

Introduction to Stroke Rehabilitation



**CHERYL SCOTT PT, DPT, NCS, CBIS-T, CSRS,
C/NDT**

Stroke Statistics



- About 795,000 Americans each year suffer a new or recurrent stroke.
 - On average, a stroke occurs every 40 seconds.
- Stroke kills more than 137,000 people a year.
 - 1 of every 18 deaths.
 - Number 4 cause of death.
 - Every 4 minutes someone dies of stroke.
- Leading cause of adult disability in the United States
- Americans will pay about \$73.7 billion in 2010 for stroke-related medical costs and disability.

F.A.S.T

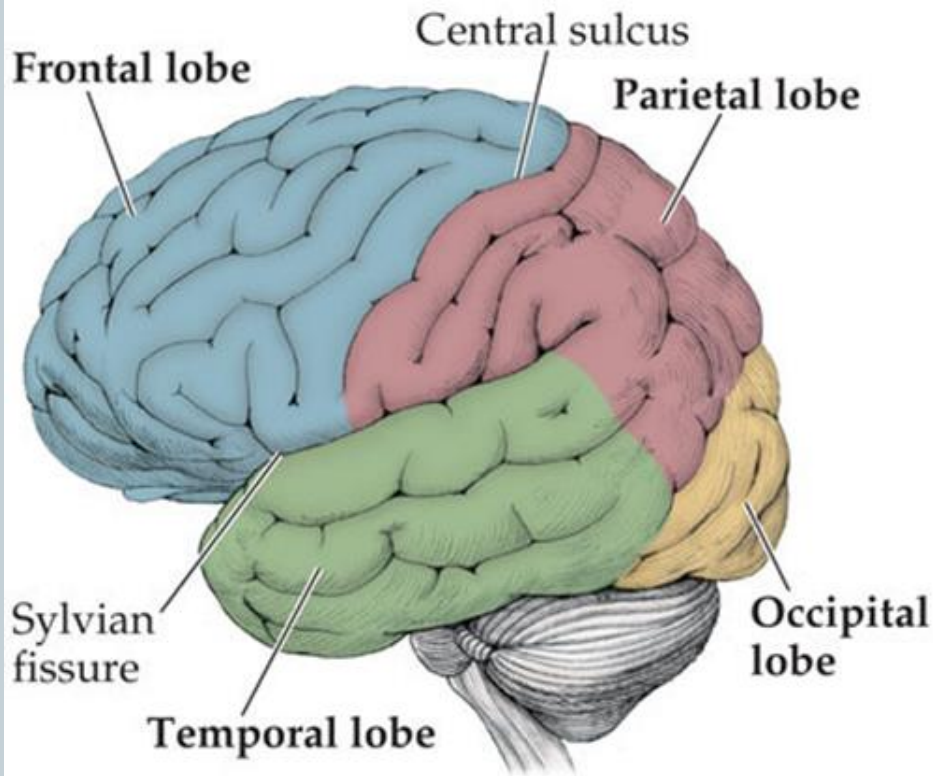


- **F.A.S.T.** is an easy way to educate your patients to remember the sudden signs of stroke.
 - **Face Drooping** – Does one side of the face droop or is it numb? Ask the person to smile. Is the person's smile uneven
 - **Arm Weakness** – Is one arm weak or numb? Ask the person to raise both arms. Does one arm drift downward?
 - **Speech Difficulty** – Is speech slurred? Is the person unable to speak or hard to understand? Ask the person to repeat a simple sentence, like "The sky is blue." Is the sentence repeated correctly
 - **Time to call 9-1-1** – If someone shows any of these symptoms, even if the symptoms go away, call 9-1-1 and get the person to the hospital immediately. Check the time so you'll know when the first symptoms appeared.

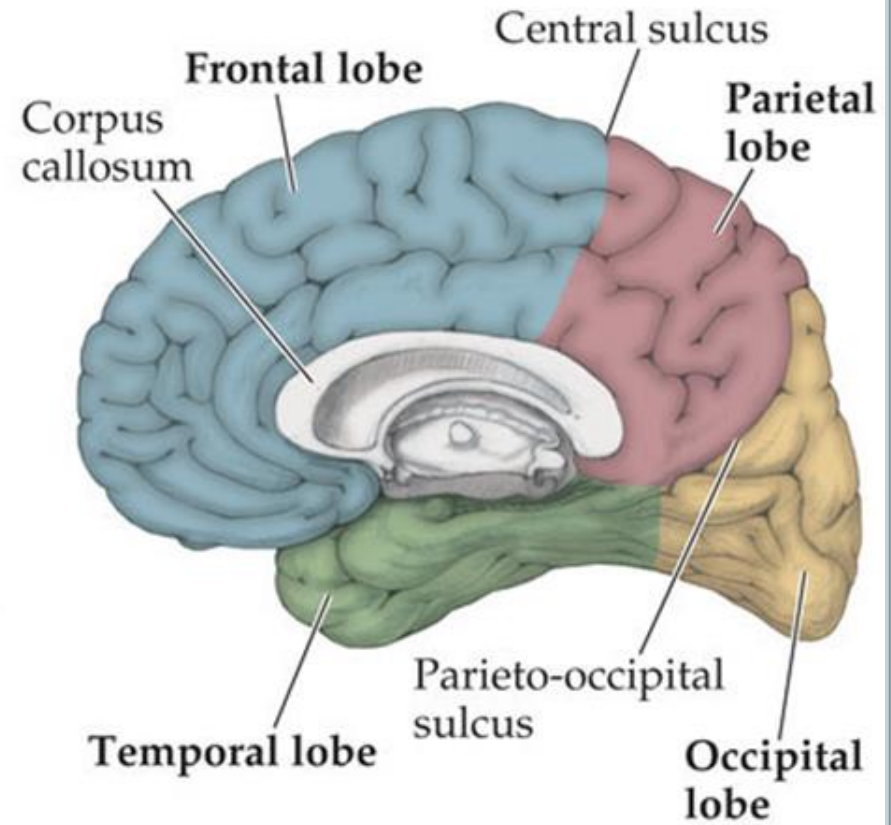
Cerebral Cortex



(A) Lateral view



(B) Midsagittal view



Lobe Disorders- Frontal Lobe



- Restraint
- Initiative
- Order
 - “RIO”

Frontal Lobe Disorder



- **Restraint**
 - Judgment
 - ✦ Impulsivity with everything; gait, transfers, eating, talking
 - Foresight
 - Perseverance
 - ✦ On anything! Eating, talking, a specific word, an activity.
 - ✦ Be direct and change the subject as appropriate.
 - Delayed gratification
 - Inhibiting socially inappropriate responses
 - ✦ Can not laugh, must be direct and firm to establish a more appropriate response
 - Concentration
 - ✦ Attention to the task you are asking

Frontal Lobe Disorder



- **Initiative**
 - Curiosity
 - Spontaneity
 - Motivation
 - ✦ Increased or decreased?
 - Drive
 - ✦ Increased or decreased?
 - Creativity
 - Personality
 - ✦ How will this effect the family? Can you help with education?
 - Mental Flexibility
 - Shifting cognitive set

Frontal Lobe Disorder



- **Order**
 - Abstract reasoning
 - Working memory
 - Perspective taking
 - Planning
 - ✦ How will this effect transfers, bed mobility?
 - Insight
 - ✦ Decreased insight into deficits
 - Organization
 - ✦ Of thinking, of task etc.
 - Sequencing
 - ✦ How will this effect transfers, bed mobility?
 - Temporal order

Contradictory Behavior in Frontal Lobe Syndromes



Dominant Hemisphere?

- Apathetic indifference
- Abulia
- Perseverance
- Mutism
 - Encourage conversation
- Depression
- Hyposexuality

Non-Dominant Hemisphere?

- Explosive emotional lability
- Environmental dependency
- Impersistence
- Confabulation
 - Do not let them believe their stories
- Mania
- Hypersexuality

Functional Frontal Lobe Dysfunctions



- Houses Primary Motor Cortex
- Frontal Release Signs
 - Primitive Reflexes
 - ✦ grasp, root, suck, snout
- Gait Apraxia/Magnetic Gait
 - Patient's feet don't leave the ground
- Urinary incontinence
 - May have a foley

Functional Frontal Lobe Dysfunctions

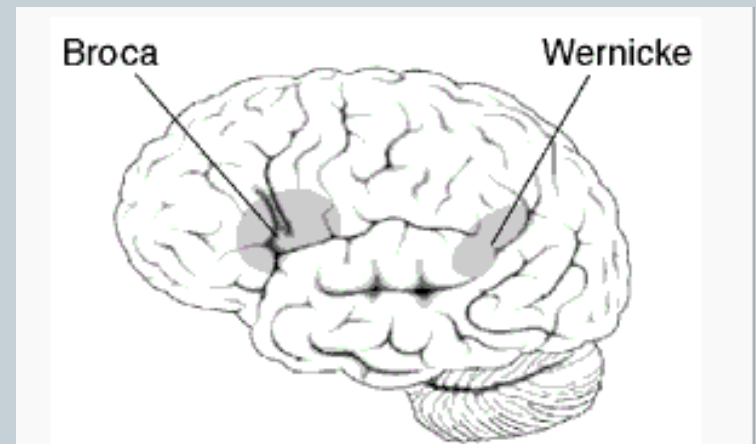


- **Neglect**
 - Left neglect OR Right inattention
 - ✦ Further discussed in the parietal lobe slide
- **Apraxia**
 - Inability to follow a motor command
 - ✦ “Pretend to strike a match and blow it out”
 - Ideomotor apraxia
 - Ideational versus dressing apraxia
- **Perseveration**
 - Written alternating sequence task
 - ✦ Square, triangle, square, triangle
 - May continue with only one shape
- **Broca’s Area**
 - Dominant Hemisphere
 - ✦ Usually left

Broca's Area- Expressive Aphasia



- Deficits in the production of language, with relative sparing of language comprehension so they are aware of their difficulties
 - Become really frustrated. Be patient! Let them try.
 - How can PT assist SLP?
 - ✦ Gait with cognitive tasks
- Broca's Broken Boca
- "Walk dog"
 - "I will take the dog for a walk."
 - ✦ Make them say the whole sentence

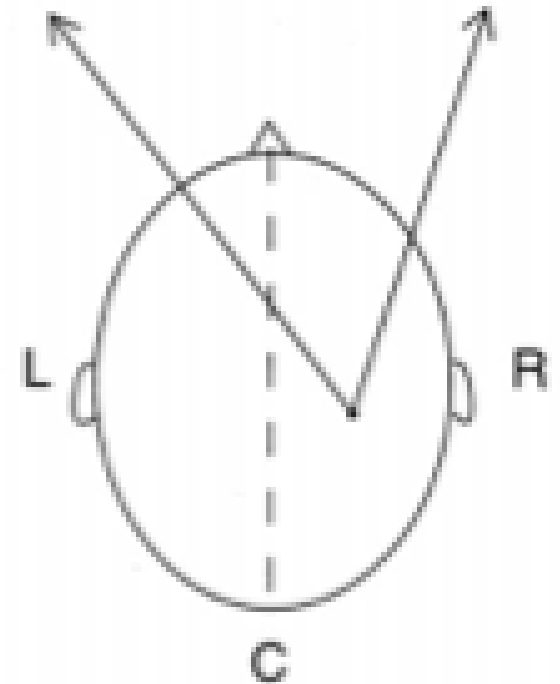
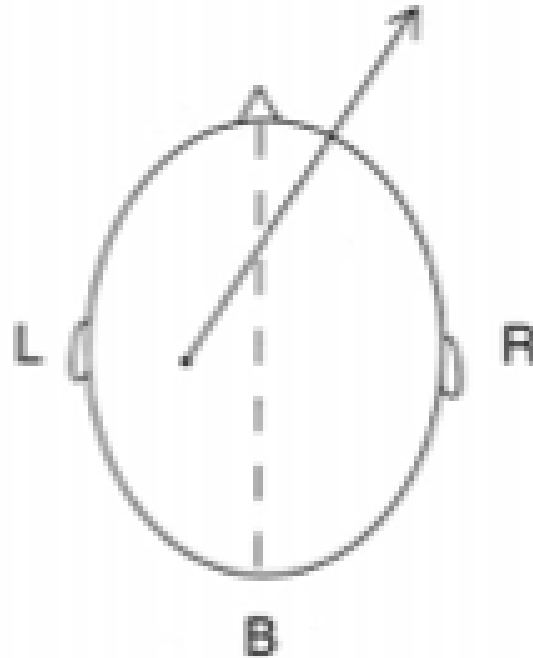
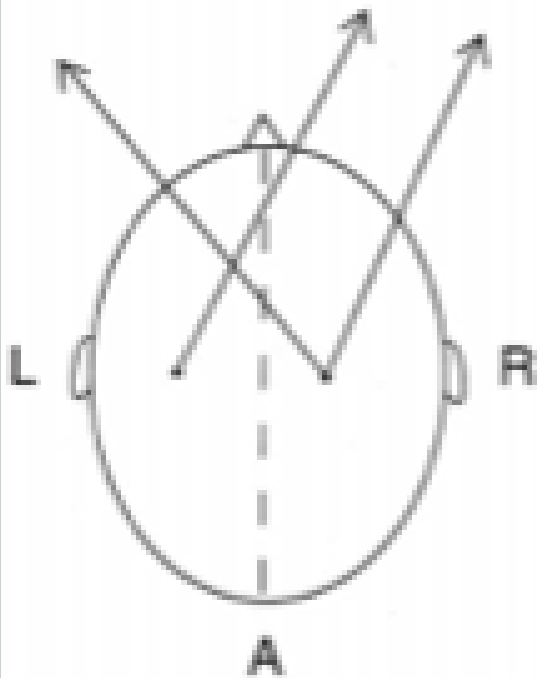


Lobe Disorders- Parietal Lobe



- **Houses Primary Somatosensory Cortex**
 - Sensory information
- **Gerstmann's Syndrome- Left Parietal Lobe**
 - Agraphia
 - Finger agnosia
 - R/L confusion
 - Difficulty with calculations
- **Anosognosia**
 - Is there something wrong with you right now?
- **Left Neglect- Right Parietal Lobe**
 - Minimal to Severe
 - May have a right inattention with left lesion but is less likely

Left Neglect and Right Inattention



Contraversive Pushing



- “Pusher syndrome,” is characterized by a distorted postural orientation.
 - Patients use their less-affected limbs to actively push toward the more-affected side.
- Patient’s are very resistant to accept weight on the less-affected side with any passive attempts to correct the push.
- Contraversive pushers usually experience a 20-degree tilt to the ipsilesional side when they are actually upright.
 - The posterior thalamus appears to be the fundamental brain structure that controls body upright posture
- Usually seen with your patients with left neglect
 - Why would this be?

Clinical Signs of “Pusher Syndrome”



- Spontaneous body tilting toward the more-affected side
- Abduction and extension of the less-affected extremities.
- Resistance to passive correction of the tilted posture.
 - Contraversive pushing rarely exists six months post-stroke
 - It takes an average of 3.6 weeks longer to achieve similar functional outcomes compared to "non-pushers."

Treatment of Contraversive Pushing



- Leaning and reaching to the unaffected side.
- Weight shifting to the unaffected side
- Do not allow the patient to use their unaffected arm when performing tasks
 - .

Lobe Disorders- Temporal Lobe



- Houses Primary Auditory Cortex
- Wierneke's Area
 - Dominant Hemisphere- usually left
- Memory
 - Medial Temporal Lobe
 - ✦ Declarative (Explicit)
 - Conscious recollection of facts/experiences
 - Amnesia- B/L Temporal Lobe
 - ✦ Non Declarative (Implicit)
 - Non-conscious learning of skills, habits and behaviors
 - Memory Book for these patients?
- Verbal Memory
 - Dominant Hemisphere (Left)
- Visual Spatial Memory
 - Non-Dominant Hemisphere (Right)

Wernicke's Area-Receptive Aphasia



- Deficits in language comprehension
- Difficulty understanding speech and are therefore often unaware of their mistakes
 - They often get really frustrated with you
 - You are constantly saying “I am sorry, I am not sure what you mean.”
- “You know that smoodle pinkered and that I want to get him round and take care of him like you want before,”
 - “The dog needs to go out so I will take him for a walk.”

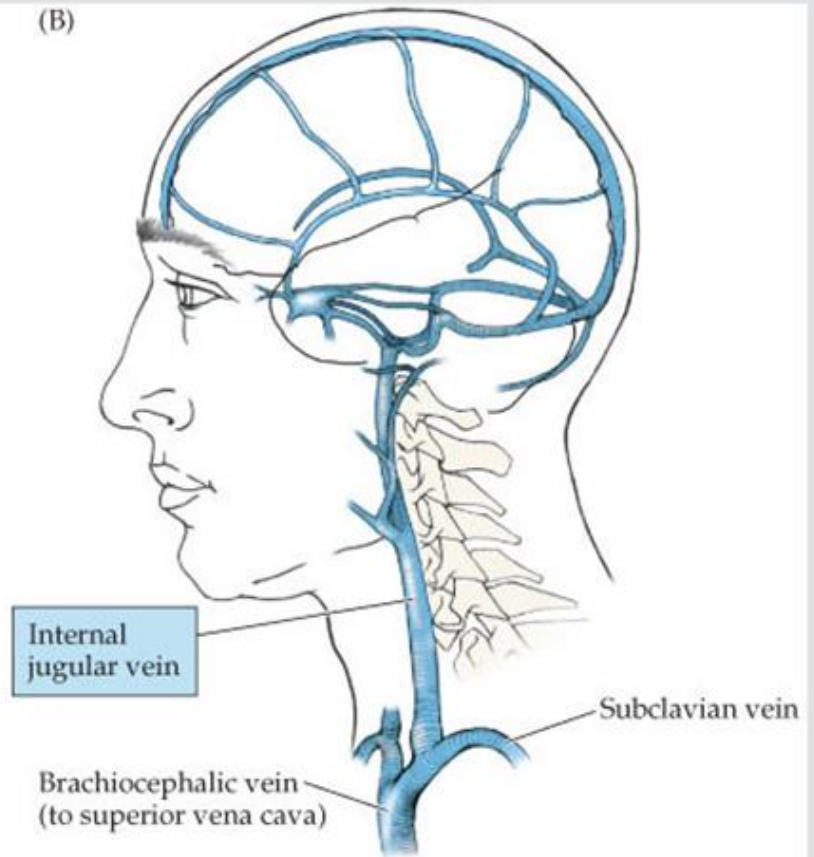
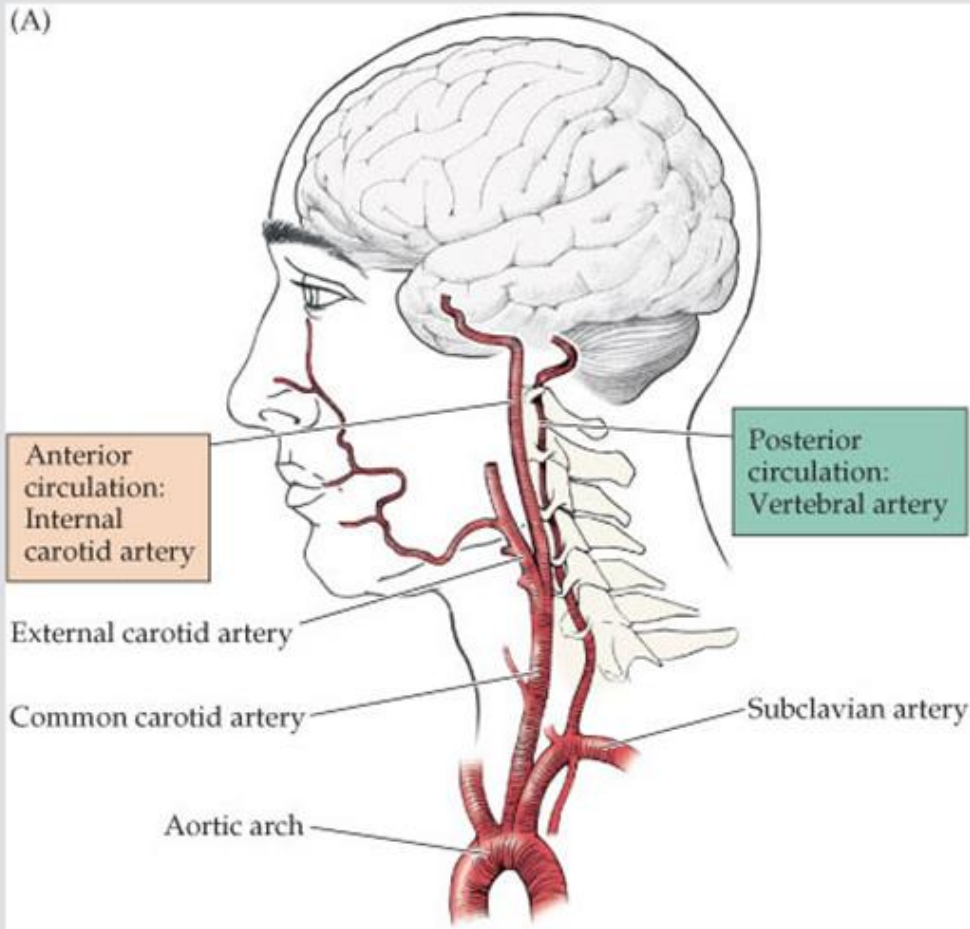
Lobe Disorders- Occipital Lobe



- Houses Primary Visual Cortex
- Visual Processing Center
- Lesions
 - Visual Hallucinations
 - Homonymous hemianopsia
 - ✦ Need to determine if it is a hemianopsia versus a neglect.
 - How would we do this?



Blood Supply to the Brain



Anterior Circulation



- Arises from Internal Carotid Arteries (2)
- Arteries
 - O- Ophthalmic
 - P- Posterior Communicating (PComm)
 - A- Anterior Choroidal
 - A- Anterior Cerebral (ACA)
 - ✦ Anastomose at AComm
 - M- Middle Cerebral (MCA)
- Supplies
 - Basal ganglia, thalamus, hemispheres, internal capsule

Posterior Circulation

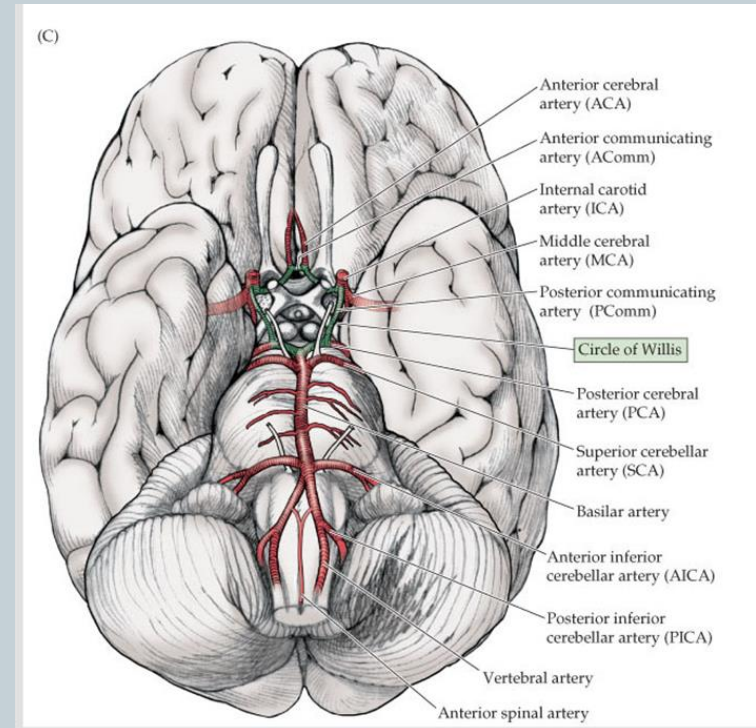


- **Arises from the Vertebral Arteries (2)**
- **Arteries**
 - Posterior Inferior Cerebellar (PICA)
 - Anterior Spinal (ASA)
 - Anterior Inferior Cerebellar (AICA)
 - Superior Cerebellar (SCA)
 - Posterior Cerebellar (PCA)
- **Supplies**
 - Brainstem (CNs), cerebellum, spinal cord

Anterior and Posterior Circulation



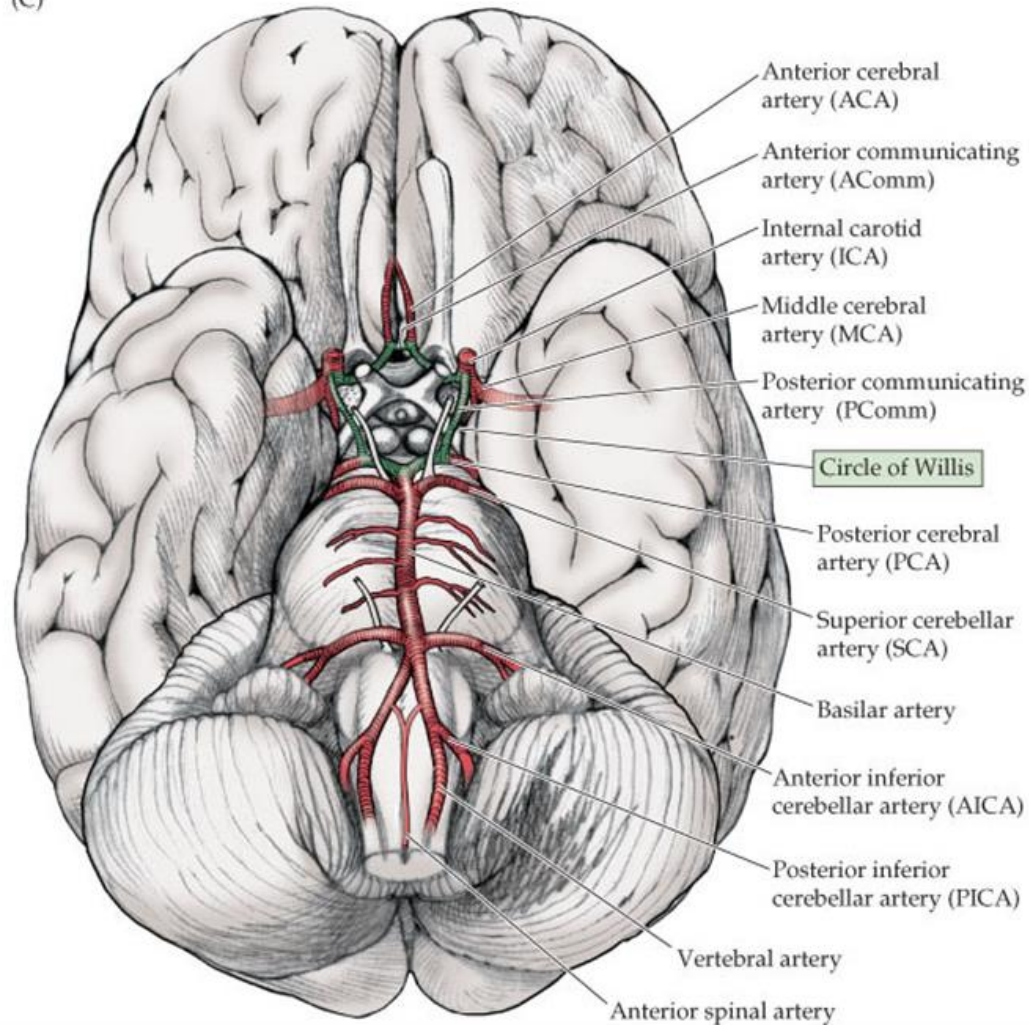
- Anterior & Posterior Circulation meet at the Circle of Willis
 - Connect via the Pcomm to the PCA



The Circle of Willis



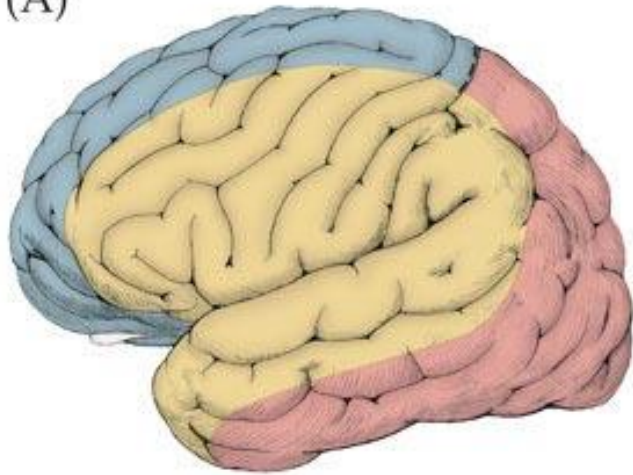
(C)



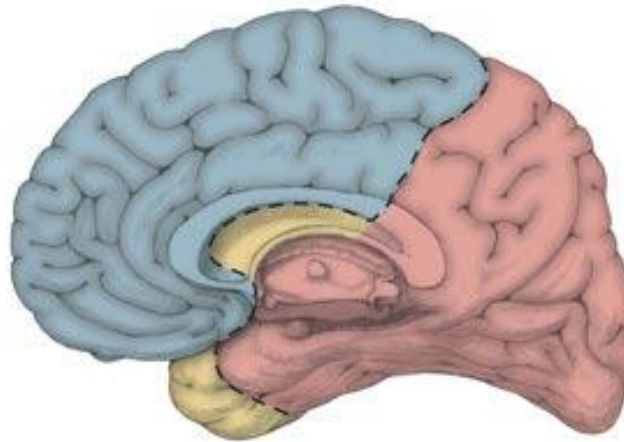
Regions Supplied by ACA, MCA and PCA



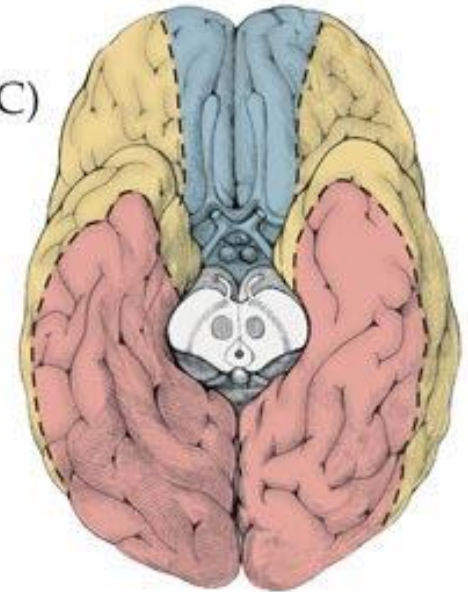
(A)



(B)



(C)



Key



Anterior cerebral artery



Middle cerebral artery



Posterior cerebral artery

Major Clinical Syndromes of the MCA



- **L MCA Superior Division**

- R face/arm weakness
- Broca's aphasia

- **L MCA Inferior Division**

- Wernicke's aphasia
- R visual field deficit
- Motor findings usually absent- but may have some weakness

- **L MCA Deep Territory**

- Pure motor hemiparesis

- **L MCA Stem**

- Combination of all with L gaze preference

- **R MCA Superior Division**

- L face/arm weakness
- L hemineglect

- **R MCA Inferior Division**

- Profound L hemineglect
- L visual field deficits
- Motor neglect

- **R MCA Deep Territory**

- Pure motor hemiparesis
- May have hemineglect

- **R MCA Stem**

- Combination of above with R gaze preference

Major Clinical Syndromes of the ACA



- **Left ACA**

- Right leg weakness
- Grasp reflex
- Frontal lobe behavioral abnormalities
- May have right hemiplegia

- **Right ACA**

- Left leg weakness
- Grasp reflex
- Frontal lobe behavioral abnormalities
- May have left hemiplegia

Major Clinical Syndromes of the PCA



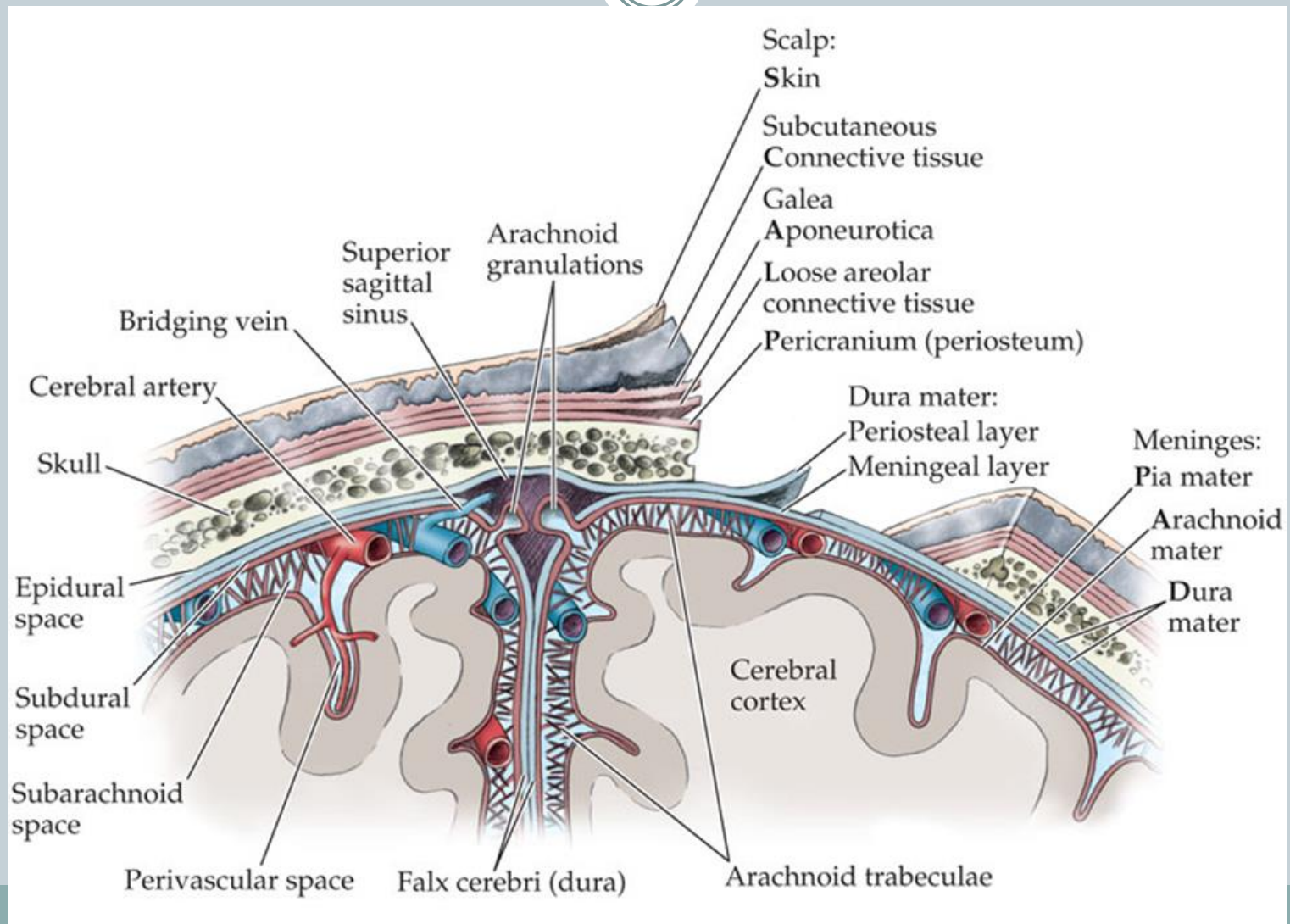
• Right PCA

- Right homonymous hemianopia
- Alexia without agraphia
 - ✦ Extension to splenium of corpus callosum
- Aphasia
 - ✦ Thalamus and internal capsule
- Right hemiparesis
 - ✦ Thalamus and internal capsule
- Right hemisensory loss
 - ✦ Thalamus and internal capsule

• Left PCA

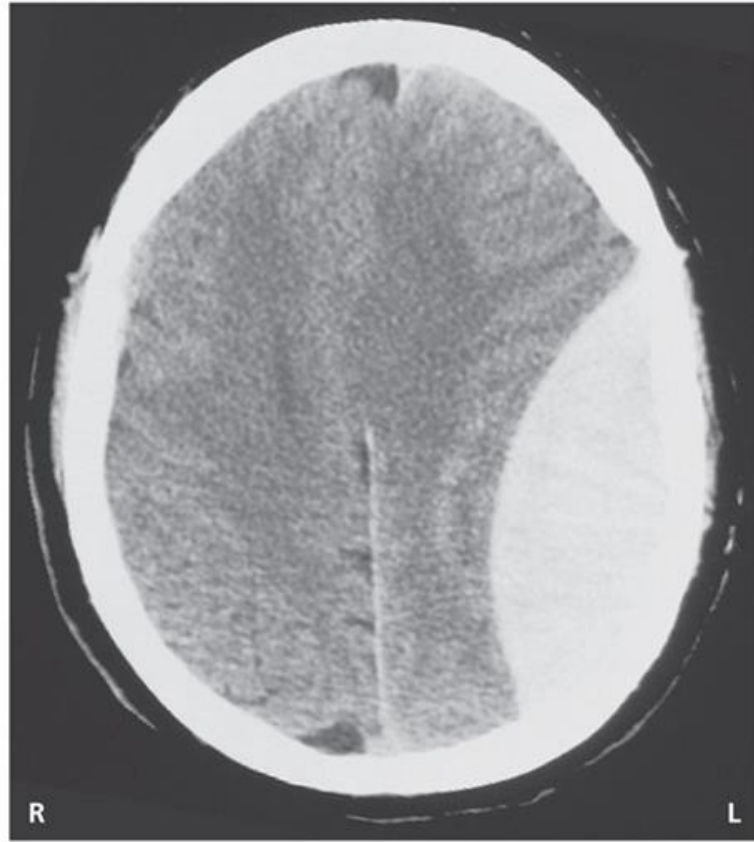
- Left homonymous hemianopia
- Left hemisensory loss
 - ✦ Thalamus and internal capsule
- Left hemiparesis
 - ✦ Thalamus and internal capsule

Layers of Protection for the Brain



Epidural Hematoma

(A) Epidural hematoma



- Lens like on imaging
- Middle meningeal artery
- Fracture of the temporal bone- head trauma/Death
- Emergency situation!

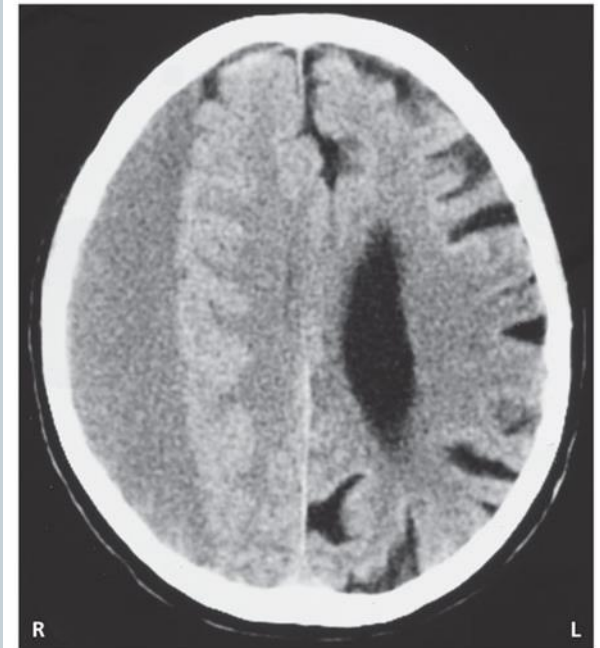
Subdural Hematoma

(B) Acute subdural hematoma



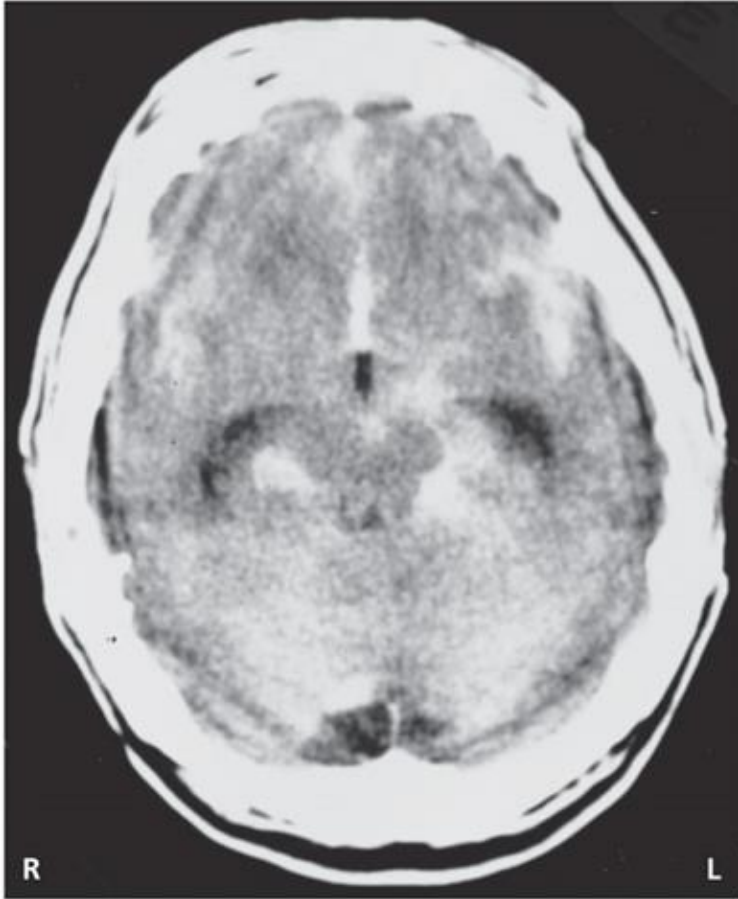
- Bridging veins rupture
- Usually due to old age
- Crescent shaped on imaging

(D) Chronic subdural hematoma



Subarachnoid Hemorrhage

(F) Subarachnoid hemorrhage



- CSF flows in here
- Blood goes into the sulci on imaging
- Non-traumatic
 - Aneurysm, AVM- WORST headache of their life

Normal Pressure Hydrocephalus



- “Wet, wacky and wobbly”
 - Incontinent, confused, off balance
- Communicating Hydrocephalus; decreased re-absorption
- Chronic Dilated Ventricles
- Ventriculoperitoneal Shunt (VP Shunt)
 - Lateral ventricle out of skull into peritoneal cavity of abdomen
- Removal through lumbar puncture

Normal Pressure Hydrocephalus



83



Nursing Implications for Stroke Rehabilitation



- **Improved interdisciplinary communication**
- **Medication Management**
 - Insight into comprehension level of the patient
 - Memory deficits for medication education
 - Aspiration Risk
 - ✦ Referral to speech therapy
- **Family Education**
 - Understanding and explaining neglect, communication deficits, swallowing deficits
- **Patient Safety**
 - How impulsive will they be?
 - ✦ Fall risk
 - Safest direction to transfer
 - Environmental set up/Room set up
 - ✦ Neglect, strength deficits

Reference



- Normal Pressure Hydrocephalus
 - Dr Jeremy Jones and Dr Gagandeep Singh et al.
- Wikipedia images
- Blumenfeld, Hal. 2010. Neuroanatomy through clinical case studies. Sinauer Associate, Inc Publishers. Sunderland Massachusetts
- Swan, L. Unilateral Spatial Neglect. *Phys Ther.*2001; 81: 1572-1580.
- Chong, D. Stop Pushing! *Phys Ther and Rehab Med.* 2006; 17:26:32.
- The internet stroke center
- American Stroke Association Website
 - www.strokeassociation.org