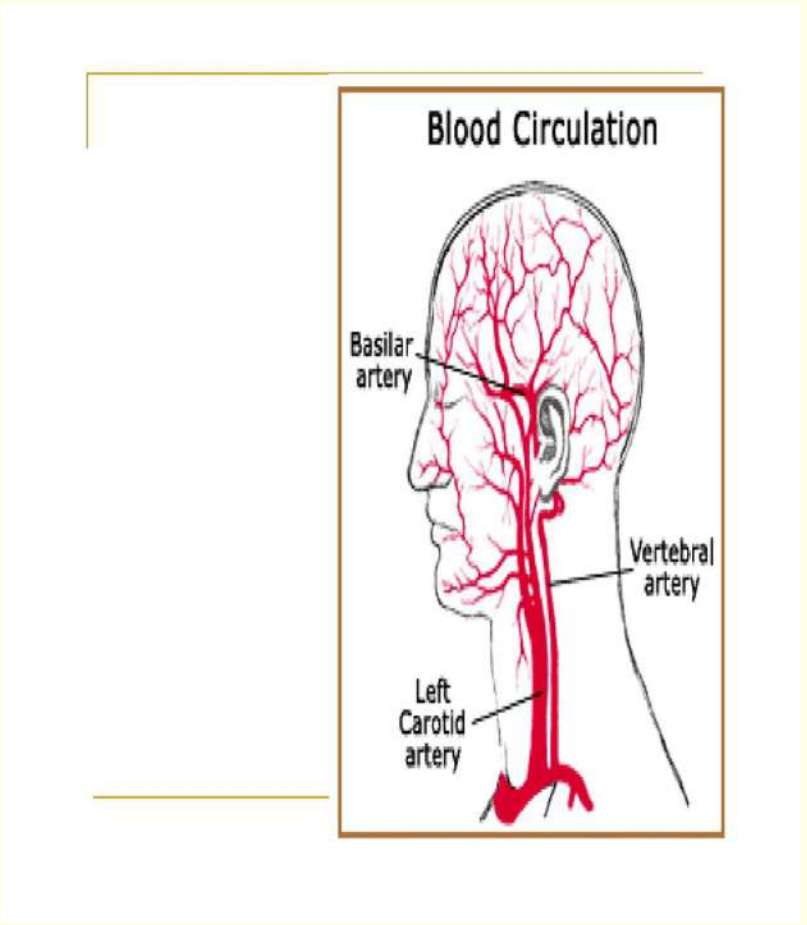
2 internal carotid arteries (common carotid arteries)

2 vertebral arteries

Internal carotid artery

- each one enter skull through carotid canal , ends below anterior perforated substances by dividing
- into 2 terminal branches
- ---- **anterior cerebral artery**

---- middle cerebral artery

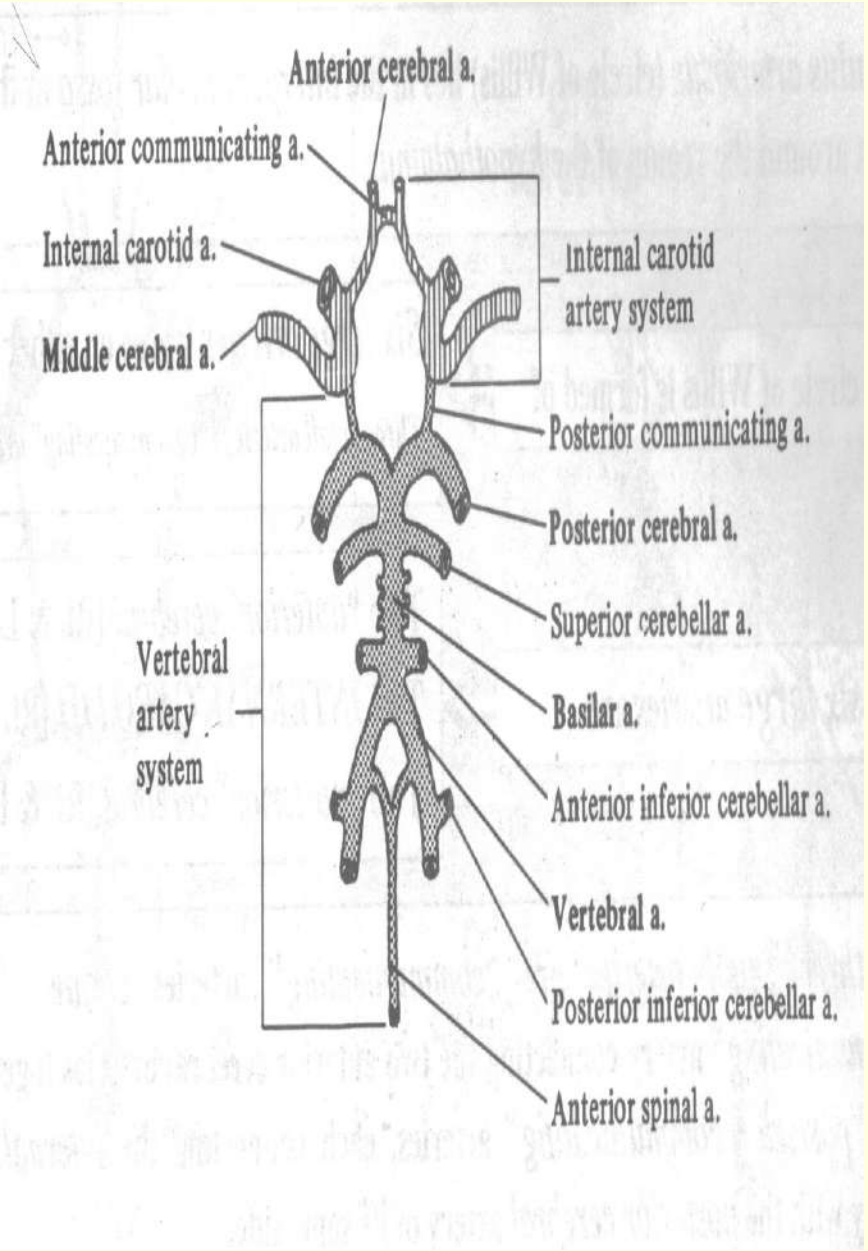


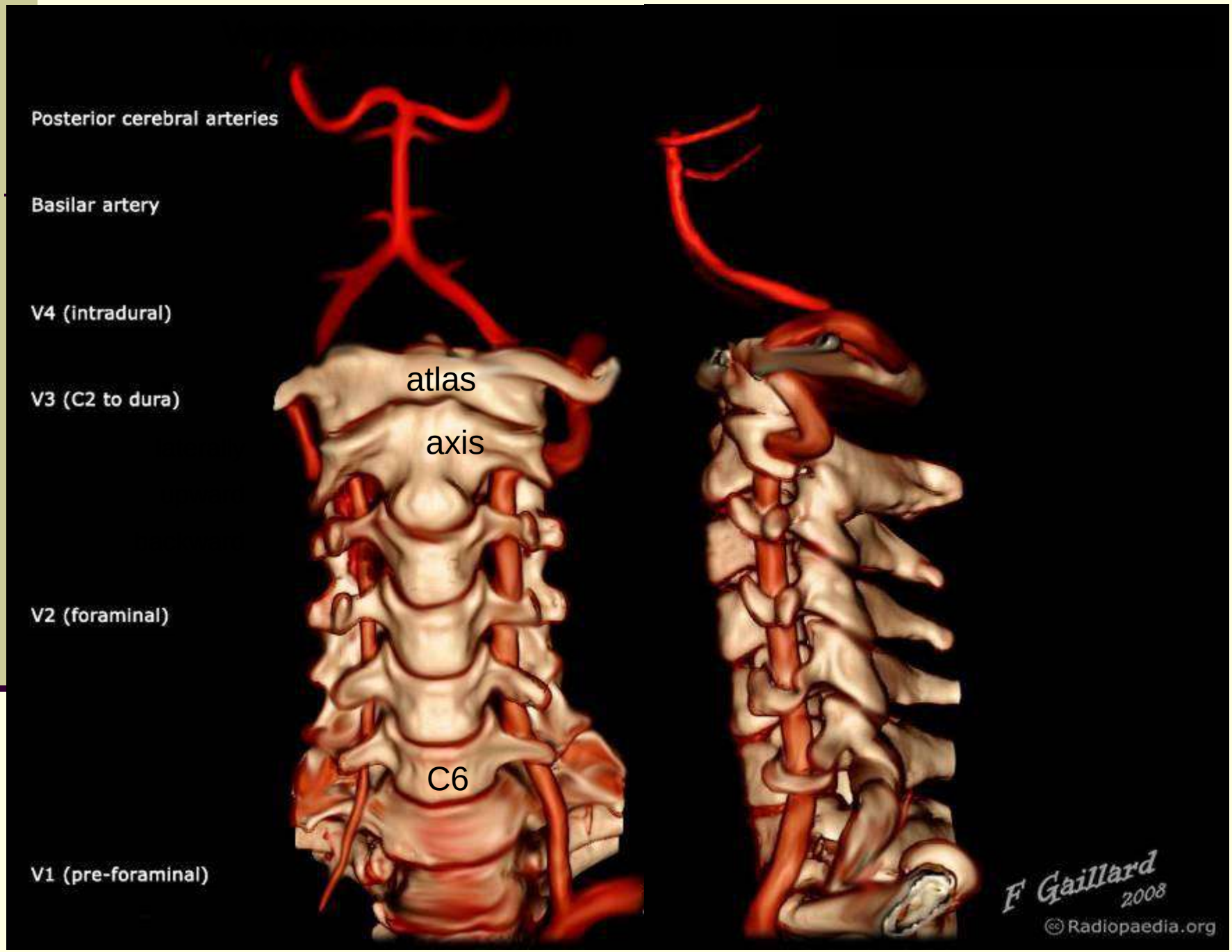
Vertebral artery:

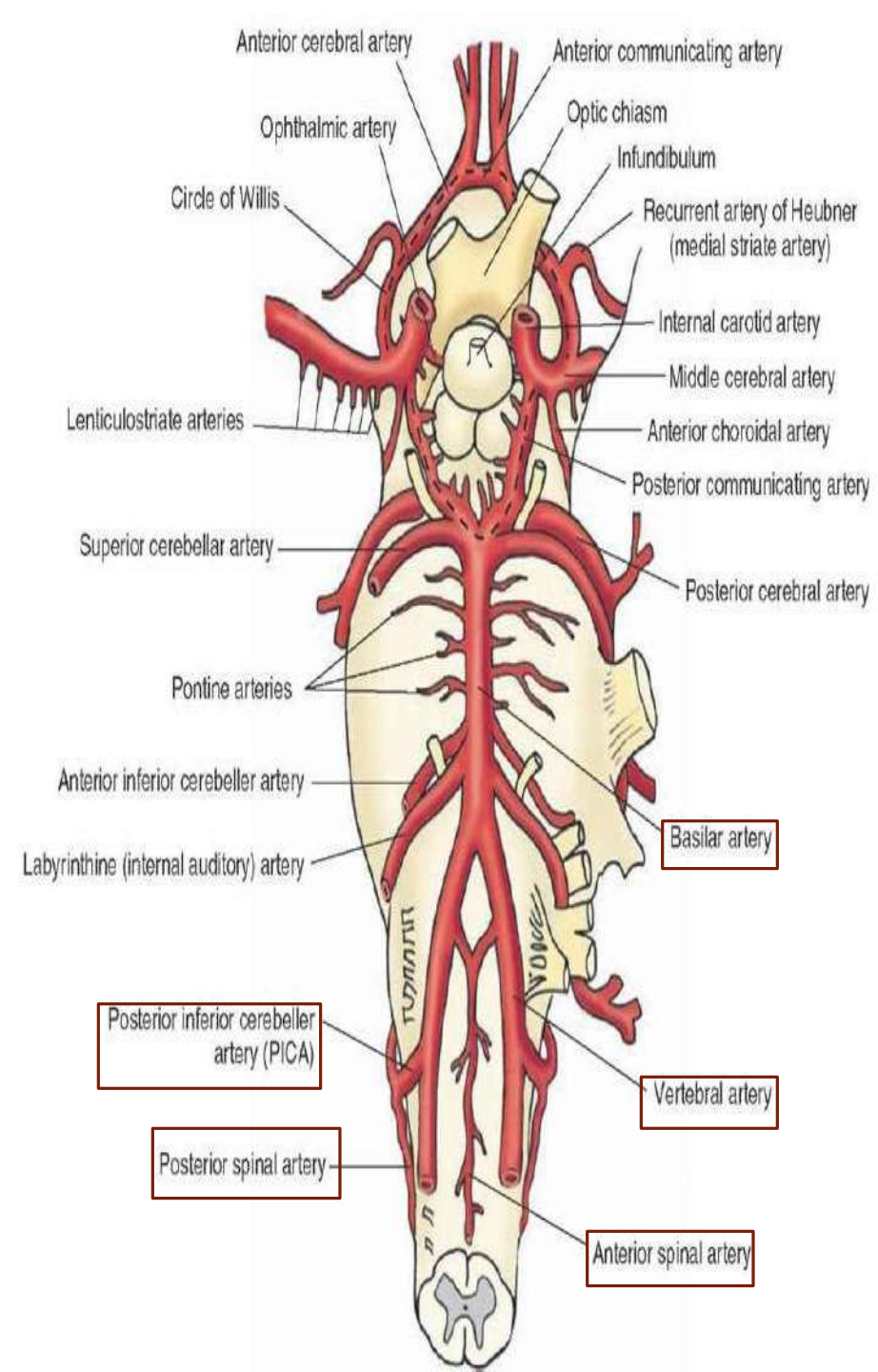
Each enter skull through foramena magnum

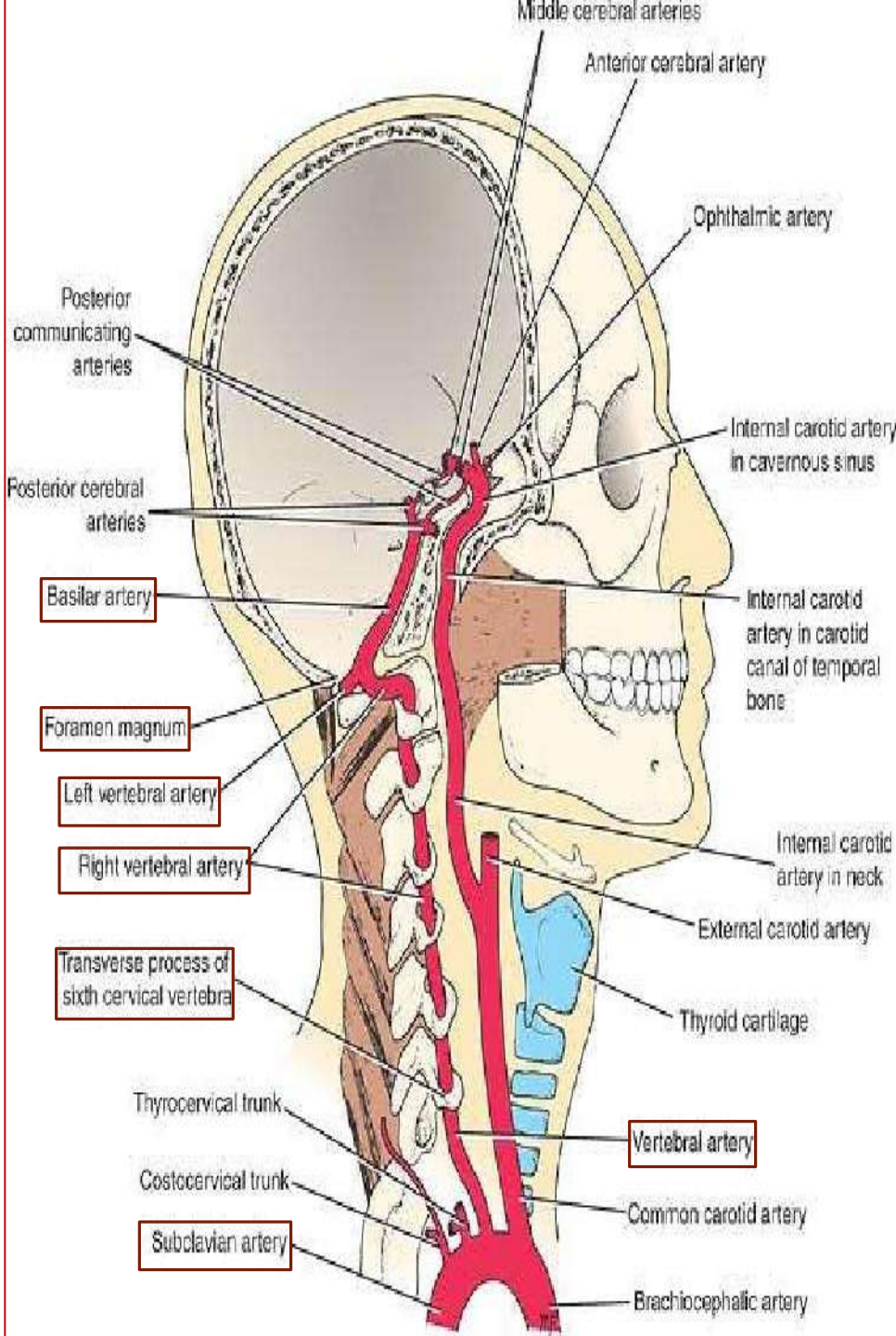
2 vertebral arteries join to form **basilar artery** which ends by dividing into

RT and LT posterior cerebral arteries .




Posterior cerebral arteries
Basilar artery
V4 (intradural)
V3 (C2 to dura)
V2 (foraminal)
V1 (pre-foraminal)
atlas
axis
C6
F Gaillard
2008
Radiopaedia.org


Anterior cerebral artery
Anterior communicating artery
Ophthalmic artery
Optic chiasm
Infundibulum
Circle of Willis
Recurrent artery of Heubner (medial striate artery)
Internal carotid artery
Middle cerebral artery
Lenticulostriate arteries
Anterior choroidal artery
Posterior communicating artery
Superior cerebellar artery
Posterior cerebral artery
Pontine arteries
Anterior inferior cerebeller artery
Basilar artery
Labyrinthine (internal auditory) artery
Posterior inferior cerebeller artery (PICA)
Vertebral artery
Posterior spinal artery
Anterior spinal artery


Middle cerebral arteries
Anterior cerebral artery
Ophthalmic artery
Posterior communicating arteries
Internal carotid artery in cavernous sinus
Posterior cerebral arteries
Basilar artery
Internal carotid artery in carotid canal of temporal bone
Foramen magnum
Left vertebral artery
Right vertebral artery
Internal carotid artery in neck
External carotid artery
Transverse process of sixth cervical vertebra
Thyroid cartilage
Thyrocervical trunk
Vertebral artery
Costocervical trunk
Common carotid artery
Subclavian artery
Brachiocephalic artery

Branches of internal carotid artery

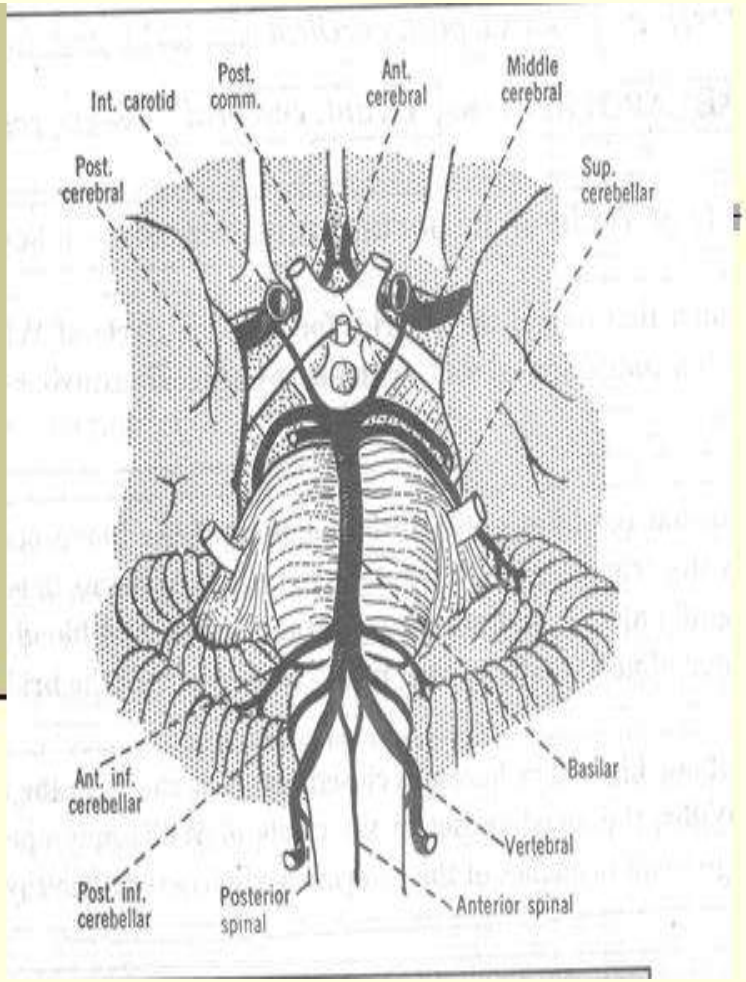
In general:

3 pairs of cerebral arteries

(anterior ,middle ,posterior)

supply cerebral hemisphere , basal ganglia, internal capsule , 2 thalami , most of midbrain.

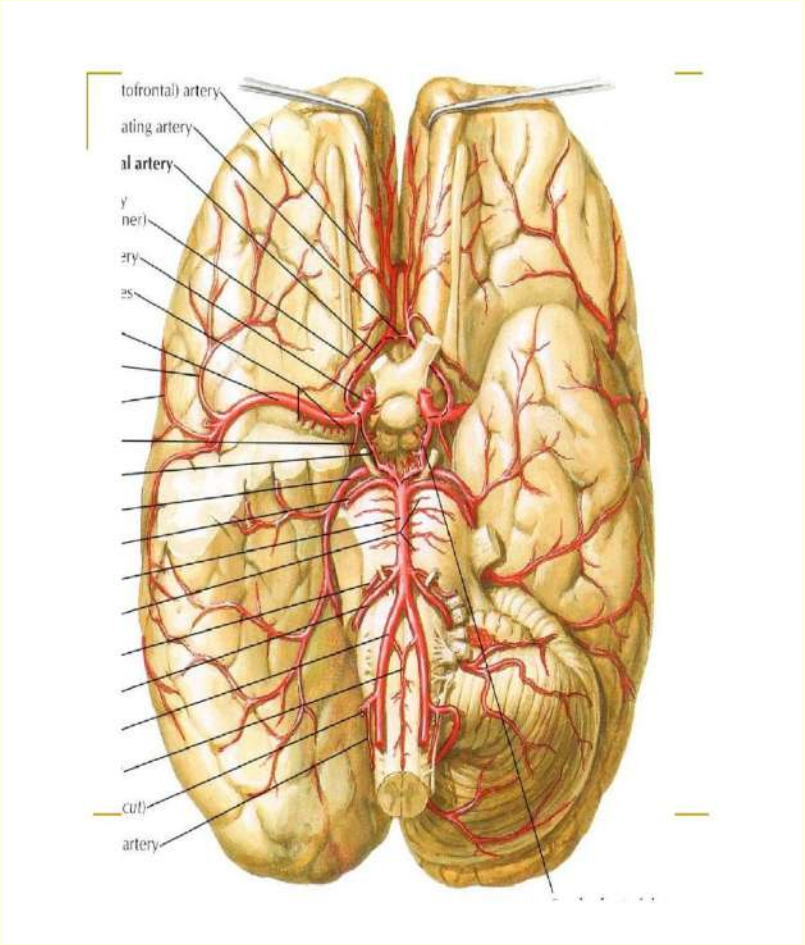
.* Rest of brain (medulla, pons small part of midbrain and cerebellum , supplied by branches of 2 vertebral arteries (Rt & Lt) and basilar artery .

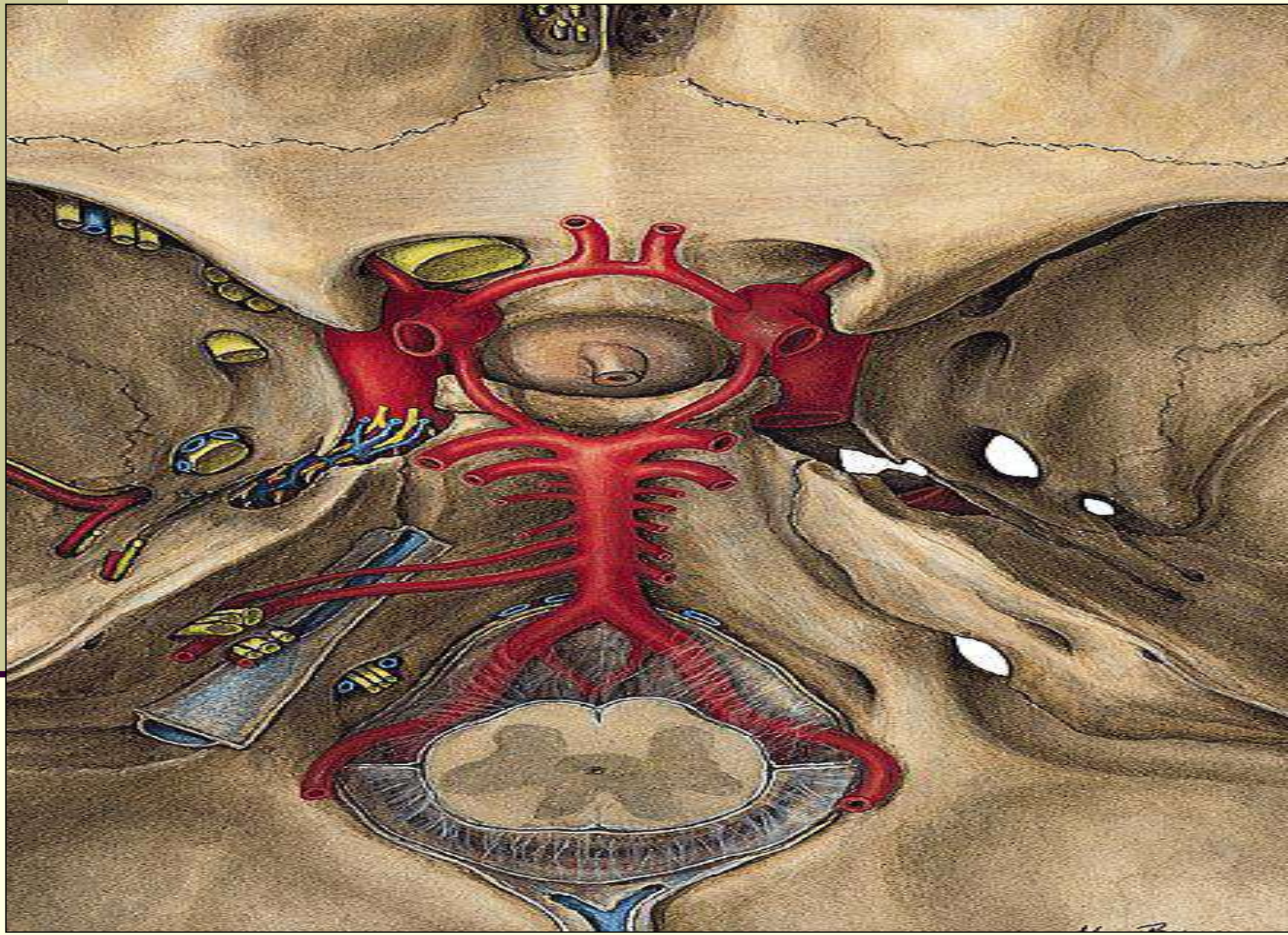


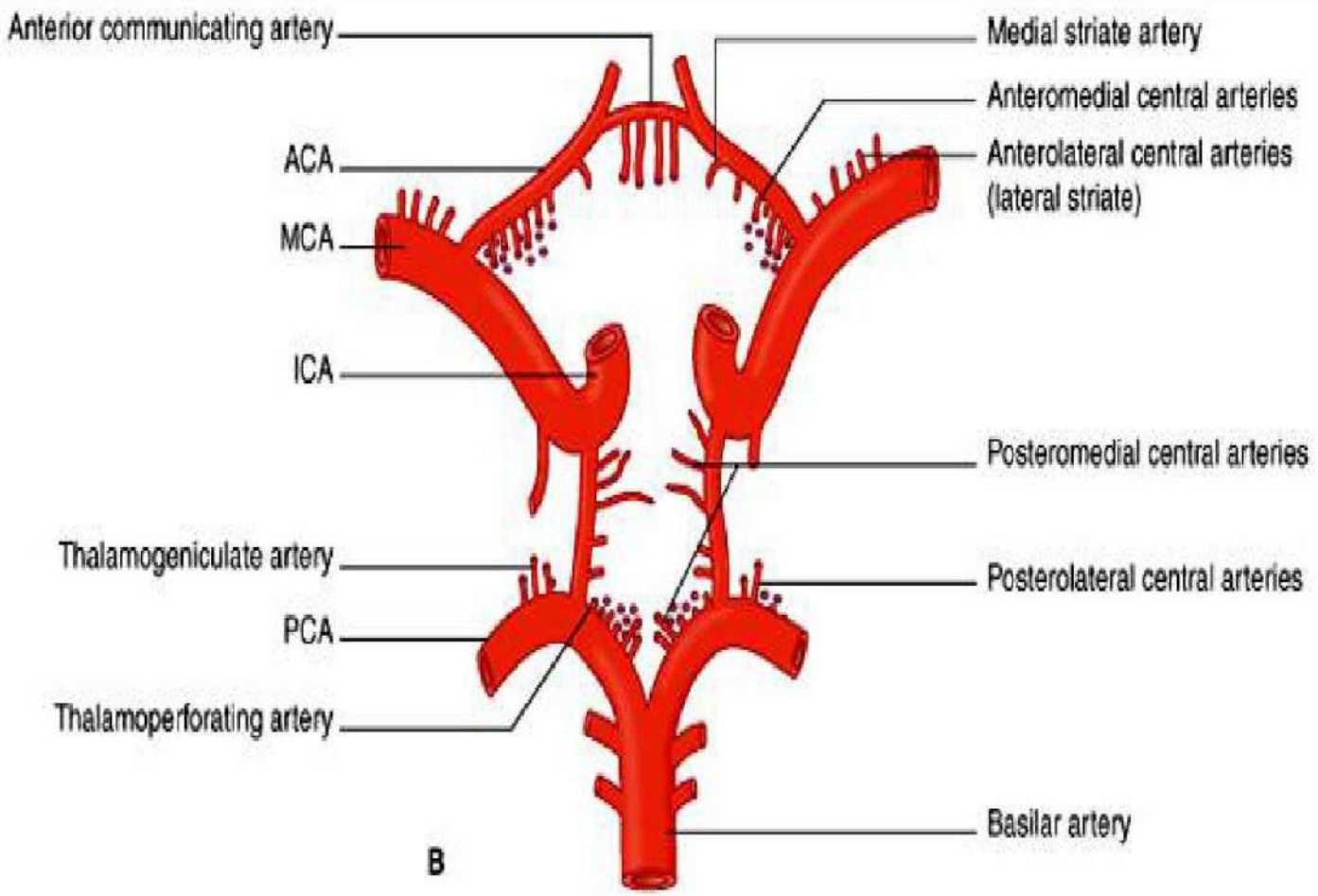
Arterial circle of Willis

- lies in interpeduncular fossa at the base of the brain around region of hypothalamus
- formed of
- 6 large arteries (3 on either side)

  \+ 3 small arteries = communicating arteries



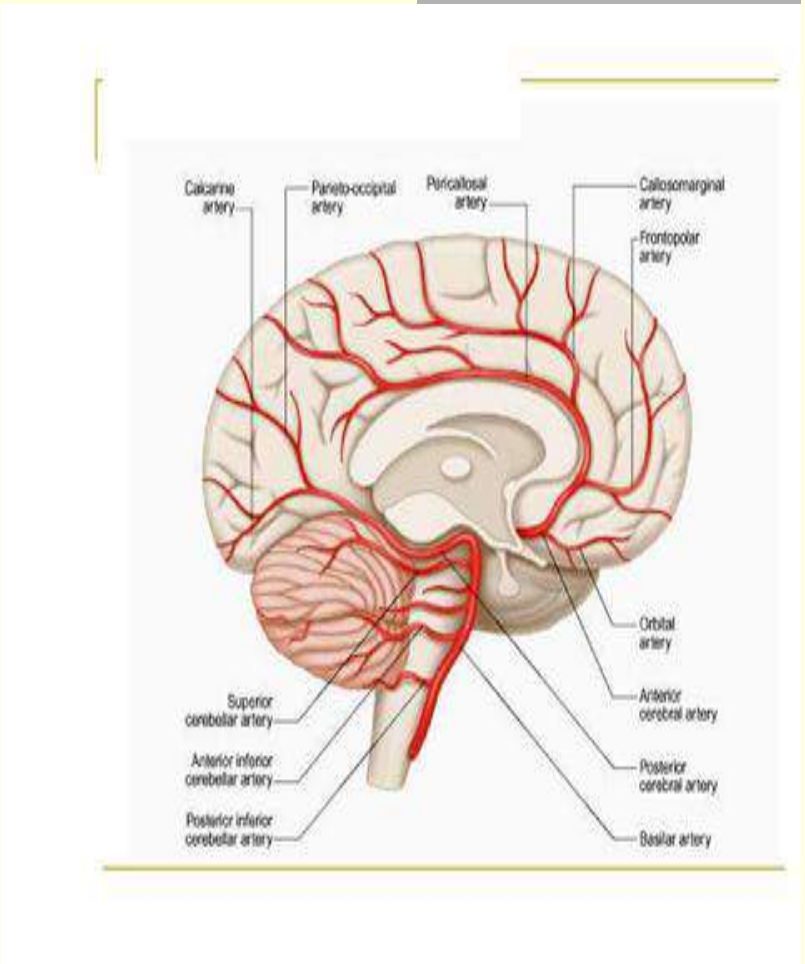


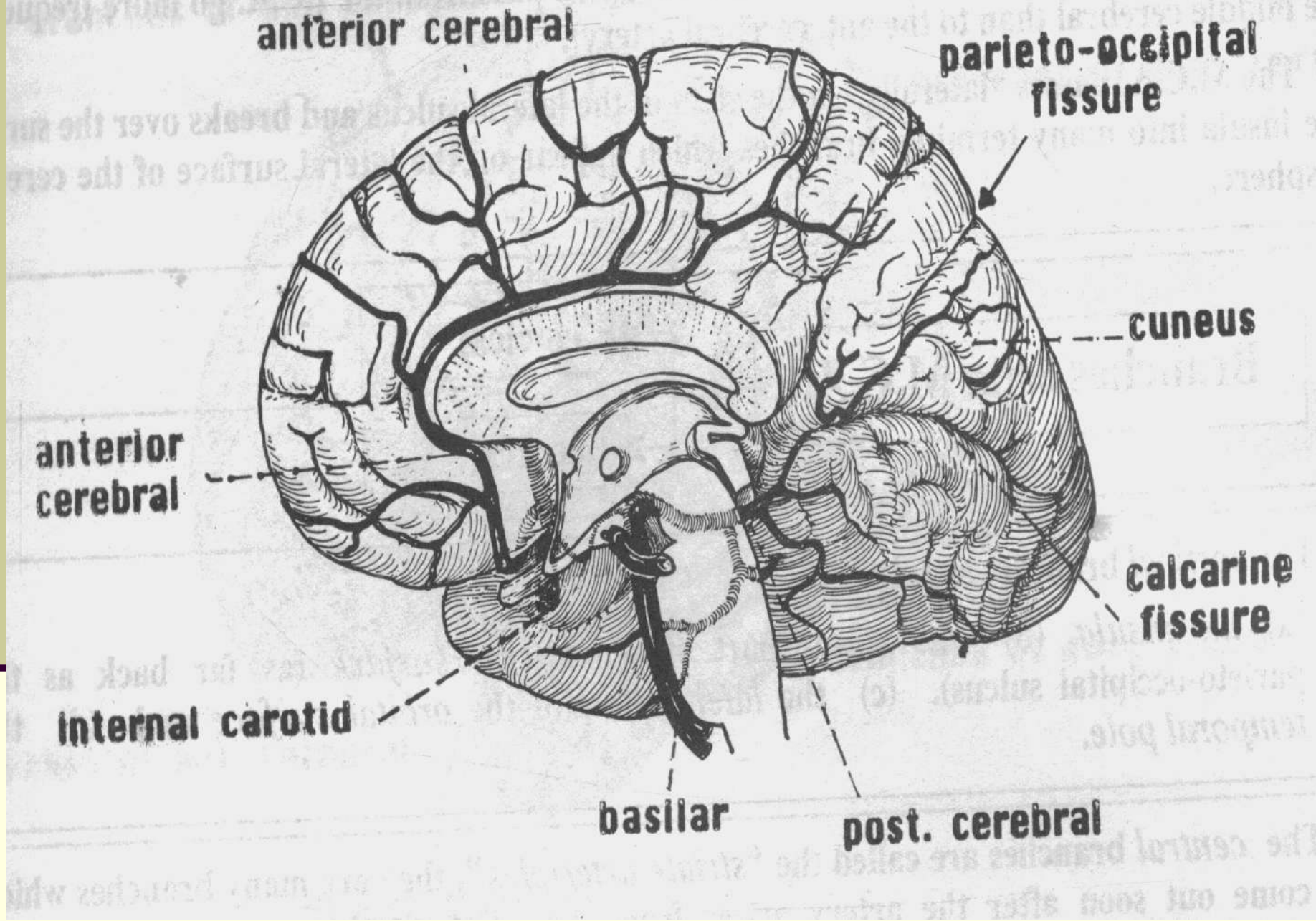

Anterior communicating artery
ACA
MCA
ICA
Thalamogeniculate artery
PCA
Thalamoperforating artery
Medial striate artery
Anteromedial central arteries
Anterolateral central arteries
(lateral striate)
Posteromedial central arteries
Posterolateral central arteries
Basilar artery
B

Branches of anterior cerebral arteries

1. **Cortical branches** mainly medial surface
2. **2. Central branches**
3. **3. Septal branches** including septum pallucidum.
4. **4. branches to corpus callosum except splenum**

   which is supplied by **posterior cerebral** artery




anterior cerebral
parieto-occipital fissure
cuneus
anterior cerebral
calcarine fissure
internal carotid
basilar
post. cerebral

Clinical importance of anterior cerebral artery:

?

Supply 3 important regions

Motor and sensory area of lower limb

in paracentral lobule

Septal region –

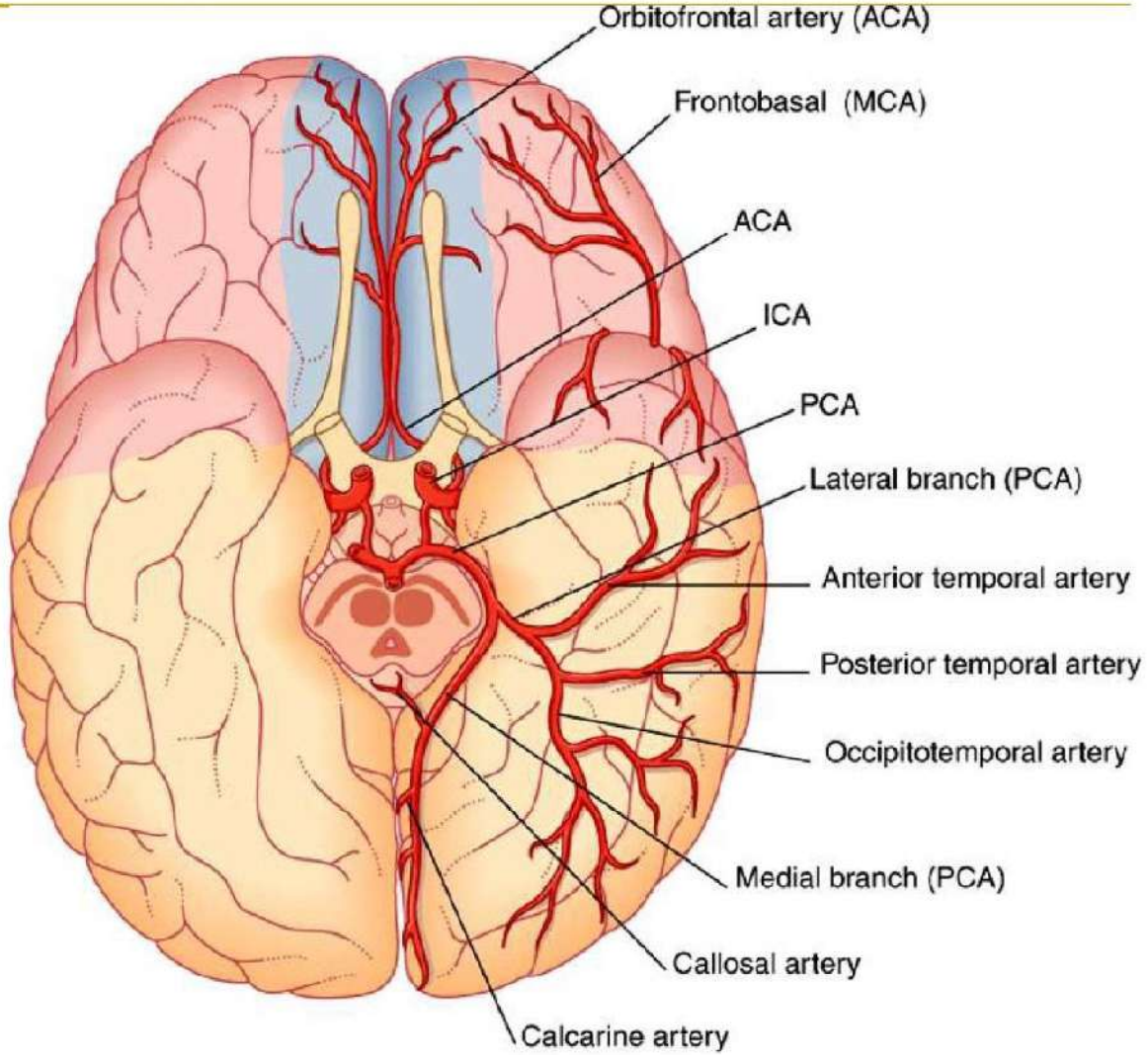
lesion result in prolonged unconciousness-

Corpus callosum

lesion cause apraxia I:e:

Unability to make purposeful movement

while muscle concerened are not paralysed .


Orbitofrontal artery (ACA)
Frontobasal (MCA)
ACA
ICA
PCA
Lateral branch (PCA)
Anterior temporal artery
Posterior temporal artery
Occipitotemporal artery
Medial branch (PCA)
Callosal artery
Calcarine artery

Middle cerebral artery

- large branch, more in **direct** continuation..

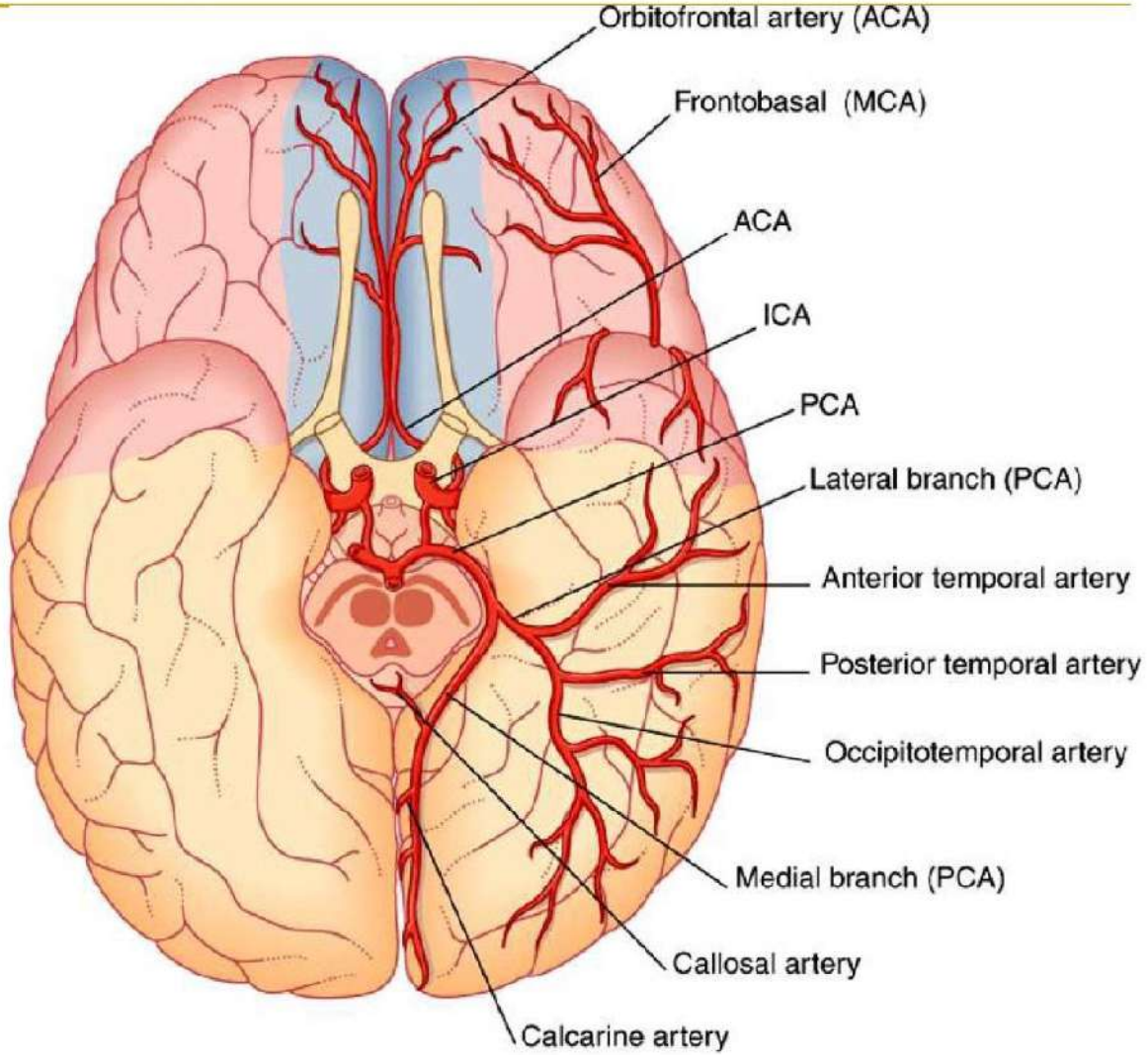
  Emboli?

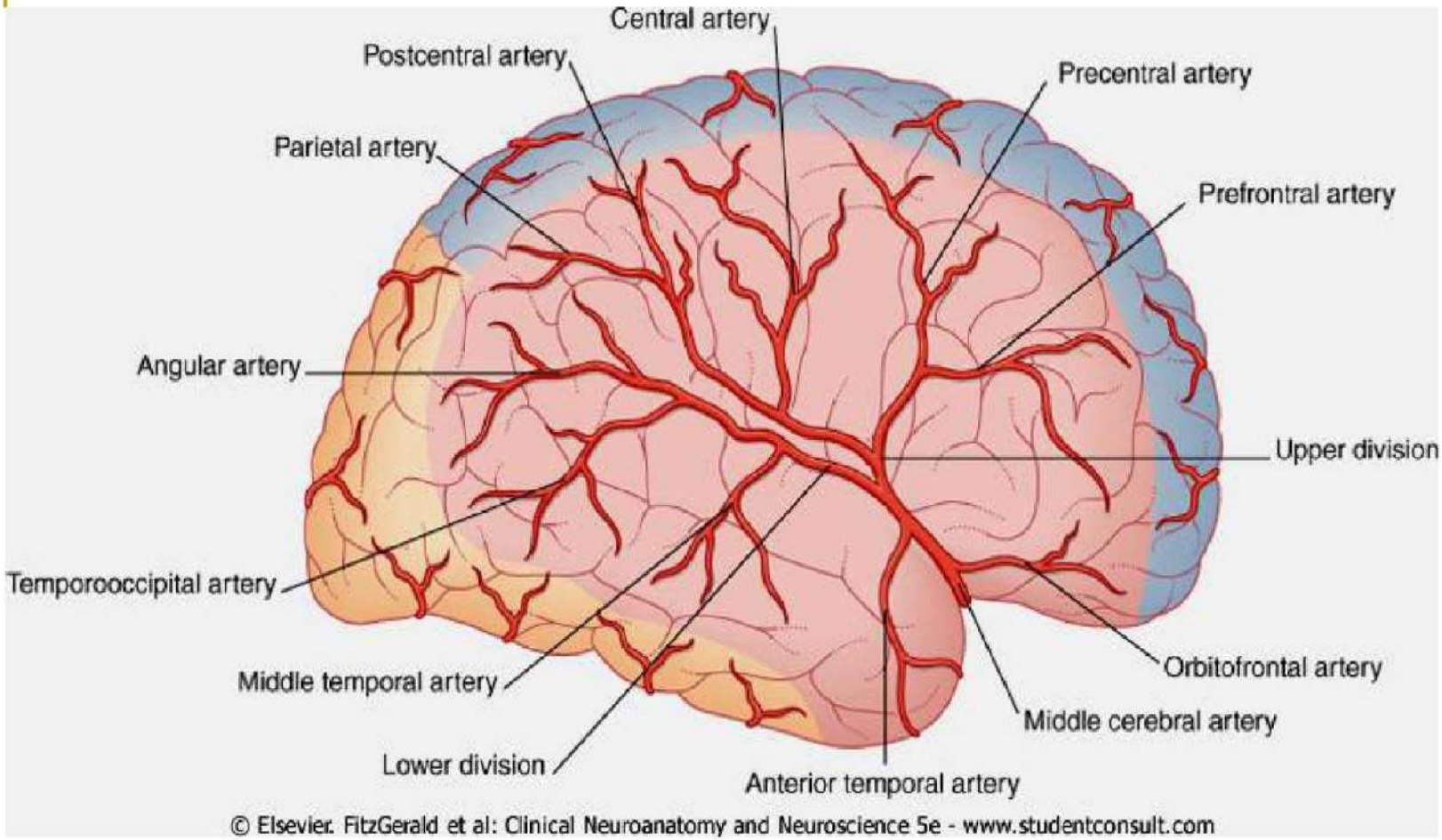
Branches:

1. **Cortical** for insula, lateral surface, lateral half of orbit
2. **Central** - striate arterioles

** they pentrate anterior perforated substances to reach corpus striatum and internal capsule

– one large artery is called **artery of cerebral hemorrhage** frequently repture causing hemorrhage inside cerebral hemisphere


Orbitofrontal artery (ACA)
Frontobasal (MCA)
ACA
ICA
PCA
Lateral branch (PCA)
Anterior temporal artery
Posterior temporal artery
Occipitotemporal artery
Medial branch (PCA)
Callosal artery
Calcarine artery


Central artery
Postcentral artery
Precentral artery
Parietal artery
Prefrontral artery
Angular artery
Upper division
Temporooccipital artery
Orbitofrontal artery
Middle temporal artery
Middle cerebral artery
Lower division
Anterior temporal artery
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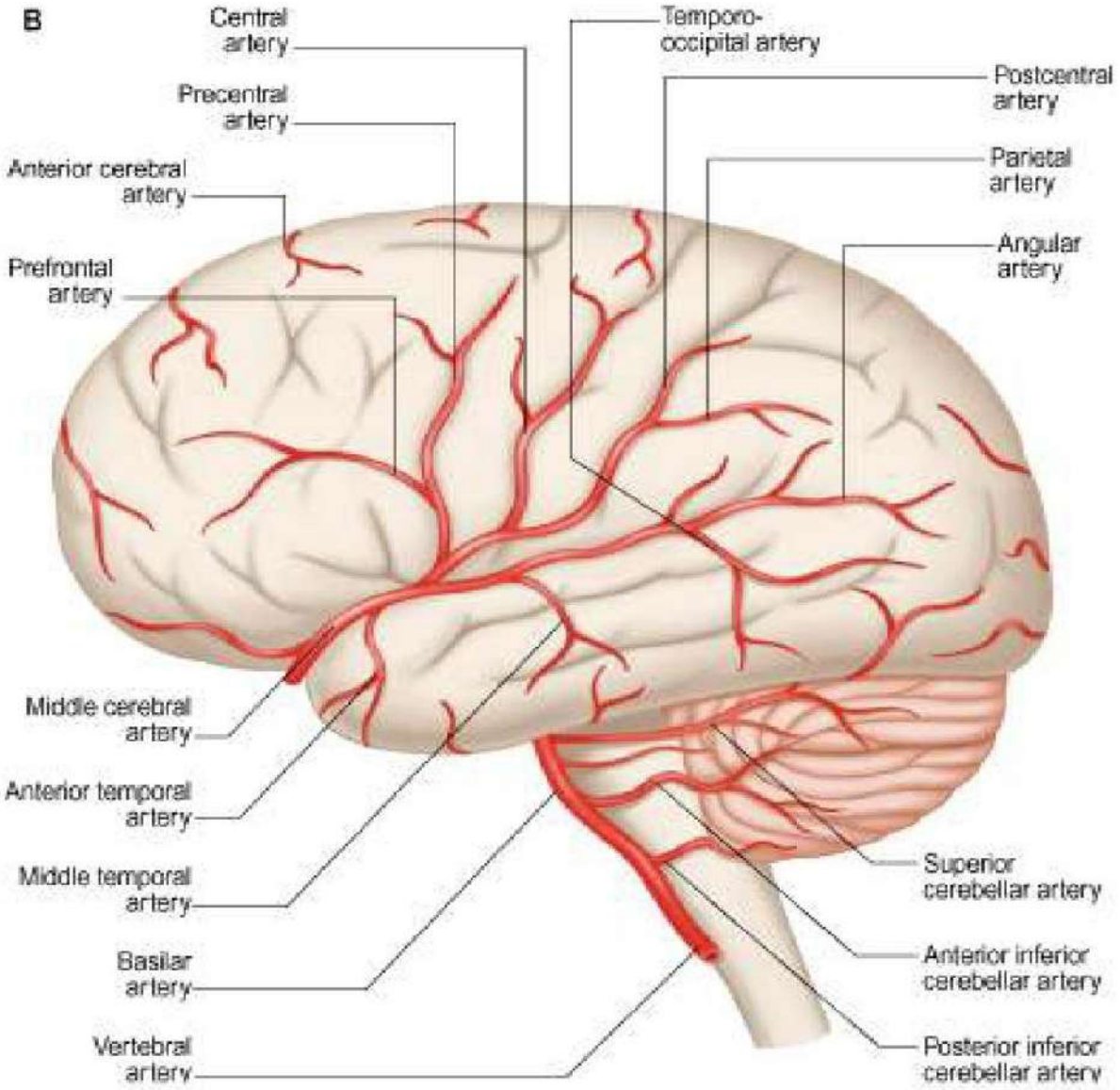
B
Central artery
Precentral artery
Anterior cerebral artery
Prefrontal artery
Middle cerebral artery
Anterior temporal artery
Middle temporal artery
Basilar artery
Vertebral artery
Temporo-occipital artery
Postcentral artery
Parietal artery
Angular artery
Superior cerebellar artery
Anterior inferior cerebellar artery
Posterior inferior cerebellar artery

Clinical importance:

Supply 3 important areas

1. Motor and sensory areas of whole body except lower limb
2. Auditory area in temporal lobe
3. Genu and posterior limb of internal capsule

(* 3 important area concerned with language)