

# **Nervous System :** **Diagnosis and** **Assessment**

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# Diagnostic Studies

-Radiologic procedures

1-skull and spine X-ray

2-CT scan

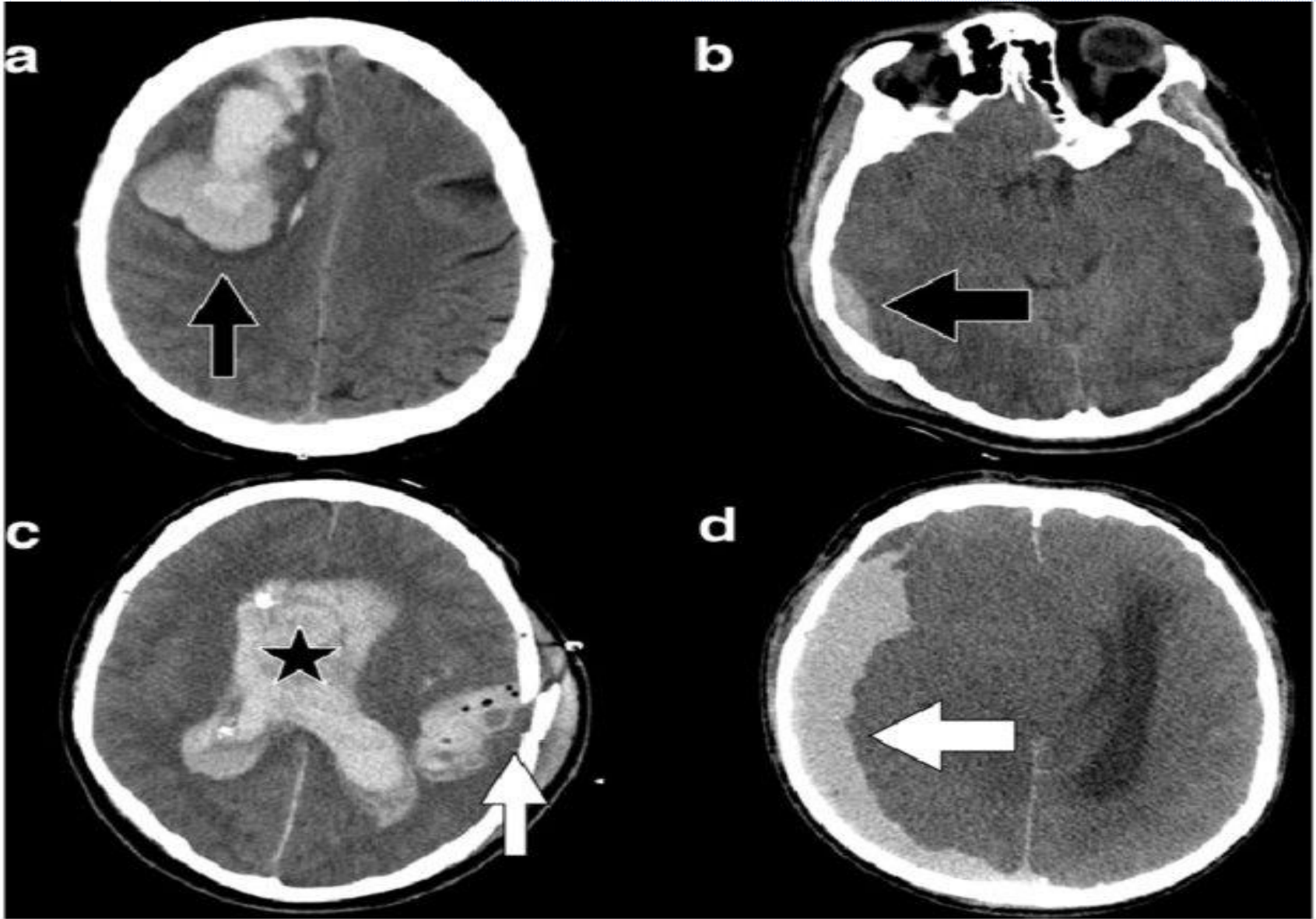
3-MRI

# skull and spine X-ray



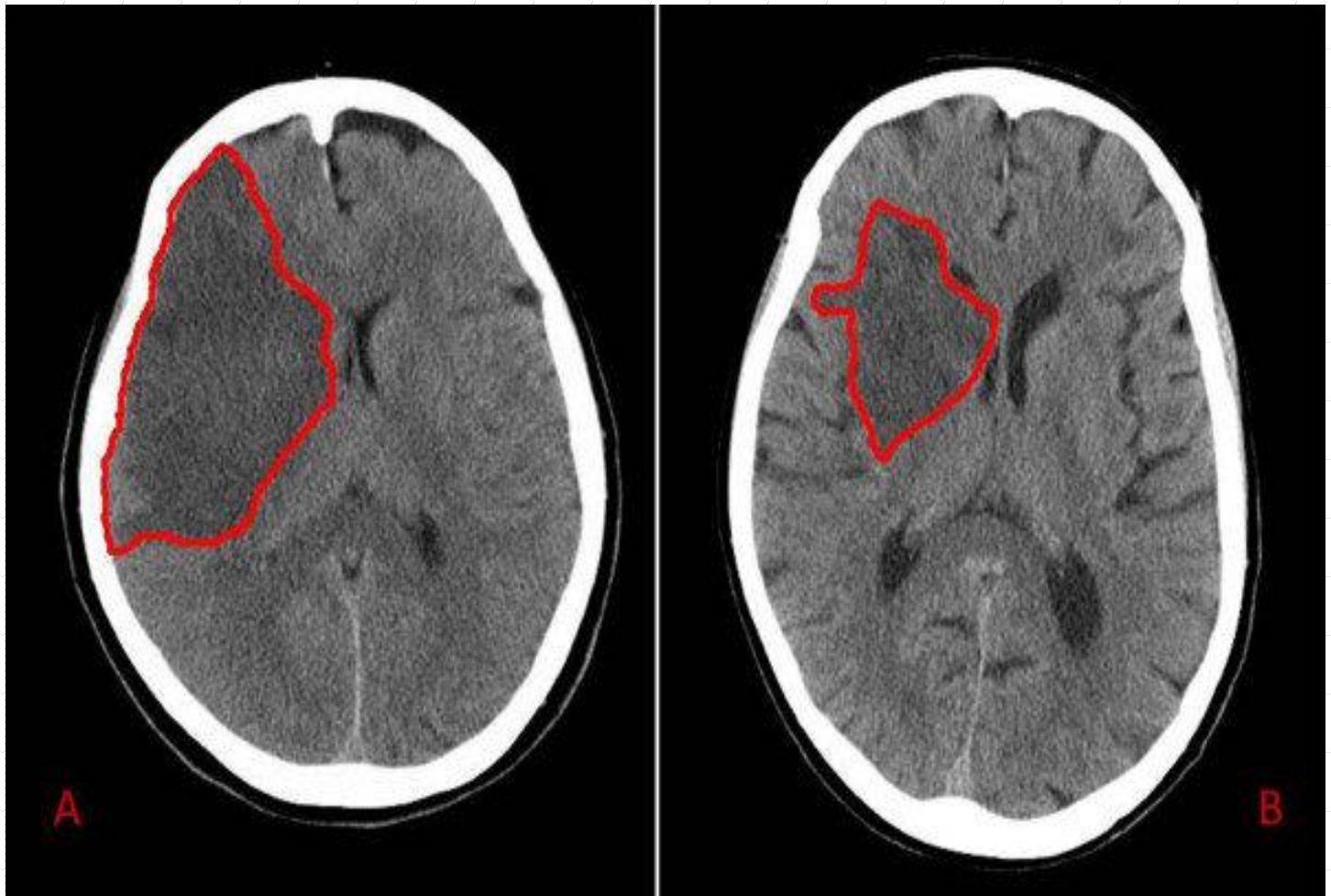
# CT scan-brain





(a) Intracerebral bleeding due to hypertension (b) Traumatic epidural hemorrhage (c) Intracerebral due to a stab wound injury through the skull, which is broken. (d) Traumatic subdural hemorrhage

# CT scans of two stroke patients- Ischemic

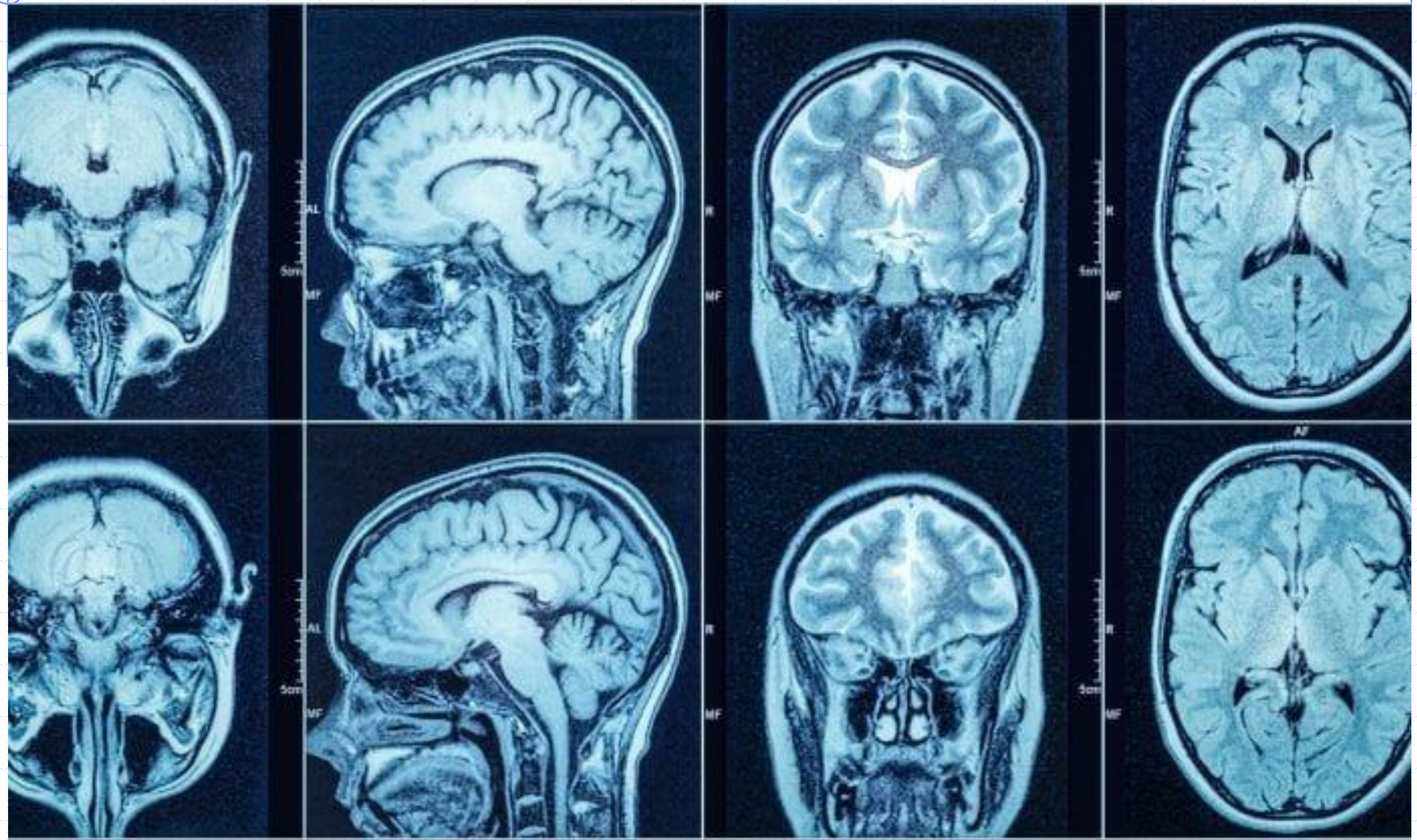


# MRI



Creates detailed pictures of areas inside the body, but it uses radio waves and a powerful magnet to generate the pictures.

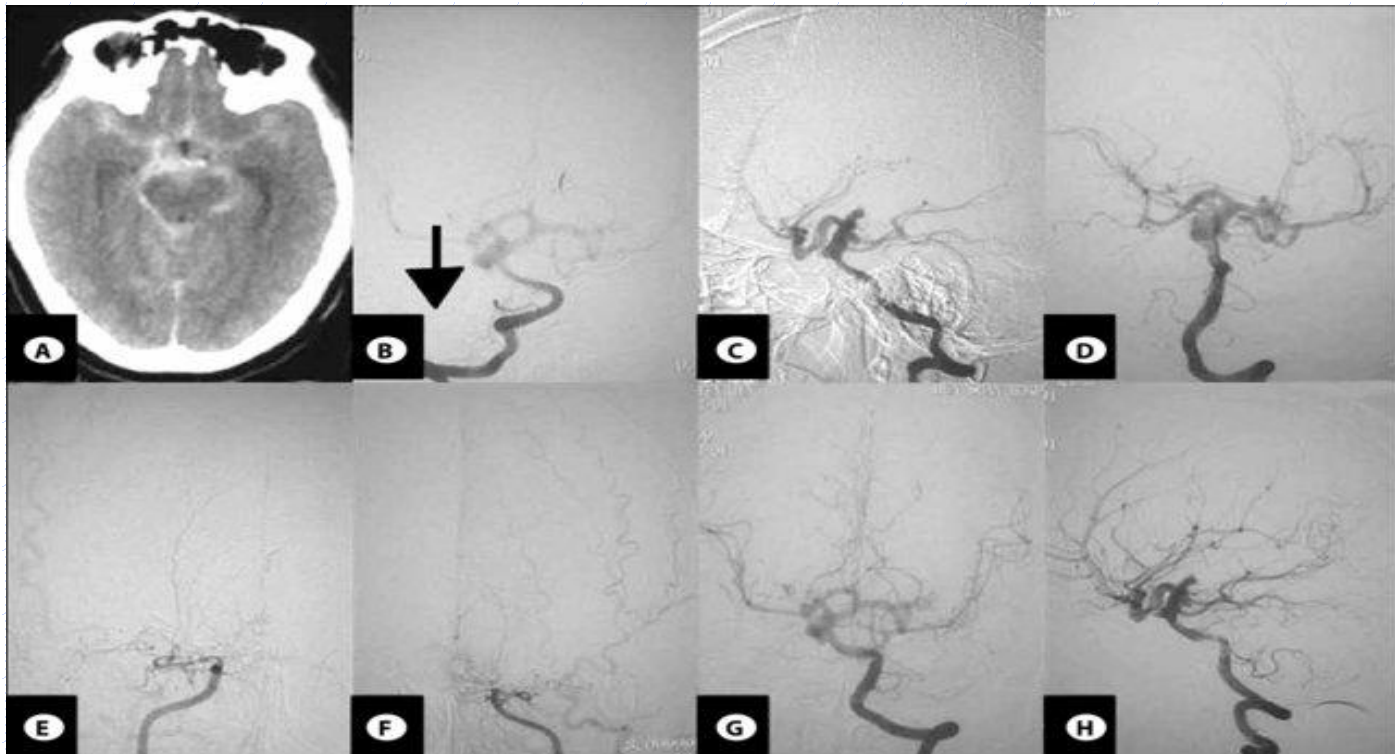
# MRI





# Cerebral Angiography

- ◆ ( a radiographic procedure used to visualize the vascular system of the brain after injection of a radiopaque contrast medium )



- ◆ Myelography (uses a contrast medium to detect pathology of the spinal cord, including the location of a spinal cord injury, cysts, and tumors ).
- ◆ Cerebral blood flow studies –evaluate the adequacy of flow of CB and to identify any abnormalities of the vascular system (perfusion CT ,Xenon CT Patients breathe xenon (an odorless, colorless gas), which acts as a contrast agent to show regions of low and high blood flow, Carotid sonography and positron emission tomography ( PET )

# Myelography



# Perfusion CT

- ◆ shows which areas of the brain are adequately supplied or perfused with blood and provides detailed information on delivery of blood or blood flow to the brain

# PET

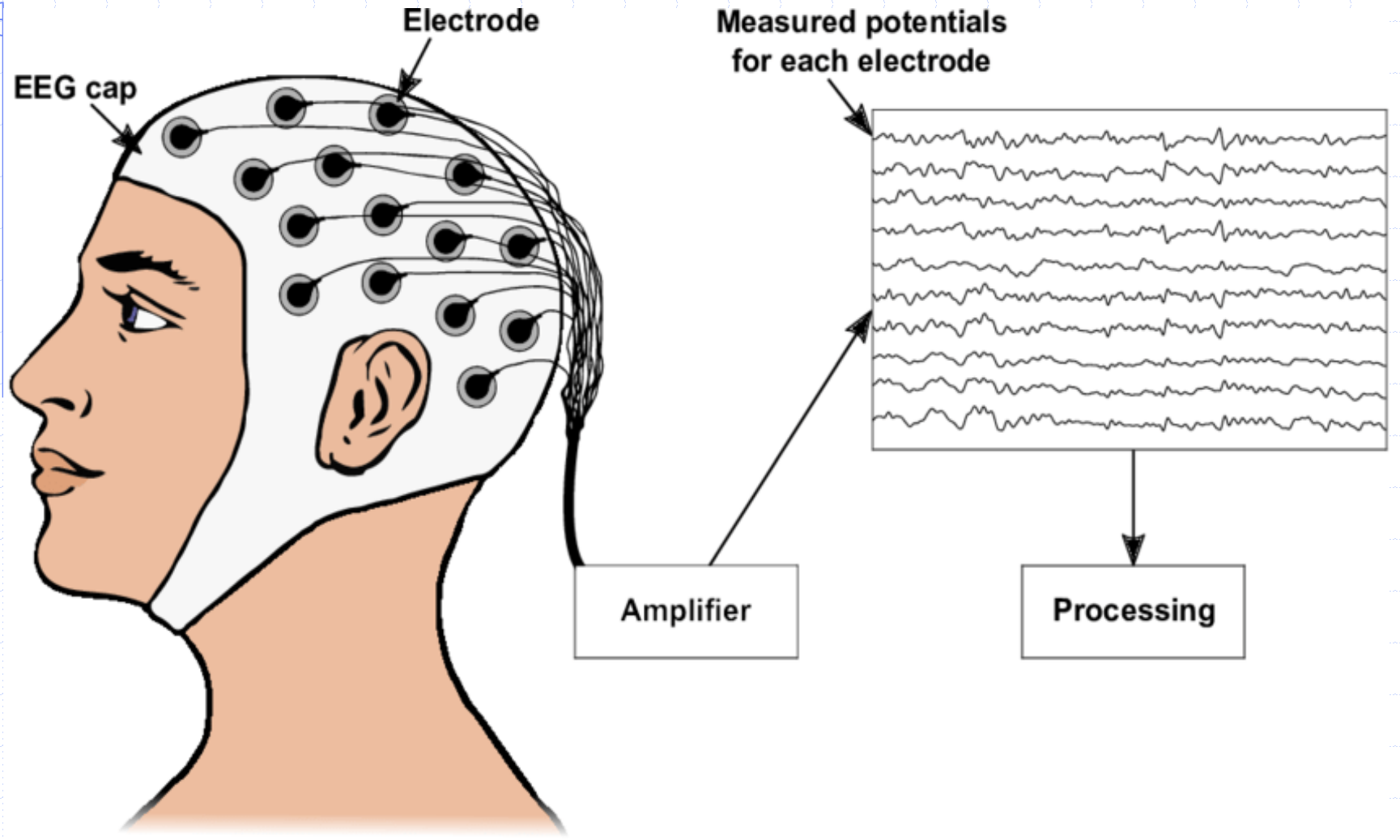
- ◆ Functional imaging technique that uses radioactive substances known as radiotracers to visualize and measure changes in metabolic processes, and in other physiological activities including blood flow, regional chemical composition, and absorption



# EEG and evoked potentials

- ◆ EEG) records the spontaneous electrical activity of the brain (cerebral cortex)
- ◆ An evoked potentials test measures the speed of nerve messages along sensory nerves to the brain and used in the diagnosis of MS

# EEG



# Laboratory studies

- ◆ CSF analysis is performed by LP or ventriculostomy to look for the presence of blood or infection in the subarachnoid space
- ◆ Cisternal puncture ( between C 1 and C2 ) if lumbar space can't be entered
- ◆ CSF ( clear ,colorless ,no blood ,specific gravity 1.007 ,WBC 0-5 cells /mm<sup>3</sup> ,glucose 40-70 mg/dl ,protein 15-40 mg/dl ,culture and serology negative )



# Cerebrospinal Fluid Analysis in Meningitis

	<b>Opening Pressure</b> (mm Hg)	<b>Cell Count</b> (WBC Cells/microl)	<b>Protein</b> (mg/dL)	<b>Glucose</b> (mg/dL)
<b>Normal</b>	<b>8 - 15</b> (100 - 180 mm of H <sub>2</sub> O) <i>with patient lying on their side.</i>	<b>0 - 5</b>	<b>&lt; 40</b>	<b>40 - 70</b>
<b>Bacterial</b>	↑	↑ PMNs	↑	↓
<b>Viral</b>	↑ or normal	↑ Lymphocytes	↑ or normal	normal
<b>Fungal/TB</b>	↑	↑ Lymphocytes	↑	↓



# Bedside Monitoring

- ◆ ICP monitoring **must be less than 15 mm Hg**

- ◆ CPP ( MAP – ICP )

Normal CPP in the average adult is approximately 80 to 100 mm Hg with arrange of 60 to 150 mm Hg

- ◆ Jugular venous oxygen saturation (SjvO<sub>2</sub>) is monitored to assess the adequacy of cerebral metabolism

Normal value is **60% to 80%**

- ◆ CBF 50 ML / 100 g of brain tissue /min

- ◆ Brain requires 15% to 20% of CO

# Neurological Assessment

- ◆ **Level of Consciousness (LOC)**
- ◆ **Pupils**
- ◆ **Vital Signs (VS)**
- ◆ **Motor function**
- ◆ **Sensory (Response to stimuli )**
- ◆ **Posturing**
- ◆ **Glasgow Coma Scale (GCS)**
- ◆ **Reflexes**

# LEVELS OF CONSCIOUSNESS

A

Alert



V

Verbal  
Stimuli



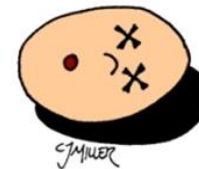
P

Painful  
Stimuli



U

Unresponsive



# Glasgow Coma Scale (GCS)

- ◆ The most common scoring system used to describe the level of consciousness in a person following a traumatic brain injury.

## Glasgow Coma Scale

EYE OPENING		VERBAL RESPONSE		MOTOR RESPONSE	
					
Spontaneous >	4	Orientated >	5	Obey commands >	6
To sound >	3	Confused >	4	Localising >	5
To pressure >	2	Words >	3	Normal flexion >	4
None >	1	Sounds >	2	Abnormal flexion >	3
		None >	1	Extension >	2
				None >	1

### GLASGOW COMA SCALE SCORE

Mild  
13-15

Moderate  
9-12

Severe  
3-8

# Mild injury

**0-20 minute loss of consciousness GCS = 13-15**  
**PTA < 24 hours**

# Moderate injury

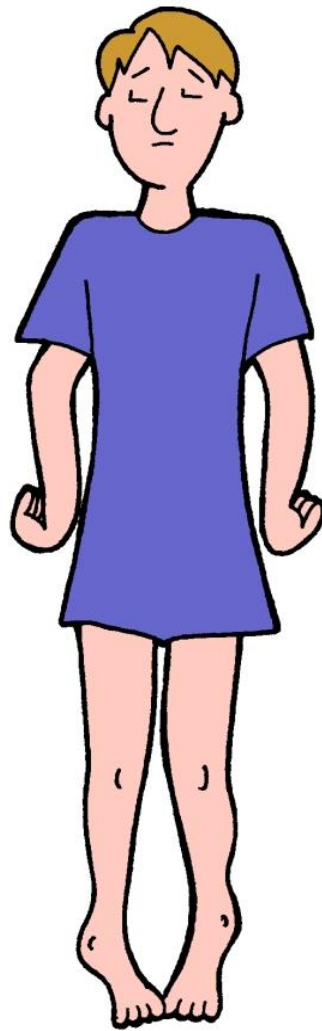
**20 minutes to 6 hours LOC**                      **GCS = 9-12**

# Severe injury

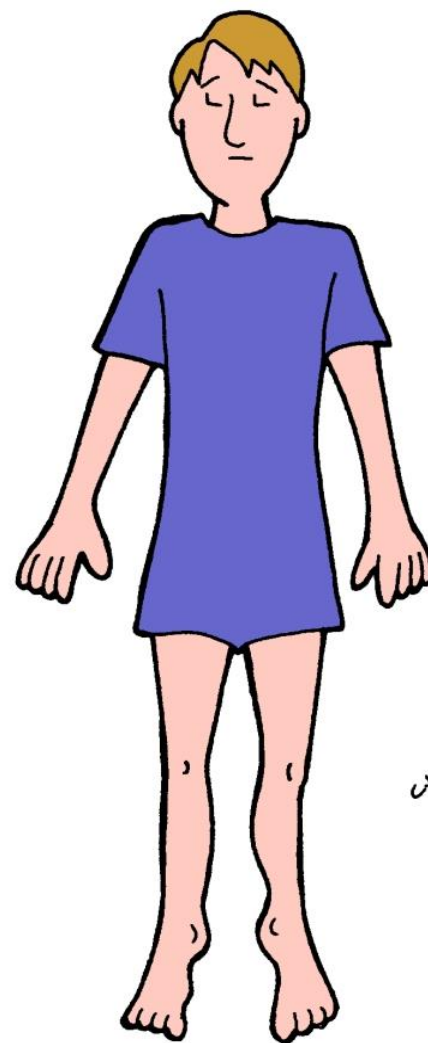
**> 6 hours LOC**                                      **GCS = 3-8**



Flexor Posturing  
(Decorticate)  
\*To The Cord



Extensor Posturing  
(Decerebrate)  
\*Lots of E's



Flaccid

S. MILLER

# ABNORMAL POSTURING

# Vital signs

- ◆ Increase in systolic blood pressure, widening of pulse pressure, and slowing of the heart rate; pulse may fluctuate rapidly from tachycardia to bradycardia and temperature increase
- ◆ Cushing's triad: bradycardia, hypertension, and bradypnea
- ◆ Respiratory pattern alterations including Cheyne-Stokes breathing and arrest



# Pupillary Changes

- ◆ Oculomotor response (Cranial nerve III)
- ◆ Size, equality, and roundness of pupils assessed
- ◆ Size measured in millimeters
- ◆ Evaluated for symmetry in size and response to light stimulus
- ◆ Brisk, sluggish, non-reactive
- ◆ Assess accommodation
- ◆ PERRLA