

ARTERIAL SUPPLY OF BRAIN

The blood reaches the brain through 2 systems of blood vessels.

1. Carotid system - Internal carotid artery
2. Vertebral system - Vertebrobasilar arteries

Circle of Willis

Middle cerebral a.

Internal carotid a. (ICA)

Posterior communicating a.

Posterior cerebral a.

Superior cerebellar a.

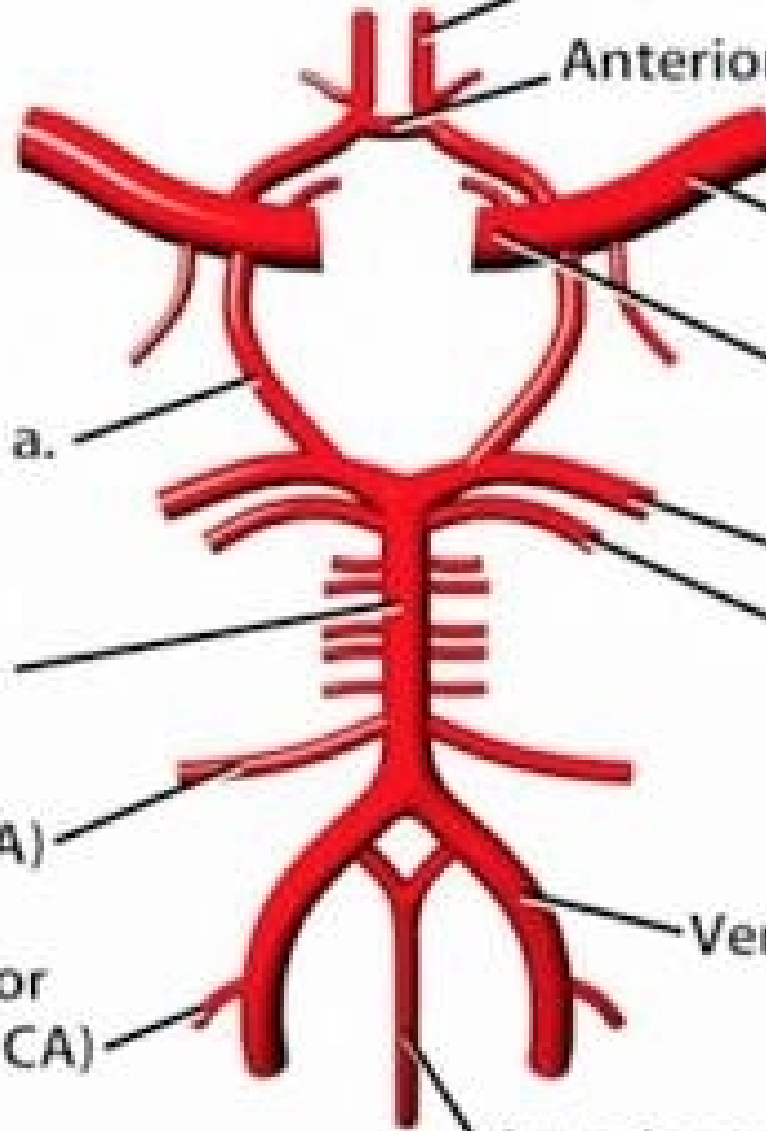
Basilar a.

Anterior inferior cerebellar a. (AICA)

Posterior inferior cerebellar a. (PICA)

Vertebral a.

Anterior spinal a.



CIRCLE OF WILLIS

Branches of ICA & branches of VB system of arteries anastomose in the base of brain to form the arterial circle of willis.

FORMATION

- Ant. communicating artery, which connects Rt & Lt ACA, forms anterior part of circle of willis.
- ACA forms anterolateral part on each side.
- Lateral part is formed by termination of ICA on each side.
- Circle is completed posteriorly by bifurcation of basilar artery into Rt & Lt PCA.
- Posterolaterally, post. communicating artery is the connecting link b/w ICA & PCA.

MCA does not take part in the formation of circle of willis.

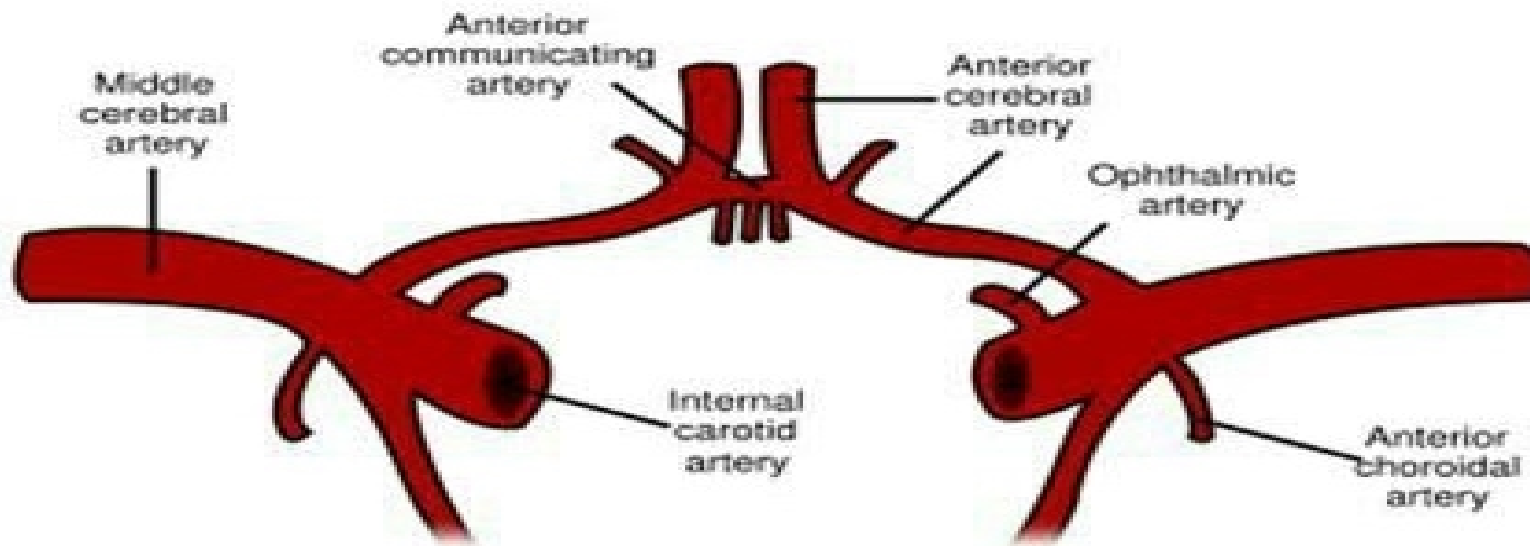
FUNCTIONAL IMPORTANCE

- This arterial circle equalises pressure of blood flow to 2 sides of brain.
- Arterial anastomosis provides an alternative route through which blood entering the ICA or basilar artery may be distributed to any part of cerebral hemisphere.
- If 1 of major arteries forming circle of willis is blocked, it is through this anastomosis that blood can be supplied to area of blocked artery.

ANTERIOR CIRCULATION OF BRAIN

- ❑ Internal carotid artery and its branches

ANTERIOR CIRCULATION



INTERNAL CAROTID ARTERY

- ✓ Each ICA arises as one of the 2 terminal branches at the bifurcation of CCA in the neck at the level of C4 vertebra.
- ✓ Artery then ascends up in the carotid sheath & enters cranial cavity through carotid canal & upper part of foramen lacerum.

- ICA - 4 parts
 - 1.Cervical part
 - 2.Petrous part
 - 3.Cavernous part
 - 4.Cerebral part

- BRANCHES OF CEREBRAL PART

- Ophthalmic artery
- Anterior choroidal artery
- Posterior communicating artery
- ANTERIOR CEREBRAL ARTERY
- MIDDLE CEREBRAL ARTERY

ACA & MCA supply entire forebrain except occipital lobe.

ANTERIOR CEREBRAL ARTERY

It is divided into two segments

- Precommunal(A1) circle of willis or stem which connects ICA to anterior communicating artery
- Postcommunal (A2) segment distal to anterior communicating artery

A1 SEGMENT SUPPLY

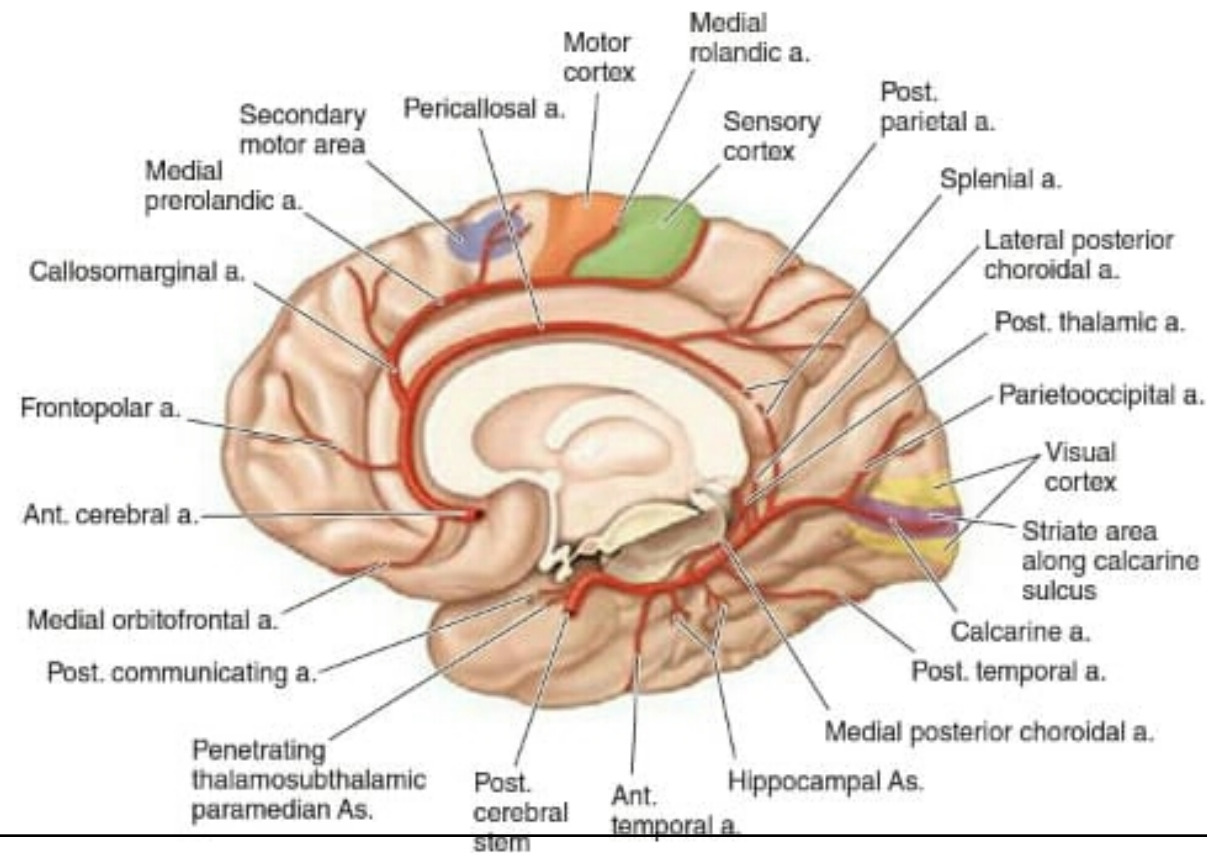
A1 give rise to several deep penetrating branches that supply

- ✓ Anterior limb of internal capsule
- ✓ Anterior perforate substance
- ✓ Amygdala
- ✓ Anterior hypothalamus
- ✓ Inferior part of head of caudate nucleus

A2 SEGMENT SUPPLIES

- Orbital branches supply medial half of orbital surface of the frontal lobe
- Frontopolar branch supplies the anteriormost part of the frontal lobe on inferior surface
- Callosomarginal and Pericallosal branches supply the medial surface of the frontal and parietal lobes
- The functional areas that receive blood from A2 segment of ACA are the motor and sensory areas for lower limb and perineum

DISTRIBUTION OF ANTERIOR CEREBRAL ARTERY



MIDDLE CEREBRAL ARTERY

- Proximal MCA (M1) segment give rise to penetrating branches (lenticulostriate arteries)
- In the sylvian fissure MCA divides into superior and inferior divisions (M2 branches)
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SUPPLY OF M1 SEGMENT

- Putamen
- Outer globus pallidus
- Posterior limb of internal capsule
- Adjacent corona radiata
- Most of the caudate nucleus

M2 BRANCHES

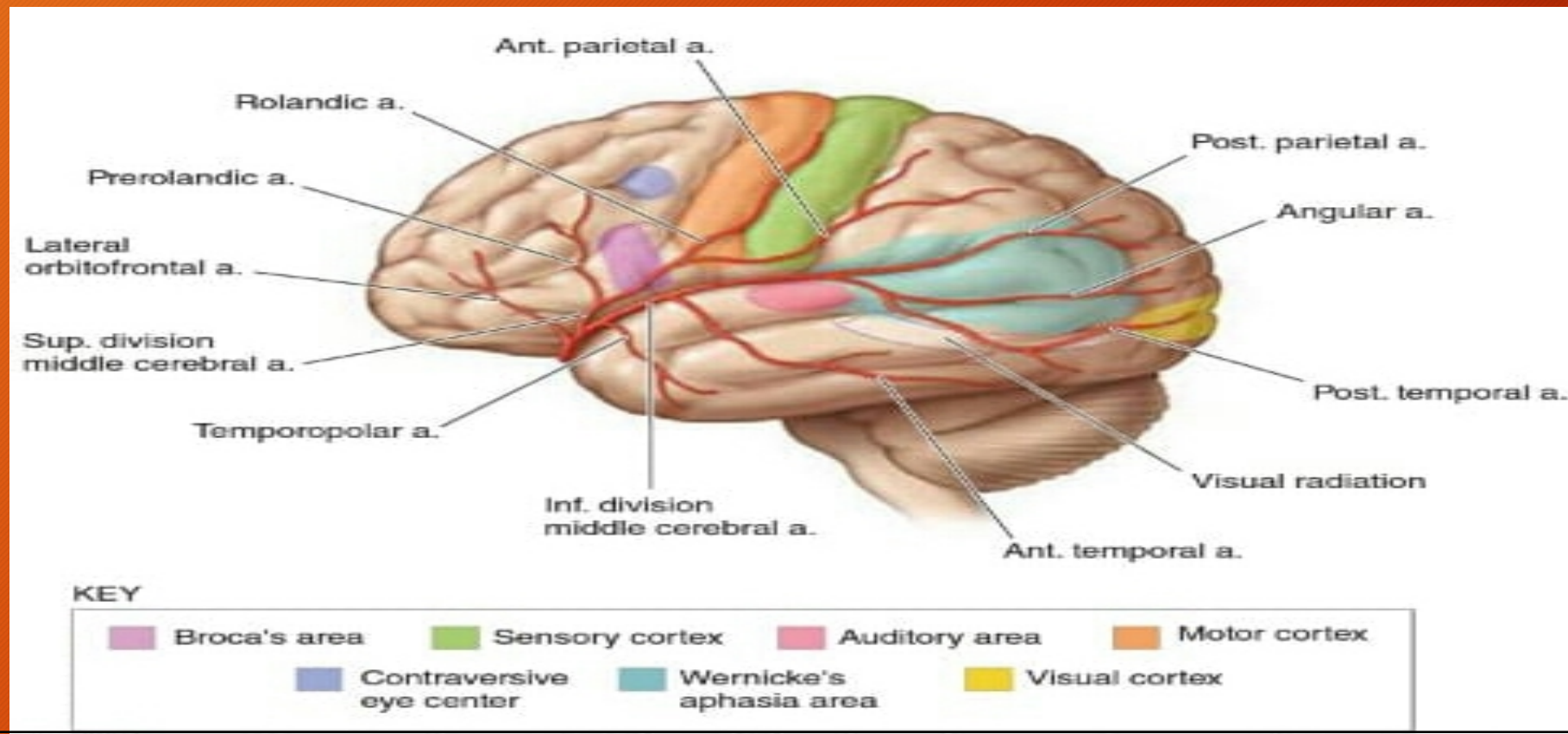
- Superior division supplies frontal and superior parietal cortex
- Inferior division supplies inferior parietal and temporal cortex

SUPPLY OF M2

- Orbitofrontal branches supply the lateral half of orbital surface of the frontal lobe
- Frontal branches (precentral and central) supply the superolateral surface of the frontal lobe excluding the area supplied by the ACA
- Parietal branches supply the Postcentral gyrus, Inferior parietal lobule and superior parietal lobule excluding the area supplied by the ACA
- Temporal branches supply the lateral surface of the temporal lobe excluding the Inferior temporal gyrus but the temporal pole

The functional areas that receive blood from MCA are motor and sensory areas, premotor area, frontal eye field, auditory area, speech centres in dominant hemisphere

DISTRIBUTION OF MIDDLE CEREBRAL ARTERY



FUNCTIONAL AREAS OF CORTEX

A.FRONTAL LOBE

1. Motor area (Area 4)
2. Premotor motor (Area 6)
3. Area of voluntary conjugate eyemovements (Area 8)
4. Broca's area (Area 44)
5. Exner's area (Area 45)
6. Prefrontal area
7. Paracentral lobule

B. PARIETAL LOBE

1. Cortical sensory area (Area 3,1,2)
2. Angular gyrus (Area 39)
3. Supramarginal gyrus (Area 37)

C. TEMPORAL LOBE

1. Auditory sensory area (area 41,42)
2. Auditory associative area (area 22)
3. Limbic system

D. OCCIPITAL LOBE

1. Visual sensory area (area 17)
2. Visual associative area (area 18 ,19)