



Ischemic Stroke

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Outlines

- What and why ?
- Pathophysiology and subtypes
- Clinical presentation
- Diagnosis (Neuroradiology 101)
- Management
- TIA





Worldwide Burden of Stroke

- ◆ 1, 2, 3, 4, 5, 6,
- ◆ Leading cause of adult disability
- ◆ 2nd cause of death
- ◆ 20 million people worldwide suffer a stroke each year.
- ◆ 1/4
- ◆ 5 million deaths/year
- ◆ Every 6 seconds

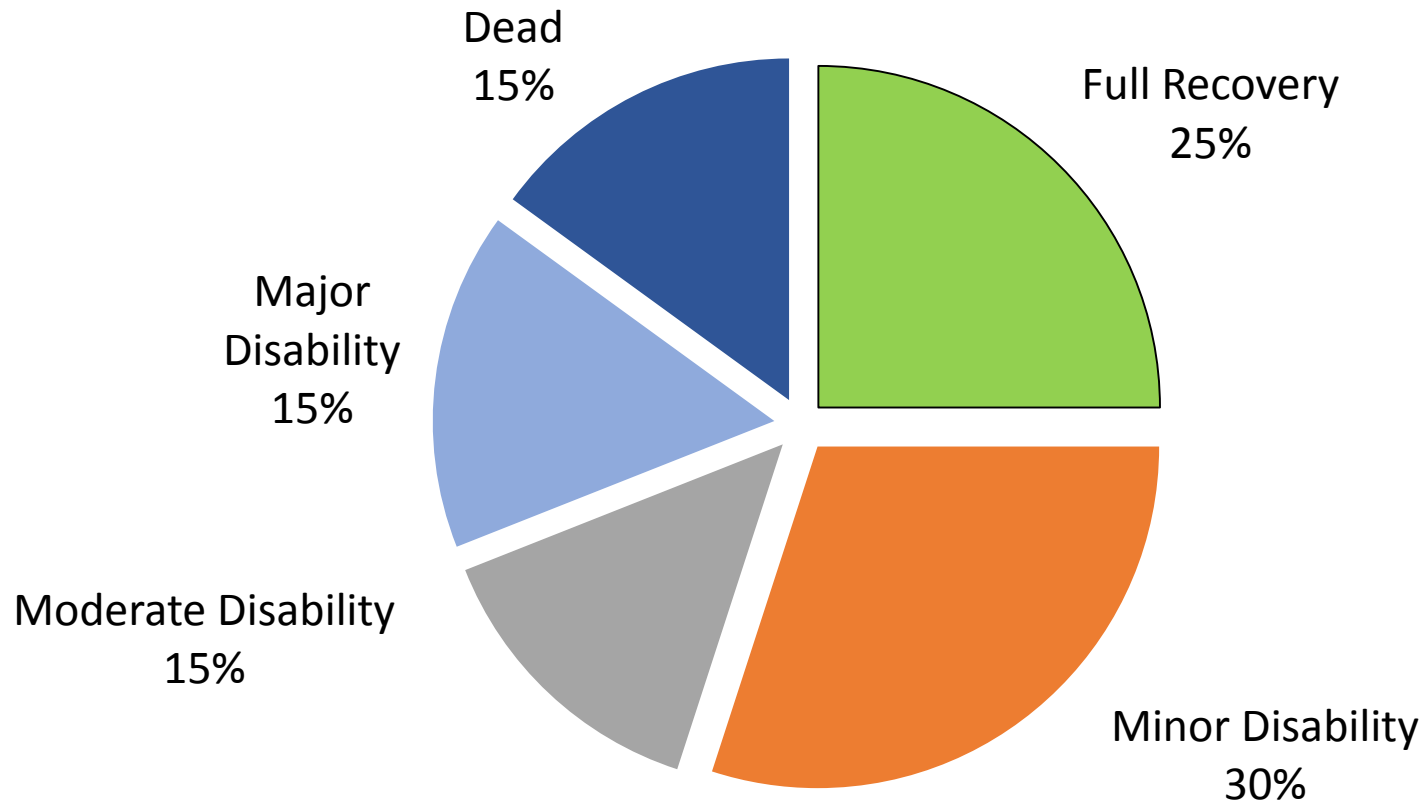


people worldwide
will have a stroke.





Outcome of Ischemic Stroke



Adapted from Stegmayr B, et al. *Stroke* 1997;**28**:1367-1374





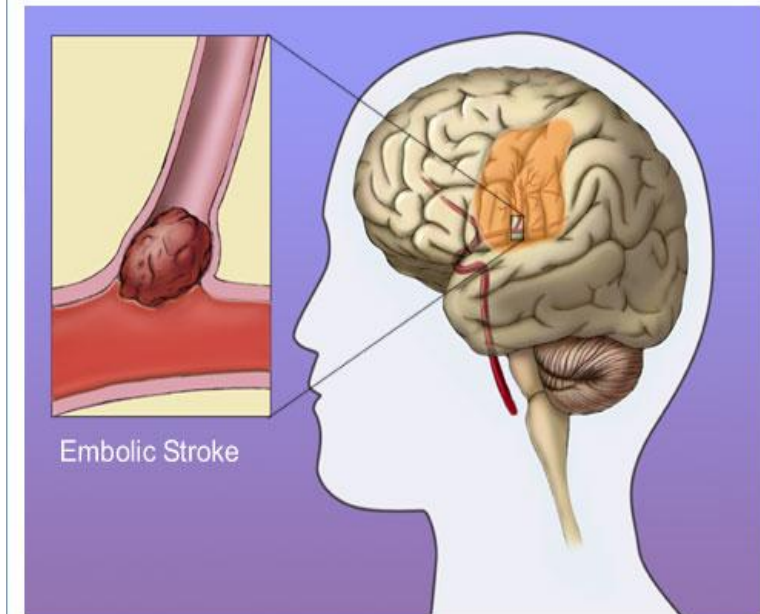
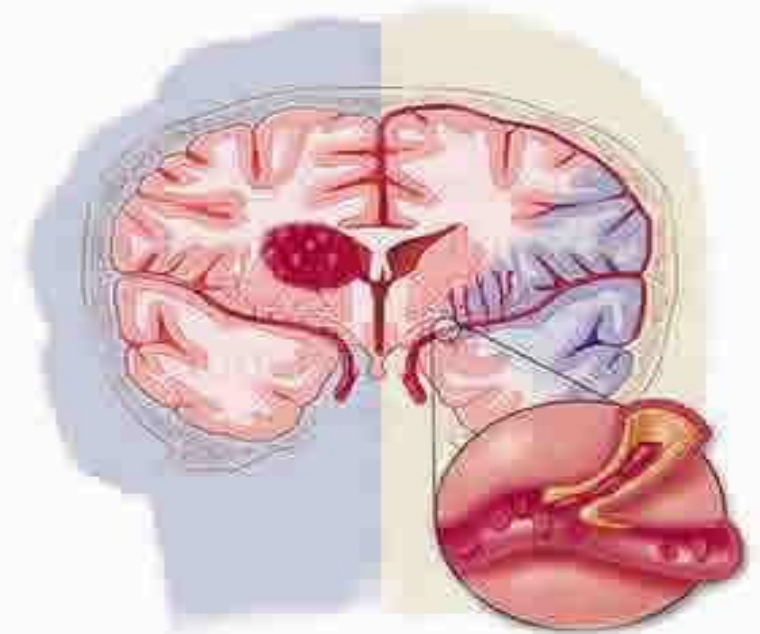
In Saudi Arabia

- 20-25,000 new strokes
- 4000-5000 deaths (estimate)
- 8000 - disabilities
- Incidence 58/100,000 new
- Total 70/100,000 total
“recurrence ”
- Cost to patient, family ,
community



Definition

- Abrupt onset
- Focal neurological deficits
- Due to interruption of vascular supply
- Can be ischemic (blockage) or hemorrhagic (bleeding)



Ischemic Stroke

- 85% of all strokes
- Acute onset of neurologic deficits caused by impaired blood flow to CNS
- Stroke
 - persisting neurologic deficit after 24hrs and/or
 - infarct on CT or MRI
- Transient ischemic attacks (TIAs) AKA “mini strokes” or “warning strokes” stroke-like symptoms that last for a very short time (<1hr) with complete recovery (most are <5 min)
- A TIA indicates that conditions for an ischemic stroke are present

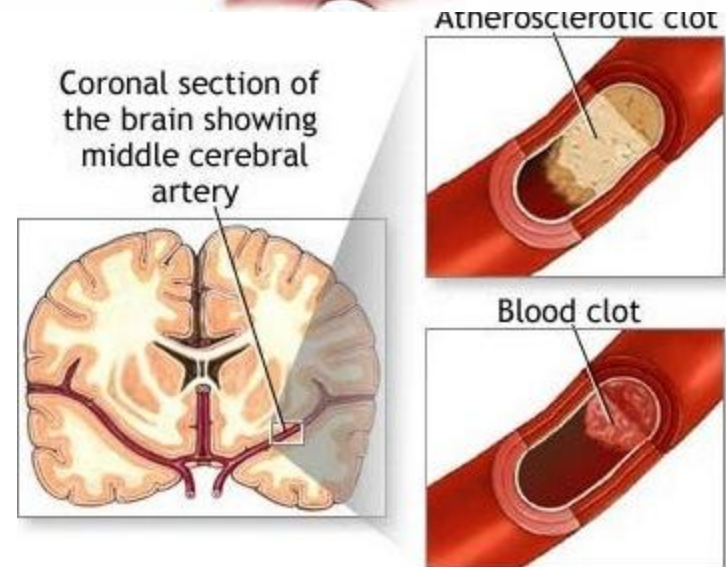
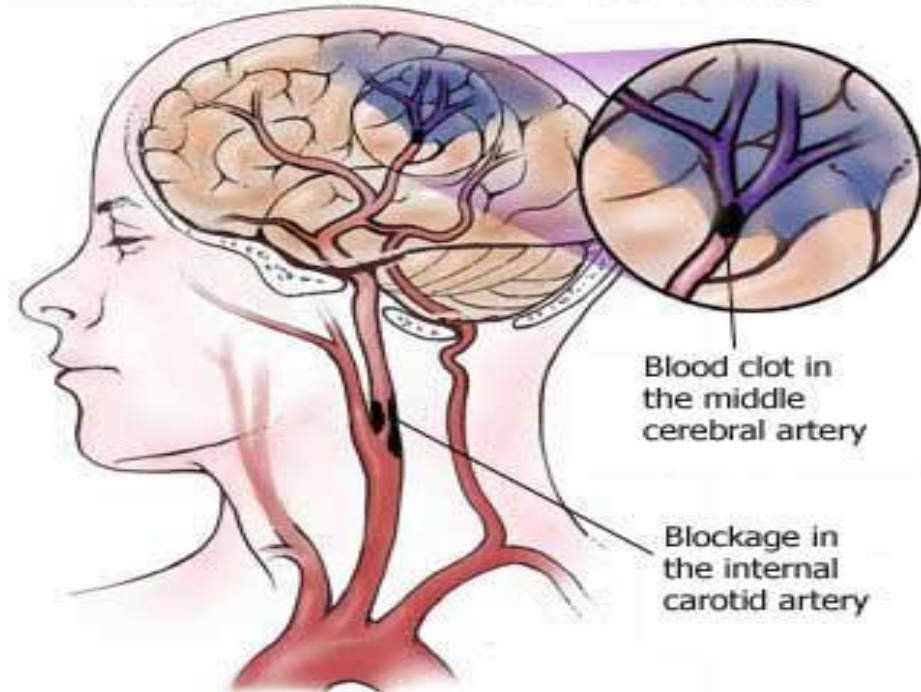
Ischemic Stroke Mechanisms

Due to *blockage* from :

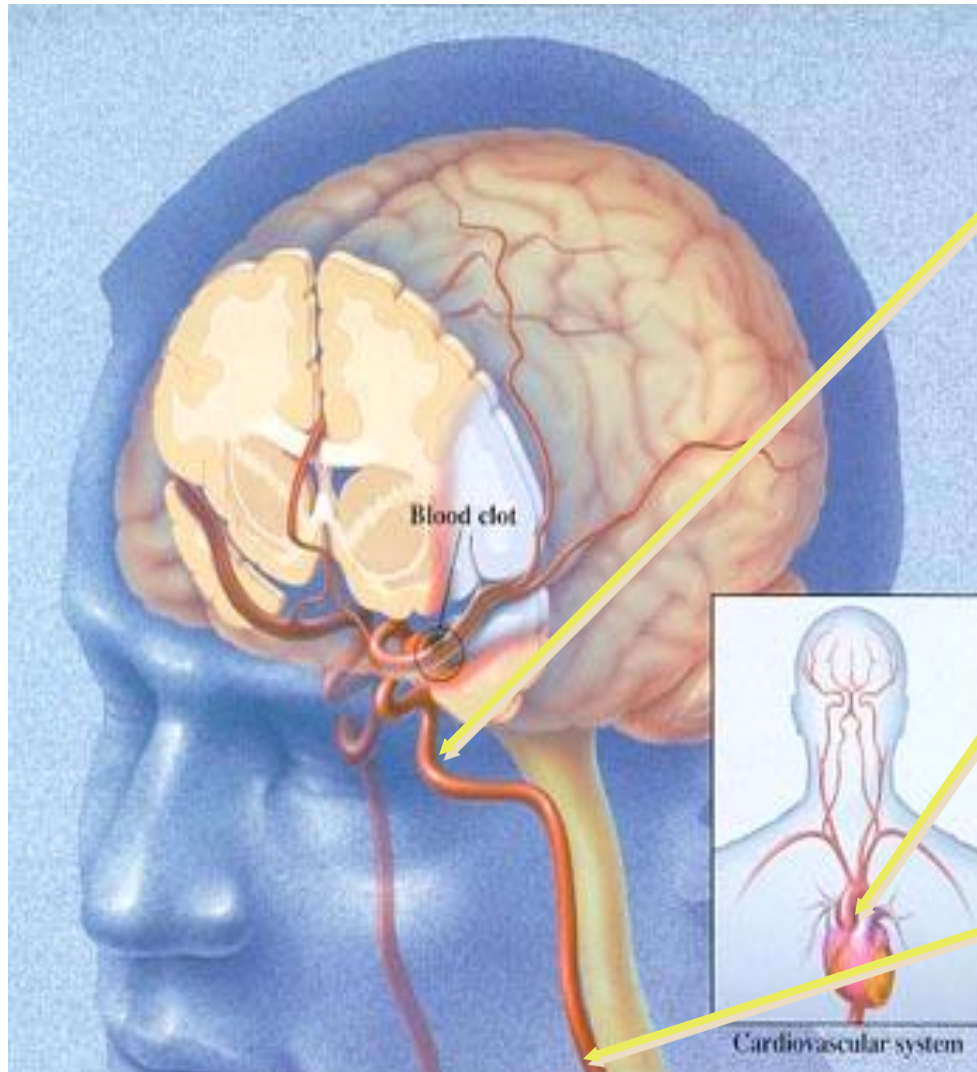
- Cerebral thrombosis: a thrombus (blood clot) that develops at the blocked part of the artery
- Cerebral embolism: typically caused by a blood clot that forms at another location and breaks loose and enters the bloodstream

Hypoperfusion (Narrow vessels reduced flow)

Ischemic Stroke
Occurs when oxygen-rich blood flow to the brain is restricted by a blood clot or other blockage



Ischemic Stroke: Mechanisms



BLOOD VESSELS

- Atheromatous (large or small vessels)
- Non atheromatous (vasculitis, dissection)

HEART

Cardioembolic

BLOOD

Coagulo and heamoglobinopathies

Risk Factors

Non-modifiable .

Age, Sex, Ethnicity, and genetic determinants

Modifiable :

HTN

DM

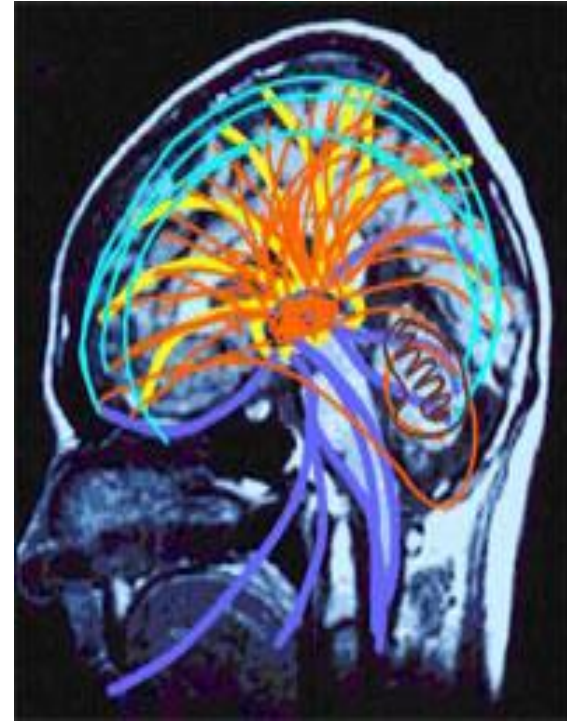
SMOKING .

Hyperlipidemia .

cardiac disease (particularly atrial fibrillation [AF])

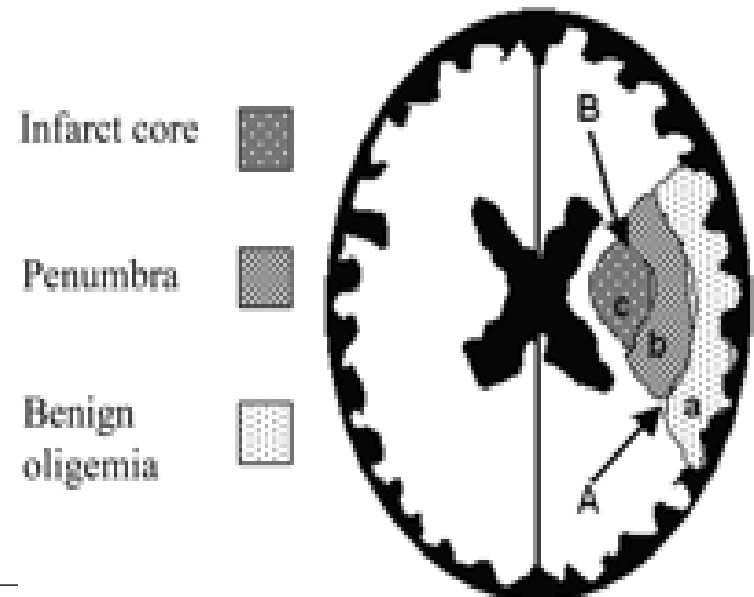
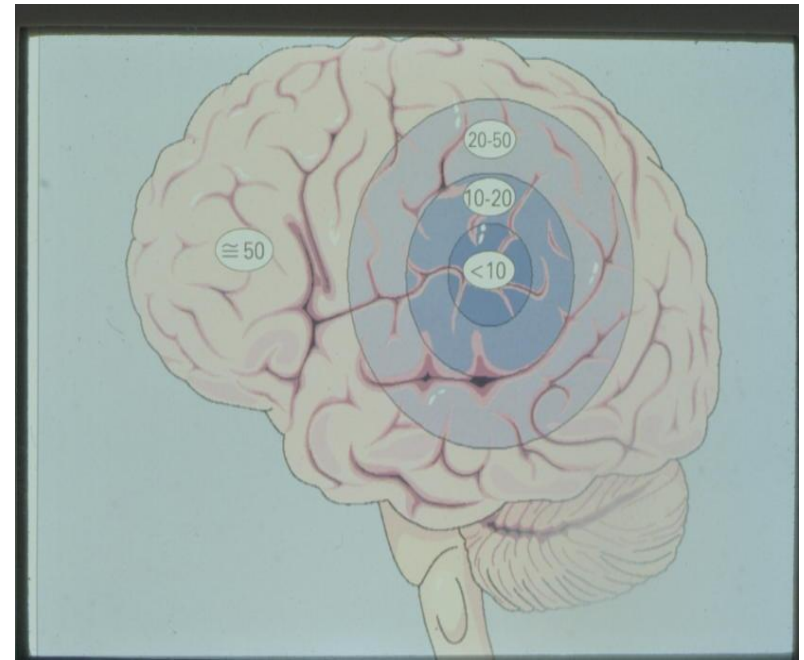
Stroke , TIA , carotid artery stenosis.

Sedentary lifestyle



Pathophysiology

- Active and does not store energy.
- the brain is not adequately perfused , cells begins to die.
- Core (area of irreversible damage)
- Penumbra (tissue at risk can



History

- ONSET (Last time seen normal)
 - Symptoms (analysis of symptoms)
 - progression
 - Headache (sudden and severe)*
 - Neck pain/ trauma*
 - Previous HX of stroke or TIA,
- PMHX : Risk factors/medication
- HX from others

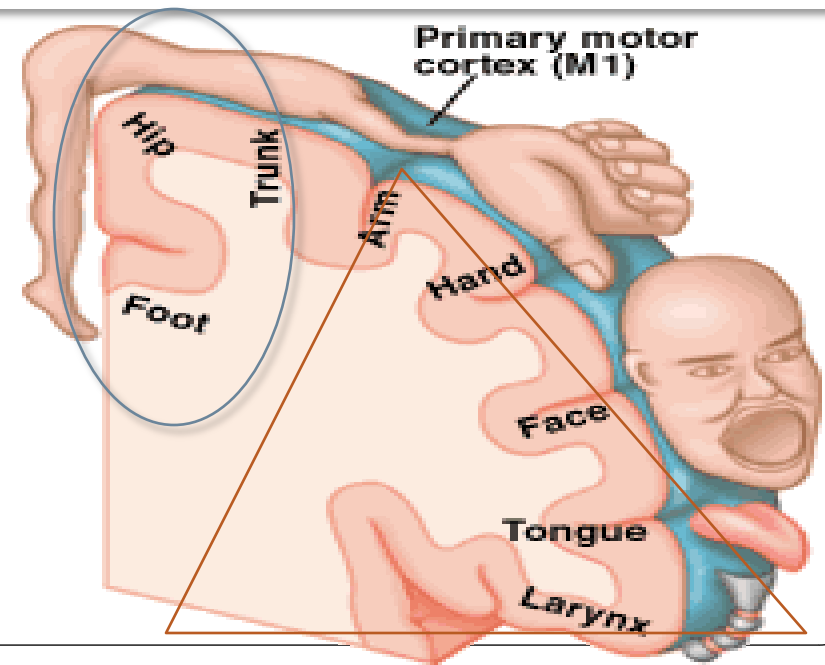
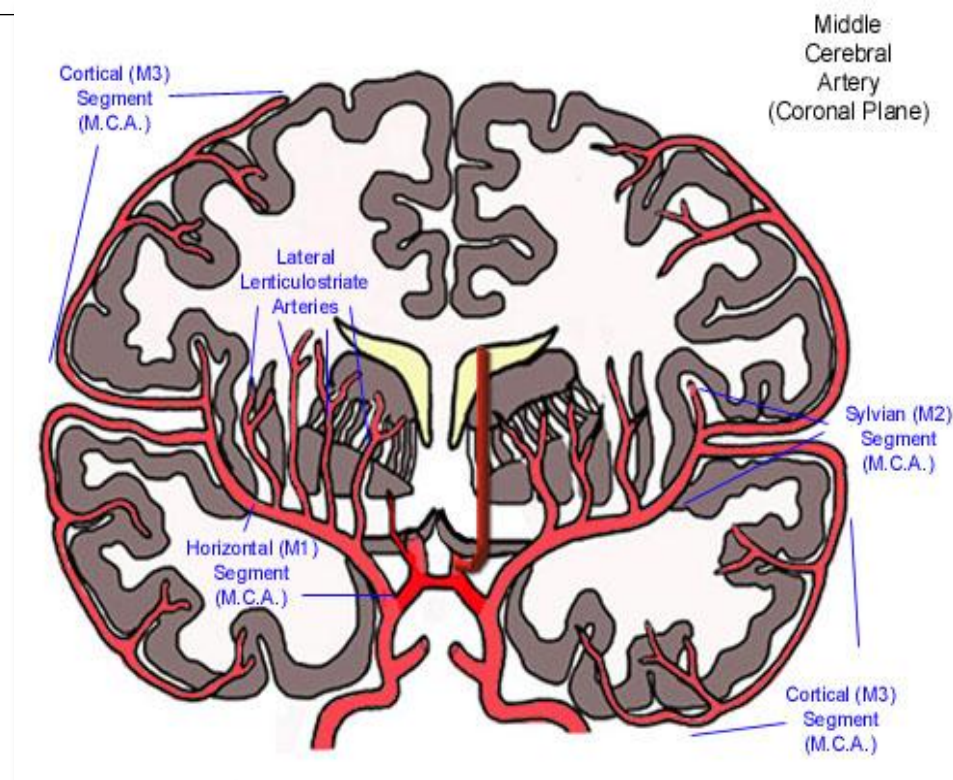
Physical examination

- ABC
- General examination
- Pulse (A.fib)
- BP
- Hand
- listen for heart murmur ,
carotid bruits
- Cortical infarcts are suspect based on the presence of
 - language impairment
 - neglect or anosognosia
 - graphesthesia or stereoagnosia
 - visual field impairment
- CN involvement and crossed motor
- Tone –decreased on side of weakness early on, later on increased
- Pyramidal pattern weakness (UMN)
 - UE extensor > flexor
 - LE flexor > extensor
- Reflexes –hyperreflexic on side of weakness, with up-going toe

Clinical presentation

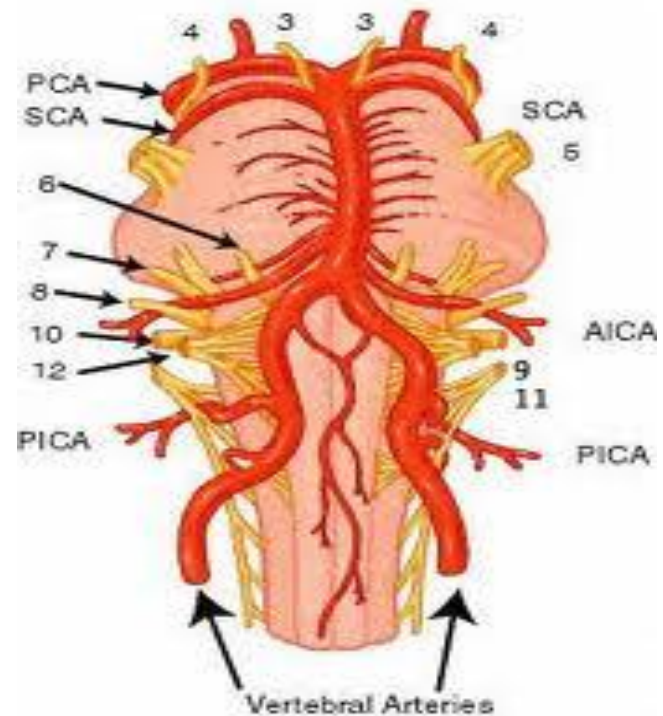
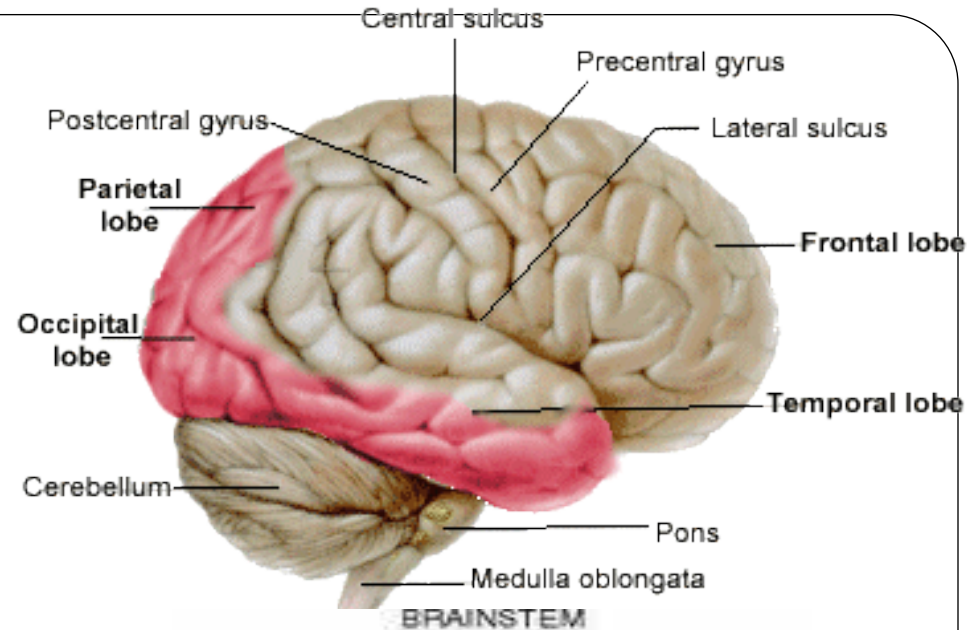
- Depends on location

- Middle Cerebral Artery MCA (arm + face > leg weakness and sensory loss aphasia, neglect, homonymous hemianopia)
- Anterior Cerebral Artery ACA (weakness LE > UE , emotional disturbance)
- Internal Carotid (above and ophthalmic)
- Lacunar syndrome (small penetrating arteries)



Clinical presentation

- Posterior cerebral artery PCA (vision-visual fields and memory)
- Vertebrobasilar : CN with crossed motor , cerebellum, altered LOC
- Midbrain
 - CN III –, dilated pupil
- Pons
 - CN V –facial numbness, weakness jaw movements
 - CN VI –lateral rectus palsy
 - CN VII –facial weakness
- Medulla
 - CN VIII –vertigo, hearing loss
 - CN IX, X –dysphagia
 - CN XII –tongue weakness



Investigation

- CBC
- Coagulation profile (PT , PTT and INR)
- Chemistry
 - Fasting glucose, Hba1c, Lipids
- Specific cases (Hb electrophoresis , hypercoagulable work up, CTD screen, HIV and syphilis)
- Imaging
 - CT scan
 - MRI
 - Vascular imaging (Carotid U/S , CTA , MRA , cerebral Angio)
- Cardiac work up
 - ECG
 - Echo (TTE or TEE)
 - Holter

CT scan

2hrs

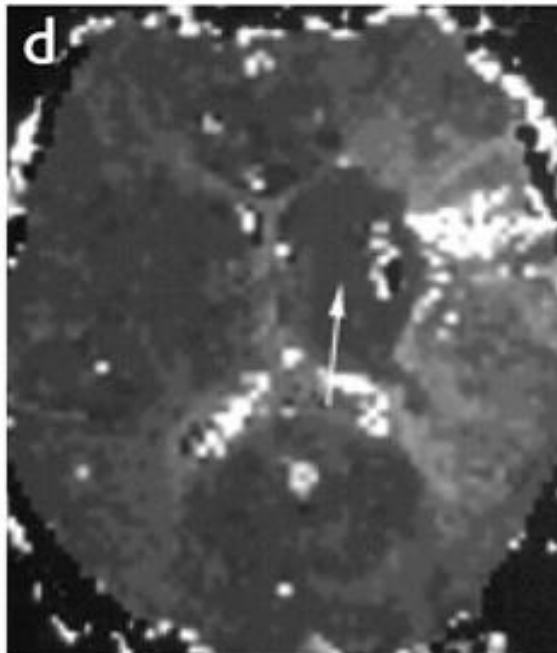
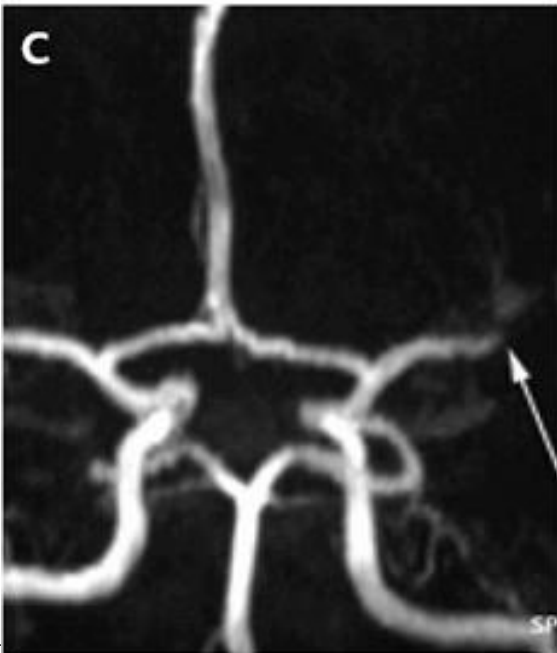
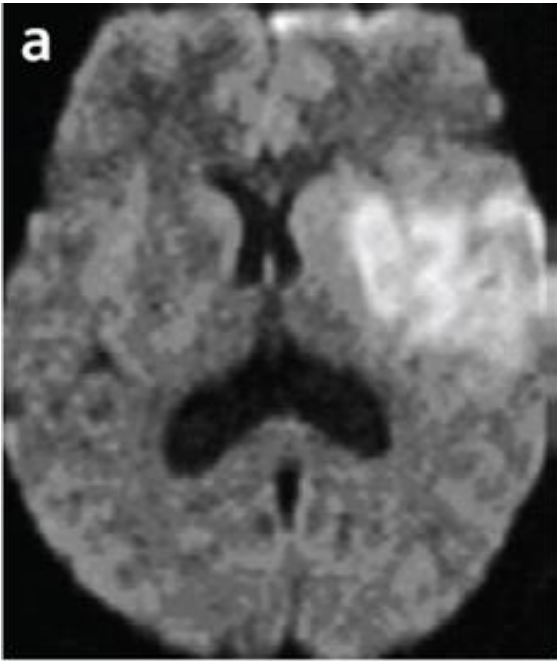
20 hrs

Medscape® www.medscape.com



36 HRS





MRI acute stroke

- More sensitive
- C/I

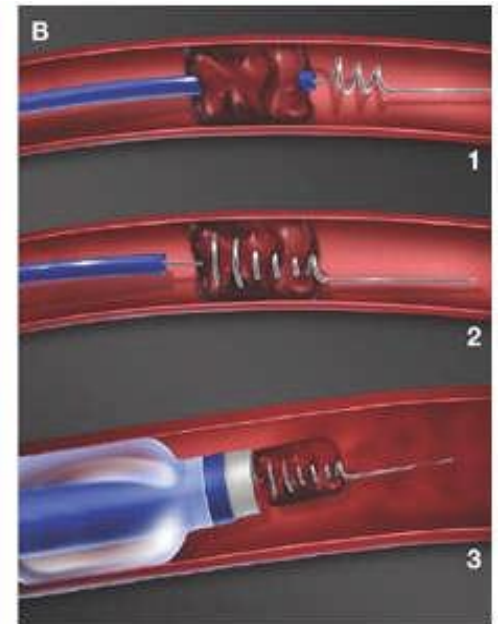
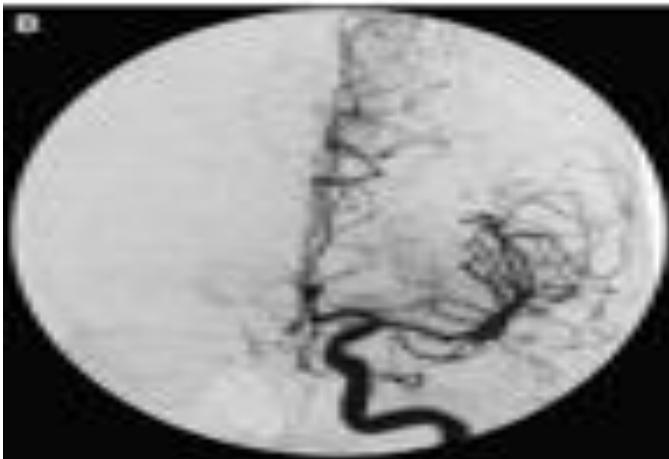
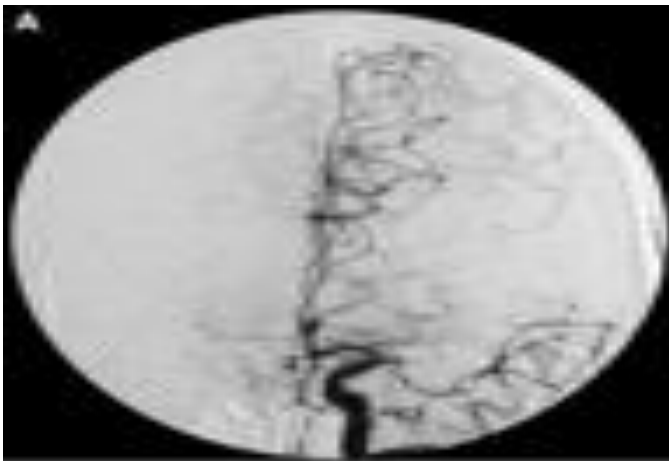
Management

- **Acute Stroke Management**
 - ABC
 - Reperfusion
 - Prevent progression and complication
- **Long Term Management**
 - Risk Factor: HTN, DM, lipid, smoking, A-fib
 - Anti-platelet (atherosclerosis) or Anticoagulant (afib or hypercoagulability)
 - Rehabilitation

Reperfusion

- Intravenous thrombolysis (IV t-PA) *Tissue plasminogen activator*
 - Effective up to 4.5 hrs from onset
 - Sooner the better (time= brain)
 - 30% chance of improvment 1/3, 1 out of 8 complete recovery
 - Risk of bleeding (ICH) = 6%
- Exclusion criteria:
 - ICH
 - prior ICH, Hx suggests of SAH, stroke past 3mts
 - GI or GU hmg in past 3wks, recent MI, major surgery 14d
 - platelet <100 000,
 - INR >1.7, PT >15
 - SBP >186 or DBP >110, Hg<100?

Intra-arterial thrombolytic



Management

➤ Stroke unit

- BP and glycemic control
- NPO, Avoid aspiration
- Dx and Rx Temp .
- PT , OT and early rehab.
- DVT prophylaxis

➤ Aspirin or other antiplatelets (started within 48 hours reduces the risk of early recurrent ischemic stroke without a major risk Hge and improves long-term outcome)

➤ Long Term Management

- HTN
- DM
- Stop smoking
- Lipid lowering agent
- Exercise

Secondary prevention

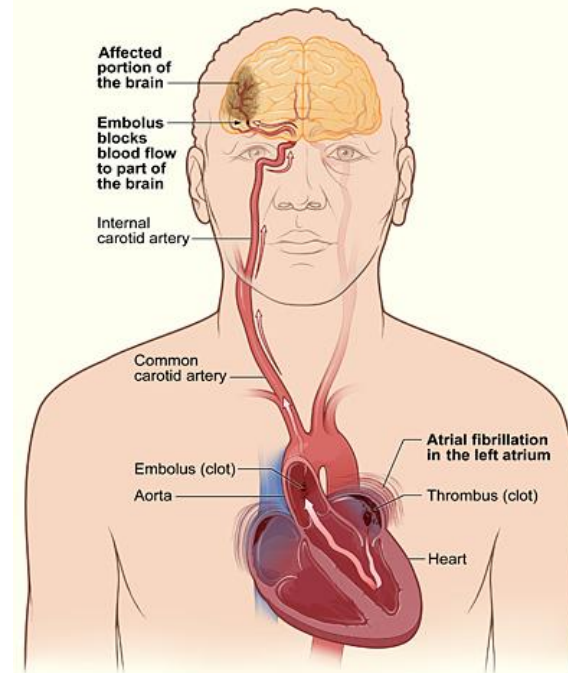
➤ Treat underline condition (Carotid SX, cardio-embolic and hypercoagulable rx with Coumadin)

TRANSIENT ISCHEMIC ATTACKS

- Brief and temporary reduction in blood flow to a focal region within the brain with no evidence of infarction on imaging.
- Is a stroke that did not finish YET
- Up to 1/3 with have stroke (usually first 48 hrs)
- most TIA's last 5-20 minutes
- if >1hr usually small infarction on MRI
- DDX (Seizure, migraine , Syncope , Labyrinthine SDH,

Approach to TIA

- Needs urgent assessment (ER)
- Rule out other causes of transient events (by HX and PE) TIA rarely march across body
- Work up (labs , CT scan or MRI ,
 - vascular imaging of carotid CTA , MRA, US
 - Cardiac work up (EKG, echo +/-Holter
- Start stroke prevention measures (like ischemic stroke) ASA , control HTN ,DM and lipids, stop smoking and exercise .





Take Home Message

- Stroke can be ischemic or hemorrhagic
- Every acute stroke patient should be viewed as an eminently treatable neuroemergency.
- Time window for effective therapy in stroke is brief (Time is brain)
- TIA Is a stroke that did not finish YET
- Any one present with sudden severe Headache should be presumed to be SAH *until proven otherwise* .

Questions

