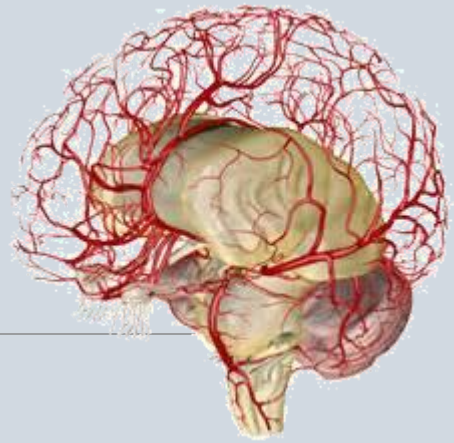
# Anatomy & Pathophysiology

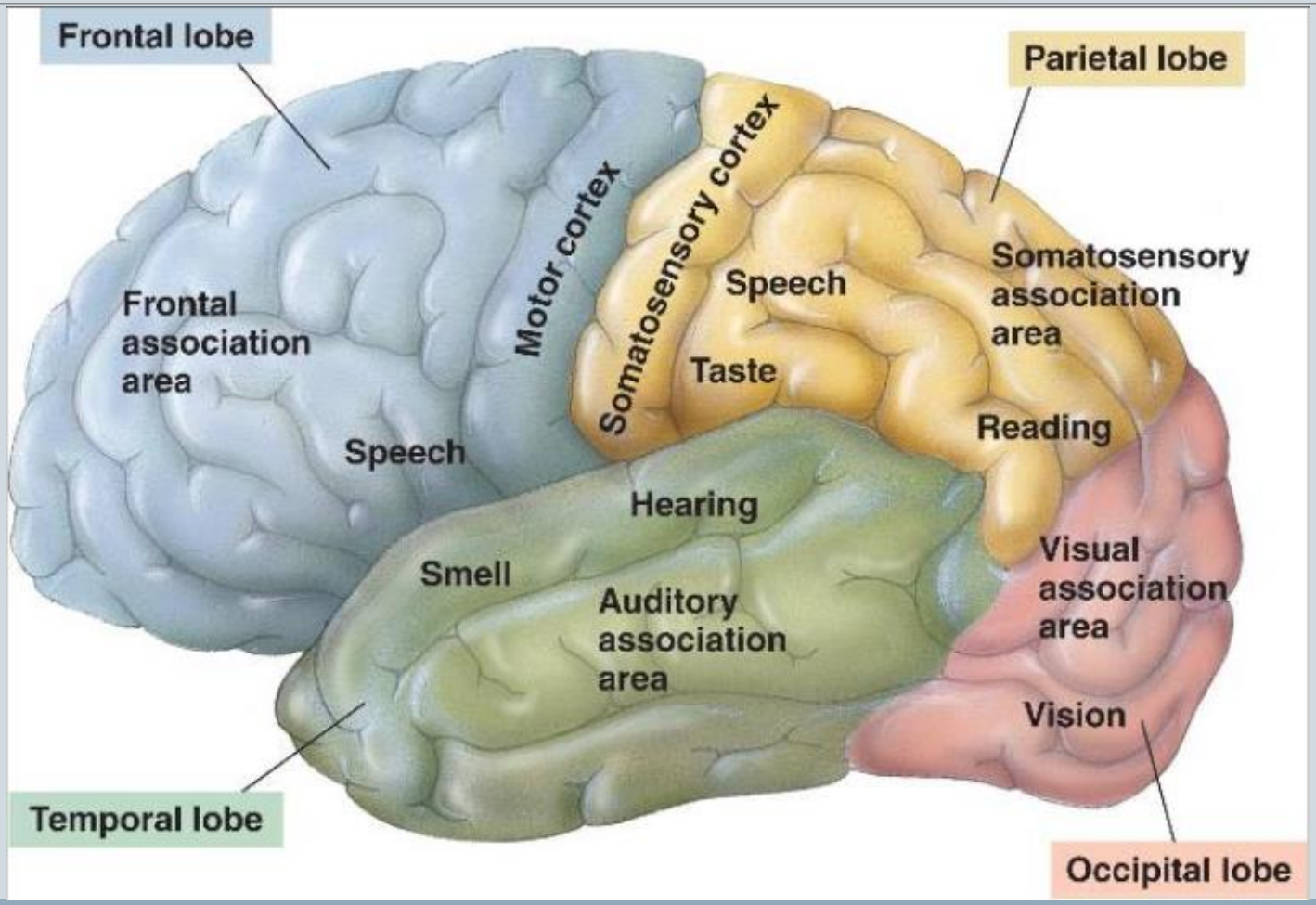


GEORGIA STROKE CURRICULUM

# Objectives

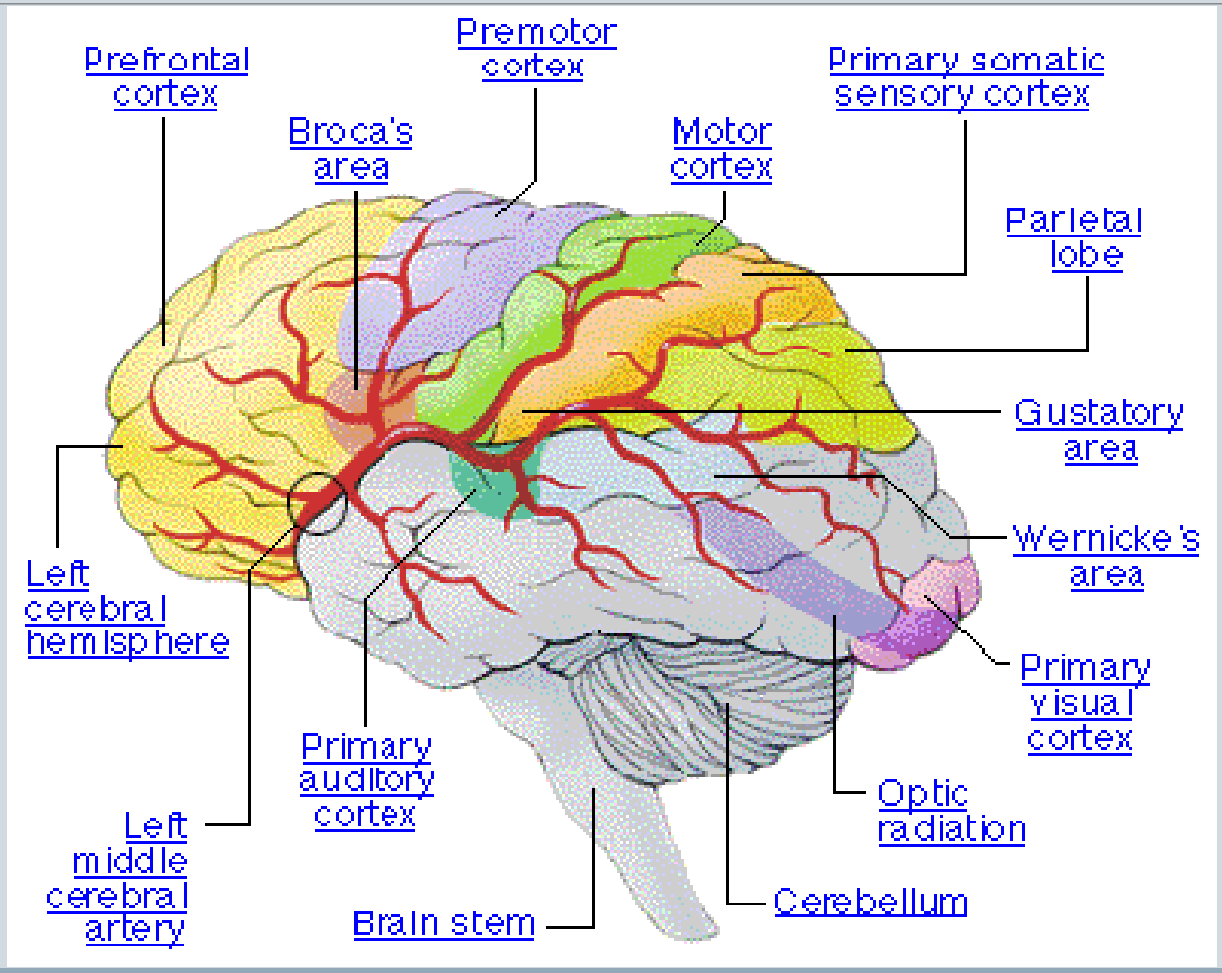
- Identify stroke syndromes
- Recognize stroke mimics

# Location! Location! Location!



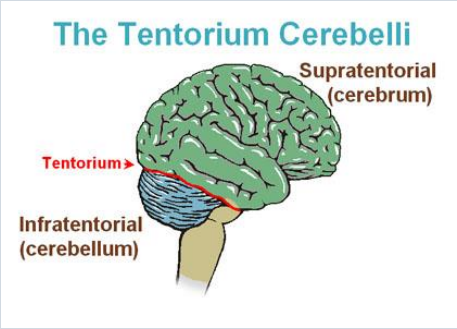
# Vascular Anatomy MCA

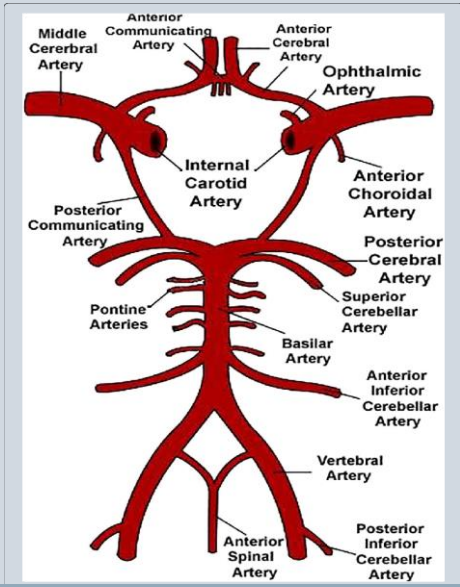
Front



# Anterior Vascular Anatomy

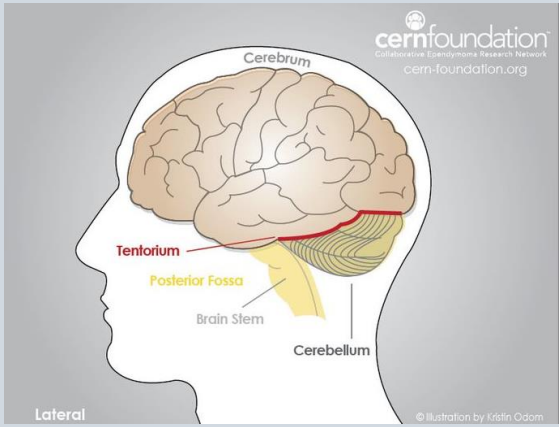
- Vessels above & in front of the Tentorium
- Internal Carotid Artery (ICA) supplies the Circle of Willis (COW)
  - COW provides important collateral blood flow between anterior and posterior circulation
- Middle Cerebral Artery (MCA) and Anterior Cerebral Artery (ACA) arise from the COW

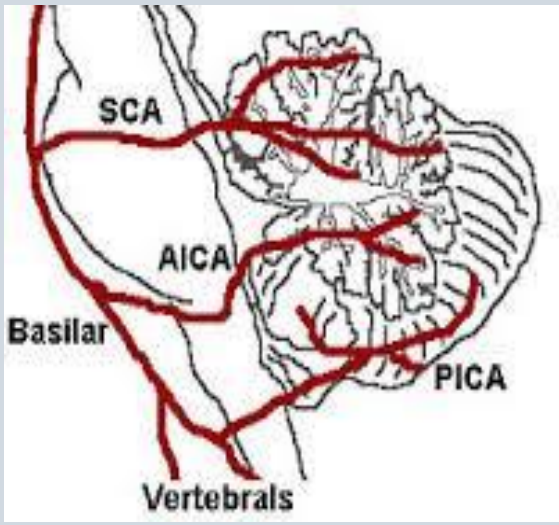


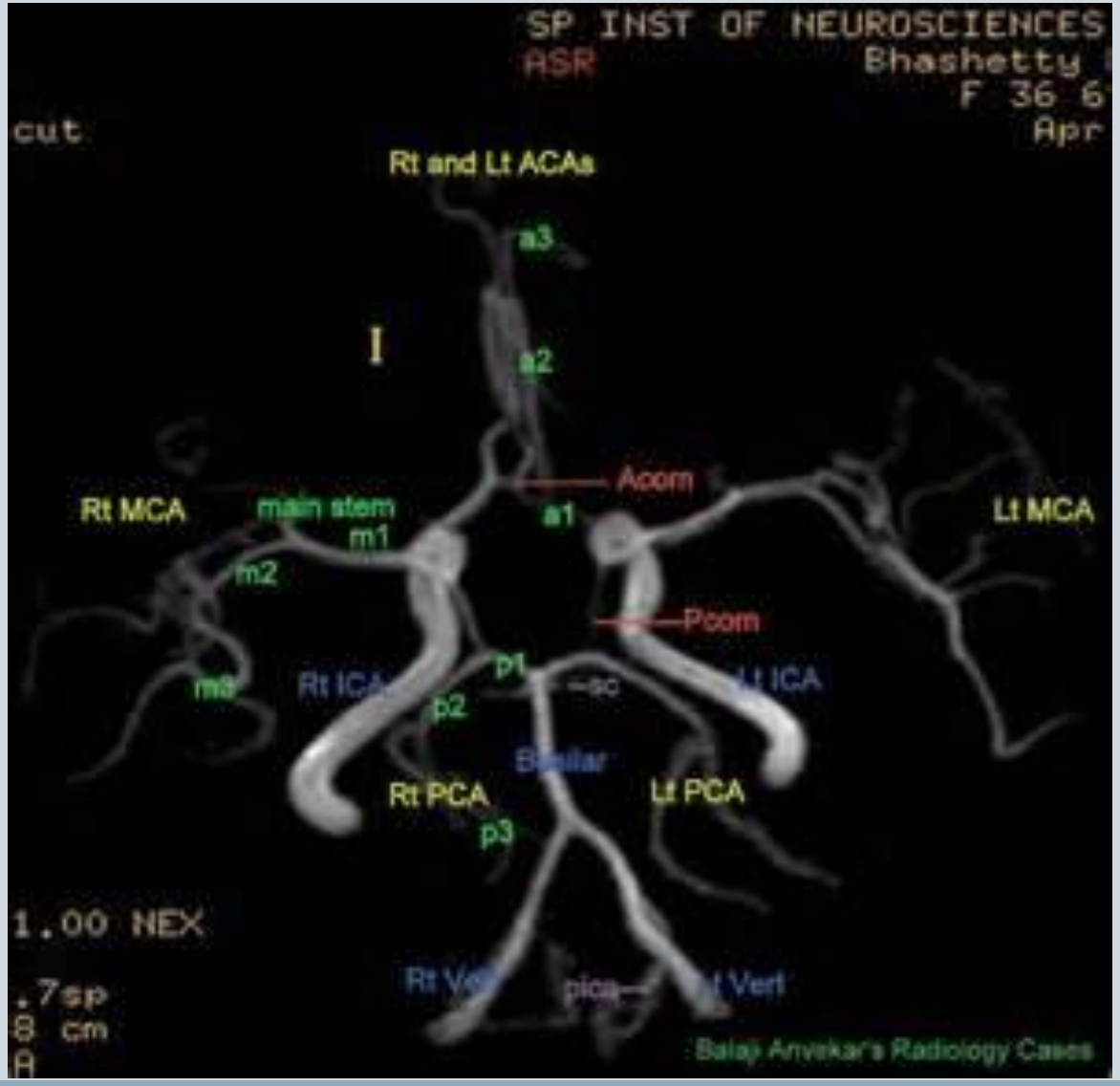
# Posterior Vascular Anatomy

- Vessels below & behind the Tentorium
- Vertebral arteries and spinal arteries supply brainstem
- Vertebral arteries join to become basilar artery (BA)
- Posterior Cerebral Artery (PCA) arises from the Basilar Artery and supplies the occipital lobe, thalamus and midbrain
- Superior Cerebellar Artery, Posterior (PICA) and Anterior (AICA) Inferior Cerebellar Arteries supply Cerebellum



# MRA view: Circle of Willis



# Stroke Pathophysiology
# Types of Strokes

**Anterior Strokes**

- **Internal Carotid Artery (ICA)**
- **Middle Cerebral Artery (MCA)**
- **Anterior Cerebral Artery (ACA)**

**Posterior Strokes**

- **Vertebral Artery (VA)**
- **Basilar Artery (BA)**
- **Posterior Cerebral Artery (PCA)**

Recognition Important

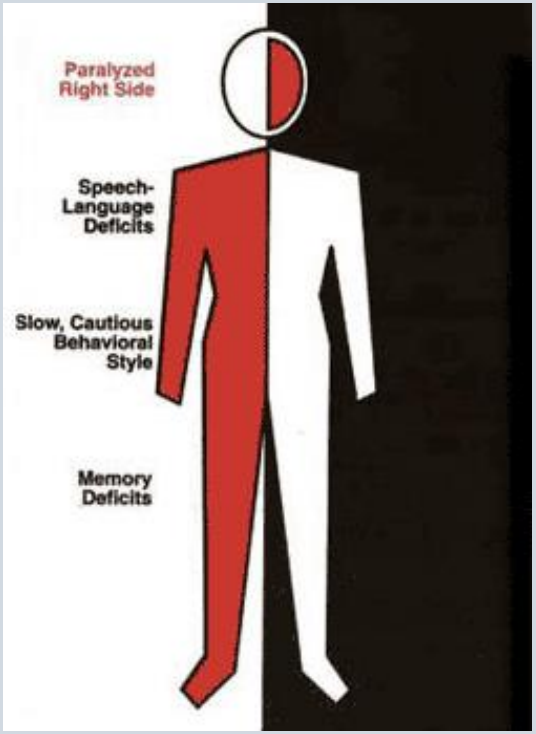
**Hemorrhagic Strokes**

**Stroke Mimics**

# Left Middle Cerebral Artery (MCA) Stroke {Anterior circulation}

**Typical Signs**

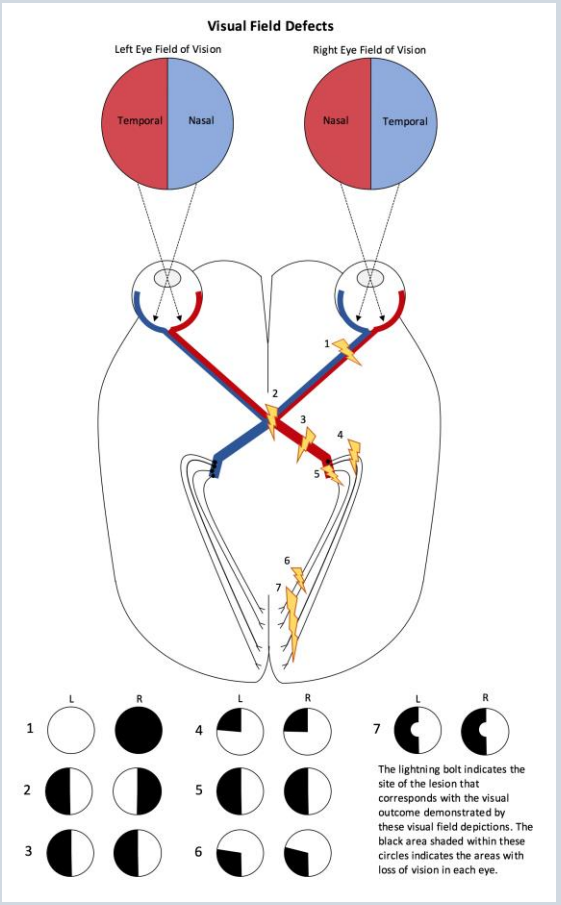
- Left Dominant – Language
  - Expressive, Receptive, Global Aphasia
  - Difficulty reading, writing & calculating
- Right sided hemiparesis or hemiplegia
- Right sided hemisensory loss
- Right visual field cuts – hemianopsia
- Left gaze deviation/preference




**Motor/sensory deficits, face > arm > leg**

The left hemisphere is dominant in > 95 percent

# Paris seen with Right Homonymous Hemianopsia



# Right Middle Cerebral Artery (MCA) Stroke {Anterior Circulation}

**Typical Signs**

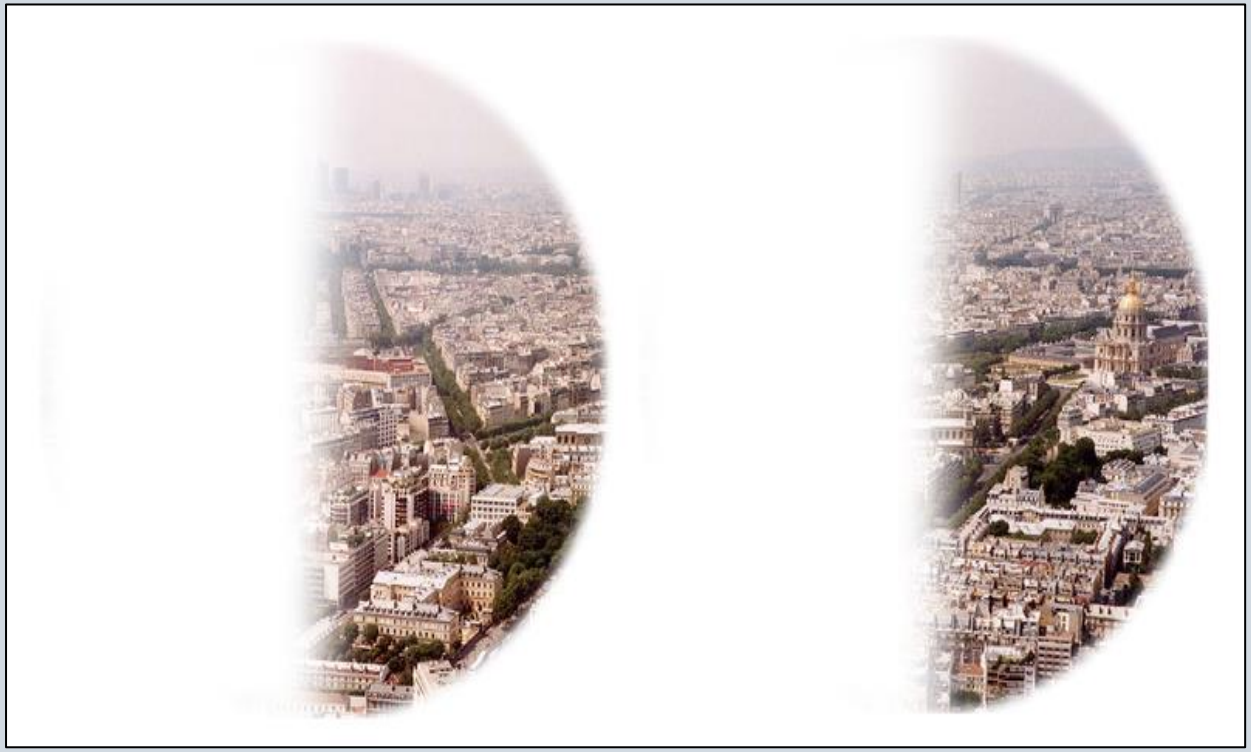
- Neglect on affected side
  - Unaware of deficits
  - No speech deficits if non-dominant
- Left visual field cuts – hemianopsia
- Left sided hemiparesis or hemiplegia
- Left sided hemisensory loss
- Right gaze deviation/preference

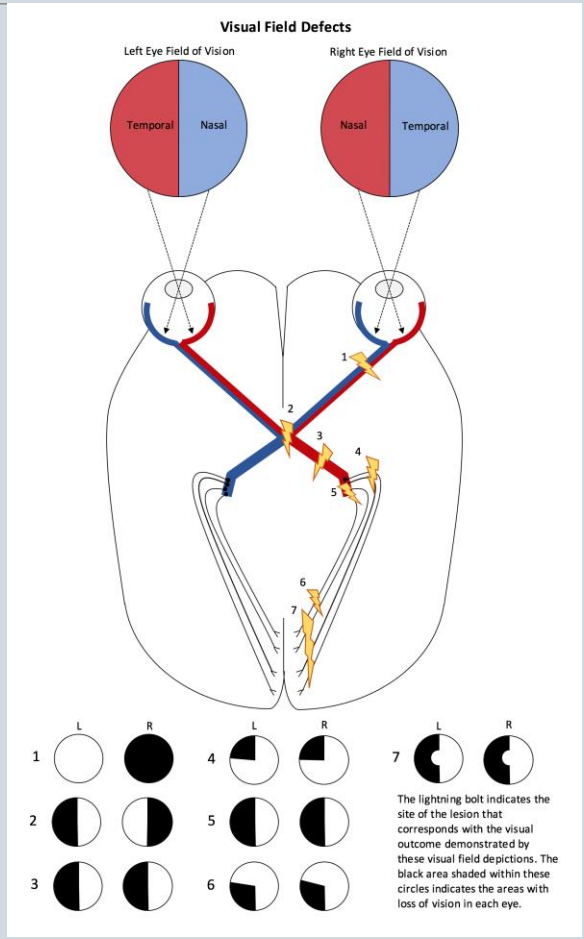

**Motor/sensory deficits, face > arm > leg**

*Approach patient from the right side*

Make patient aware of the side they are “missing”

# Paris seen with Left Homonymous Hemianopsia



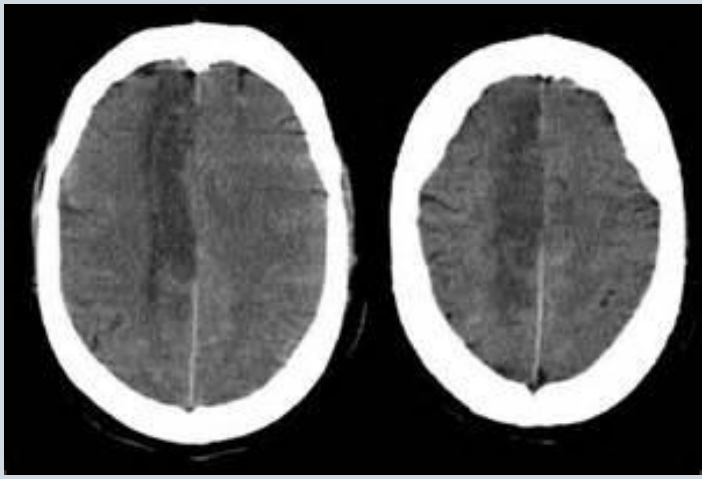


# Anterior Cerebral Artery (ACA) Stroke {Anterior Circulation}

**Typical Signs**

- Leg weakness and sensory loss
- Incontinence
- Behavioral abnormalities
- Foot drop

**Right ACA Stroke**



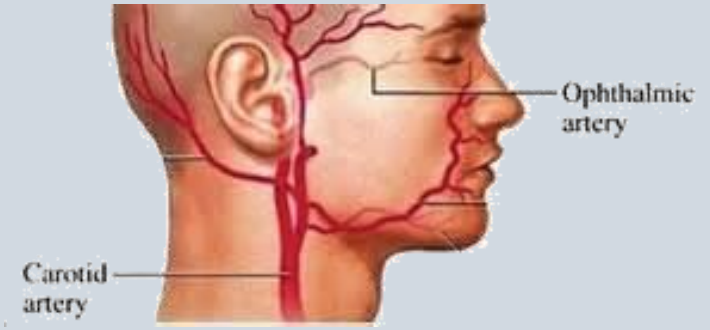
**Leg greater than arm weakness**

THINK…..LIB for ACA

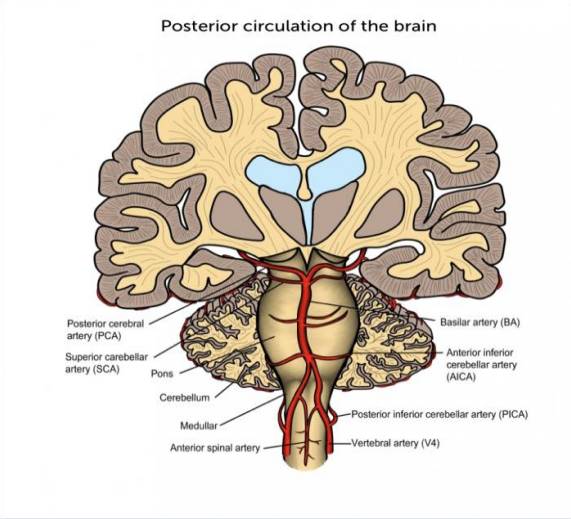
# Internal Carotid Artery (ICA) {Anterior Circulation}

**Typical Signs**

- Contralateral Face, Arm, and Leg weakness
- Contralateral sensory loss
- Gaze palsy
- Left ICA – global aphasia
- Right ICA – neglect
- Contralateral visual – field deficit
- Temporary (amaurosis fugax) or permanent blindness in one eye



# Vertebral Artery Stroke
# {Posterior Circulation}



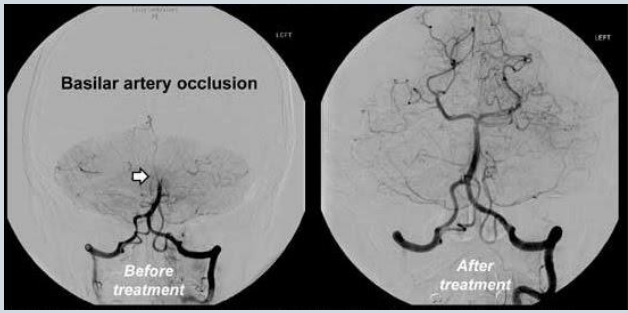

**Typical Signs**

- Ataxia (ipsilateral limb, gait, truncal)
- Nausea and Vomiting
- Headache and Dysarthria
- Central Vertigo/Dizziness & Nystagmus
  - Pt with isolated vertigo, always assess ability to walk and for nystagmus (one of the two deficits are present in 84% cerebellar infarcts)
- Dysmetria (unable to touch target)

Vertebral Artery Dissections are often due to trauma

# Basilar Artery Stroke
# {Posterior Circulation}

**Typical Signs**




- Quadriplegia
- Akinetic mutism (“locked in”)
- Sensory loss
- Weakness of facial, lingual, or pharyngeal muscles
  - Dysarthria
  - Dysphagia
- Dysconjugate gaze
- Abnormal respirations, Hiccups

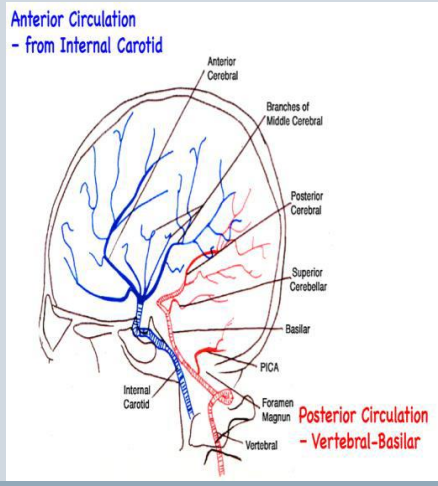
"DIZZY PLUS"

6 "D's"

# Posterior Strokes Brainstem and Cerebellum

**Overview Typical Signs**

- **D**izziness, **D**ystaxia, vertigo,
- **D**ysphagia, **D**ysarthria,
- **D**iplopia, **D**ecreased LOC,
- **D**ysconjugate gaze, gaze deviation, nystagmus,
- Abnormal respirations, nausea, vomiting,
- Hiccups, tinnitus (ringing in the ear)

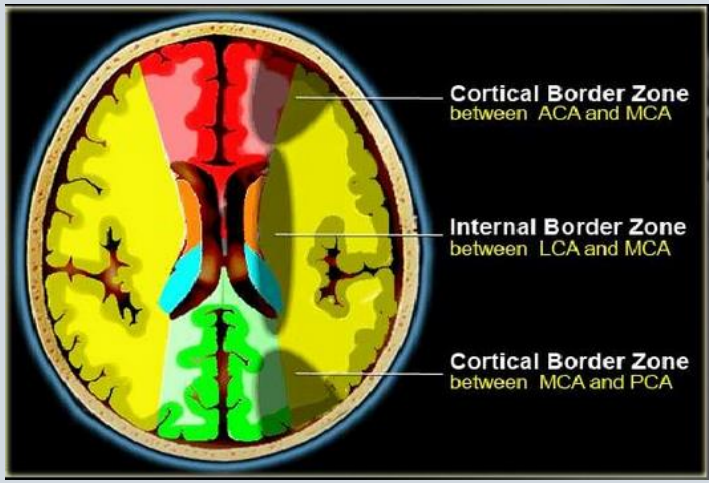


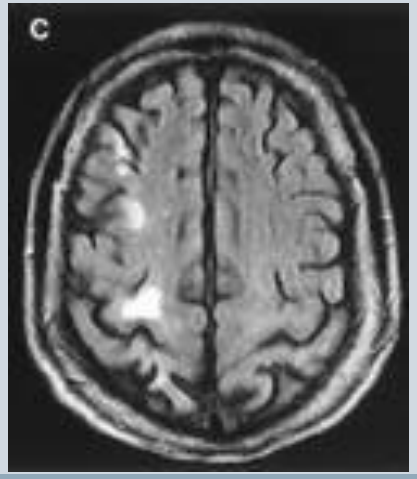
# Watershed Infarcts

- Strokes that occurs between the terminal distributions of two adjacent arteries:  ACA & MCA
- Vulnerable areas affected by low blood pressure
- High risk for ischemia when CPP drops

**Common Causes**

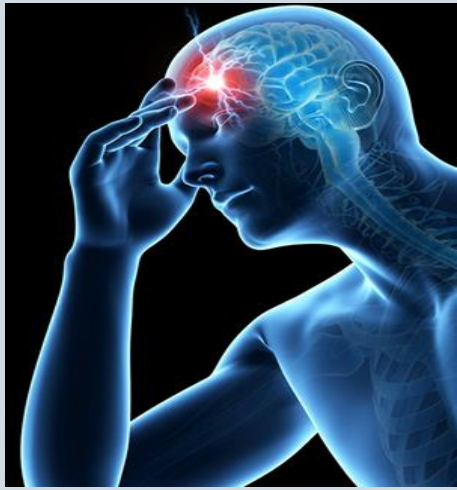
- Dehydration
- Heart attacks
- Sepsis
- Low blood pressure
- Carotid Stenosis



# Stroke Mimics

- Hypoglycemia
- Seizures with postictal state
  - Todd's paralysis
- Migraine
- Conversion Reaction
- Tumor
- Abscess
- Subdural Hematoma
- Metabolic Conditions



# Summary

- Every minute two million brain cells die during a stroke
  - Every hour 3.6 years of accelerated aging occurs
  - In LVO strokes, accelerated aging is 36 years
- Stroke is an Emergency treat it like a Trauma or STEMI
- Stroke Team identifies type of stroke and appropriate treatment
- Recognize, Treatment, Prevention (RTP)

Time is Brain but Tissue is the Issue!

# Questions – Thank You

# References


Comprehensive Review for Stroke Nursing, Second Edition. (2020). In S. L. Kiffon Keigher. American Association of Neuroscience Nurses.

DNV. (2019). Primary Stroke Center Certification Requirements. *DNV GL Healthcare USA, Inc.*

J. Adam Oostema, M., John Konen, B. T., Mojdeh Nasiri, M., & Mathew J. Reeves, P. (2015). Clinical Predictors of Accurate Prehospital Stroke Recognition: a cohort study. *AHA*. Retrieved from www.agajournal.org/toc/str/46/6

Nasser Razack, M. J. (2018). Stroke Made simple. Razack Intellectual Properties, LLC.

Stroke Certification Study Guide for Nurses. (2017). In K. Morrison. Springer .

Susan Ashcraft, D. A. (2021). Care of the Patient With Acute Ischemic Stroke (Prehospital and Acute Phase of Care): Update to the 2009 Comprehensive Nursing Care Scientific Statement. *AHA Journal* .

William J. Powers, M. F. (2019). Guidelines for the Early Management of Patients With Acute Ischemic Stroke:2019 Update to the2018 Guidelines for Early Management of Acute Ischemic Stroke. *AHA/ASA Guideline*.