

# Stroke

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# Stroke-Brain Attack!

- A general term for acute brain damage caused by disease of the blood vessels.
  - Onset is rapid
  - Produces focal injury
  - Causes death to brain cells



# Tissue damage is a result of:

- **Biochemical changes**

- Changes are in and around the brain cells.

- **Autolysis**

- Accumulation of lactic acid and phosphokinase

- **Edema**

- Increases blood flow to area of the brain, resulting in an increase of ICP, further injuring cells

# Costs of Stroke

- Health issues
- Acute and rehab care
- Home care
- Younger-loss of earning capacity

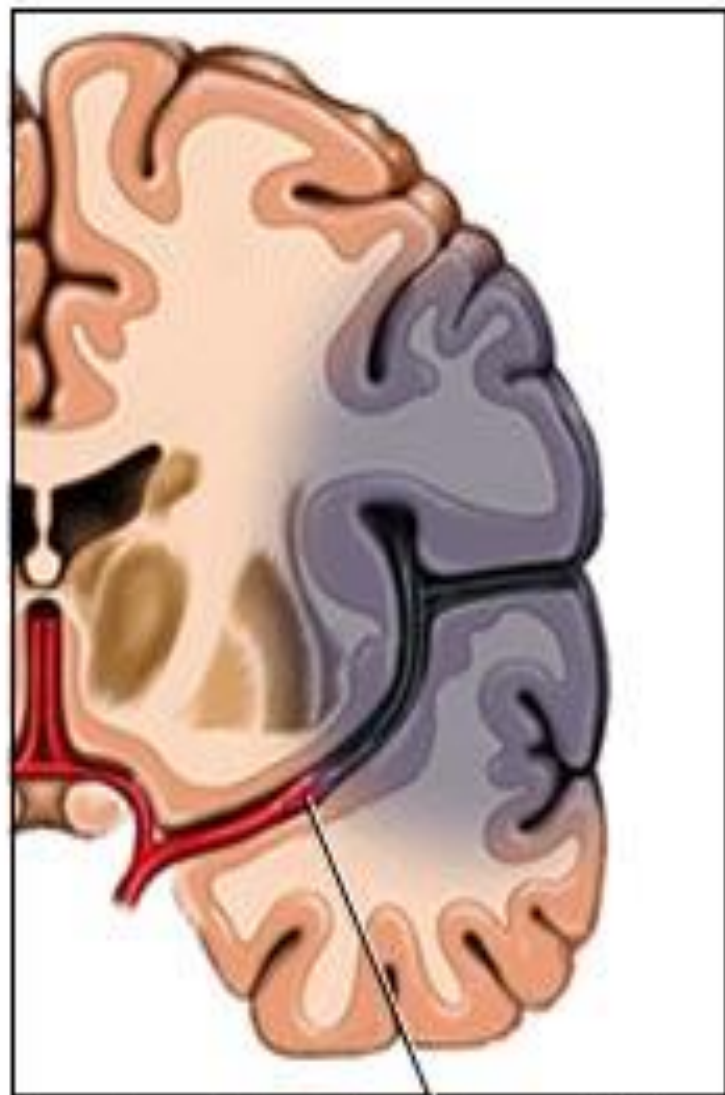
# Pathophysiology

- **Ischemic stroke:** focal areas of the brain receive diminished or no blood supply due to vessel occlusion.

Cryptogenic stroke (CS) is defined as cerebral ischemia of obscure or unknown origin. The cause of CS remains undetermined because the event is transitory or reversible

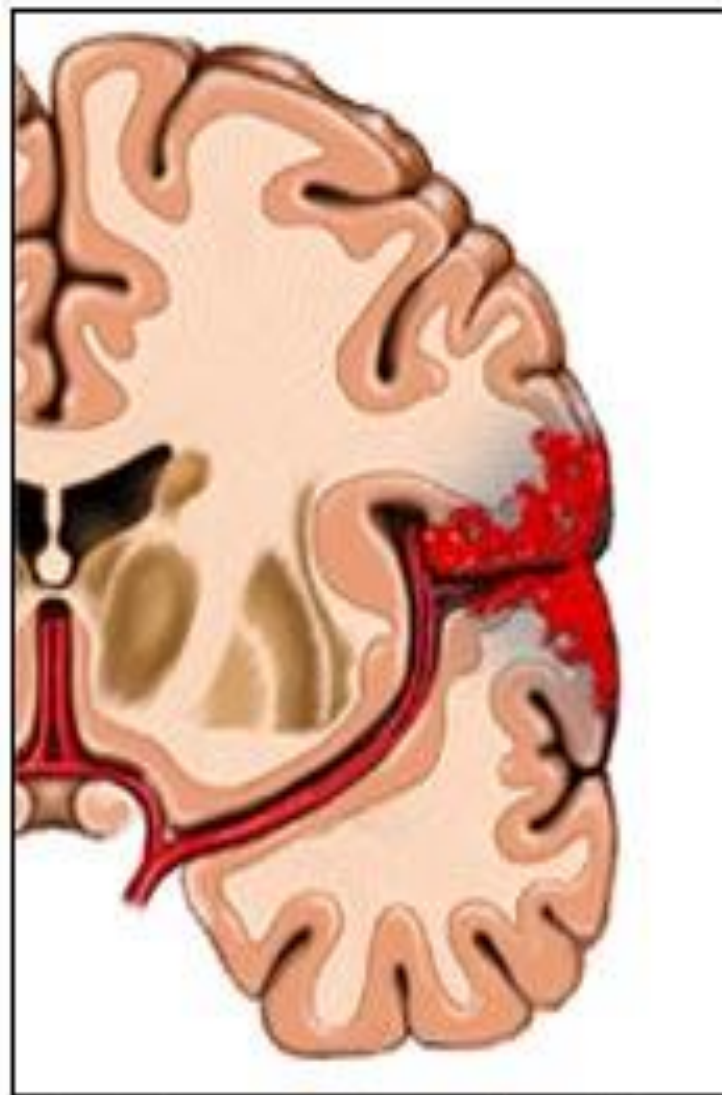
- **Hemorrhagic stroke:** spontaneous rupture of cerebral blood vessels resulting in blood entering the brain tissue or arachnoid space.  
(More than 50% of those who have large hemorrhagic strokes die within a few days)

## Ischemic stroke



A clot blocks blood flow to an area of the brain

## Hemorrhagic stroke



Bleeding occurs inside or around brain tissue

# Symptoms of a Stroke

- **Motor loss:** sudden weakness or paralysis of one arm or leg or one side of the face
- **Sensory loss:** numbness, tingling, in one arm or leg or one side of the face
- Difficulty **communicating** (written or oral).
- Dimness or loss of **vision** in one or both eyes or double vision
- Sudden severe **headache** with no known cause
- **Unexplained dizziness, unsteady gait, sudden falls, confusion and/or seizures**

# STROKE STRIKES SUDDENLY!

How many stroke symptoms can you recognize?



- Numbness \_\_\_\_\_
- Loss of Balance \_\_\_\_\_
- Face Weakness \_\_\_\_\_
- Loss of Vision \_\_\_\_\_
- Headache \_\_\_\_\_
- Weakness \_\_\_\_\_
- Loss of Speech \_\_\_\_\_
- Double Vision \_\_\_\_\_
- Confusion \_\_\_\_\_
- Dizziness \_\_\_\_\_

**DON'T STALL - MAKE THE CALL**

**9 1 1**



# BE FAST

- B (balance)
- E (eye/vision loss)
- F (face) ask individual to smile
- A (arms) ask them to raise both arms
- S (speech) Can they speak?
- T (time) time to call 911
- Get video on YouTube

# Medscape.com

“Our best approach to improving outcome is to put more effort into teaching about stroke symptoms.”

# Incidence of Stroke

- 5th leading cause of death in Western countries
- **Primary cause of serious disability**
- > 795,000 people have a stroke each year in the U.S.
- Another 185,000 have a recurrent stroke
  - Men, elderly and African Americans are at the highest risk

# Incidence of Stroke

- Death every 3 mins & 33 secs
- 1 in 19 deaths
- A stroke happens every 40 seconds



# Readmission to Hospital

- 85% of stroke survivors are readmitted to hosp in first five years.
- Reason for admission-pneumonia or other respiratory disorders

\*\*\* Check for pneumonia vaccine date

- African Americans Have a higher Prevalence of Stroke Risk Factors:
  - ↑B/P: The rate of high blood pressure in African Americans is among the highest in the world
  - Diabetes mellitus
  - Obesity
  - Poor dietary habits
  - Physical inactivity
  - African Americans as a group are less likely to receive or ask for information on how to decrease, prevent, or

# Stats on Women

- American Stroke Association has found:
  - 55% of all strokes
  - 60% of all stroke deaths occur in women.
- The fact that risk goes up with age and that women live longer than men accounts for a large portion of that difference

# Stroke and Women

- Women are more likely than men to **inherit** ischemic stroke, new research indicates
- This holds true regardless of traditional vascular risk factors
- Maternal stroke was 80% more likely than paternal stroke



# Stroke Belt

- 11 states:
  - Indiana, Kentucky, Tennessee, Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi (highest rate), Arkansas (highest death rate). Louisiana
- The buckle
  - NC SC & GA
  - due to diet, smoking and sedentary lifestyle



# Children and Stroke

- Childhood stroke occurs between 1 month and 18 years
- About 6 cases /100,000 children per year
- Top 10 causes of death in children in US
- In-utero stroke-perinatal and prenatal
- Those that have within first month of life at risk for CP
- Causes: cryptogenic, birth defects, infections, trauma, blood disorder
- Activity–stroke risk factors

# Risk Factors

- Change or modify
  - Weight, lifestyle (smoking: **1-in-5 adults smoke** and inactivity), illicit drugs use
- Cannot change
  - Age, sex, family history & ethnicity
- Work on
  - Controlling BP( **#1 risk factor**) 58 million in US
  - Controlling diabetes, lowering cholesterol & CRP
  - Sleep apnea, secondhand smoke, ETOH and Metabolic syndrome-The greatest risk of developing stroke was found in individuals with metabolic syndrome that had either hypertension or elevated fasting glucose

# Stroke

About half of hypertensive patients do not adhere well to their prescribed therapy

# Cholesterol Lab Values

Cholesterol is considered abnormal when:

- Total cholesterol is 200 mg/dL or higher
- HDL or "good" cholesterol level is less than 40 mg/dL
- LDL or "bad" cholesterol is 160 mg/dL or higher -- with 190 and above being very high.
- However, the lower the LDL, the better. An LDL less than 100 is considered optimal; 100 to 129 is near optimal; 130 to 159 is border-line high

# CRP: C-Reactive Protein

- A bad attitude may put your heart/brain at risk,
- Anger, hostility, and depression can give have higher levels CRP.
- Also, in response to the inflammation caused by:
  - Stress
  - Infection
  - Other threats to the immune system..

## Lab values for CRP

- 1.0 and less is considered normal
- 1.0 to 3.0 is increased risk
- 3.0 and above is high risk

# Classification of Ischemic Strokes 87%

## Non-lacunar

- Transient ischemic attack (TIA)
- Cerebral thrombus
- Cerebral embolism lacunar infarct  
( small vessel)
- Other
  - Reversible ischemic neurological deficit (RIND)
  - Systemic hypoperfusion (ischemic anoxic encephalopathy)



# Transient Ischemic Attack

- Episode of temporary focal dysfunction of vascular onset
- Rapid onset
- Duration varies from 1-15 minutes (NO longer than 24 hours)
- No residual deficits
- Risk of a stroke following a TIA is 30% within 5yrs
- **Although a TIA doesn't produce lasting damage, it's one of the most important warning signs of stroke**

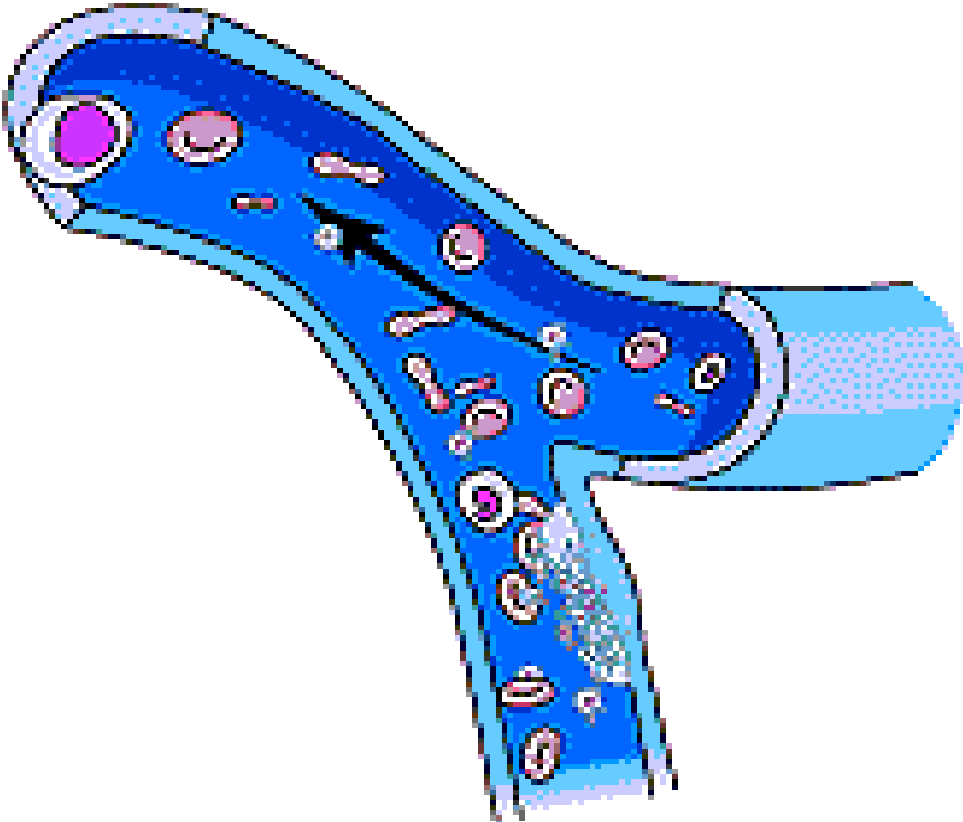
# Cerebral Thrombus

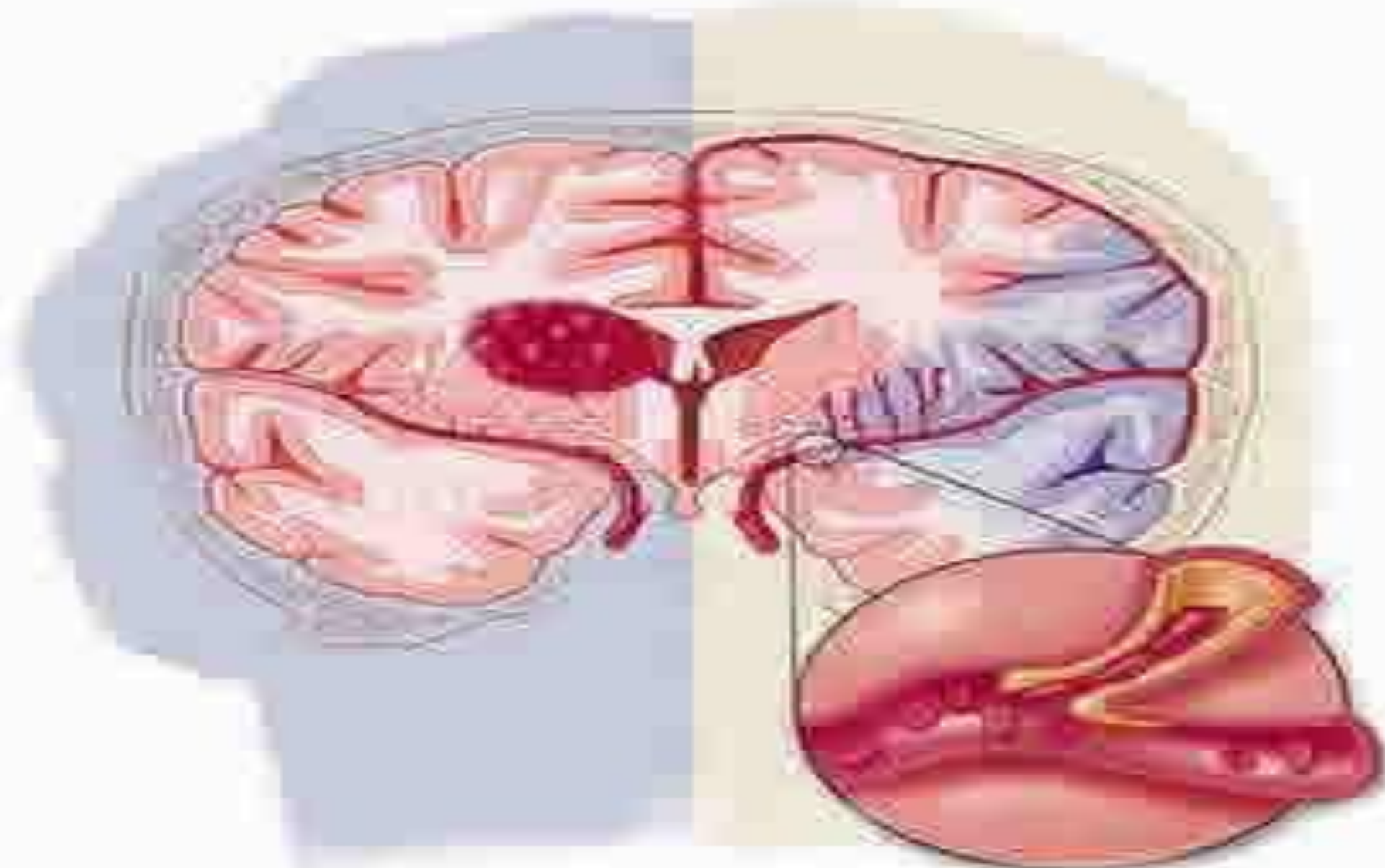
- Caused by atherosclerotic plaques, which cause the blood vessels to narrow
- **Plaque buildup narrowing a cerebral artery is known as cerebral artery stenosis (CAS)**
- Can also lead to a tear of a weakened wall
- Triggering of the clotting process, leading to narrowing of blood vessels

# CAS

- Because plaque development is such a slow process, a patient can have CAS and not know it

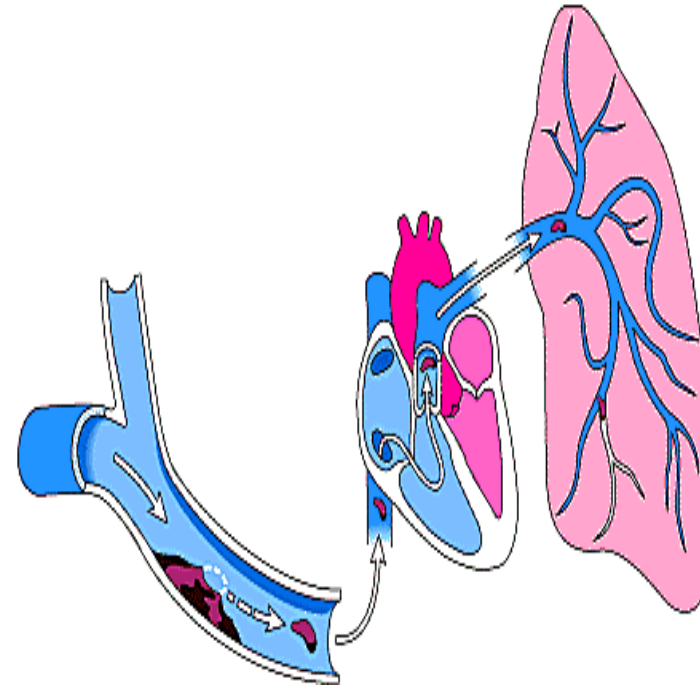
# Thrombus





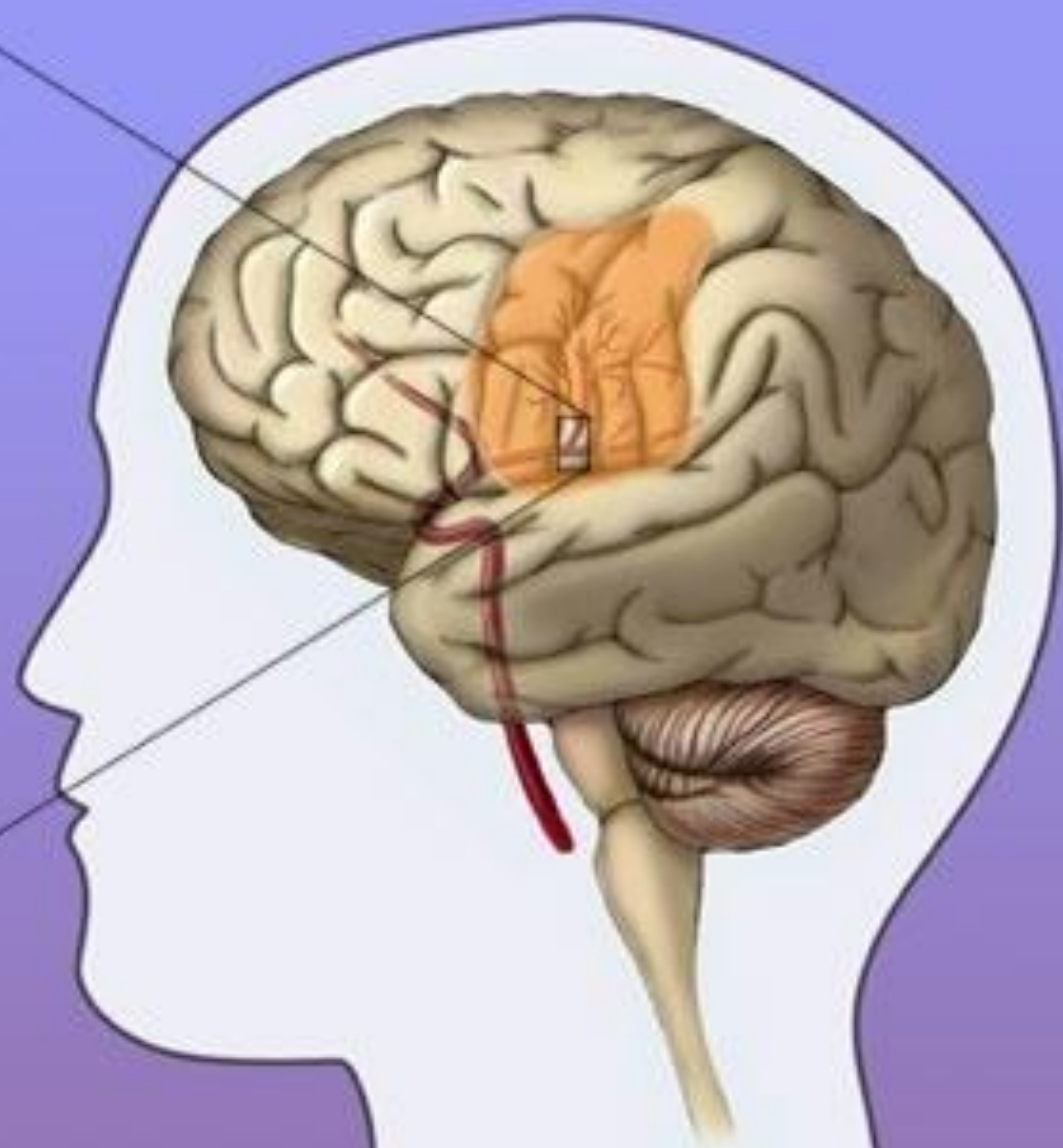
# Cerebral Embolism

- Traveling clot, usually originating from thrombi in the heart or aortic arch
- Becomes jammed in the cerebral vessels and obstructs blood flow





Embolic Stroke



# Lacunar Infarct

- Thrombotic occlusion in the small deep cerebral arteries
- Produces small lesions, oval in shape, which pit and are deep within the brain
- Usually develops in the **pons or thalamic pathways**
- Purely motor or purely sensory deficits



Diving Bell & the Butterfly  
by Jean-Dominique Bauby

Stroke of Midnight  
Robert Smith

Stroke of Insight  
Jill Bolte Taylor

# Reversible Ischemic Neurological Deficit

- Episode of temporary focal dysfunction of vascular origin
- Time of onset varies
- Takes days to resolve
- NO residual deficits after 2 weeks

# Systemic Hypoperfusion

- Small distal cerebral arteries not receiving adequate blood flow
- Cardiac pump failure or hypovolemia are the cause of this event
- Sometimes called “Watershed stroke”

# Classification of Hemorrhagic Strokes

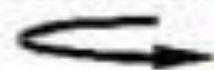
13%

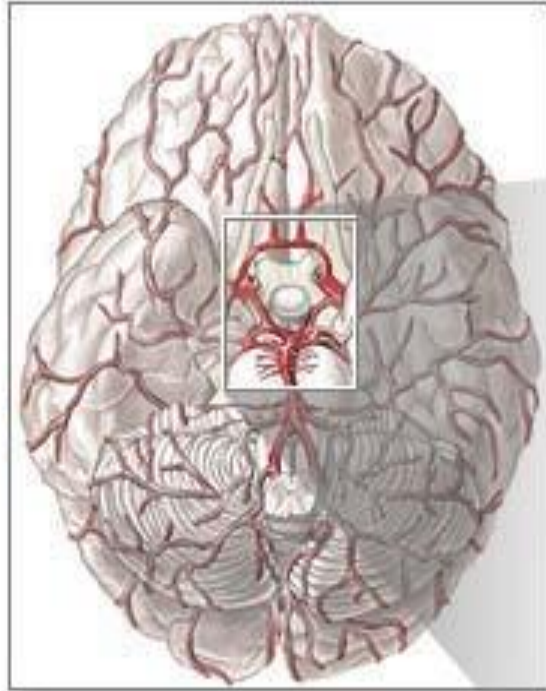
- Subarachnoid hemorrhage: occurs when there is spontaneous rupture of the cerebral vessels and blood enters the subarachnoid space surrounding the brain (**3%**)
- Intracerebral hemorrhage: rupture of small, deep vessels of the brain, releasing blood directly into the brain (**10%**)

# STROKE



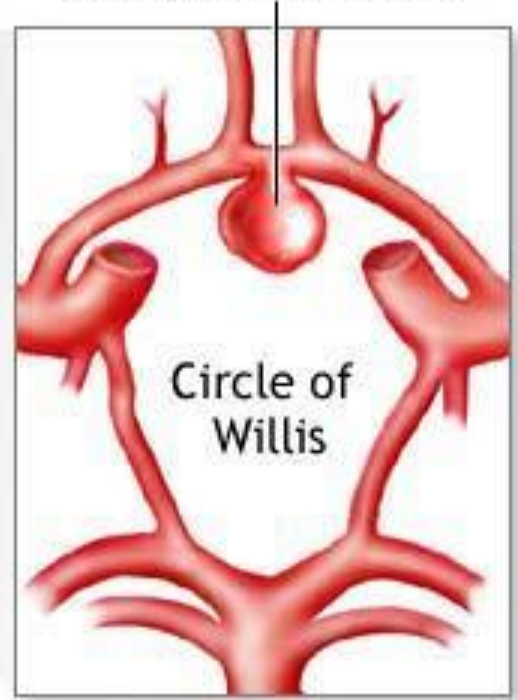
BLOOD VESSEL  
BURSTING  
IN THE BRAIN





Bottom view of brain  
and major arteries  
of the brain

Berry aneurysm on the  
anterior communicating  
artery of the brain



# Deficits

- Left

- Right

# Psychosocial Issues

## **Depression # 1 (Prozac, Zoloft, Lexapro, Cymbalta)**

a.

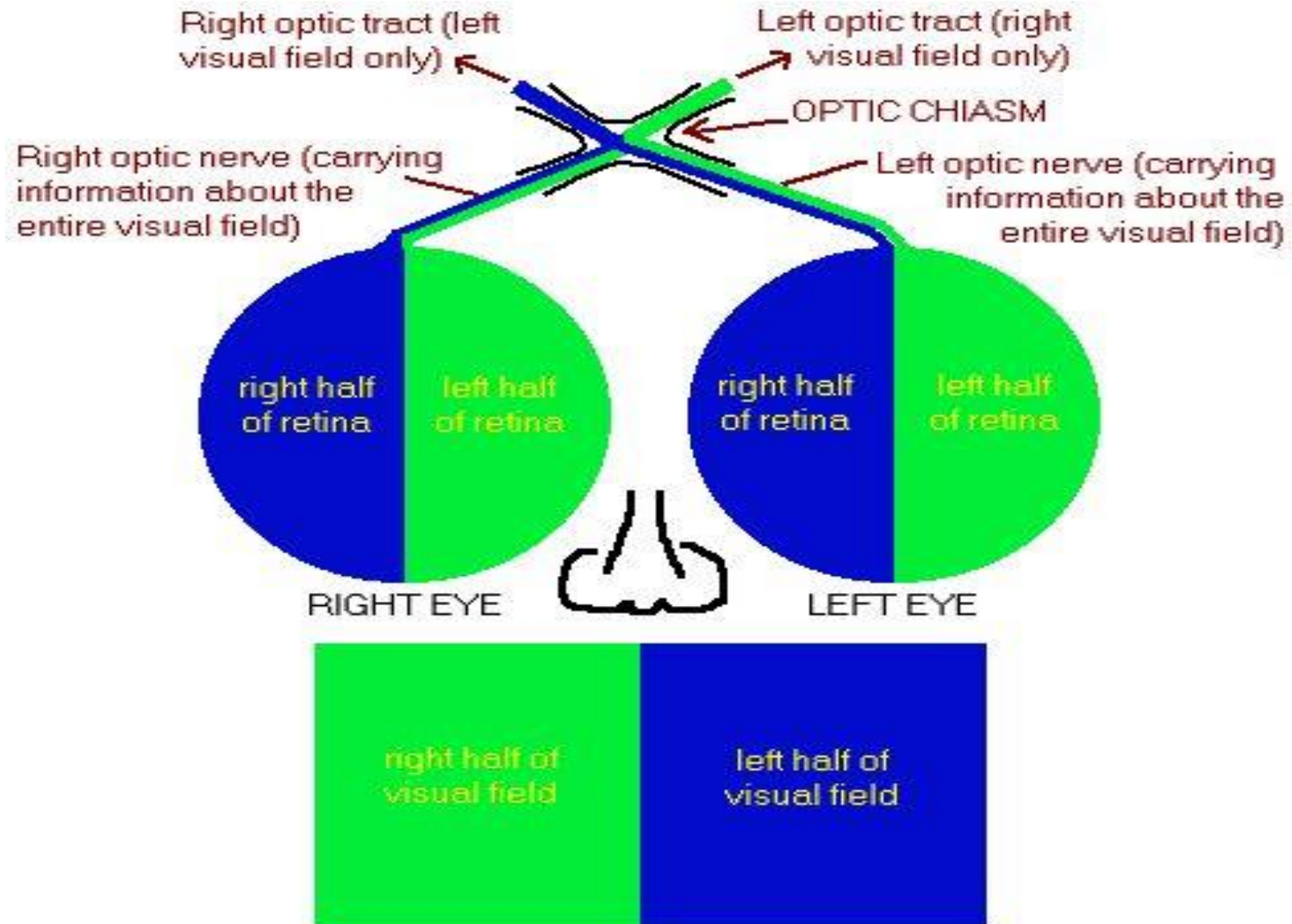
- Dependence in activities of daily living (ADL's)
- Decreased self-esteem
- Altered role performance
- Sexual dysfunction
- Change in social and leisure activities
- Decreased financial earning and/or decreased vocational capacity



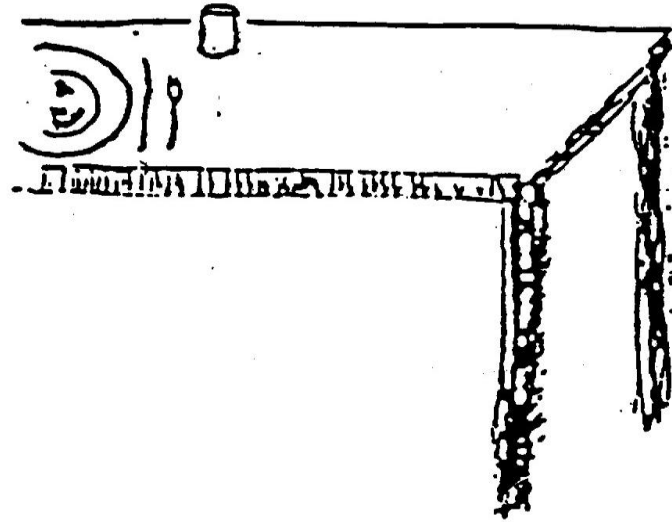
# Updates

- Impaired executive function is common and often permanent following stroke
- New study findings suggest that treatment with antidepressants may help patients recover their cognitive and psychosocial capacities

# Left & Right Deficits



# Hemianopsia



# Homonymous Hemianopsia



# Possible Consequences No Matter Which Side

- Neurogenic bladder and bowel
- Fatigue
- Dysphagia
- Seizures

# Consequences of Stroke

- Physical
- Behavioral
- Cognitive

(Refer to handout)

# Medical Assessment

## Emergent

- Diagnosis is critical
- Decision for tPA...4-hour rule

## Acute

- NIH stroke scale
- Rankin scale
- Control of medical issues

## Rehabilitation

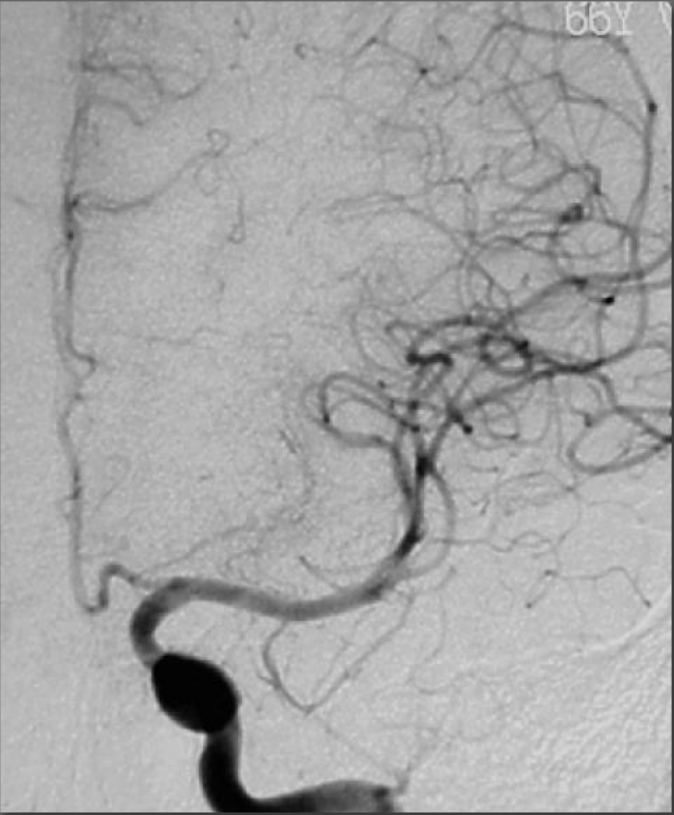
- GG measures
- More later...

# Medical Assessment

- CT limits visualization of lacunar stroke  
(The CT scan can reveal hemorrhage immediately after it occurs but not a new area of infarct)
- CTA shows vessel status-occlusion/stenosis
- MRI better check on hemorrhage  
  
(The MRI is more sensitive for identifying infarction at an earlier stage)
- MRA images with angiogram
- PET/SPECT uses radiologic substance to visualize the tracking of blood vessels to the brain



Normal Path of  
Blood Through the Brain



Blood Flow  
Through Brain Blocked



# Acute Medical Treatment

- Medication

- Antihypertensive
- Antiplatelets
- Anticonvulsants
- Antipyretics
- Fibrinolytic

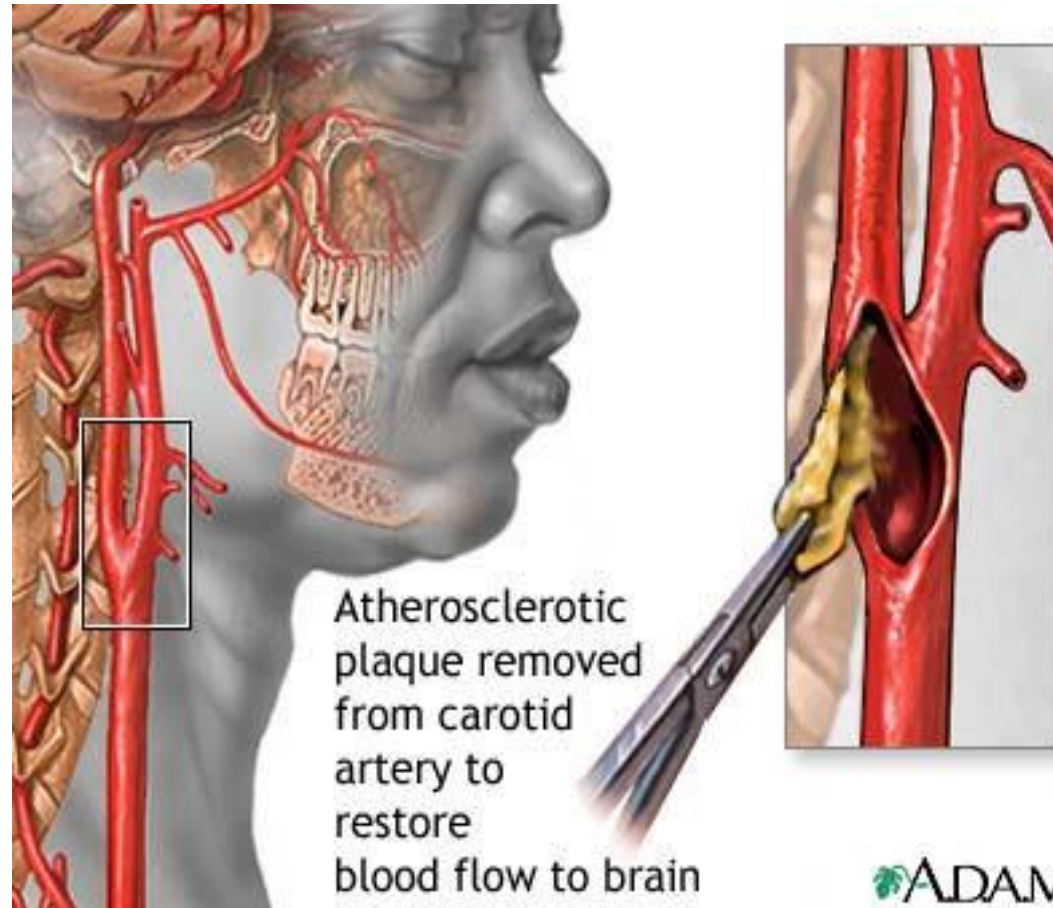


- Surgery



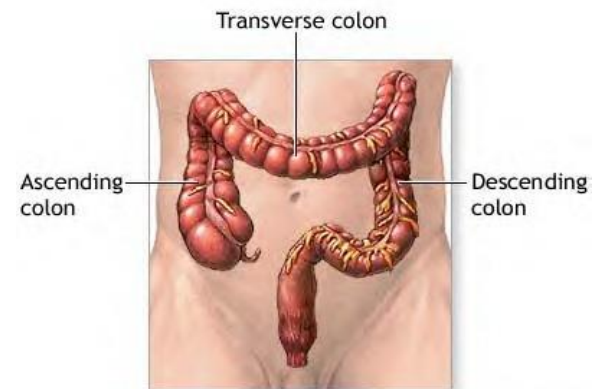
- Hemicraniectomy for ICP
  - Surgical removal of hematoma
- Neuroprotective agents

# Carotid Endarterectomy



# Nursing Assessment

- General Health  
HX
- -Co-morbidity
  - Personal  
patterns
  - Dysphagia-87%
  - Elimination-  
60%



# Quick 5 Pt. Neuro Check

## Behavior

Affect  
Irritability  
Restlessness

## Speech

Appropriateness  
Slurring

## Orientation

PPT & S

## Arousability

Spontaneous  
To voice  
To touch

## Pupils

Widen  
Constricted  
Fixed

# More Complications

- Agnosia
- Apraxia
- Aphasia
- Dyspraxia
- Dysarthria
- Dysgraphia

# Web Sites for Stroke

- National Stroke Association: **stroke.org**
  - **800-787-6537**
  - ***Stroke Smart***
- American Stroke Association **strokeassociation.org**
  - ***Stroke Connection***
  - **888-4- stroke**
- National Institute of Neurological  
Disorder and Stroke 1-301-496-5751  
**ninds.nih.gov**
- Paralysis.org
  - 800-539-7309

[Info@paralysis.org](mailto:Info@paralysis.org)
- FAST video