London Health Sciences Centre
Southwest Ontario Regional Base Hospital Program

Stroke

Paramedic Rounds
Presented by
Dr. Adam Dukelow

Case Study 1:

- ID: 64 year old male in Amherstburg, ON.
- HPI: 911 activated by spouse for difficulty speaking
- EMS History:
  - Normal at 0900 AM watching TV conversing with wife
  - Found at 1000 AM unable to respond to wife but eyes open
  - No trauma or tox ingestion
- EMS Exam
  - Vitals are all normal.
  - Glucose 6.1 mmol/L.
  - Unable to speak. Left pronator drift and Left Facial Droop

Case Study 2:

- ID: 72 year old female in Stratford, ON.
- HPI: 911 activated by spouse for loss of balance/fall
- EMS History:
  - Normal at 1900hrs, patient went to shower
  - Found at 1930hrs, laying in bath tub, small laceration to forehead
- EMS Exam
  - Glucose 5.2 mmol/L.
  - Patient has a blank stare, cannot speak and withdraws to painful stimulus.

Objectives

At the completion of this session, the paramedic will be able to:

- Identify and describe the function of key anatomical structures of the brain
- Relate various signs and symptoms of stroke to the affected location within the brain
- List various medical conditions that can mimic stroke
- Summarize the pre-hospital assessment and care of stroke patients
- Assess patients to determine if the Stroke Bypass Protocols apply

Stroke Statistics

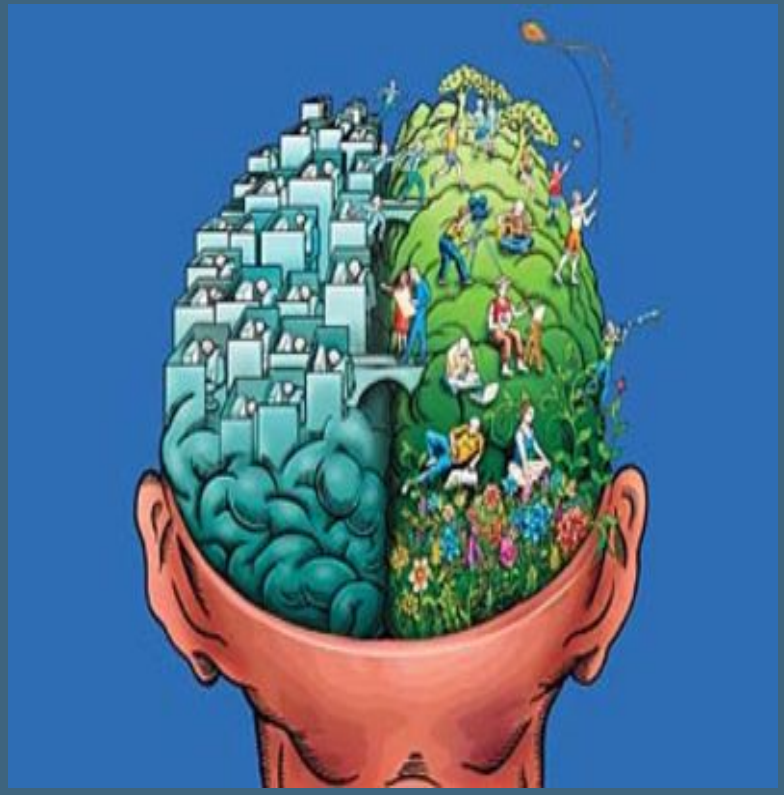
- Third leading cause of death in Canada (14,000/yr)
- More than 50,000 strokes in Canada per year
- Of every 100 people who have a stroke:
  - 15% die
  - 10% recover completely
  - 25% recover with minor disability
  - 40% are left with moderate to severe disability
  - 10% are so severely disabled they require long-term care

Source: Heart and Stroke Foundation of Canada
http://www.heartandstroke.on.ca/site/c.pvI3IeNWJwE/b.3581729/k.359A/Statistics.htm#stroke

Division of the Brain

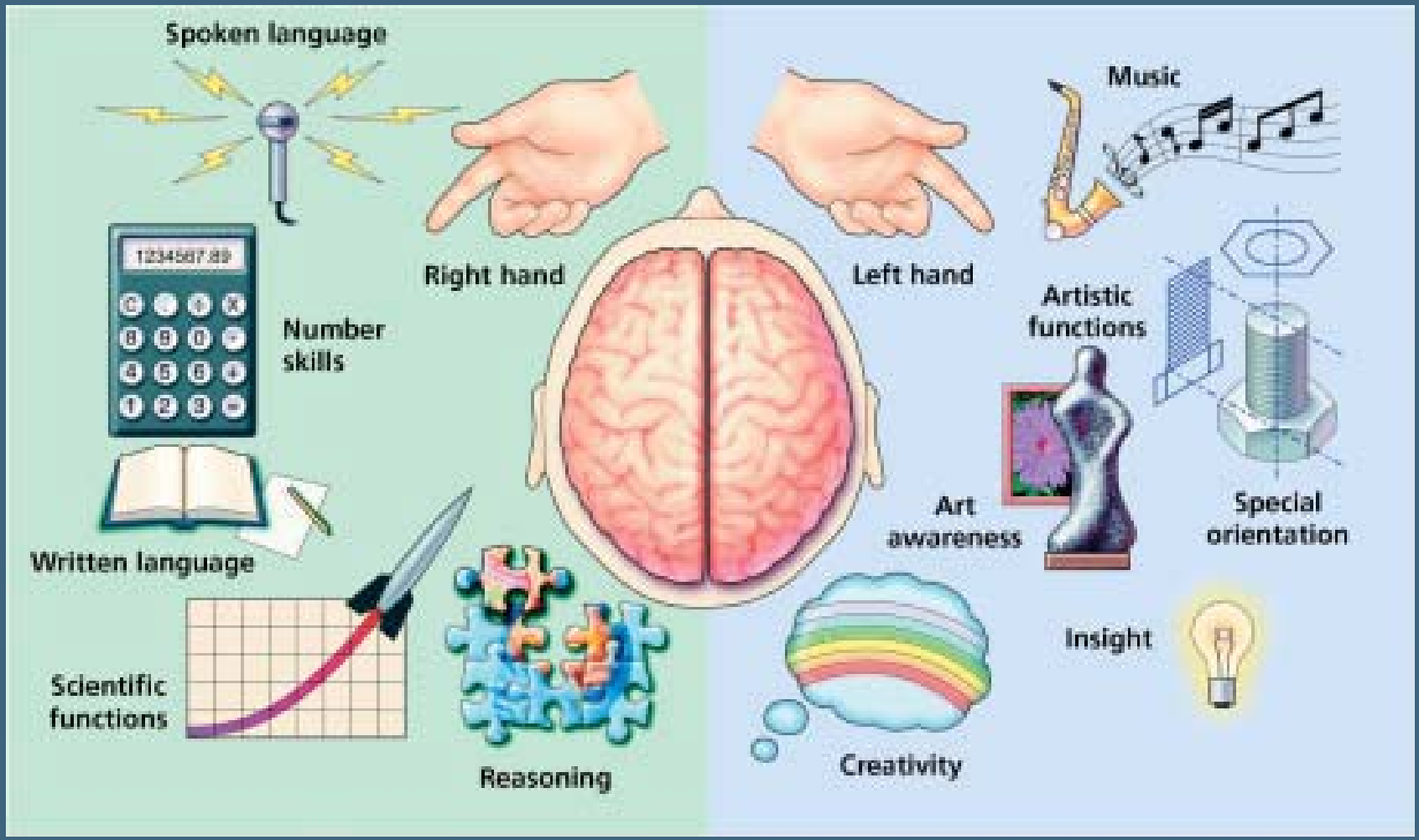
BRAIN IS DIVIDED INTO LEFT AND RIGHT HEMISPHERE

Generally left side houses logic



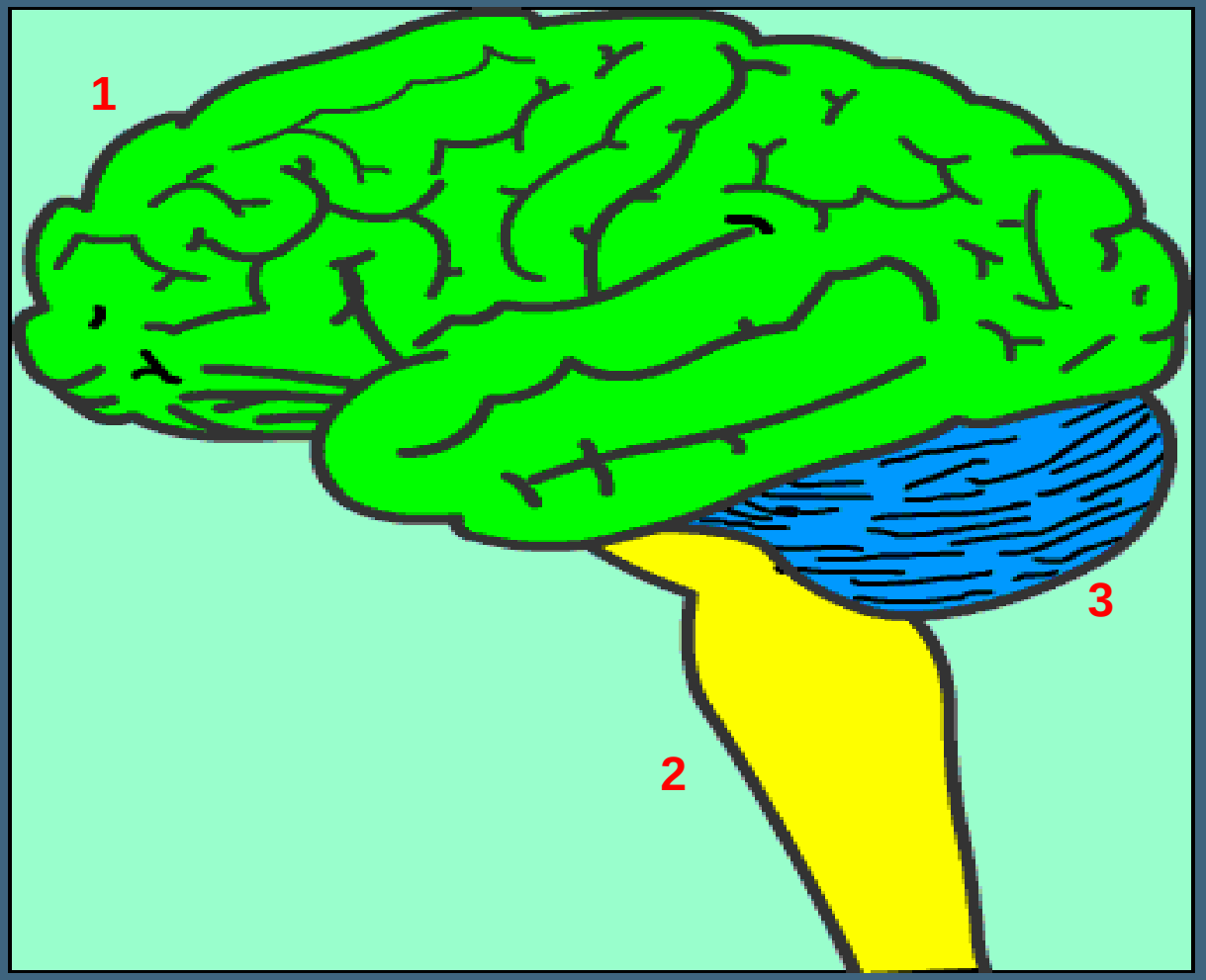
Generally right side houses creativity

Hemisphere Functions

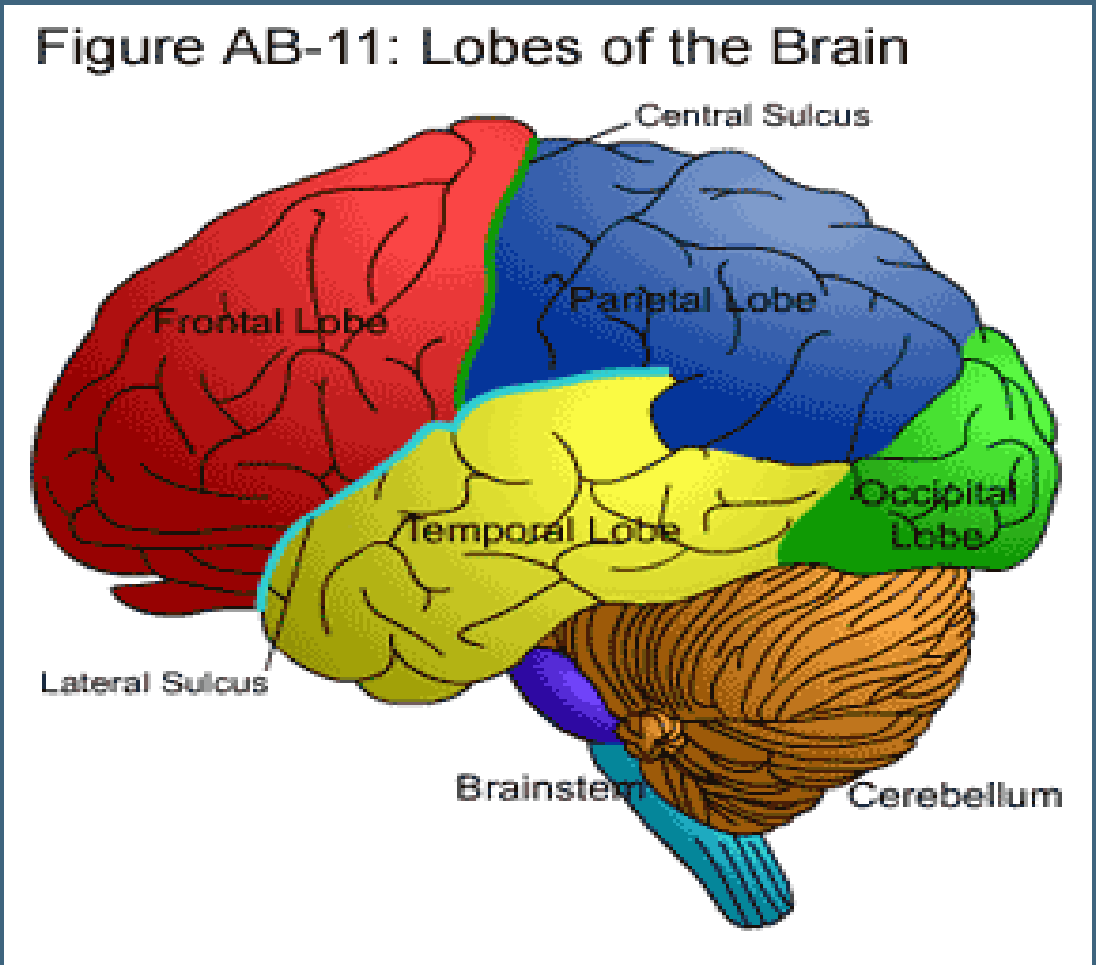


Divisions of the Brain

1. Cerebrum
2. Brain stem
3. Cerebellum



Cerebrum – Four Lobes



Each lobe has many functions

Hypothalamus

REGULATES

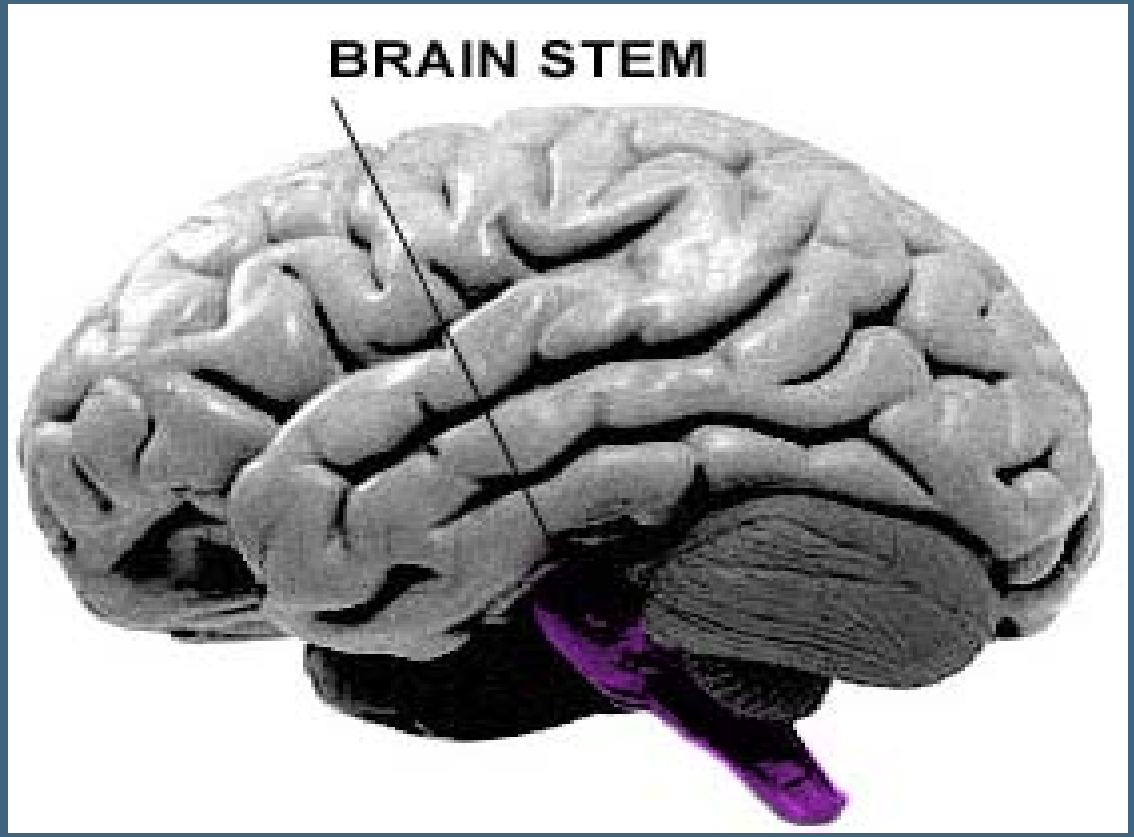
- **physiological drives**
  e.g. appetite, sexual drive, thirst

- **autonomic nervous system**
  e.g. sympathetic system, temperature, hormones, peristalsis

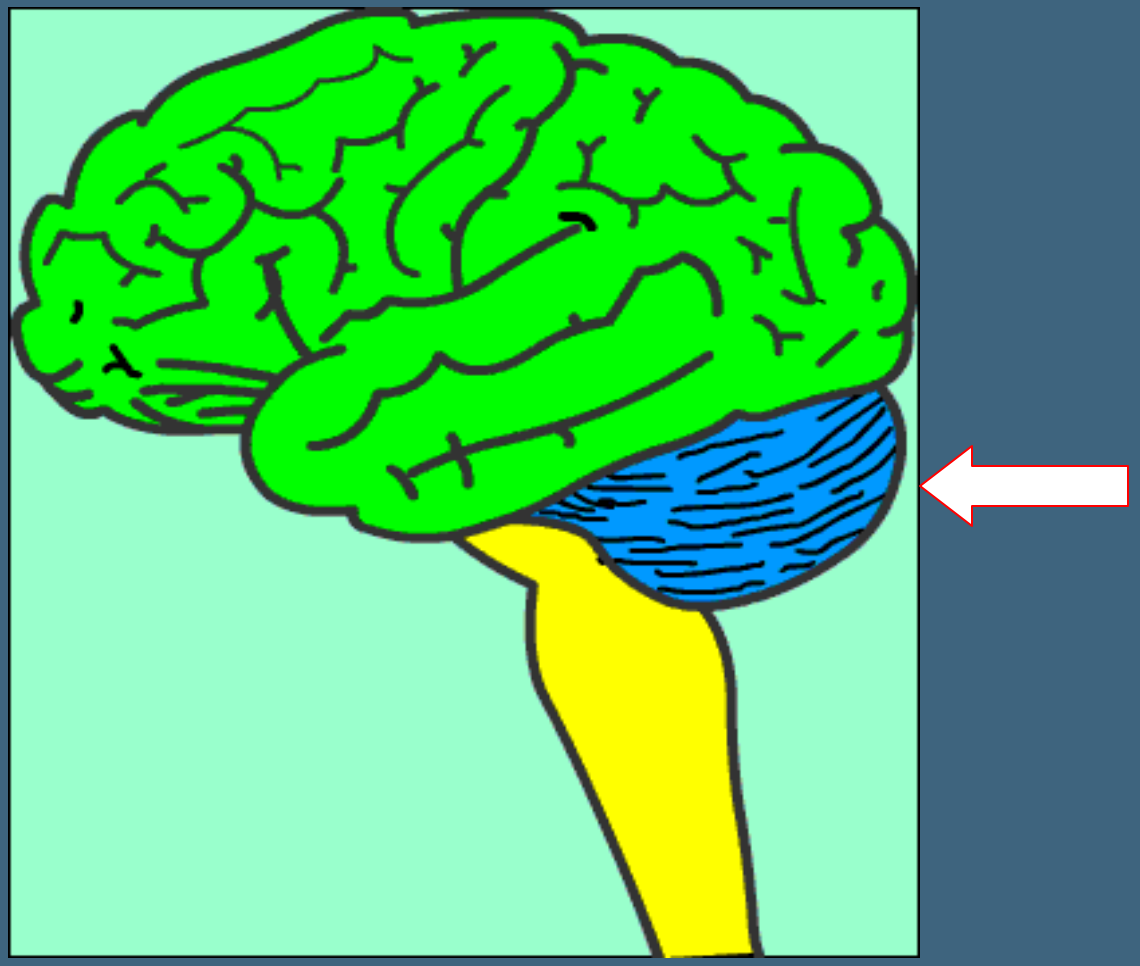
You may observe some associated S&S with your patients!

Brain Stem

- Midbrain
- Pons
- Medulla

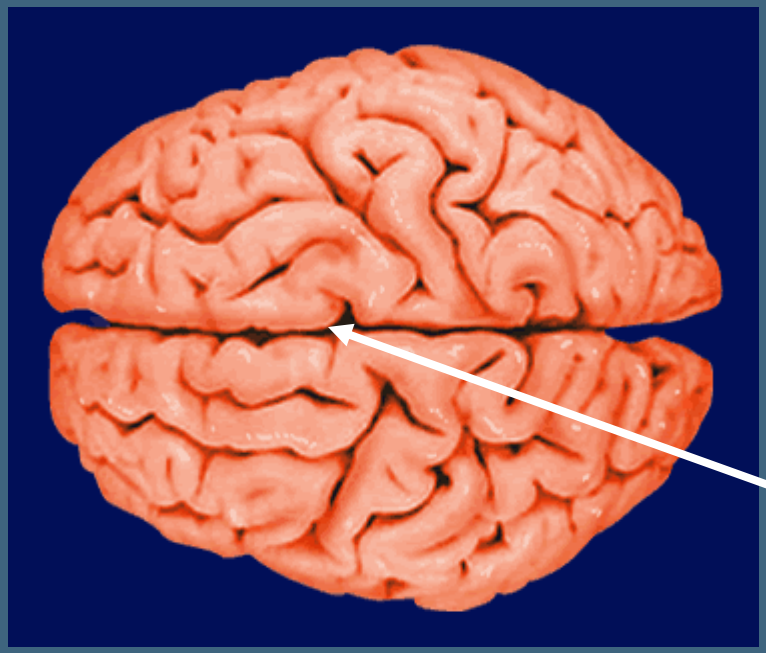


Cerebellum



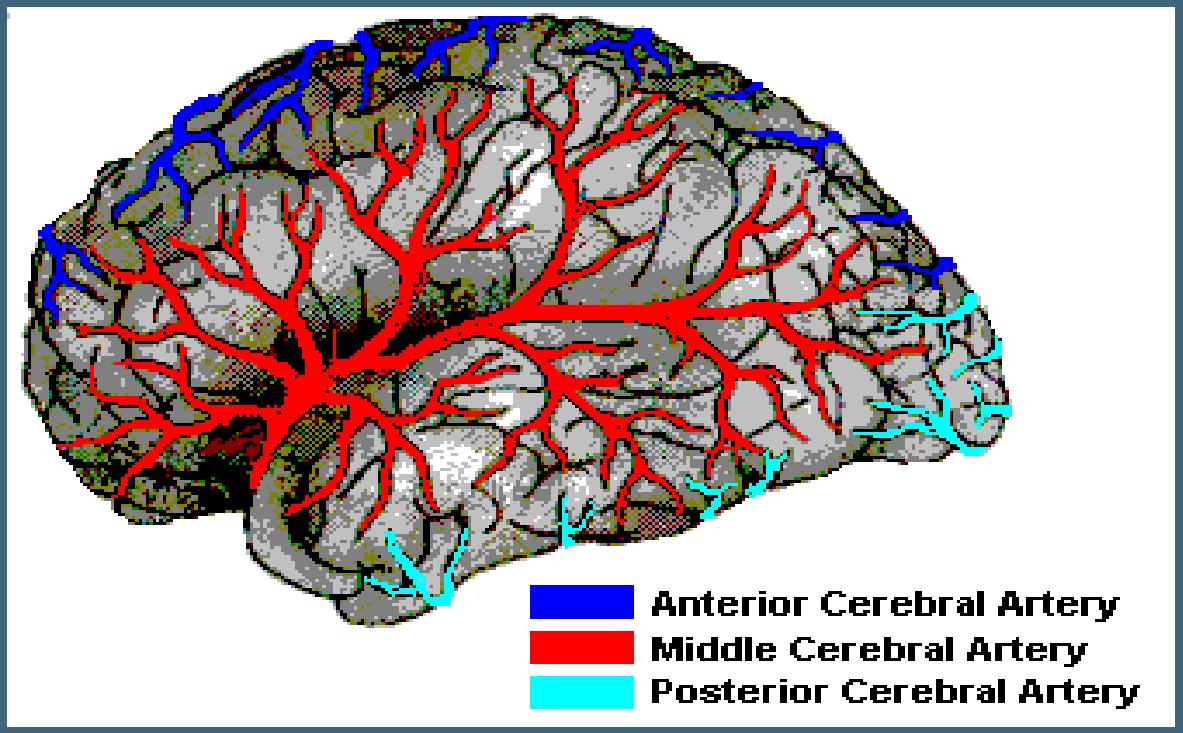
Cerebral Blood Flow

Generally, the Anterior Cerebral Artery (ACA) runs between the left and right hemispheres of the brain within the great longitudinal fissure.



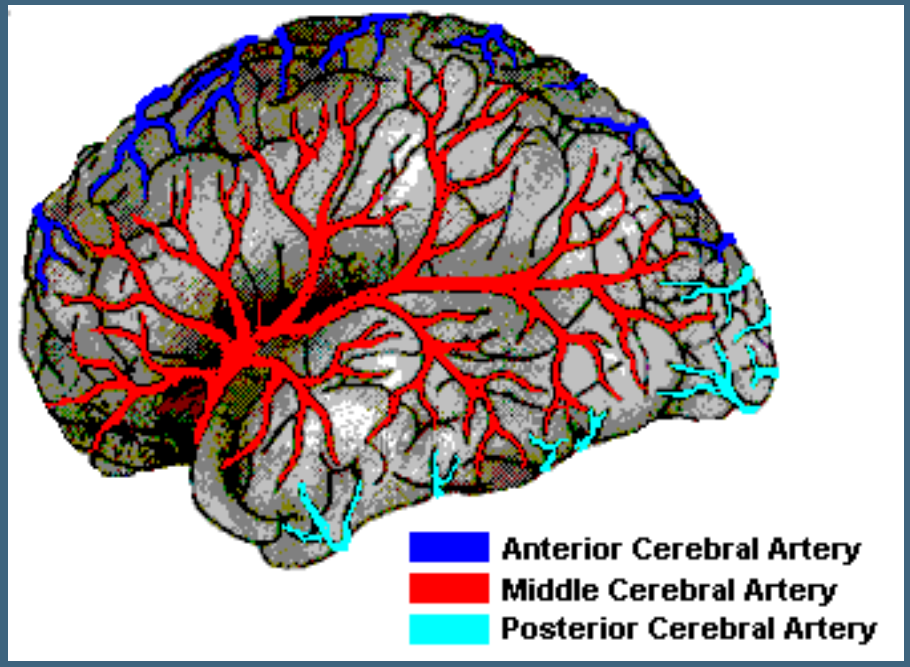
Cerebral Blood Flow

Generally, the Middle Cerebral Artery (MCA) runs on the lateral side of the 2 hemispheres and portions of the ventral (bottom) side of the lobes.



Cerebral Blood Flow

POSTERIOR CEREBRAL ARTERY



Note the ventral location of this artery

Cerebral Blood Flow

CIRCULATION WITHIN THE LOBES OF THE BRAIN IS OFTEN SUPPLIED BY

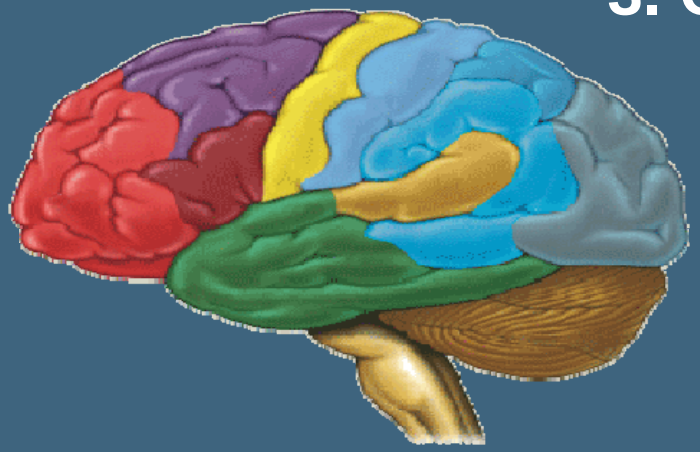
MORE THAN ONE CEREBRAL ARTERY

E.g.. ACA and MCA to the frontal lobe

Deficits in Stroke

DEFICITS IN A PATIENT WITH A STROKE CAN BE EXPLANED BY:

1. **AREAS OF THE BRAIN**
2. **CIRCULATION OF THE BRAIN**
3. **COMBINATION OF BOTH**



Common Signs and Symptoms

LEFT HEMISPHERE

- R hemiparesis or weakness
- R visual defect
- Aphasia
- L gaze preference

RIGHT HEMISPHERE

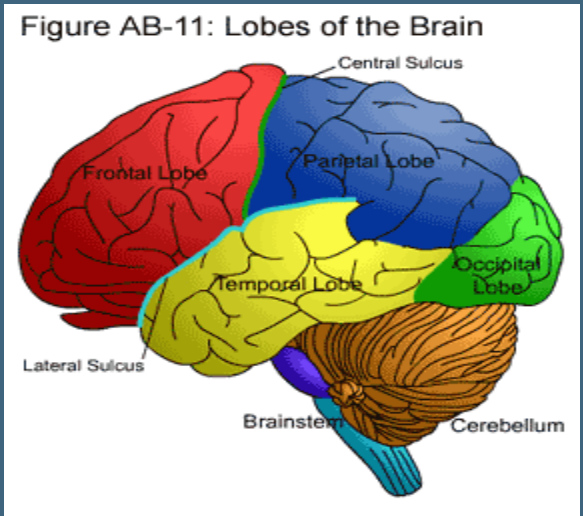
- L hemiparesis or weakness
- L visual defect
- L neglect or inattention
- R gaze preference

GENERALLY

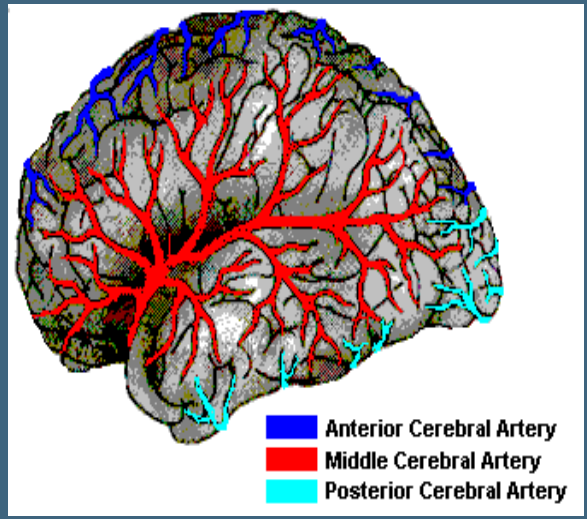
A RIGHT HEMISPERE STROKE = LEFT SIDED S&S

A LEFT HEMISPERE STROKE = RIGHT SIDED S&S

Frontal Lobe Stroke



BLOOD SUPPLIED BY ACA AND MCA

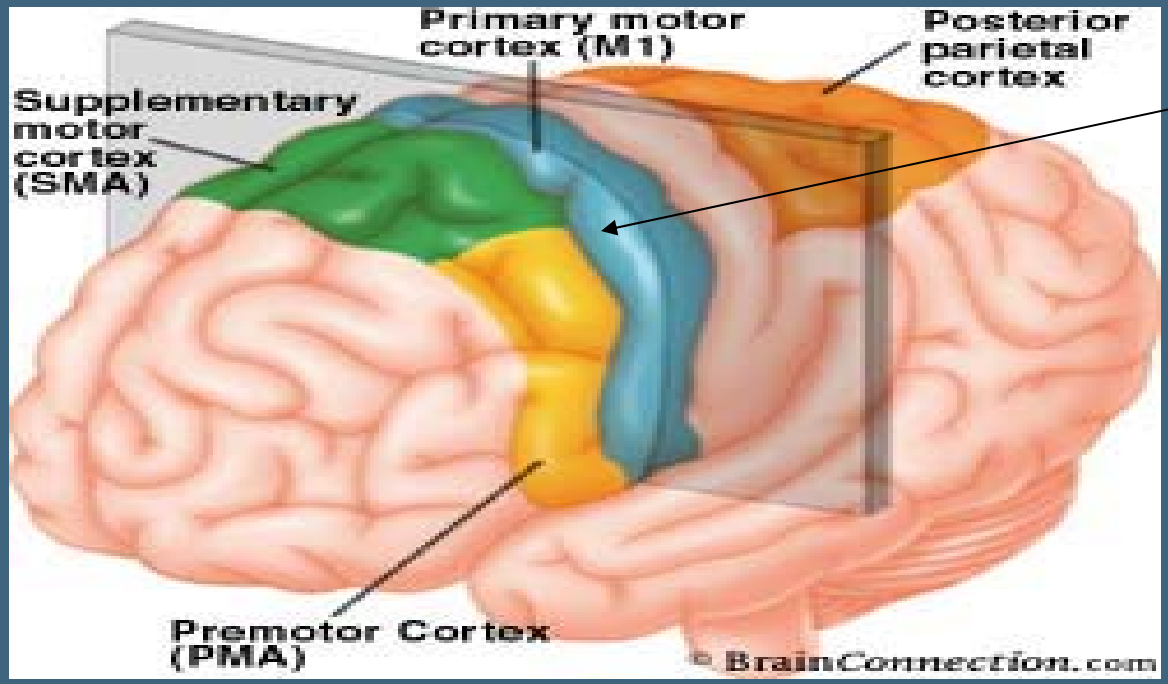


Patient may experience:

- **Contralateral paralysis or paresis of face, arm, leg**
- **Difficulty expressing language " stuttering, using wrong word, articulation, repeating word(s)" (BROCA'S APHASIA)**
- **Urinary incontinence**
- **Personality changes and emotional lability**

Frontal Lobe Stroke

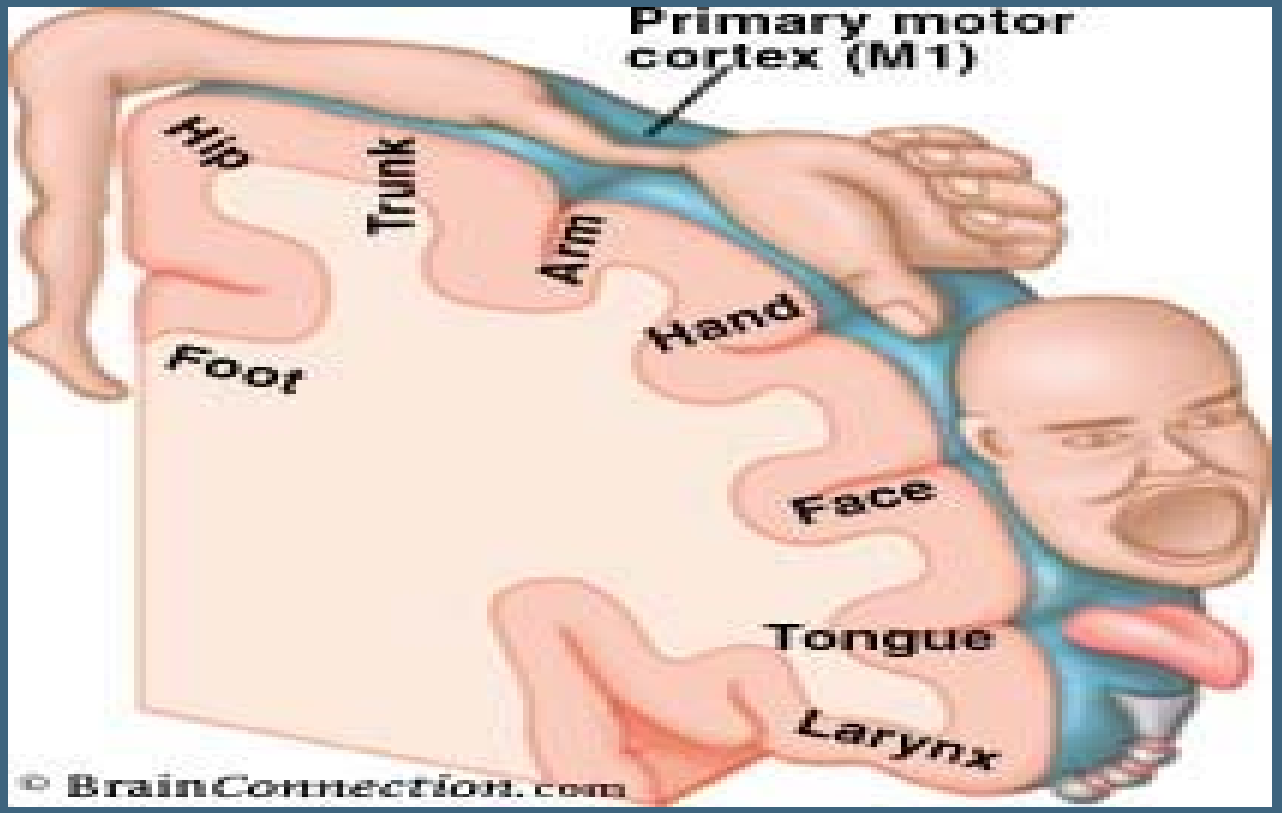
IMPORTANT STRUCTURES



Primary motor strip

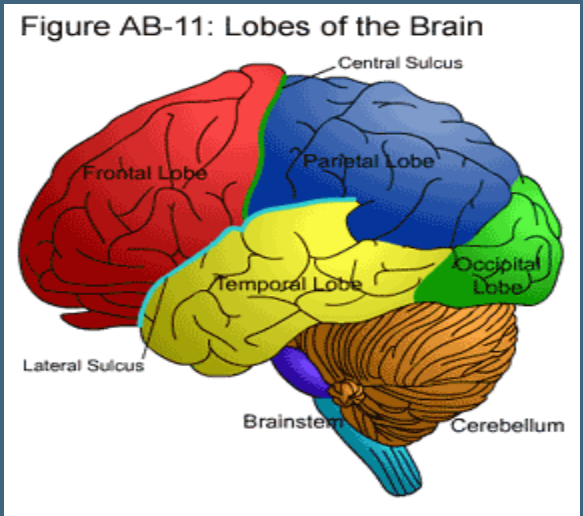
Control of muscle movement

Homunculus

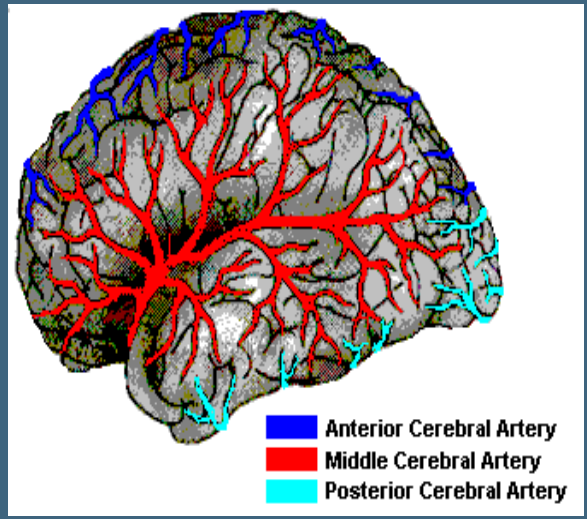


DEFINITION : A figurative representation of the body map encoded in the primary motor cortex (strip)

Parietal Lobe Stroke



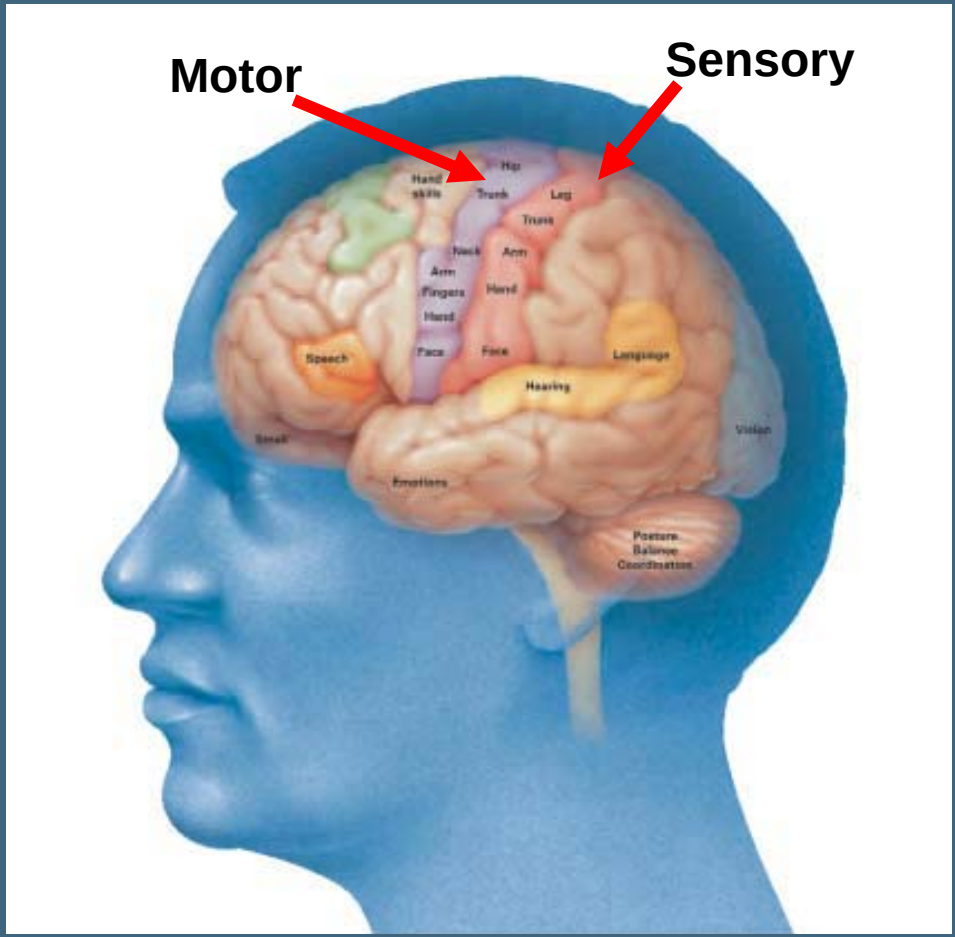
BLOOD SUPPLIED BY ACA, MCA, PCA



This patient may experience:

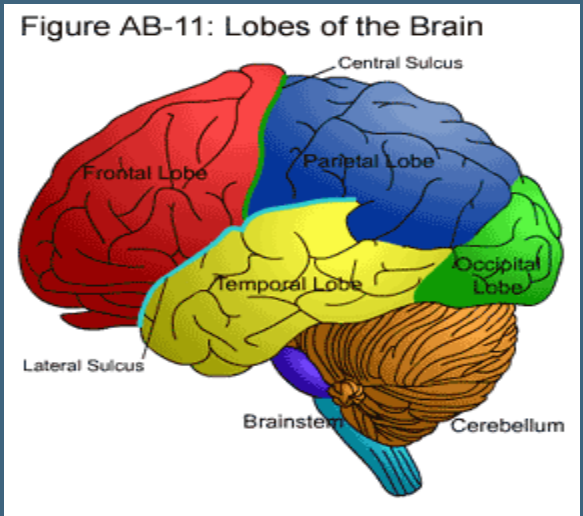
- Sensory deficit – loss of sensation i.e. pain, pressure, touch
- Neglect – patient does not recognize a body part
- Denial of deficits (often with neglect)

Parietal Lobe Stroke

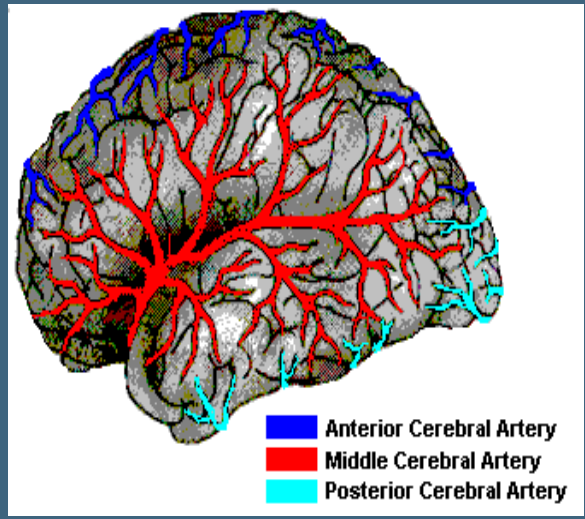


The primary sensory cortex (strip) of the parietal lobe is arranged in the same topographic scheme as the motor strip in the frontal lobe.

Temporal Lobe Stroke



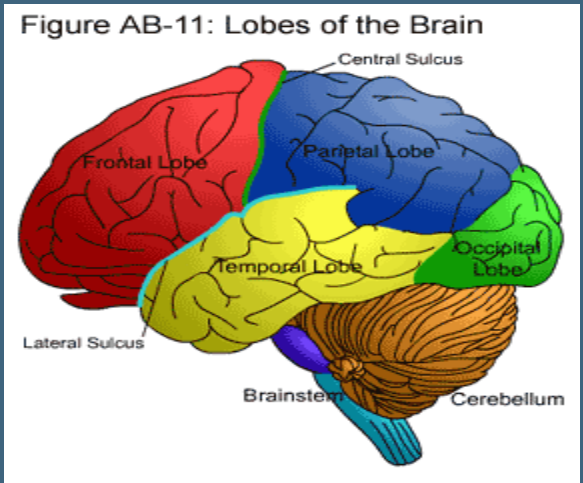
BLOOD SUPPLIED BY MCA AND PCA



Patient may experience:

- Severe communication problem :
  - loss of comprehension of spoken language (Receptive Aphasia also called Wernicke's Aphasia)
- Memory loss or disturbances in memory
- Aggressiveness

Occipital Lobe Stroke



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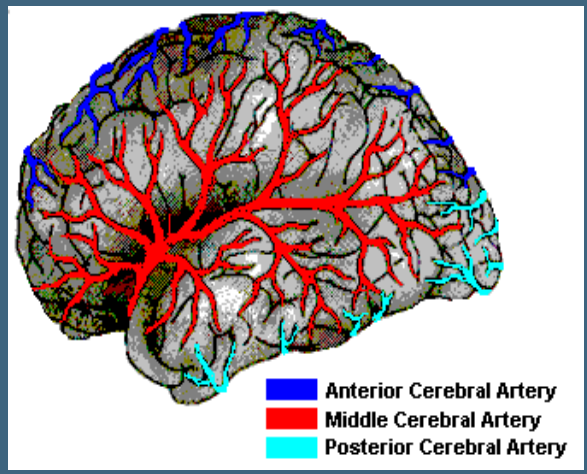


This patient may experience:

VISUAL DISTURBANCES

- Types of blindness- total or hemianopsia's
- Loss of recognition of objects when shown them
- Hallucinations

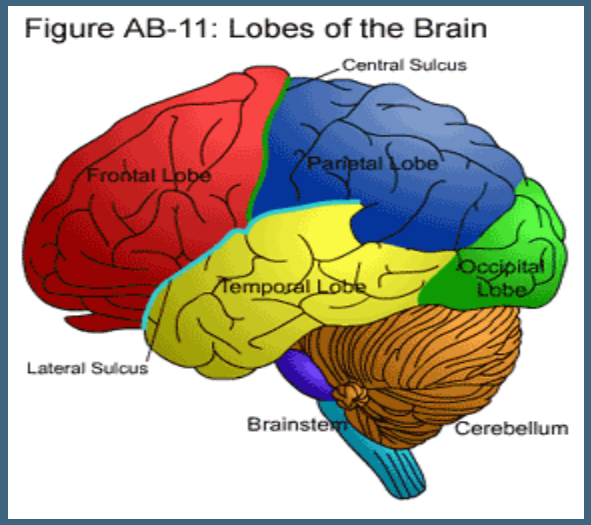
Hemianopsia

If a moving car appears in front of us, we are not alarmed because we detected it was coming from the side.

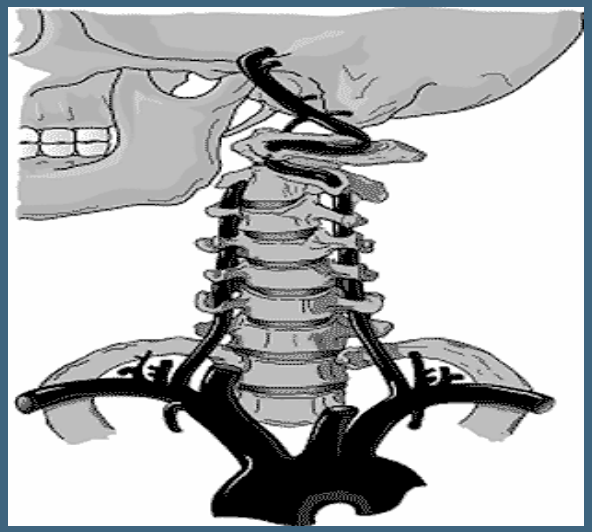
With hemianopsia…
..objects suddenly appear
causing the patient to be startled
(as with a paramedic walking into a patient's bedroom)

Occipital Lobe Stroke

Stroke in the Cerebellum



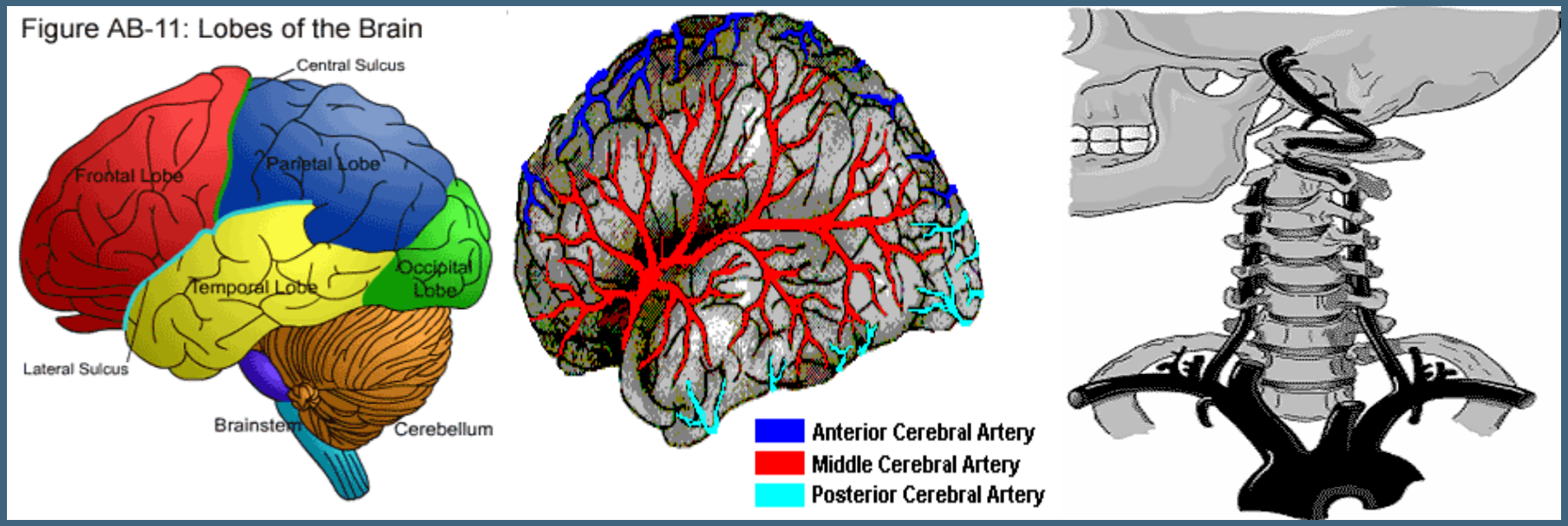
BLOOD SUPPLIED BY VERTEBROBASILAR ARTERIES



Patient may experience:

- **A gait that looks similar to an inebriated person**
- **Poor balance**
- **Complaints of dizziness, light headedness, “floating”**

Stroke in the Brain Stem



Blood supplies by Vertebrobasilar and Posterior Cerebral Artery

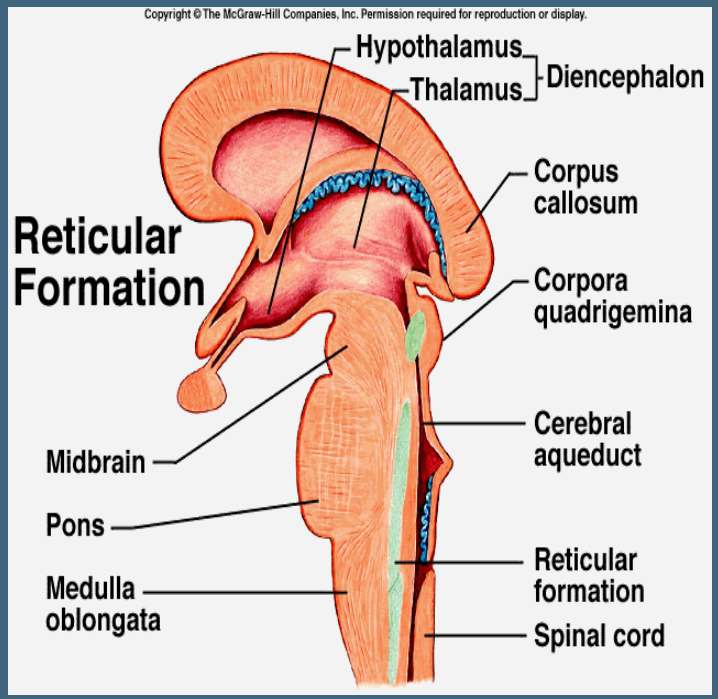
The signs and symptoms depend on the location of the stroke in the 3 areas of the brain stem

Mid brain – Pons - Medulla

Brain Stem Stroke

General Symptoms:

- Decreased LOA
- Dysphagia
- Cardiac / blood pressure difficulties
- Respiratory depression
- Limb weakness



Stroke Syndromes: MCA

- Most common ischemic stroke
- Signs and Symptoms
  - arm + face > leg weakness and sensory loss (opposite to side of ischemia in brain)
  - can see aphasia
  - Neglect
  - Homonymous hemianopsia

Stroke Syndromes: ACA

- 3% of all Ischemic Strokes
- Signs and Symptoms
  - weakness LE >UE
  - head deviation toward lesion

Stroke Syndromes: Brainstem

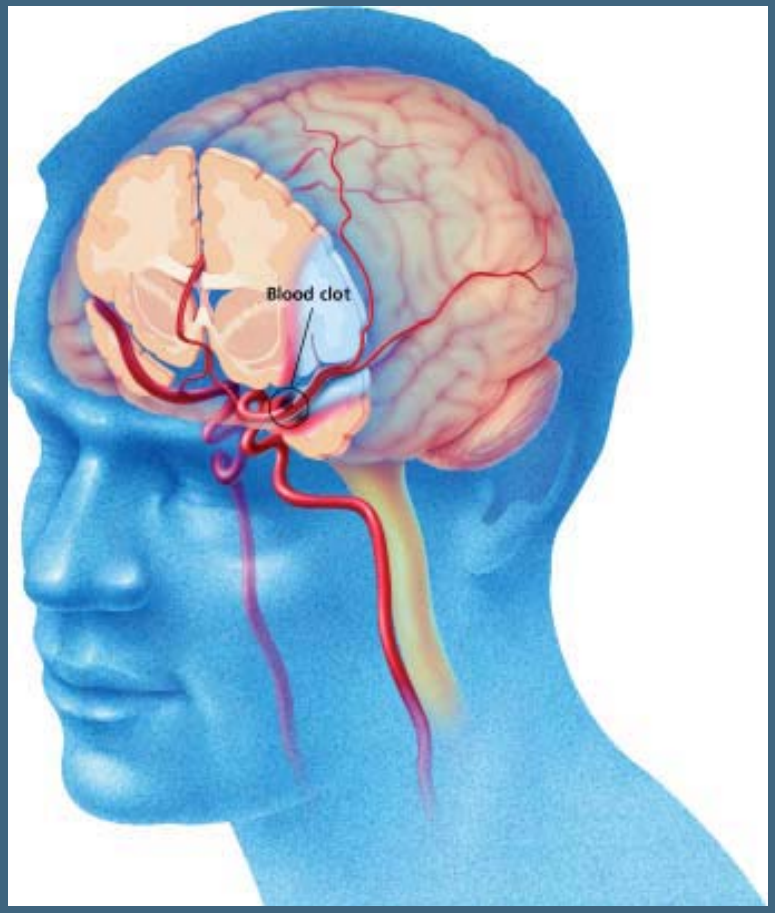
- Locked in Syndrome
  - bilateral ventral pons lesion
  - quadriplegia, aphonia, impairment horizontal eye movements
  - can move eyes vertically, can blink

- Lateral Medullary Syndrome (Wallenberg's)
  - vertebral artery occlusion, less commonly PICA
  - ipsilateral Horner's, loss pain/temp face, weakness
  - contralateral –pain/temp body loss

Types of Stroke - Ischemic

- **Ischemic (80 %)**
  - **Caused by blockage of an artery**
  - **Usually the result of a blood clot**

Thrombotic or embolic



Ischemic Stroke - Etiology

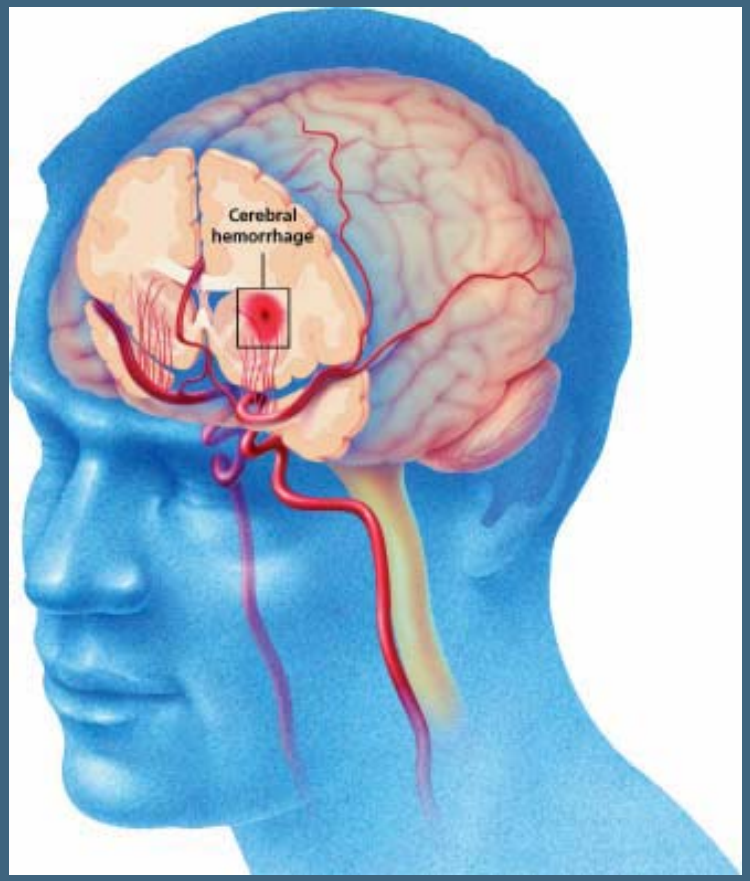
- **Thrombosis**
  - Atheromas
  - Vascular Inflammation (ie: Meningitis)
  - Oral Contraceptive use in older women
- **Embolism**
  - Atrial Fibrillation
  - Rheumatic Heart Disease
  - Recent MI
  - Recent Surgery

Types of Stroke - Hemorrhagic

- **Hemorrhagic (20%)**
  - Caused by an arterial rupture

  Subarachnoid hemorrhage (SAH)

  Intracerebral Hemorrhage (ICH)



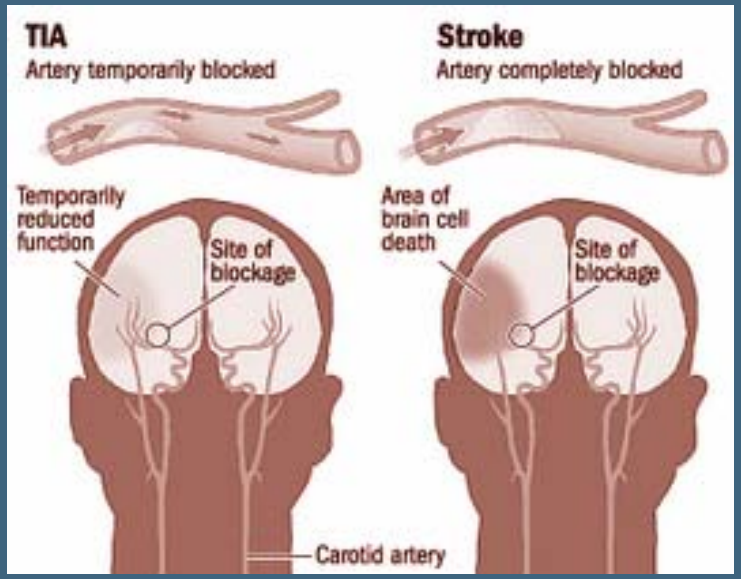
Hemorrhagic Stroke - Etiology

- **Primary**
  - Chronic hypertension
  - Anticoagulant /platelet therapy
  - Drug use
  - Other bleeding disorders
- **Secondary**
  - Vascular malformations
  - Tumors

Types of Stroke - TIA

- Temporary disruption in blood flow
- S/S consistent with Ischemic Stroke
- S/S are temporary lasting ~ 2-30min

- Of all patients who have a TIA:
  - 33% will have another TIA
  - 33% will have a stroke
  - 33% will have no recurrence



TIA - Etiology

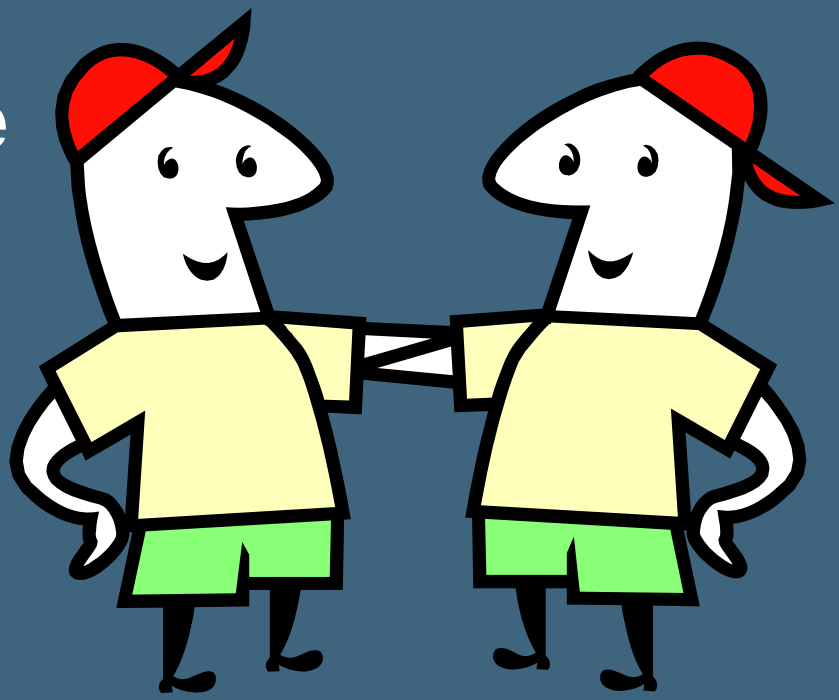
- Atherosclerosis
- Arteritis
- Sympathomimetic Drugs – ie: Cocaine
- Vasospasm

Mechanism of Stroke

Feature	Hemorrhage	Ischemic
Preceding TIA	No	30%
Onset	With Activity	Sedentary
Hypertension	Usually Present	Often Present
Clinical Course	Rapidly Progressive	Stepwise or static
Signs of ICP	Present	Absent - later
CT Scan	Presence of blood	Normal or subtle changes

Stroke Mimics

- Postictal seizure
- Systemic infections
- Tumour/ abscess
- Metabolic disturbance
- Hypoglycemia
- Bell's palsy
- Old stroke
- Confusion
- Head trauma
- Intoxication



Assessment and Care

Rapid and Detailed Assessment is the key!

- History
  - Last seen normal *******
  - Symptoms
  - Risk factors
  - General Medical Assessment – care for ABC's
  - Associated conditions

- Neurological Examination
  - Rule out mimics – includes Blood Glucose Level
  - Determine if patient meets criteria for Bypass

PARAMEDIC PROMPT CARD
FOR
ACUTE STROKE PROTOCOL

Indications for Patient Transport to a Designated Stroke Centre

Transport to a Stroke Centre must be considered for patients who:

Present with a new onset of at least one of the following symptoms suggestive of the onset of an acute stroke.

- unilateral arm/leg weakness or drift
- slurred or inappropriate words or mute
- facial droop

AND

Can be transported to arrive within two (2) hours of a clearly determined time of symptom onset or the time the patient was "last seen in a usual state of health".

Contraindications for Patient Transport Under Stroke Protocol

Any of the following conditions exclude a patient from being transported under Stroke Protocol.

- CTAS Level 1 and/or uncorrected Airway, Breathing or significant Circulatory problem
- Symptoms of the stroke have resolved
- Blood Sugar $\leq$ 4 mmol/l
- Seizure at onset of symptoms or observed by paramedic
- Glasgow Coma Scale <10
- Terminally Ill or Palliative Care Patient

CACC will authorize the transport once notified of the patient's need for transport under the Stroke Protocol.

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Ontario

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Southwest Ontario Regional Base Hospital Program

Case Study:

- ID: 64 year old male in Amherstburg, ON.
- HPI: 911 activated by spouse for difficulty speaking
- EMS History:
  - Normal at 0900 AM watching TV conversing with wife
  - Found at 1000 AM unable to respond to wife but eyes open
  - No trauma or tox ingestion
- EMS Exam
  - Vitals are all normal.
  - Glucose 6.1 mmol/L.
  - Unable to speak. Left pronator drift and Left Facial Droop

Case Study 2:

- ID: 72 year old female in Stratford, ON.
- HPI: 911 activated by spouse for loss of balance/fall
- EMS History:
  - Normal at 1900hrs, patient went to shower
  - Found at 1930hrs, laying in bath tub, small laceration to forehead
- EMS Exam
  - Glucose 5.2 mmol/L.
  - Patient has a blank stare, cannot speak and withdraws to painful stimulus.

Case Conclusion:

- Paramedics patch to BHP in Windsor
- Patient transported CTAS 2, Code 4 to Windsor Regional Stroke Centre
- Assessed by Dr. Desai
- Receives TPA
- Discharge post stroke day 3 to home with minimal deficits

Conclusion

- Deficits of a stroke can be explained by area of the brain affected, circulation of the brain or a combination of both.
- Rapid Assessment is critical
- Remember to exclude stroke mimics
- Identify patients for Stroke Bypass
- Rapid treatment is critical

Time is Brain!!!!!!!!

Questions?

Presentation Credits:

Much of this presentation was developed for shared use by

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Further resources from

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