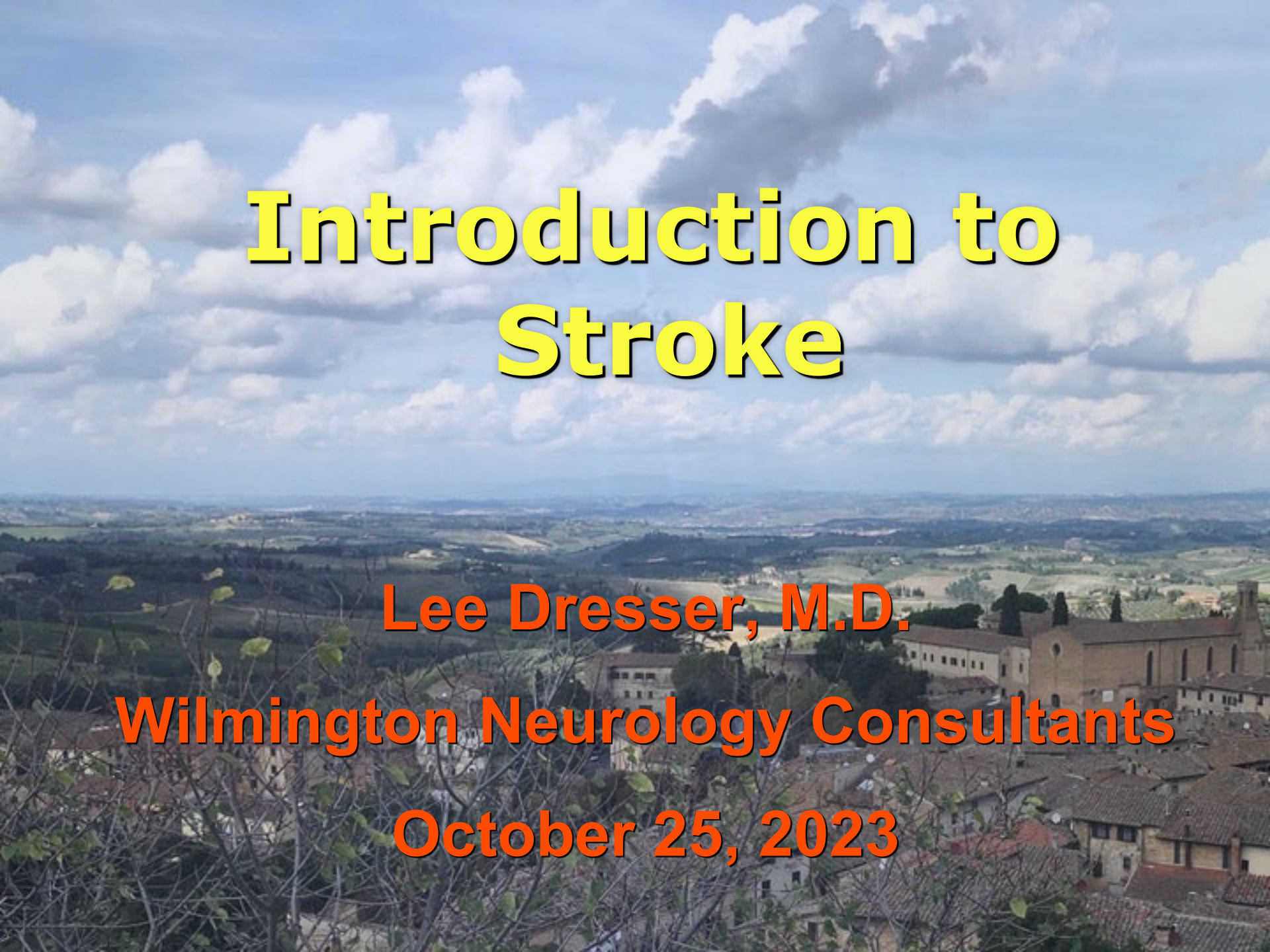


Introduction to Stroke

Lee Dresser, M.D.

Wilmington Neurology Consultants

October 25, 2023

What is a Stroke?

Sudden, Focal Neurological Impairment Due to Interruption of Blood Supply to the Central Nervous System

TIA

Spanish for Aunt?

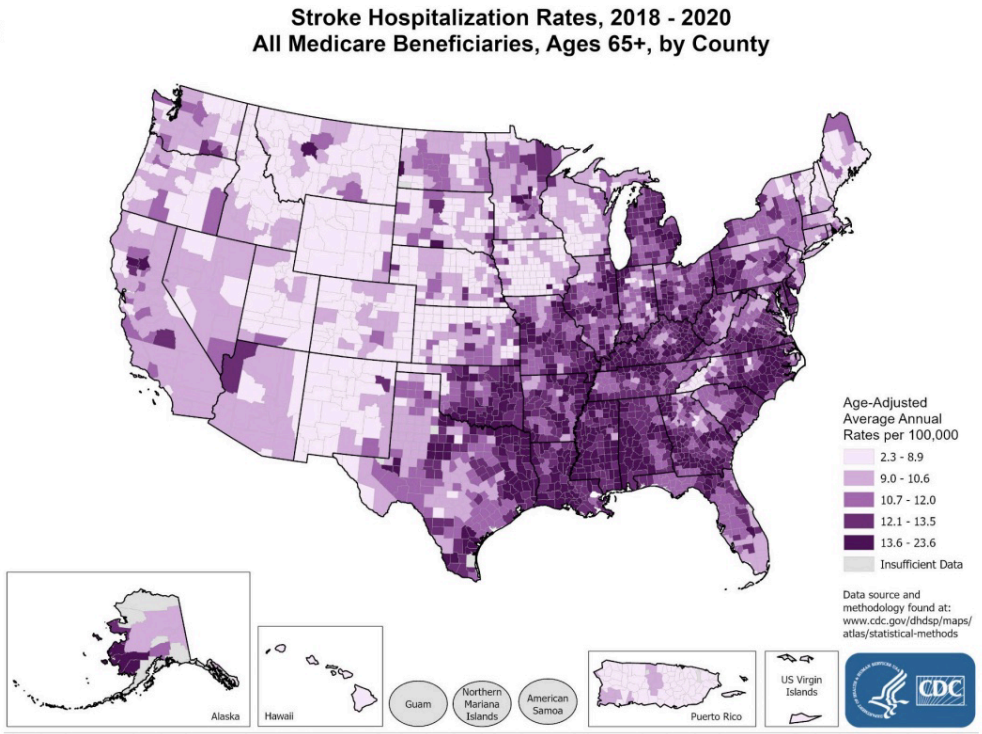
- The same neurological symptoms as a Stroke, but in a TIA the symptoms resolve within 24 hours
- TIA indicates a high risk of stroke within the next days to weeks
- TIA and ischemic stroke have the same diagnostic evaluation

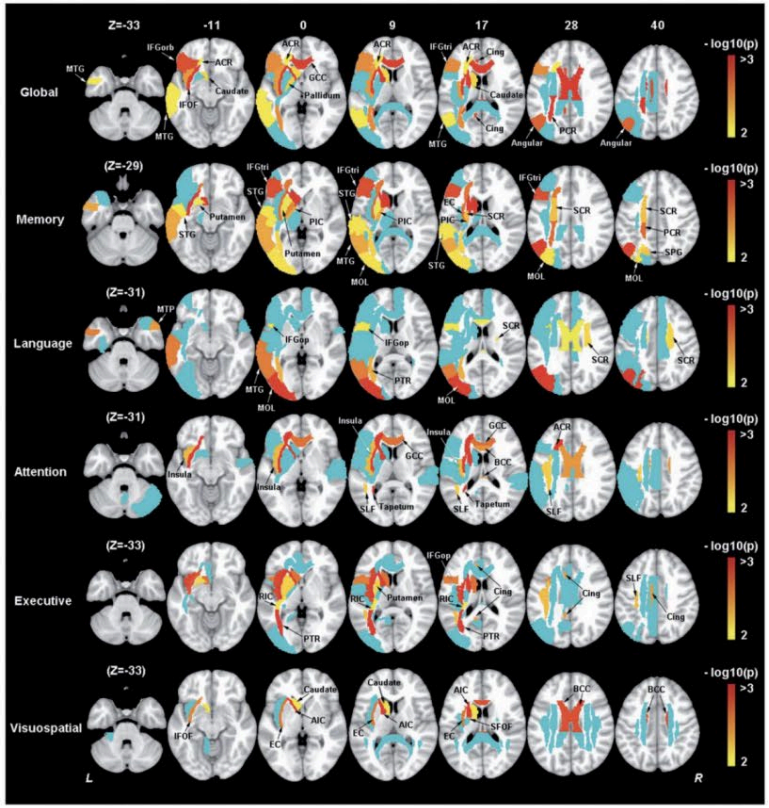
Why Worry About Stroke?

- ~900,000 Strokes per Year
- One Every 45 Seconds
- #5 Cause of Death
- #1 Cause Adult Disability

Stroke by the numbers

- **1 in 6 deaths** from cardiovascular disease was due to stroke.
- **795,000 new strokes per year** in the United States.
  - 610,000 of these are first or new strokes.
- **87%** of all strokes are ischemic
- **$53 billion**: stroke-related costs in the United States between 2017 and 2018. (Cost of health care services, medicines to treat stroke, and missed days of work).
- **Number 1:** Stroke is a leading cause of serious long-term disability.





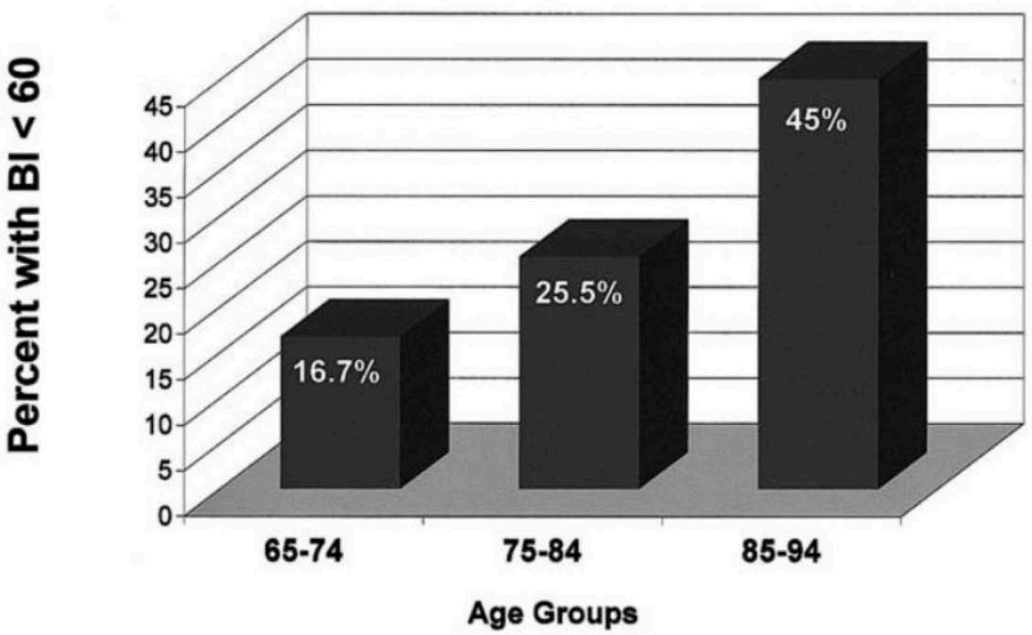
Factors associated with post-stroke cognitive impairment

- Stroke volume
- Strategic location
  - Right corticospinal tract, left anteromedial thalamus, left arcuate fasciculis, left middle frontal gyrus, left postero-inferior cerebellum, left angular gyrus
- Total brain volume
- Medial temporal lobe atrophy
- White matter disease
- Presence of microbleeds

Stroke. 2018;49:2666- 2673.
Journal of Cerebral Blood Flow & Metabolism 2018. Vol. 38(8) 1299–1311

Framingham Heart Study
Three Generations of Dedication

Influence of Age on Disability After Stroke



- Severe disability in activities of daily living ((ADL) function following stroke
- Defined as Barthel Index < 60
- As age increased, the percent of severely disabled survivors also increased

Kelly-Hayes M. The influence of gender and age on disability following ischemic stroke: the Framingham study. J Stroke Cerebrovasc Dis. 2003;12(3):119–26.

Stroke Recovery is multidimensional

Lesion Characteristics

Amount and Type of Rehabilitation

Cortical Network involvement

Neuroactive Medications

Initial Impairment

Genetics

Age

Depression

Social Support Structures

Premorbid Disability

Fatigue

Socio-economic Demographics

Resilience

Medical Complications & Comorbidities

Framingham Heart Study
Three Generations of Dedication

6-month outcomes in stroke survivors greater than 65 years old

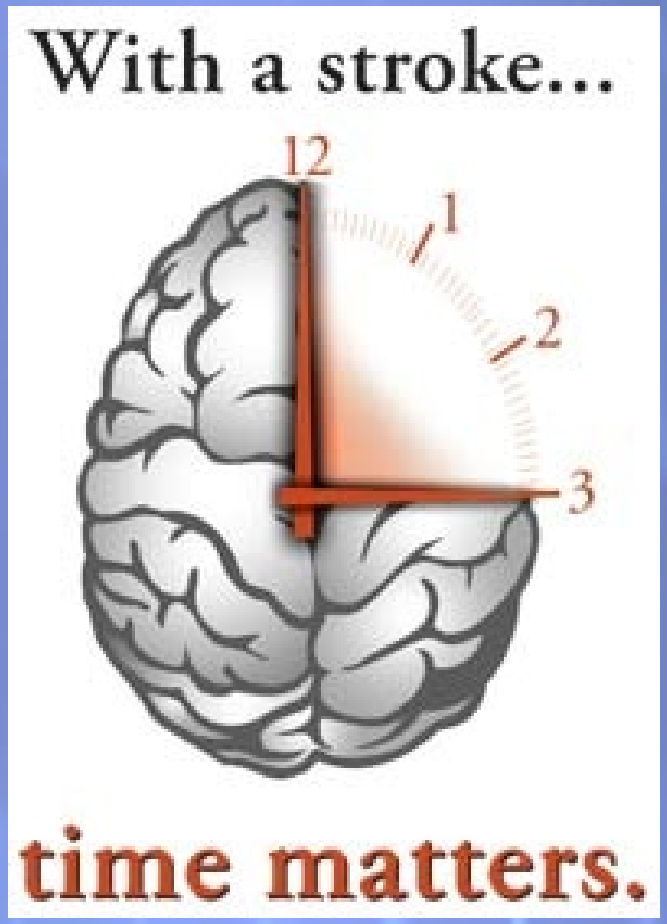
- Hemiparesis (50%)
- Cognitive deficits (46%)
- Depressive symptoms (35%)
- Unable to walk unassisted (31%)
- Social disability (30%)
- **Poor subjective health (40%)**

	Women (n = 63)	Men (n = 45)	Total (n = 108)
Neurological deficits (%)			
Hemiparesis	57.4	40.0	50.0
Cognitive deficits	49.2	42.2	46.2
Hemianopsia	17.7	22.2	19.6
Aphasia	23.8	11.6	18.9
Sensory deficits	21.7	6.8	15.4
Disability measures (%)			
ADL: Barthel <60	33.9	15.6	26.2
Unable to walk unassisted	40.3	17.8	30.8
Bladder incontinence	28.6	13.3	22.2
Depression symptoms	31.9	39.5	35.3
Social disability	36.8	23.1	29.9
Institutionalization	34.9	13.3	25.9
Poor subjective health	40.7	38.1	39.6

Kelly-Hayes M. The influence of gender and age on disability following ischemic stroke: the Framingham study. J Stroke Cerebrovasc Dis. 2003;12(3):119–26.

Penn Medicine

Time is Brain!

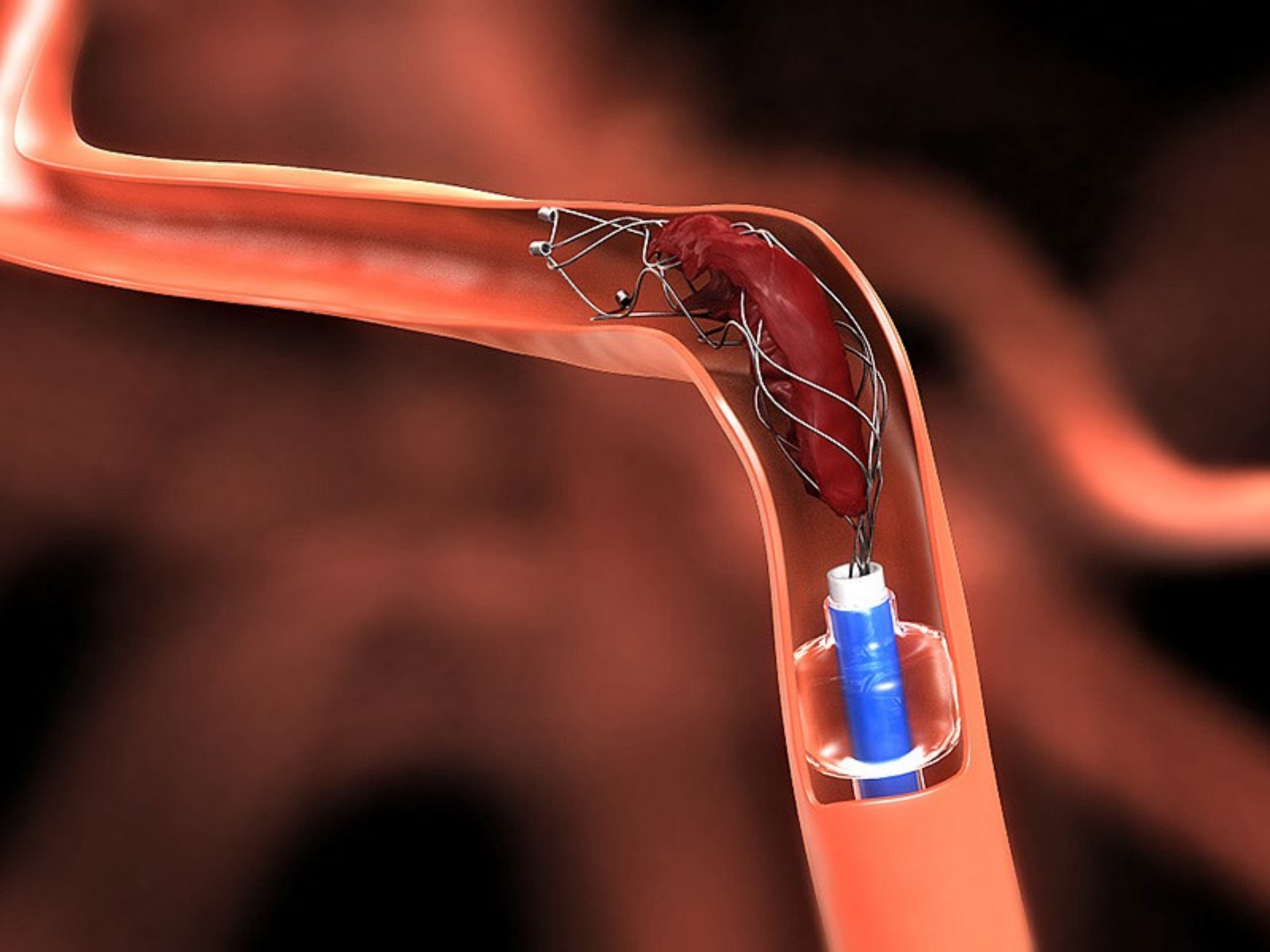


Call 911!

Clot Busters

TPA (Tissue Plasminogen Activator) and Tenecteplase

- **Promotes Lysis of Blood Clot**
- **Must be Given Within 4.5 Hours - *The Sooner the Better!!***
- ***FDA Approved for 3.0 Hours***
- **2 Million Brain Cells Lost Every Minute**



Stroke Risk Factors

Modifiable:

- **Hypertension**
- **Diabetes**
- **Hyperlipidemia**
- **Smoking**
- **Obesity**
- **Heart Disease**
- **Excessive Alcohol**
- **Sleep Apnea**
- **Sedentary Lifestyle**

Stroke Risk Factors

Nonmodifiable:

- Age
- Genetics
- Race
- Sex

Stroke Prevention

- Primary - Modify Risk Factors

- Secondary
  * Risk Factor Modification
  * Blood Thinners
  * Lipid Lowering
  * Lifestyle Modification
  * Surgery
  * Stents

Stroke Prevention

Primary - Modify Risk Factors

1. Control Blood Pressure
2. Stop Smoking
3. Control Diabetes
4. Control Lipids
5. Exercise
6. Weight Loss
7. Avoid Excess Alcohol
8. Treat Sleep Apnea
9. Treat Heart Disease, Anticoagulation

Stroke Prevention

Secondary

1. Surgery - Carotid Endarterectomy

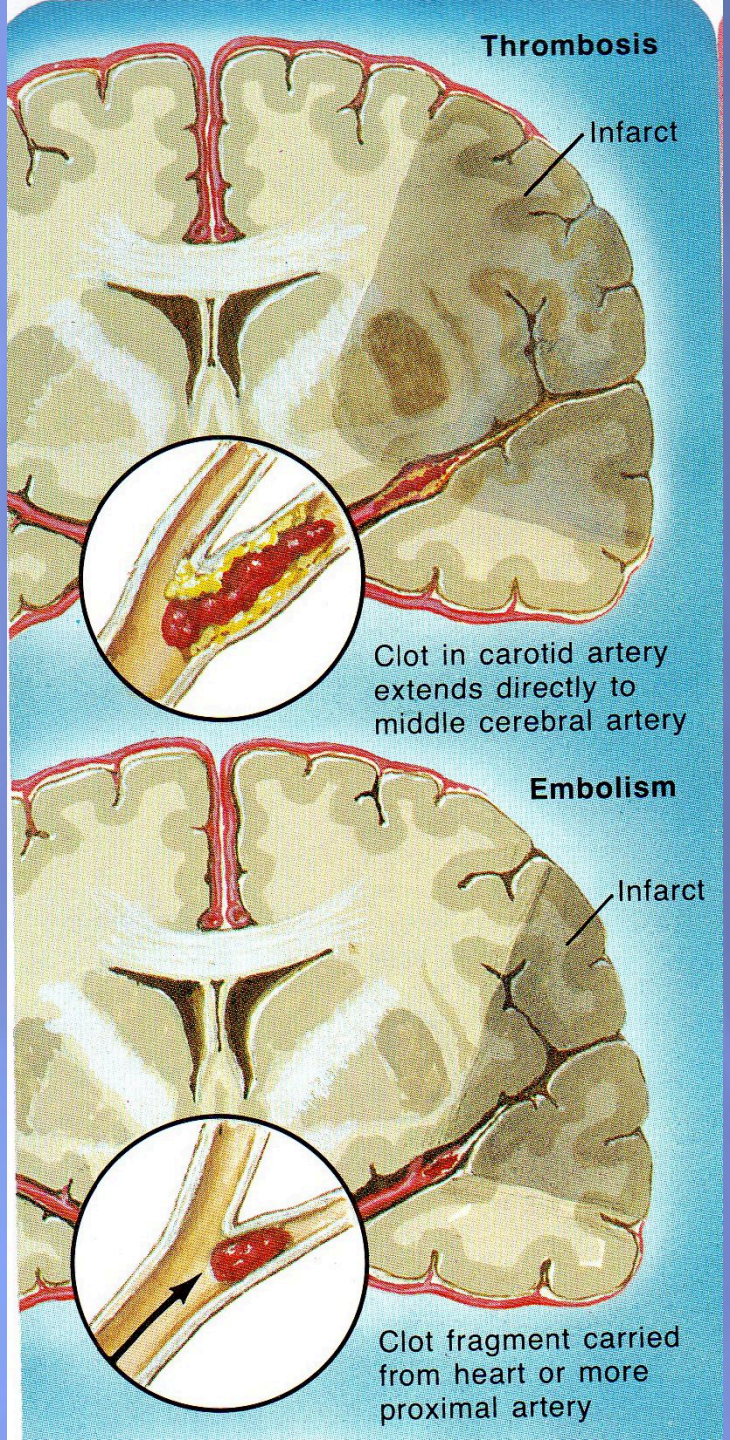
2. Devices to Occlude Left Atrial Appendage

Types of Stroke

- Ischemic (Blockage)
- Hemorrhagic (Bleeding)

Ischemic Stroke

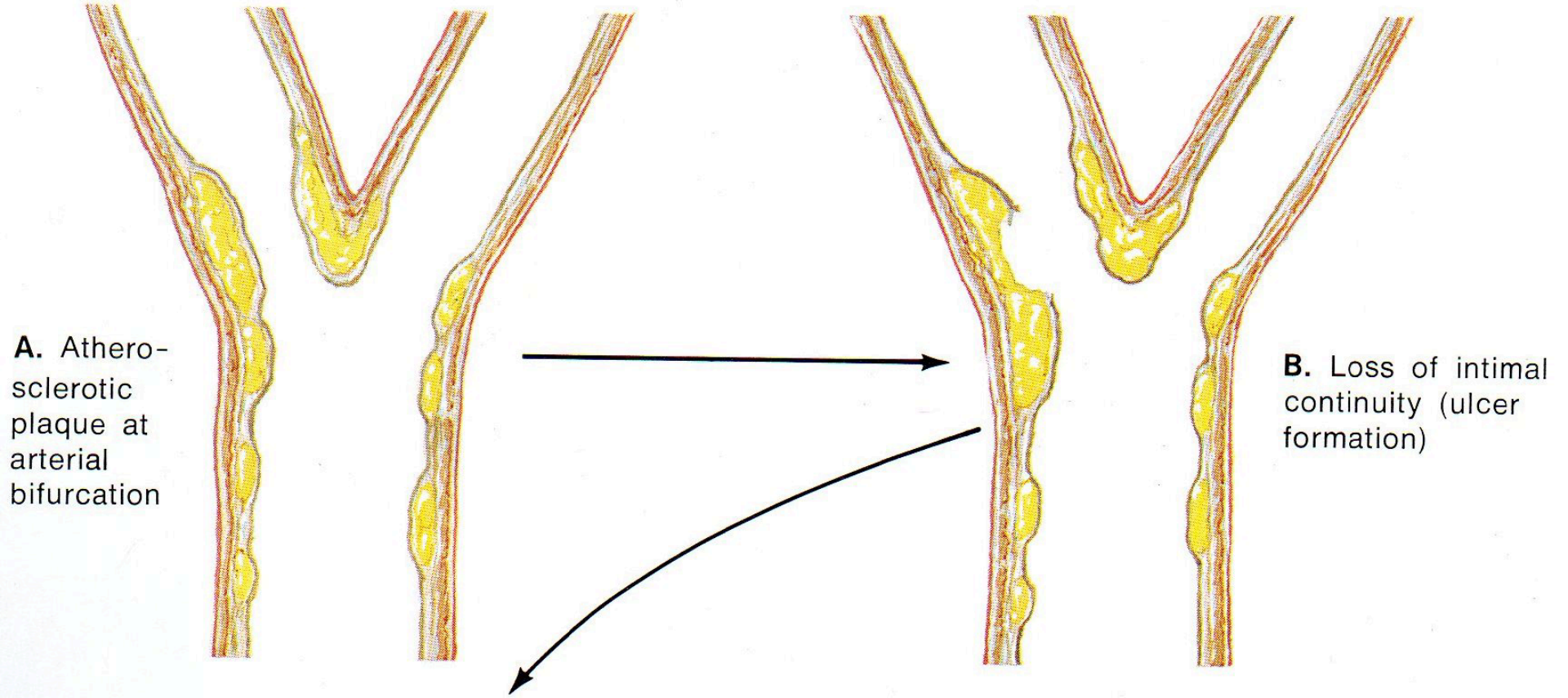
- Thrombotic
  1. Large vessel
  2. Small vessel (Lacunar)
- Embolic
- Cryptogenic

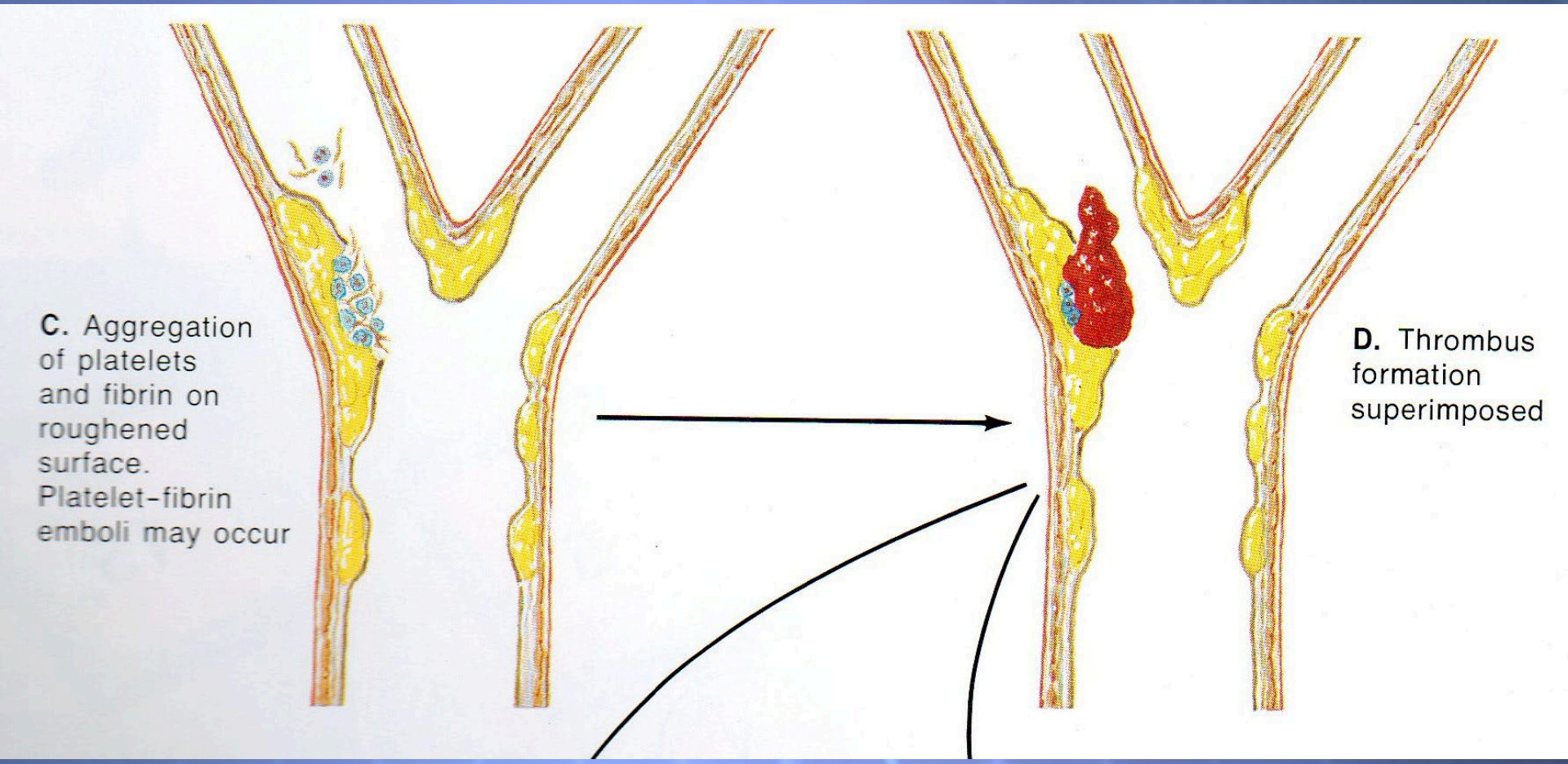

Thrombosis
Infarct
Clot in carotid artery extends directly to middle cerebral artery
Embolism
Infarct
Clot fragment carried from heart or more proximal artery

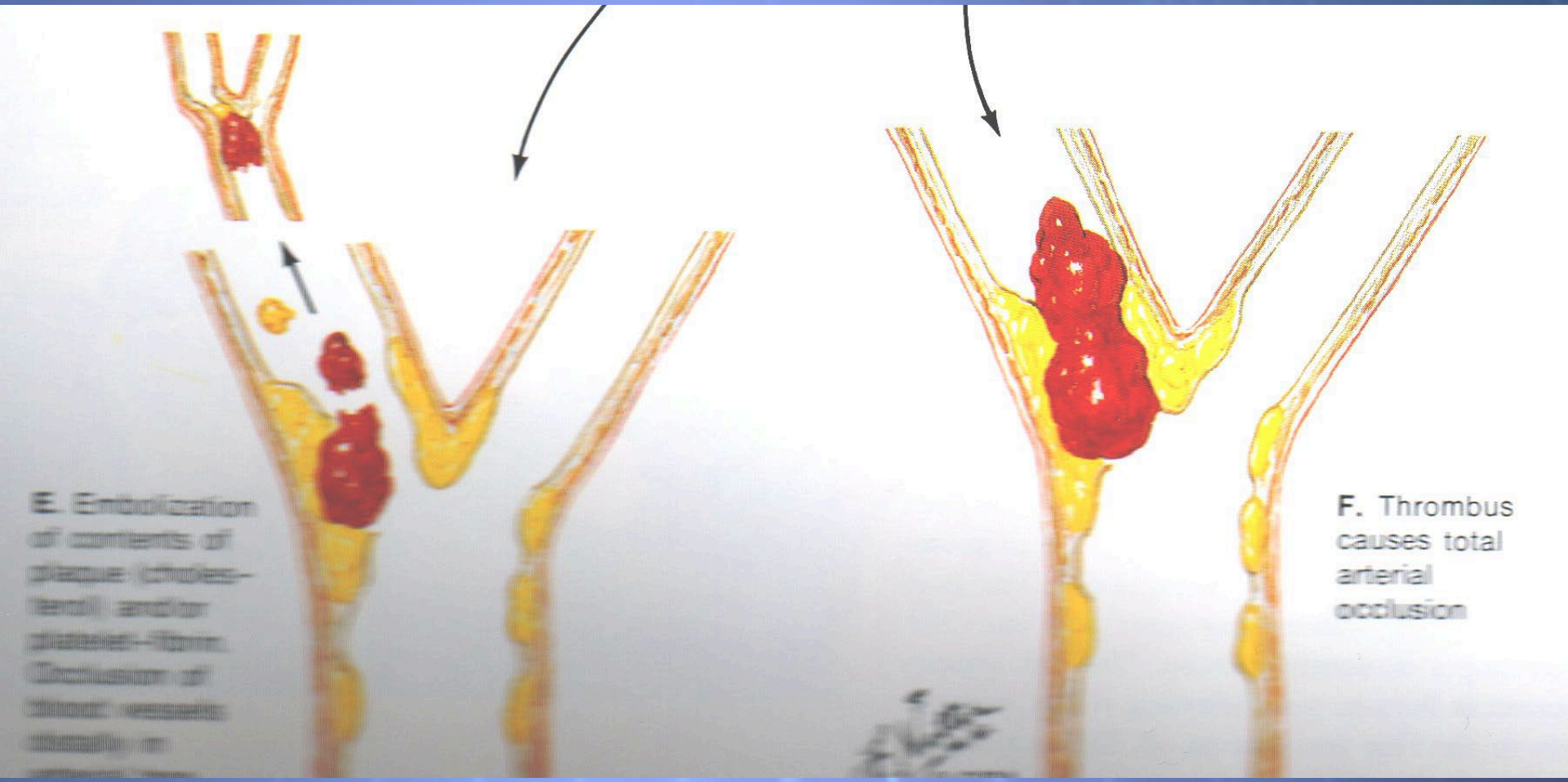
Thrombotic Stroke

- **Atherosclerotic**
- Dissection
- Inflammation
- Hypercoagulable (Excessive Clotting)

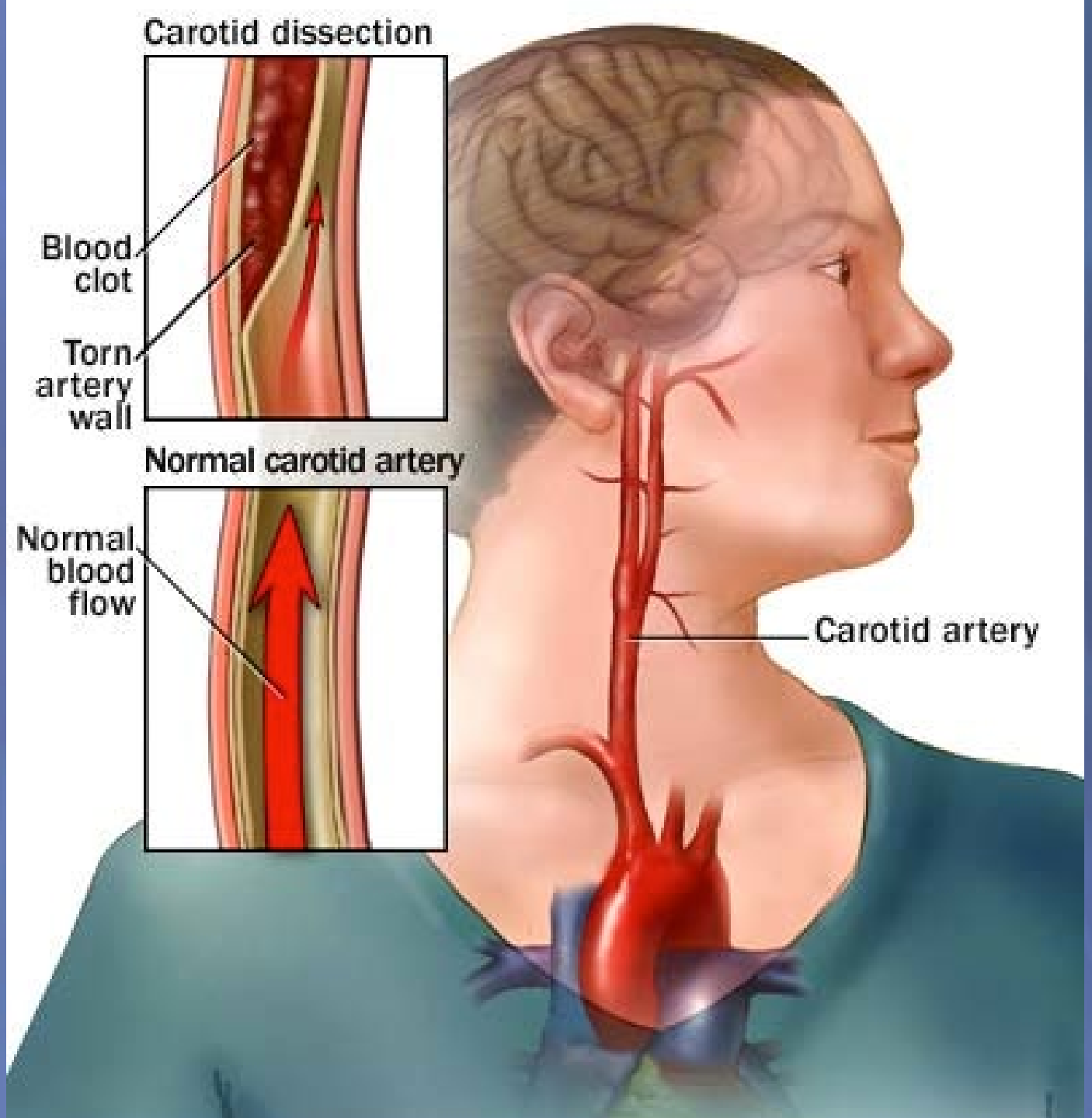
Atherosclerosis, Thrombosis and Embolism




C. Aggregation of platelets and fibrin on roughened surface. Platelet-fibrin emboli may occur
D. Thrombus formation superimposed



F. Thrombus causes total arterial occlusion


Carotid dissection
Blood clot
Torn artery wall
Normal carotid artery
Normal blood flow
Carotid artery

NORMAL ARTERY

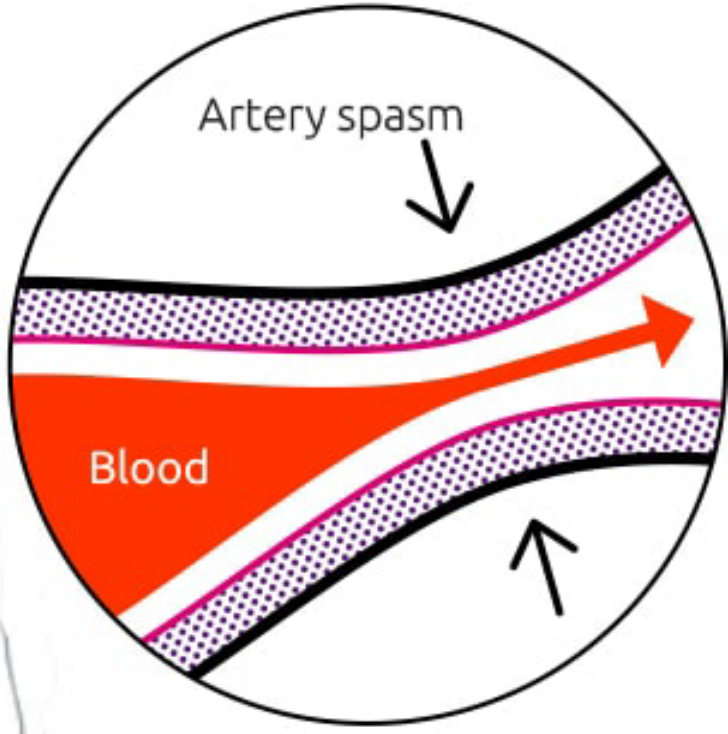
VASOSPASTIC ARTERY

1.

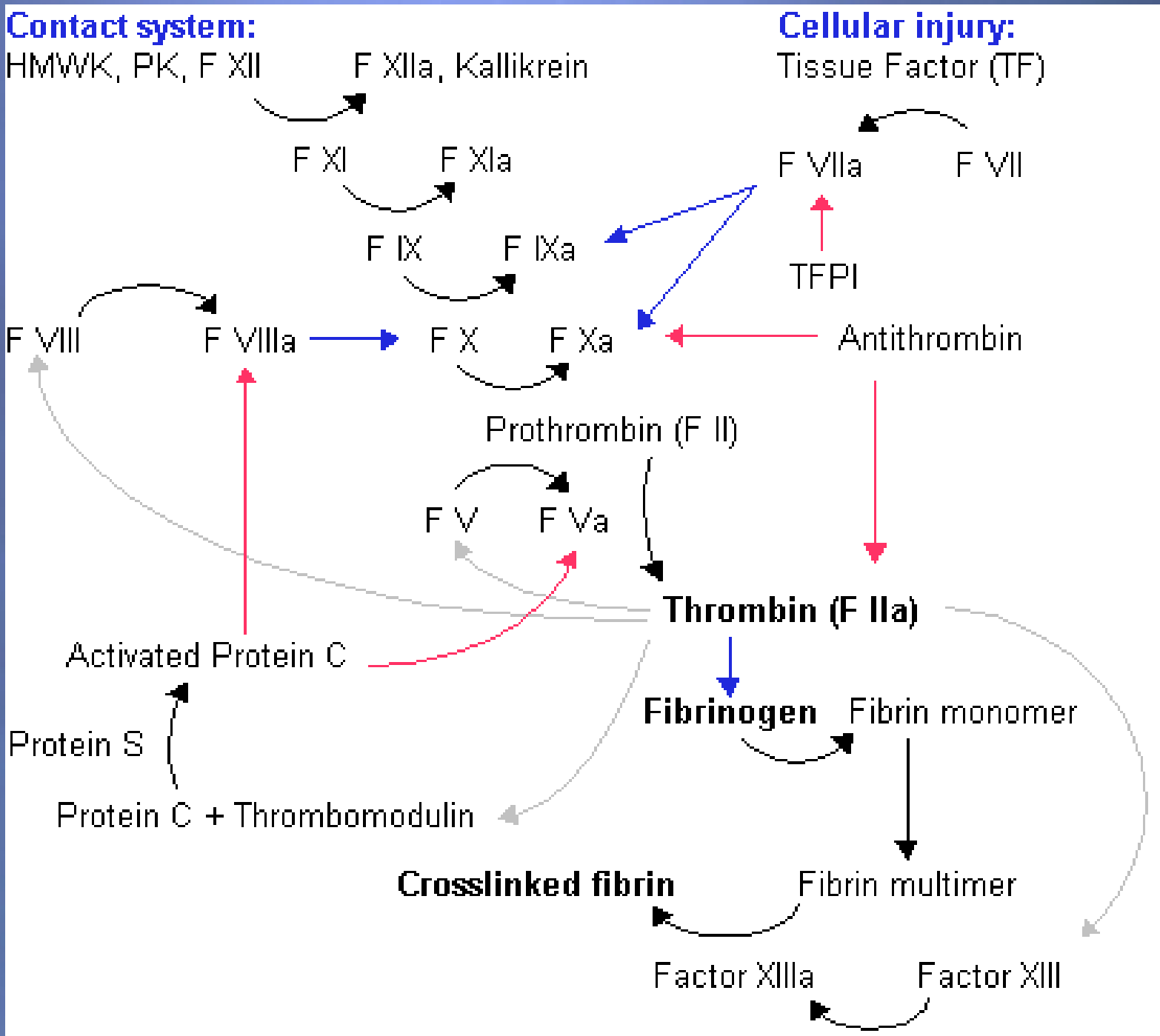
Coronary artery spasm with cerebral vasospasm

Baseline aSAH: normal MCA

7 days after SAH: cerebral vasospasm



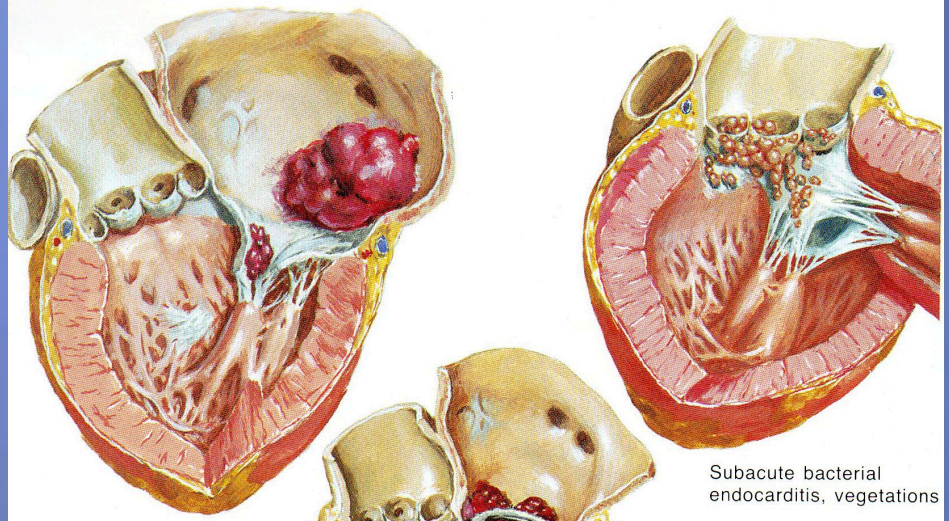
Blood flow is constricted during an artery spasm


Contact system:
HMWVK, PK, F XII
F XIIa, Kallikrein
F XI
F XIa
F IX
F IXa
F VIII
F VIIIa
Cellular injury:
Tissue Factor (TF)
F VIIa
F VII
TFPI
F X
F Xa
Antithrombin
Prothrombin (F II)
F V
F Va
Thrombin (F IIa)
Activated Protein C
Protein S
Protein C + Thrombomodulin
Fibrinogen
Fibrin monomer
Crosslinked fibrin
Fibrin multimer
Factor XIIIa
Factor XIII

Ischemic Stroke

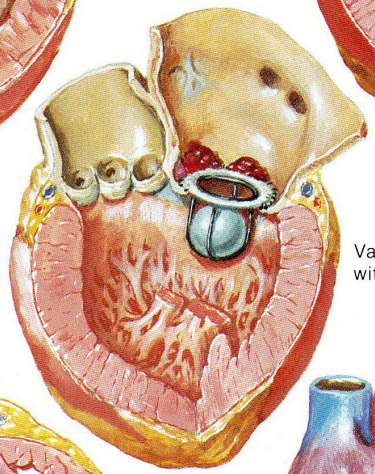
- Embolic

1. From the Heart
2. Artery to Artery



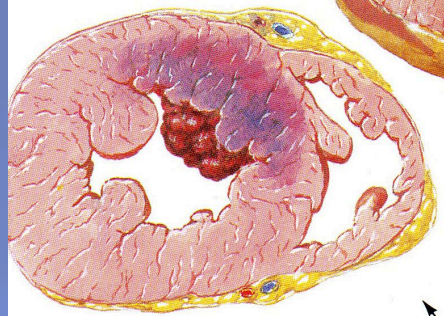
Mitral stenosis, mural and valvular thrombi

Subacute bacterial endocarditis, vegetations



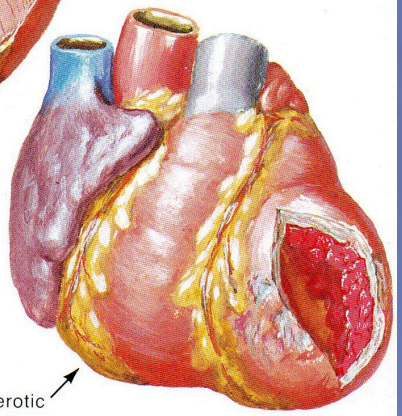
Valve replacement with thrombus formation

F. Netter M.D.
© CIBA

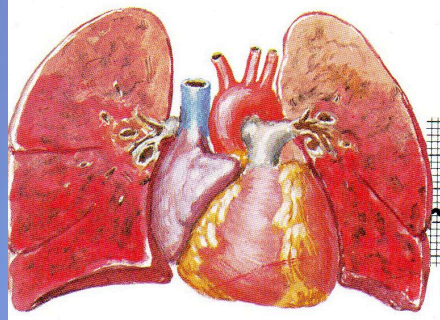


Myocardial infarction with mural thrombus

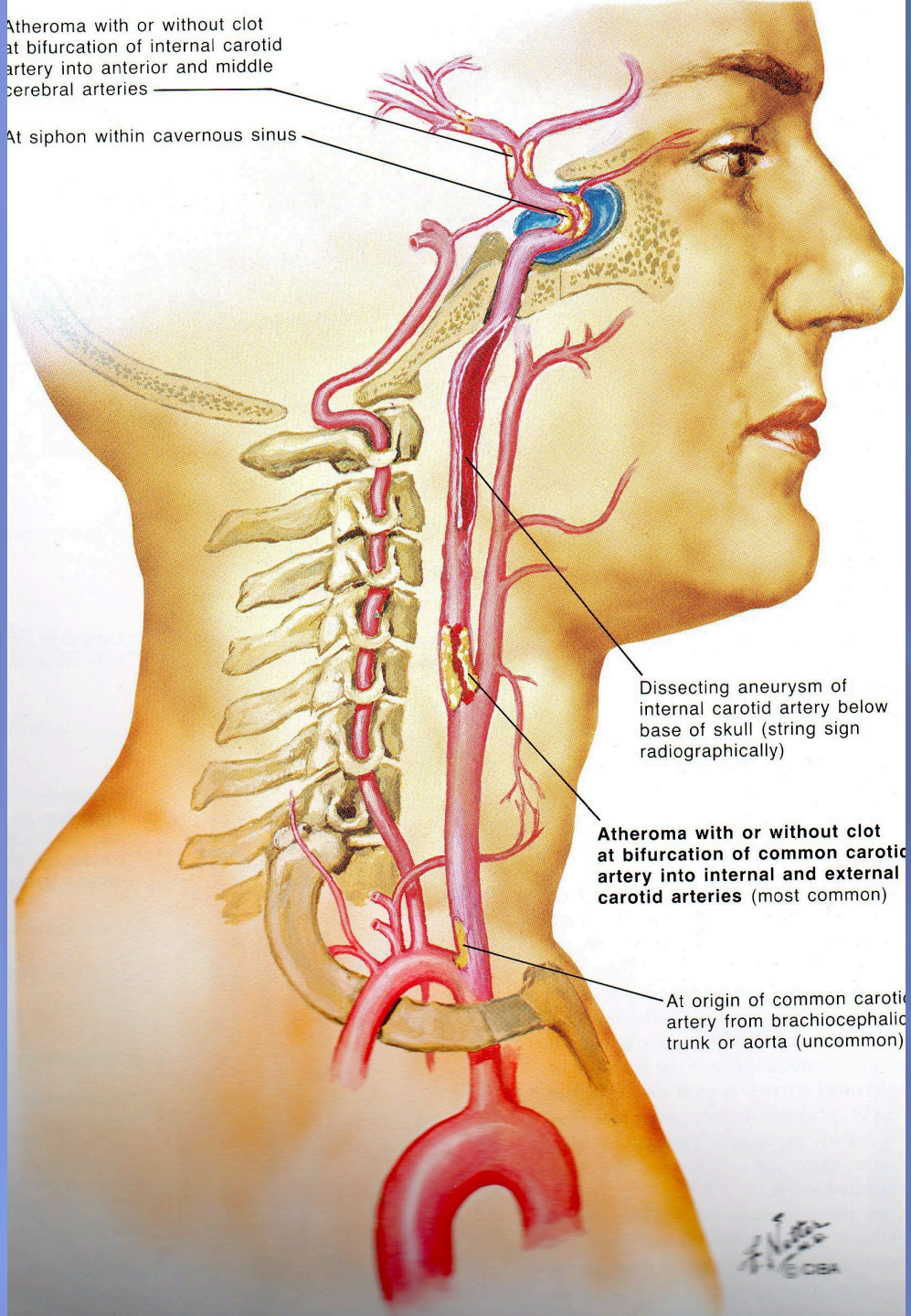
Arteriosclerotic heart disease



Ventricular aneurysm with intraluminal clot formation



Congestive heart failure, atrial fibrillation

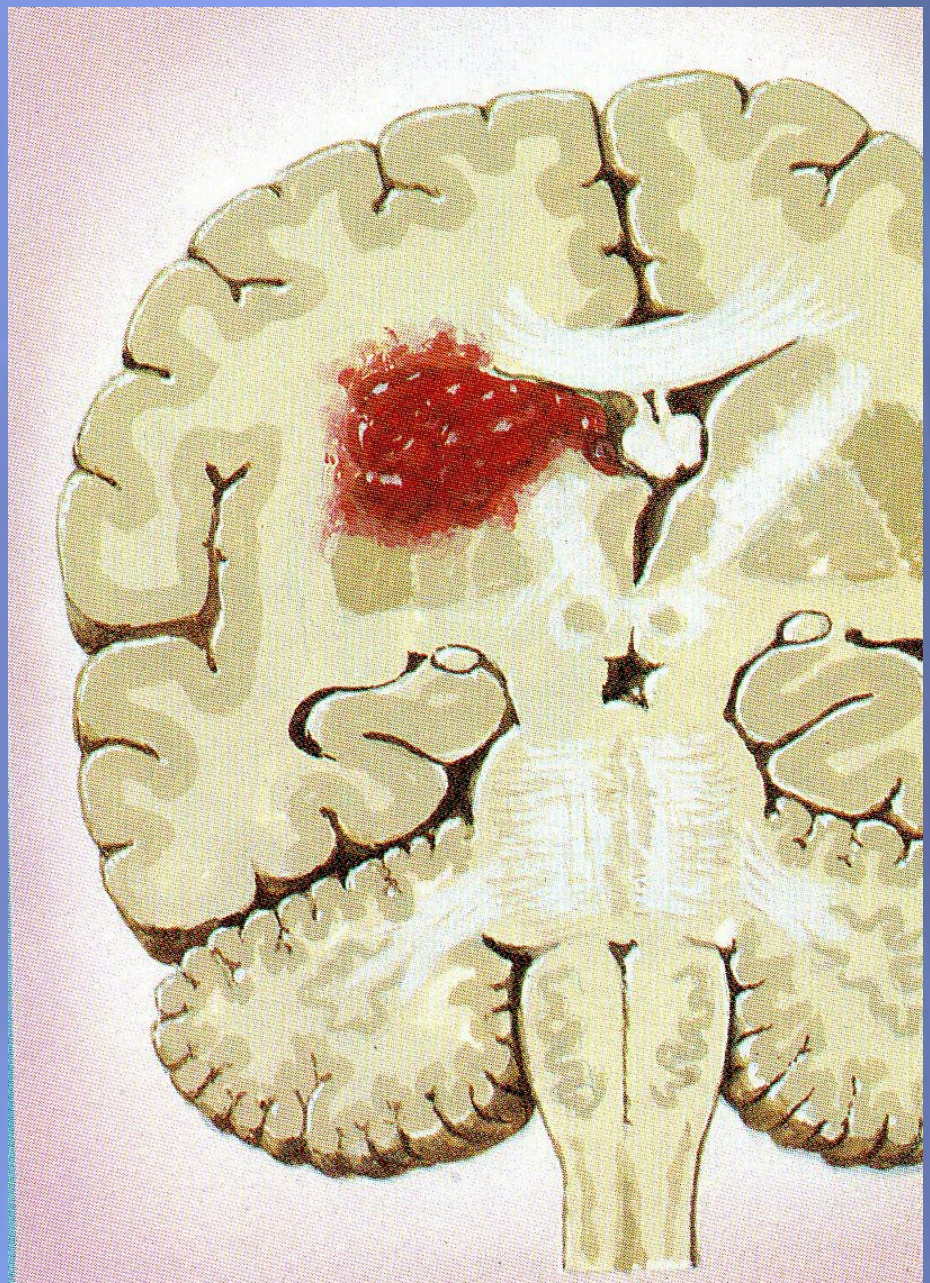

Atheroma with or without clot at bifurcation of internal carotid artery into anterior and middle cerebral arteries
At siphon within cavernous sinus
Dissecting aneurysm of internal carotid artery below base of skull (string sign radiographically)
Atheroma with or without clot at bifurcation of common carotid artery into internal and external carotid arteries (most common)
At origin of common carotid artery from brachiocephalic trunk or aorta (uncommon)
© CIBA

Hemorrhagic Stroke

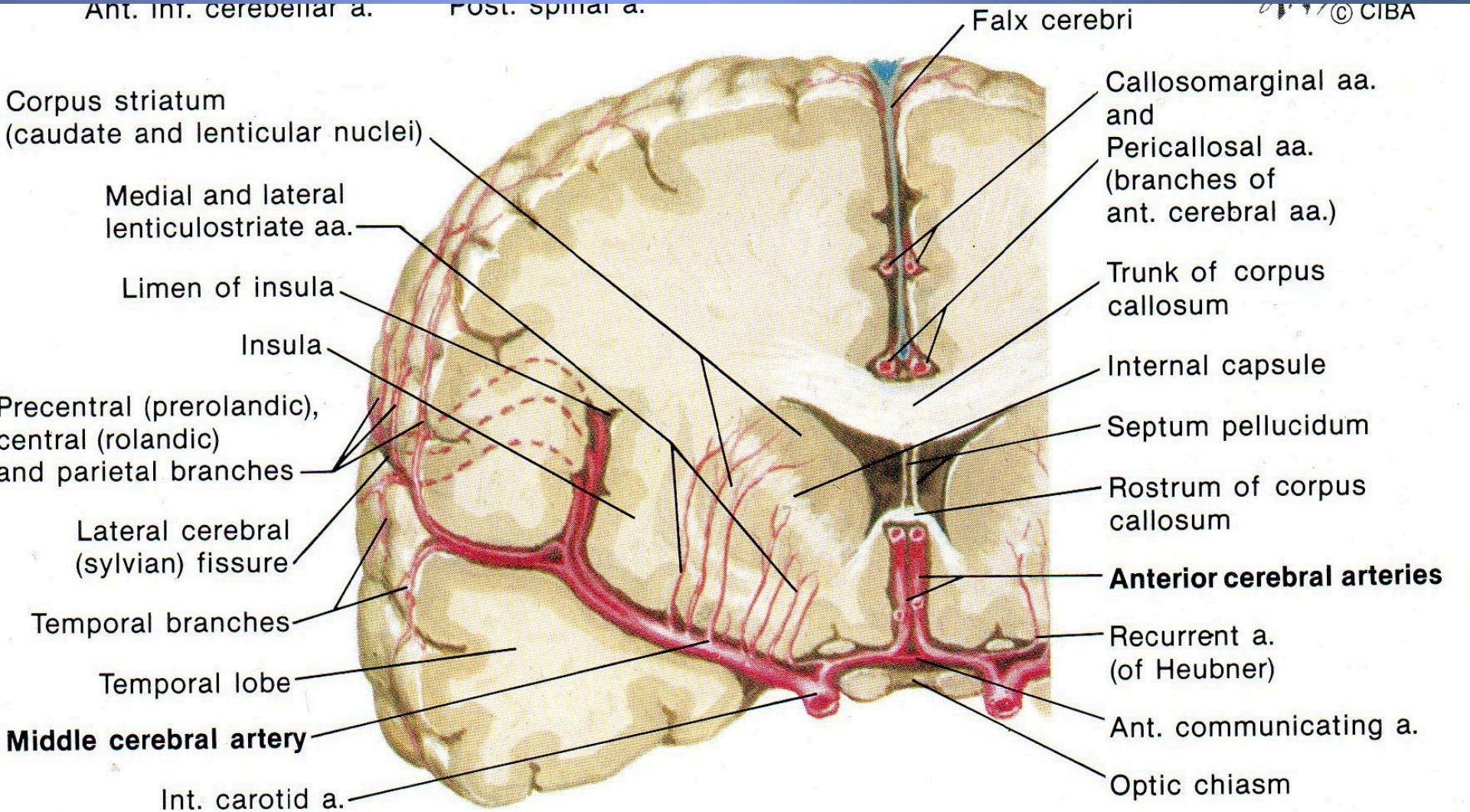
- Hypertensive
- Aneurysm Rupture
- Traumatic:
  * Epidural
  * Subdural

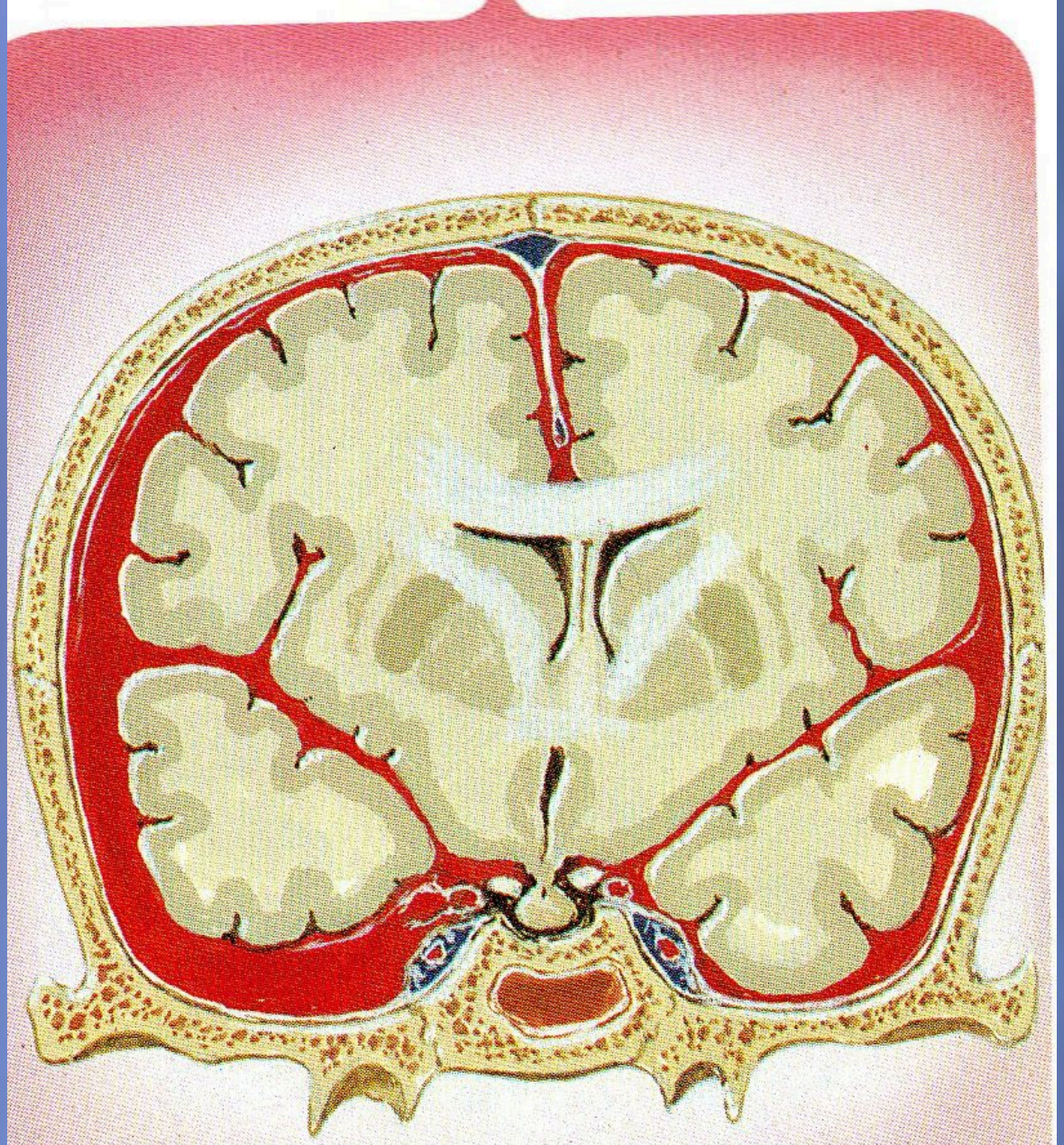
Cerebral Aneurysm Rupture:

- Most common cause nontraumatic subarachnoid hemorrhage



Intracerebral hemorrhage
(hypertensive)

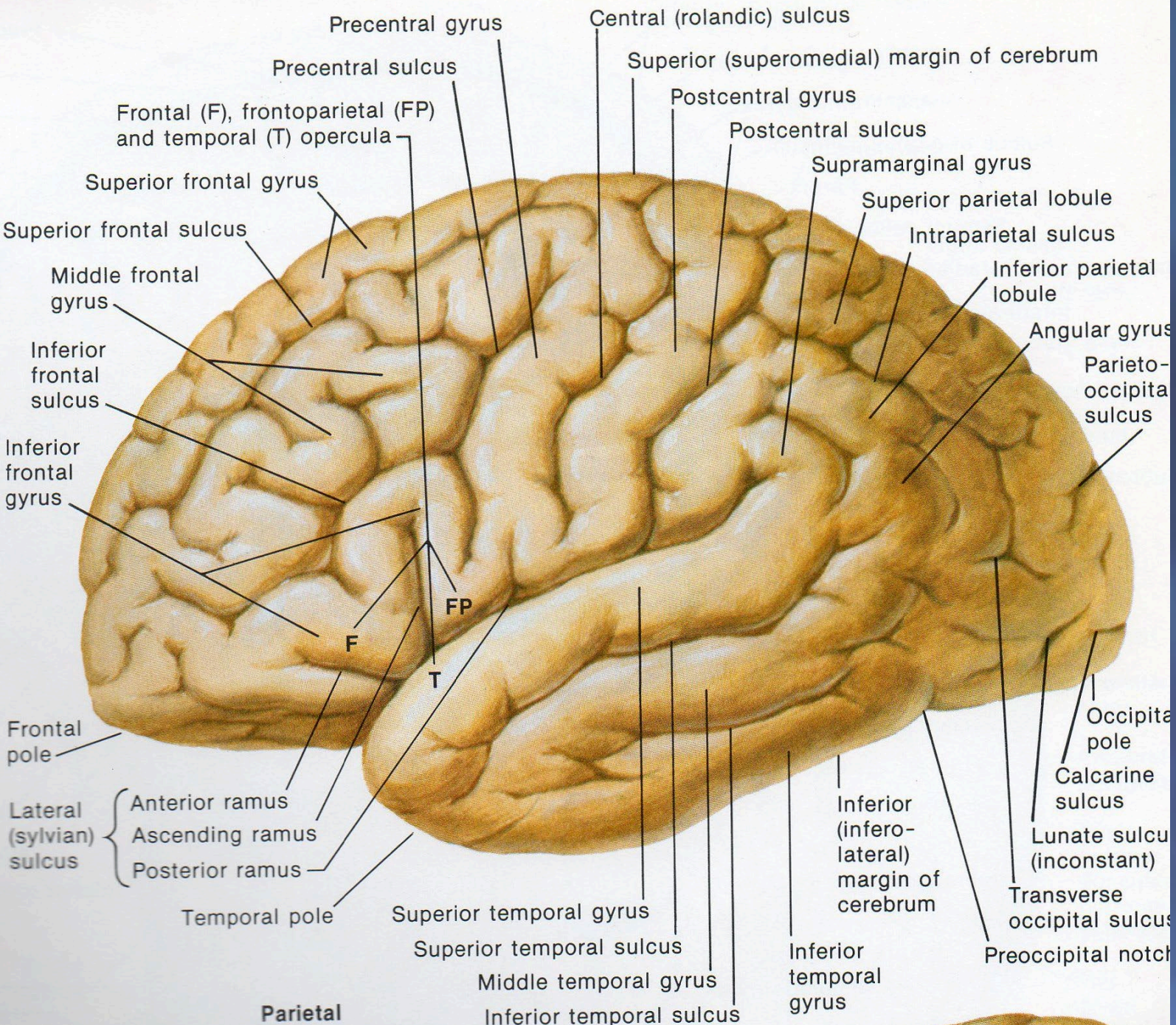

Ant. inf. cerebellar a.
Post. spinal a.
© CIBA
Falx cerebri
Corpus striatum
(caudate and lenticular nuclei)
Callosomarginal aa.
and
Pericallosal aa.
(branches of
ant. cerebral aa.)
Medial and lateral
lenticulostriate aa.
Trunk of corpus
callosum
Limen of insula
Internal capsule
Insula
Septum pellucidum
Precentral (prerolandic),
central (rolandic)
and parietal branches
Rostrum of corpus
callosum
Lateral cerebral
(sylvian) fissure
Anterior cerebral arteries
Temporal branches
Recurrent a.
(of Heubner)
Temporal lobe
Ant. communicating a.
Middle cerebral artery
Optic chiasm
Int. carotid a.

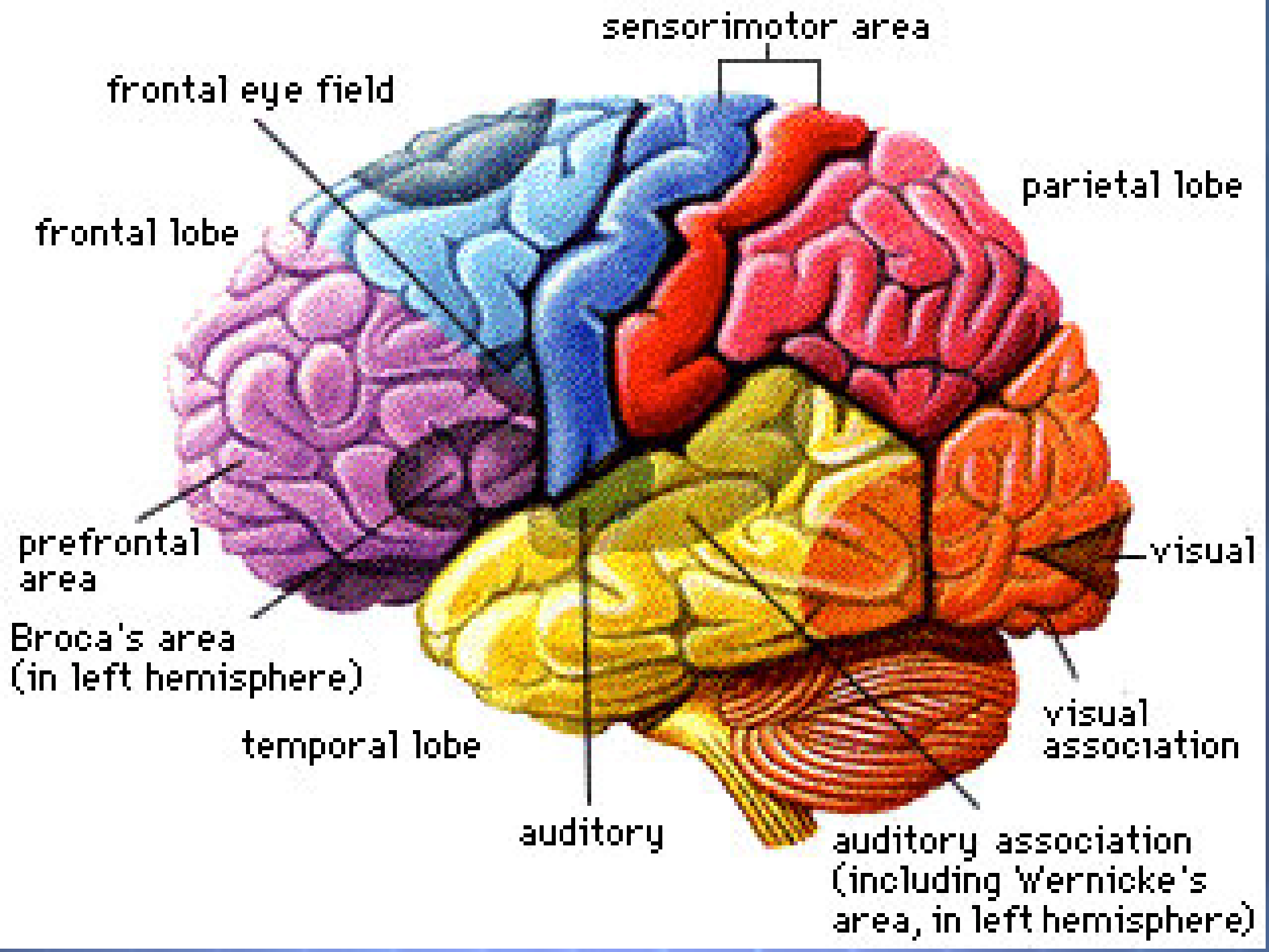


Subarachnoid hemorrhage
(ruptured aneurysm)

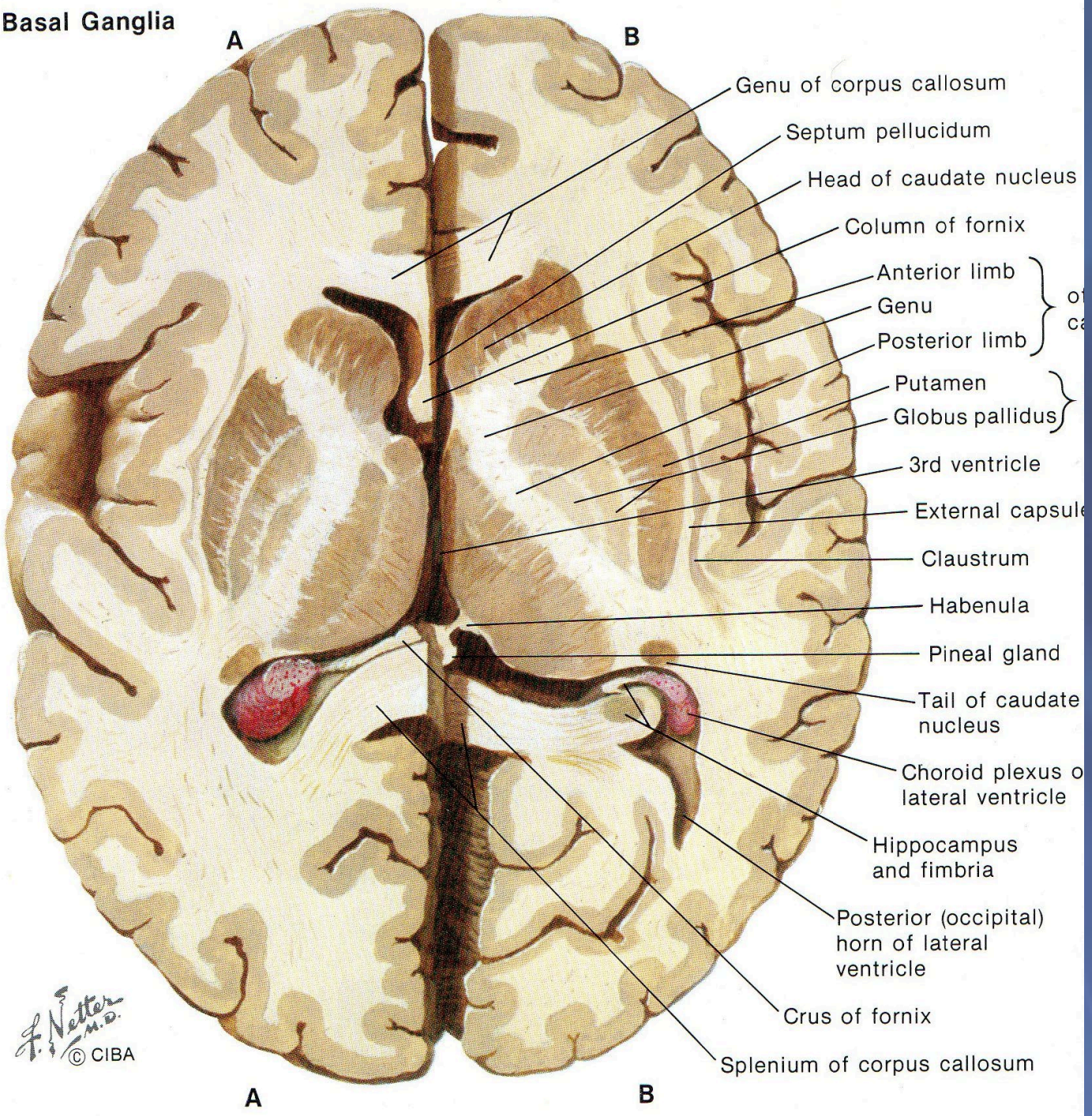
The Anatomy of the Brain and its Blood Supply

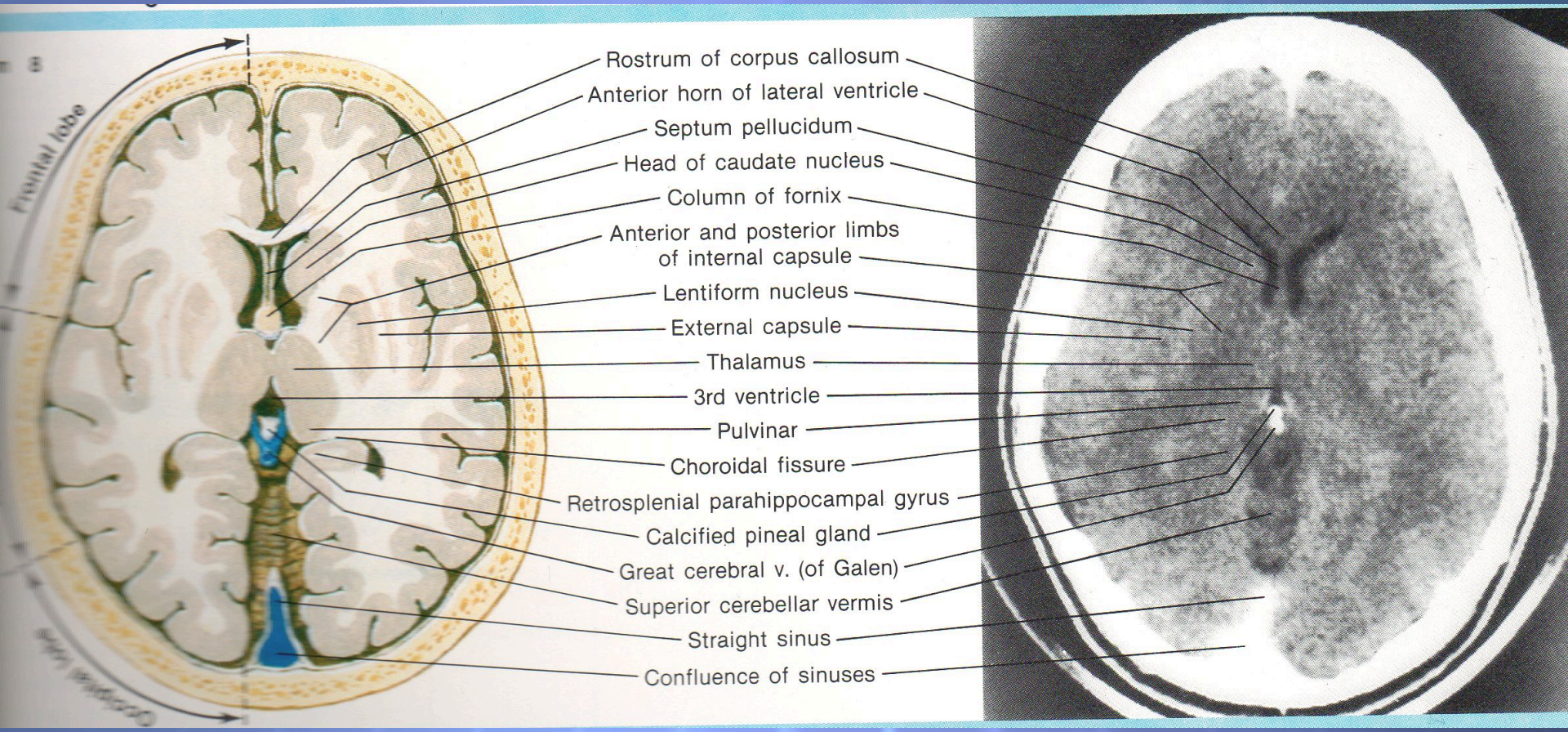
Superolateral Surface of Brain

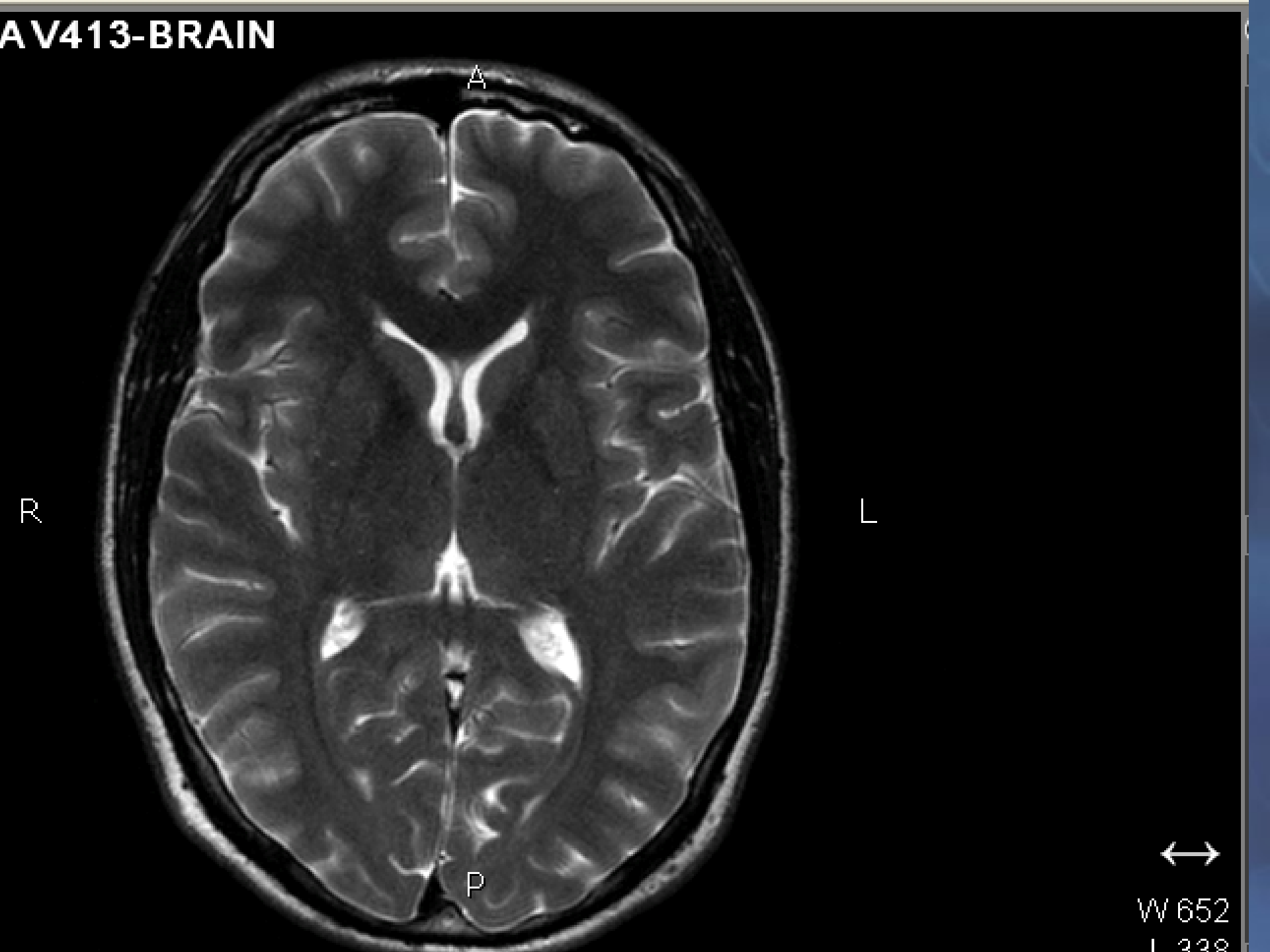



sensorimotor area
frontal eye field
parietal lobe
frontal lobe
prefrontal area
visual
Broca's area (in left hemisphere)
visual association
temporal lobe
auditory
auditory association (including Wernicke's area, in left hemisphere)

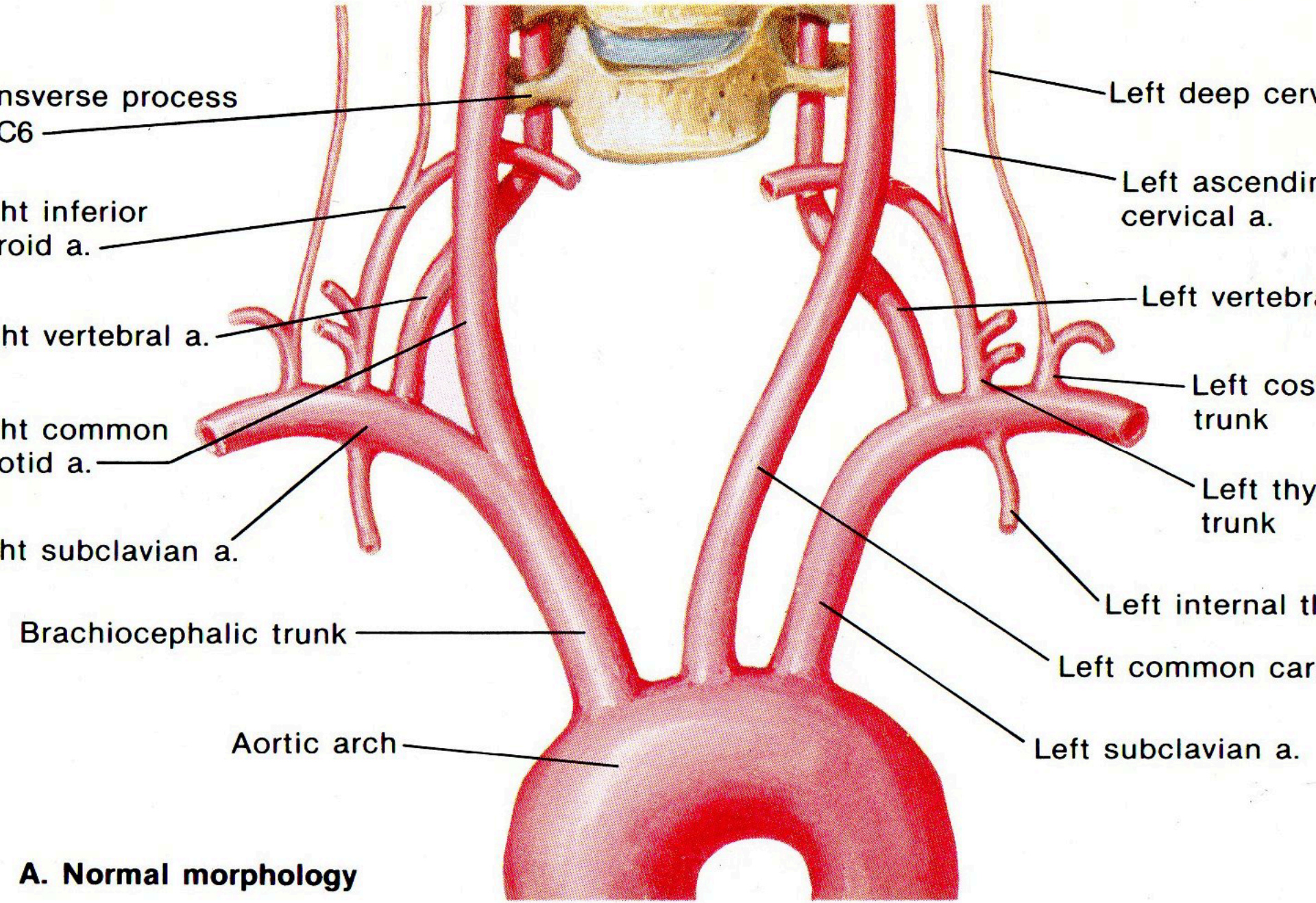
Basal Ganglia



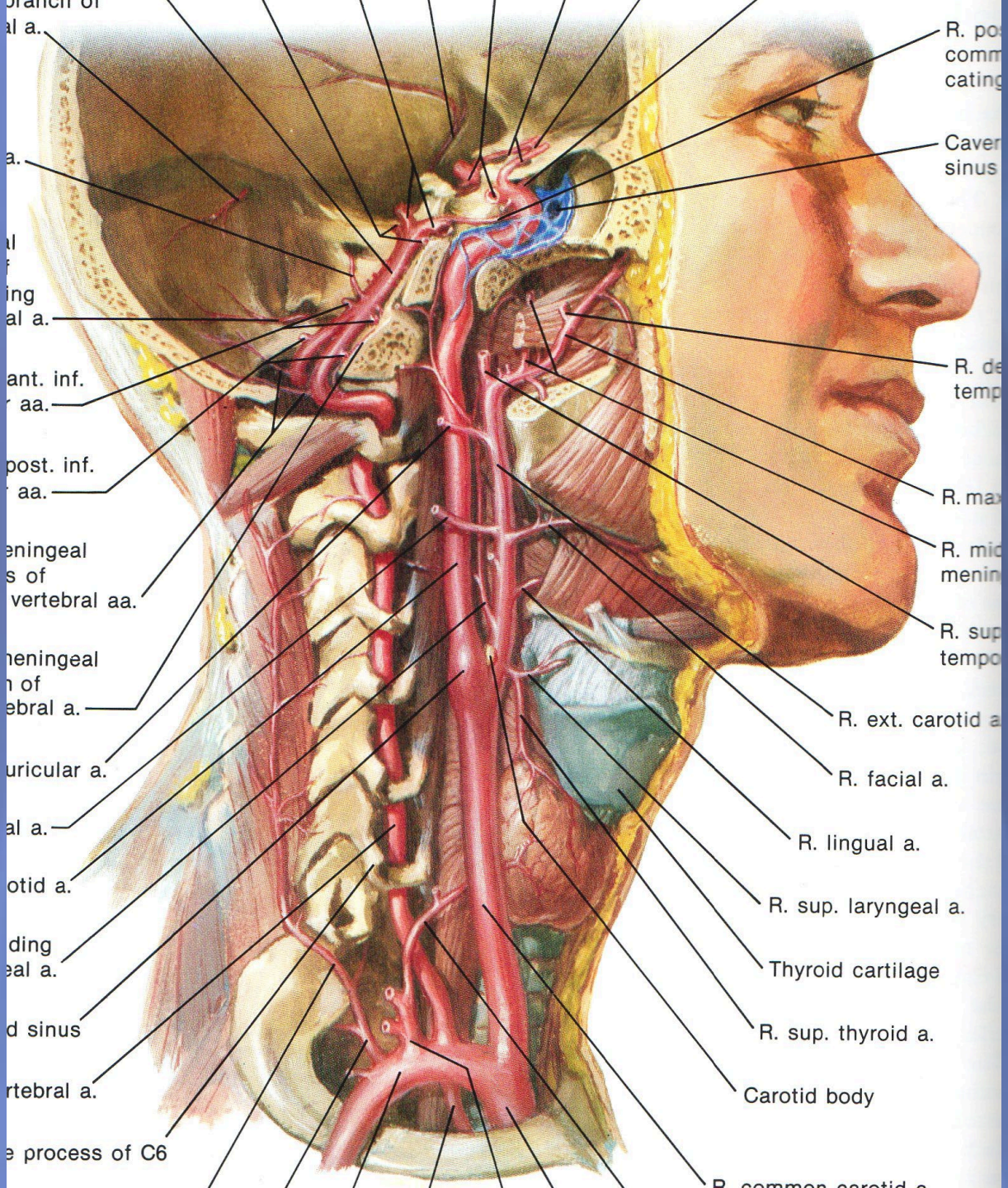

Frontal lobe
Occipital lobe
Rostrum of corpus callosum
Anterior horn of lateral ventricle
Septum pellucidum
Head of caudate nucleus
Column of fornix
Anterior and posterior limbs of internal capsule
Lentiform nucleus
External capsule
Thalamus
3rd ventricle
Pulvinar
Choroidal fissure
Retrosplenial parahippocampal gyrus
Calcified pineal gland
Great cerebral v. (of Galen)
Superior cerebellar vermis
Straight sinus
Confluence of sinuses

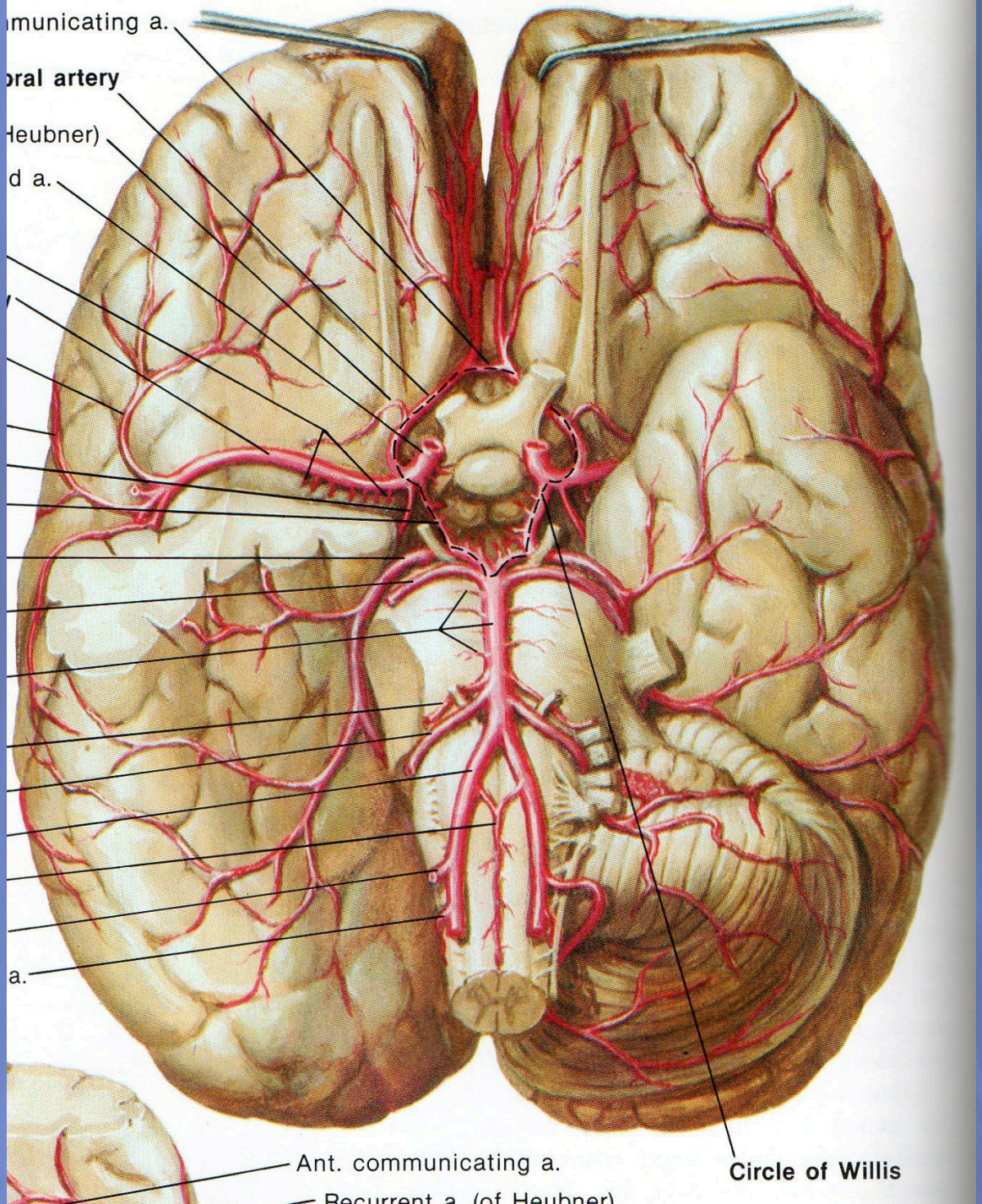

AV413-BRAIN
A
R
L
P
W 652

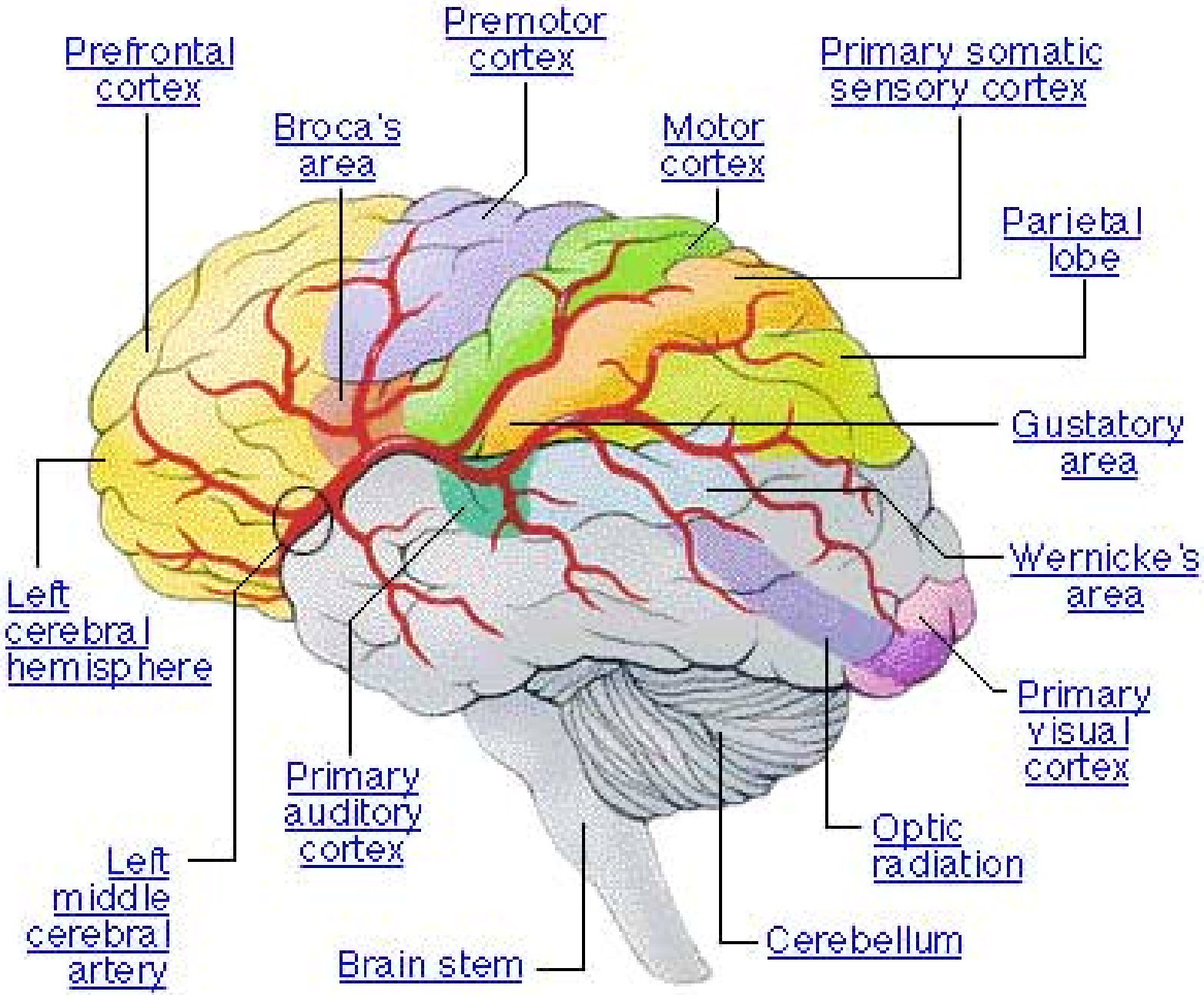
Normal and Anomalous Origins of Common Carotid and Vertebral Arteries



A. Normal morphology


R. ext. carotid a.
R. facial a.
R. lingual a.
R. sup. laryngeal a.
Thyroid cartilage
R. sup. thyroid a.
Carotid body
vertebral aa.
Thyroid cartilage


mmunicating a.
oral artery
Heubner)
d a.
a.
Ant. communicating a.
Recurrent a. (of Heubner)
Circle of Willis


Prefrontal cortex
Premotor cortex
Primary somatic sensory cortex
Broca's area
Motor cortex
Parietal lobe
Gustatory area
Wernicke's area
Left cerebral hemisphere
Primary visual cortex
Primary auditory cortex
Optic radiation
Left middle cerebral artery
Cerebellum
Brain stem

Signs and Symptoms of Stroke

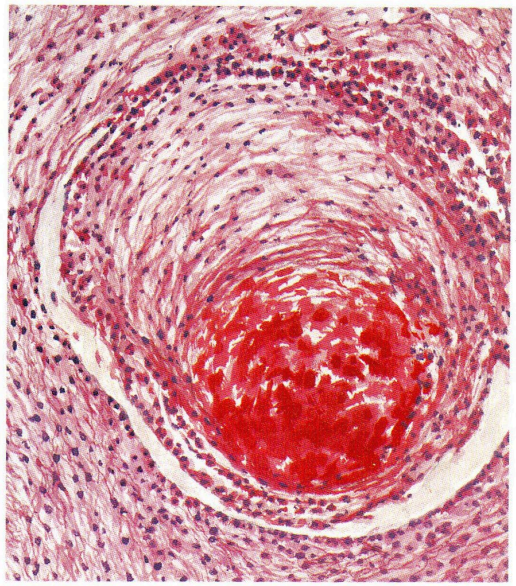
Sudden Onset of:

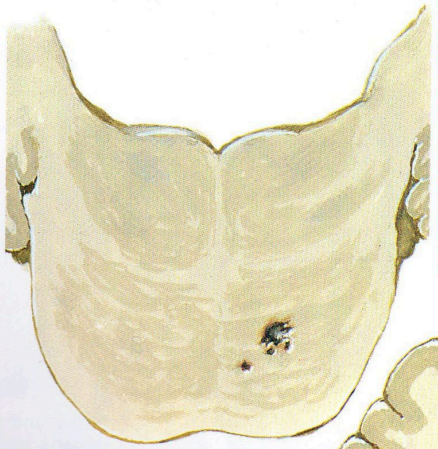
- Weakness
- Numbness
- Change in Vision
- Change in Speech
- Severe Headache
- Change in Balance
- Altered Level of Consciousness

Location, Location, Location!

Lacunar Infarction

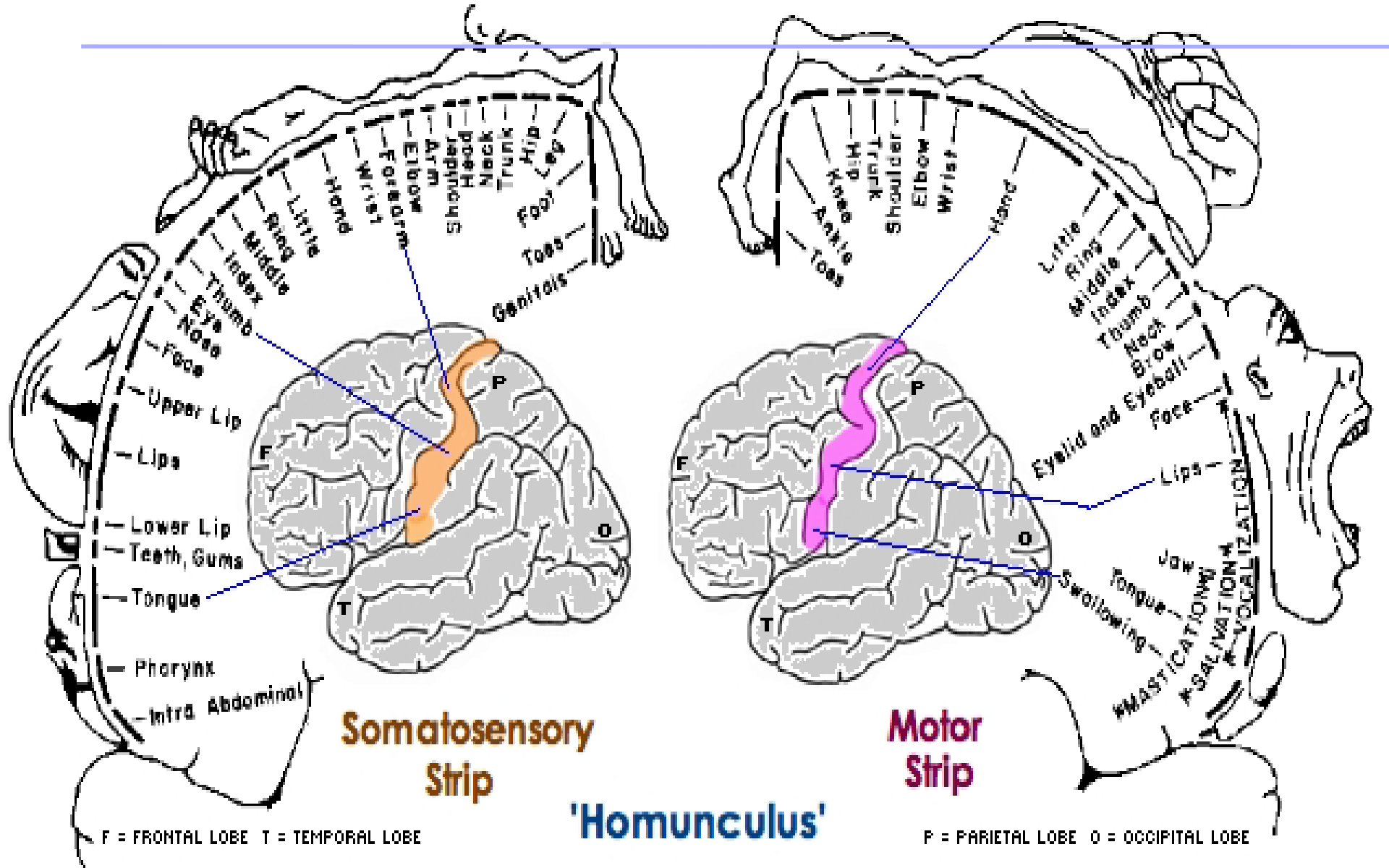
Small (100 μm) artery within brain parenchyma showing typical pathologic changes secondary to hypertension. Vessel lumen almost completely obstructed by thickened media and enlarged to about three times normal size. Pink-staining fibrinoid material within walls





Lacunar infarcts in base of pons interrupting some cortico-spinal (pyramidal) fibers. Such lesions cause mild hemiparesis

The cortical homunculus

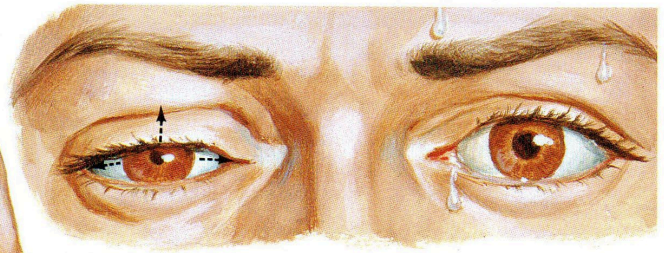


Large vessel syndromes

Artery	Major clinical findings
ACA	Contralateral leg weakness
MCA	Contralateral face/arm>leg weakness, sensory loss, field cut, gaze preference, and either aphasia (L) or neglect (R)
PCA	Contralateral visual field cut
Basilar	Oculomotor deficits and/or ataxia, with crossed sensory/motor deficits and diminished consciousness
Vertebral	Lower cranial nerve deficits and/or ataxia, with crossed sensory deficits

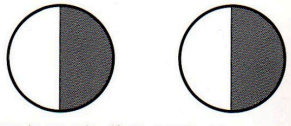
Ischemia in Vertebrobasilar Territory: Clinical Manifestations

Vertigo, ataxia; motor and sensory deficits, which may be unilateral, bilateral or alternating



Abnormal eye movements (cranial nerves III, IV and/or VI). Horner's syndrome may be present

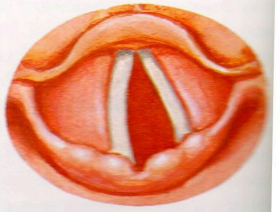
Motor and sensory deficits in face; unilateral, bilateral or alternating (cranial nerves V and VII)



Hemianopsia (frequently bilateral)

Headache, vomiting

Dysphagia (cranial nerve X)



Dysphonia (cranial nerve X)

F. Netter M.D.
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Altered consciousness (partial or complete) may be fleeting, transient or of long duration

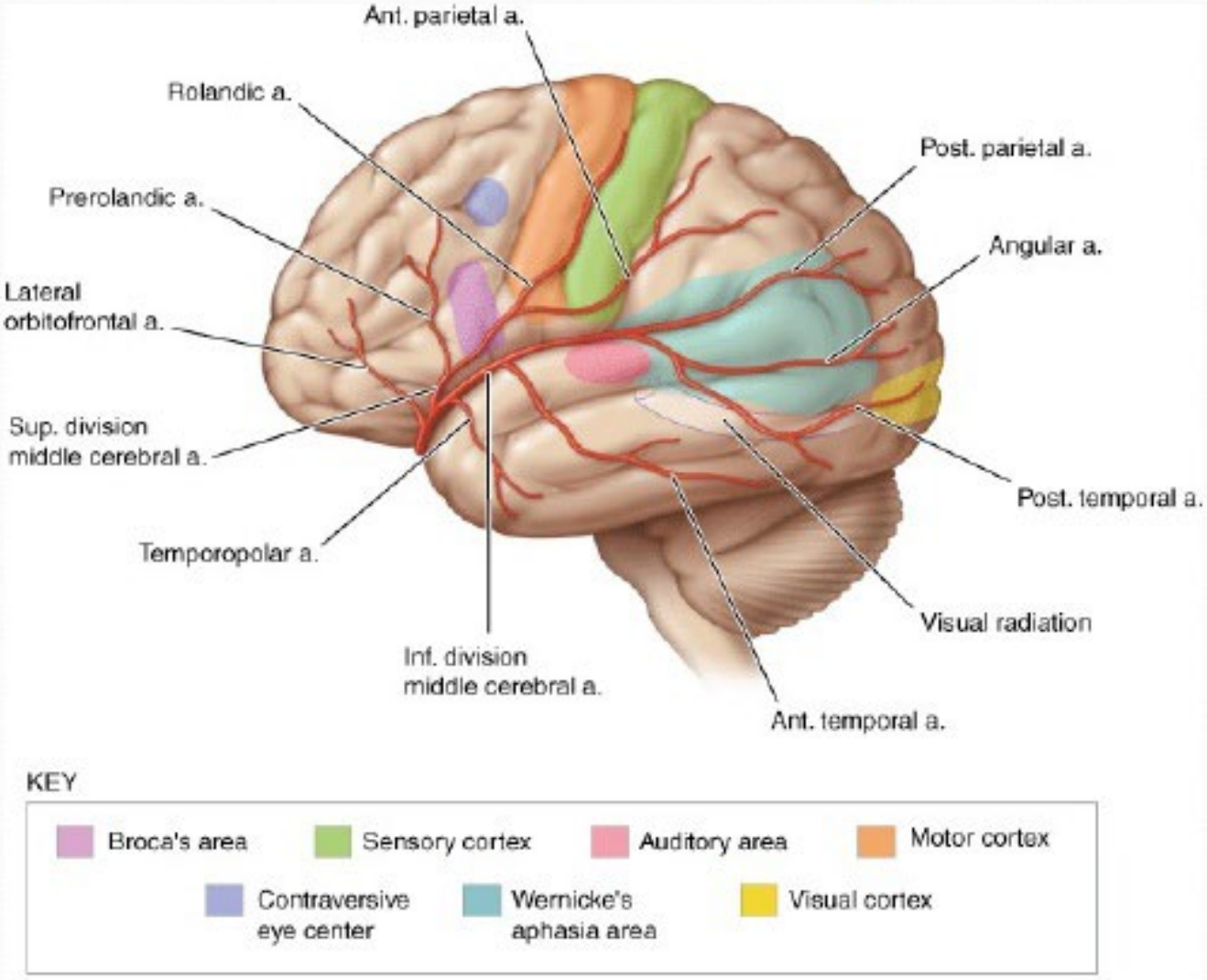
Cortical signs

- Aphasia (not dysarthria)
- Neglect
- Visual field cuts
- Aprosody
- Prosopagnosia
- Acalculia
- Apraxia
- Anosognosia

Common, delayed effects of stroke

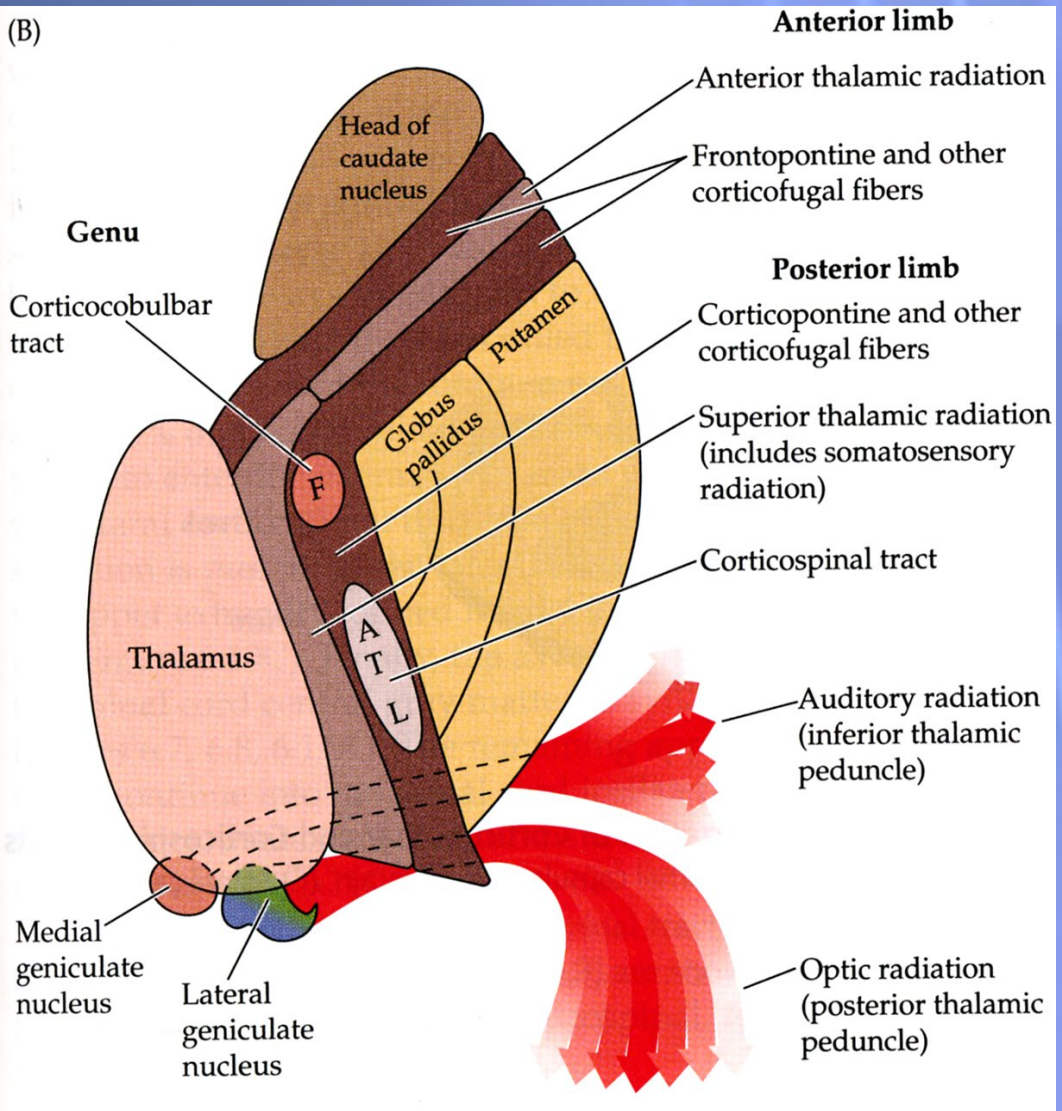
a. Depression
b. Fatigue
c. Anxiety

Middle Cerebral Artery



Source: Fauci AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine*, 17th Edition: http://www.accessmedicine.com

Lacunar syndromes

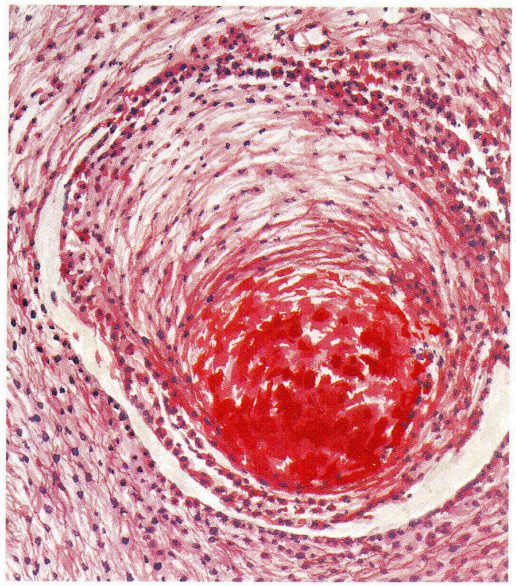


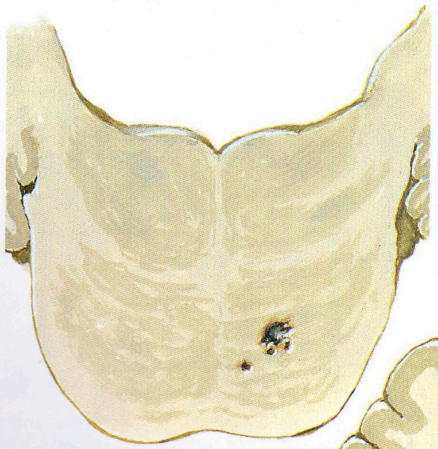
- Pure motor
- Pure sensory
- Sensorimotor
- Ataxic hemiparesis
- Clumsy hand-dysarthria
- Hemiballismus-hemichorea

No Cortical Signs

Lacunar Infarction

Small (100 μm) artery within brain parenchyma showing typical pathologic changes secondary to hypertension. Vessel lumen almost completely obstructed by thickened media and enlarged to about three times normal size. Pink-staining fibrinoid material within walls





Lacunar infarcts in base of pons interrupting some cortico-spinal (pyramidal) fibers. Such lesions cause mild hemiparesis

March 15, 2022; 98 (11) EDITORIAL

Stroke Prognostication Obeys the Same Rules as Real Estate

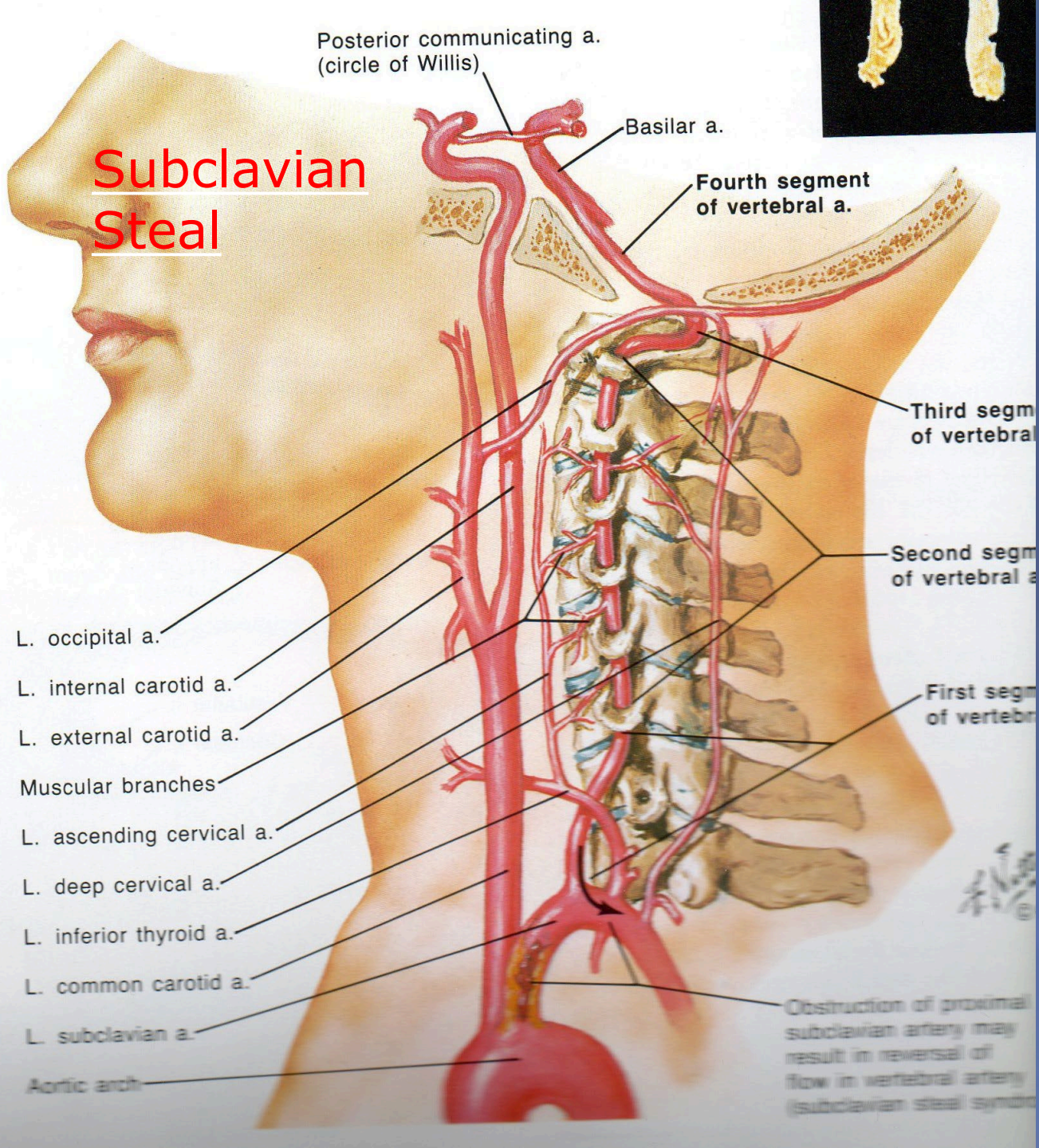
Location, Location, Location!

Stroke Location and Outcome

Lesion Locations Predicting Poor Long-Term Outco

- **Bilateral Precentral and Postcentral Gyri**
- **Bilateral Insular and Opercular Cortex**
- **Left Putamen and Left Caudate**

Subclavian Steal



Stroke Risk Factors

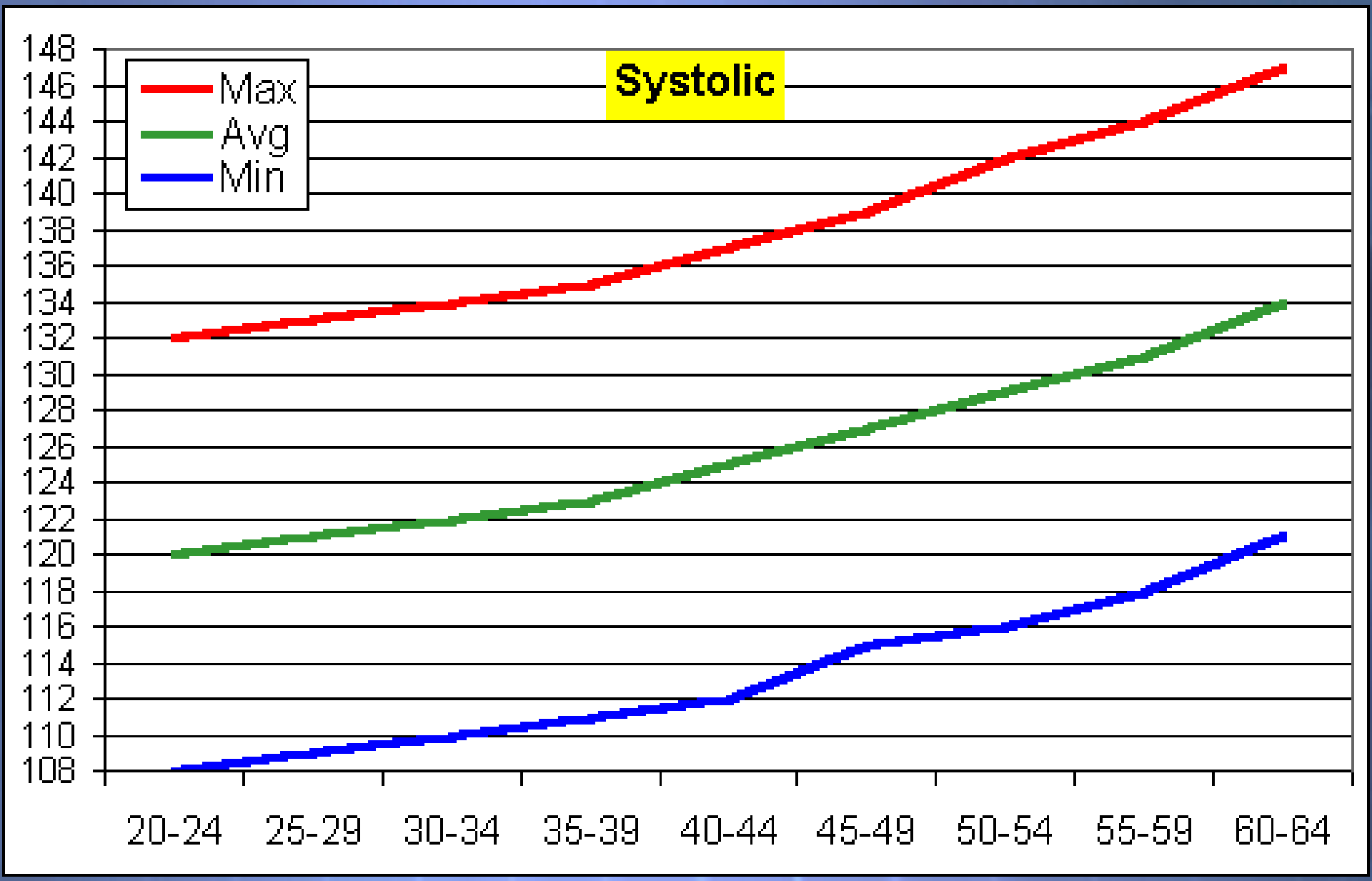
Modifiable

- HYPERTENSION
- Diabetes
- Cigarette Smoking
- Elevated Cholesterol
- Heart Disease
- Obesity
- Drug Use
- Physical Inactivity

Stroke Risk Factors

Non-Modifiable

- Age
- Race
- Family History
- Sex


Systolic
Max
Avg
Min
148
146
144
142
140
138
136
134
132
130
128
126
124
122
120
118
116
114
112
110
108
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64

Diagnosis

- History and Physical Examination
- Brain Imaging:

  1. Computerized Tomography (CT)

  2. Magnetic Resonance Imaging (MRI)

Diagnosis

- History and Physical Examination
- Brain Imaging:

  1. Computerized Tomography (CT)

  2. Magnetic Resonance Imaging (MRI)

RACE: Stroke by the Numbers

Test Item	RACE	NIHSS Equivalent
Facial Palsy	0-1	0-3
Arm Motor Function	0-2	0-4
Leg Motor Function	0-2	0-4
Head Gaze Deviation	0-1	0-2
Aphasia (R side)	0-2	0-2
Agnosia (L side)	0-2	0-2

https://www.youtube.com/watch?v=9SxopJueV50

NIH Stroke Scale

Category	Score/Description		Date/Time Initials	Date/Time Initials	Date/Time Initials	Date/Time Initials	Date/Time Initials
1a. **Level of Consciousness** (Alert, drowsy, etc.)	0 = Alert 1 = Drowsy 2 = Stuporous 3 = Coma						
1b. **LOC Questions** (Month, age)	0 = Answers both correctly 1 = Answers one correctly 2 = Incorrect						
1c. **LOC Commands** (Open/close eyes, make fist/let go)	0 = Obeys both correctly 1 = Obeys one correctly 2 = Incorrect						
2. **Best Gaze** (Eyes open - patient follows examiner's finger or face)	0 = Normal 1 = Partial gaze palsy 2 = Forced deviation						
3. **Visual Fields** (Introduce visual stimulus/threat to pt's visual field quadrants)	0 = No visual loss 1 = Partial Hemianopia 2 = Complete Hemianopia 3 = Bilateral Hemianopia (Blind)						
4. **Facial Paresis** (Show teeth, raise eyebrows and squeeze eyes shut)	0 = Normal 1 = Minor 2 = Partial 3 = Complete						
5a. **Motor Arm - Left** 5b. **Motor Arm - Right** (Elevate arm to 90° if patient is sitting, 45° if supine)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement X = Untestable (Joint fusion or limb amp)	Left					
		Right					
6a. **Motor Leg - Left** 6b. **Motor Leg - Right** (Elevate leg 30° with patient supine)	0 = No drift 1 = Drift 2 = Can't resist gravity 3 = No effort against gravity 4 = No movement X = Untestable (Joint fusion or limb amp)	Left					
		Right					
7. **Limb Ataxia** (Finger-nose, heel down shin)	0 = No ataxia 1 = Present in one limb 2 = Present in two limbs						
8. **Sensory** (Pin prick to face, arm, trunk, and leg - compare side to side)	0 = Normal 1 = Partial loss 2 = Severe loss						
9. **Best Language** (Name item, describe a picture and read sentences)	0 = No aphasia 1 = Mild to moderate aphasia 2 = Severe aphasia 3 = Mute						
10. **Dysarthria** (Evaluate speech clarity by patient repeating listed words)	0 = Normal articulation 1 = Mild to moderate slurring of words 2 = Near to unintelligable or worse X = Intubated or other physical barrier						
11. **Extinction and Inattention** (Use information from prior testing to identify neglect or double simultaneous stimuli testing)	0 = No neglect 1 = Partial neglect 2 = Complete neglect						
	TOTAL SCORE						

INITIAL	SIGNATURE	INITIAL	SIGNATURE	INITIAL	SIGNATURE

1a. Level of Consciousness (Alert, drowsy, etc.)	0 = Alert 1 = Drowsy 2 = Stuporous 3 = Coma	
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		TOTAL SCORE

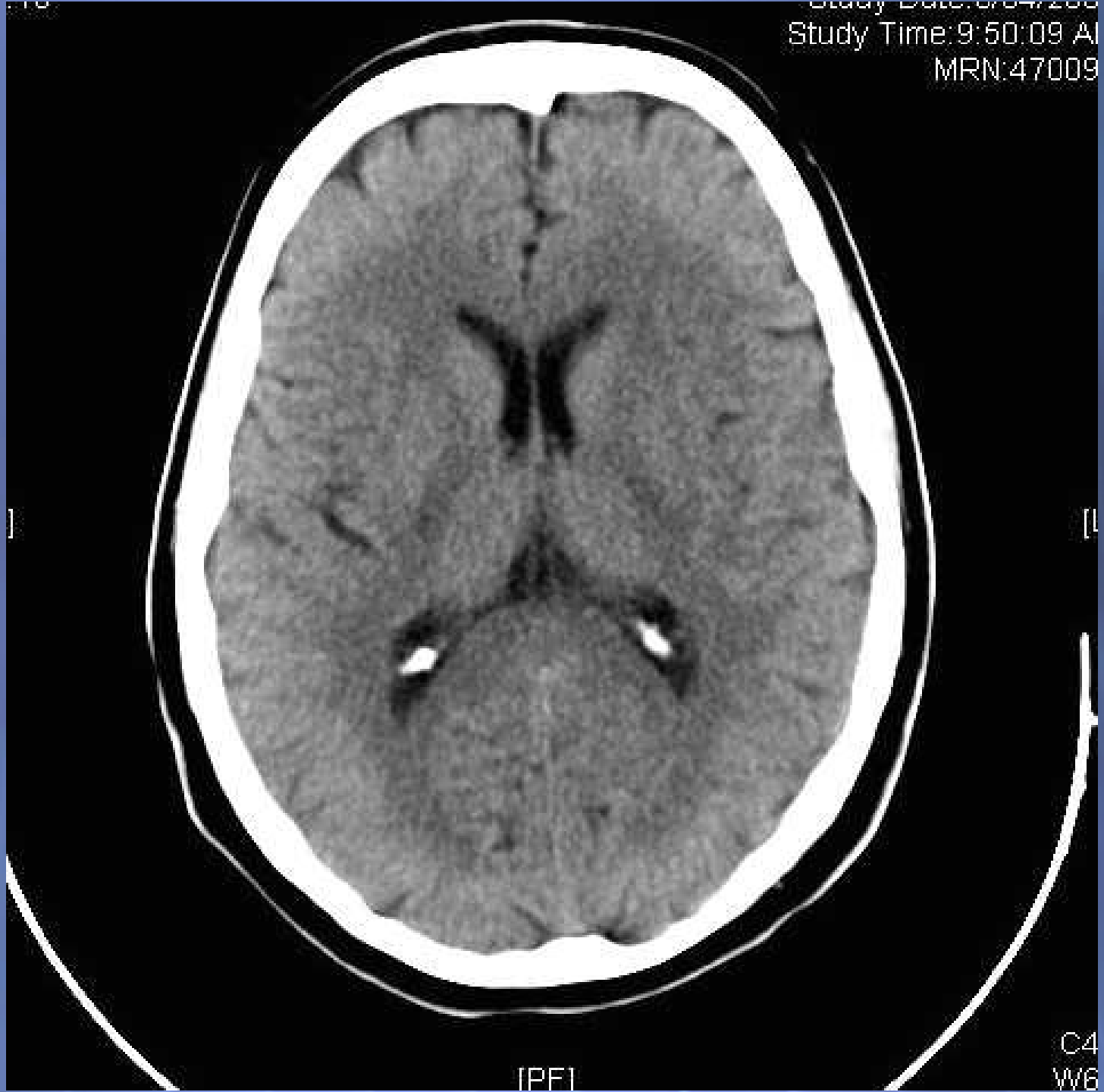
Diagnosis

- History and Physical Examination
- Brain Imaging:

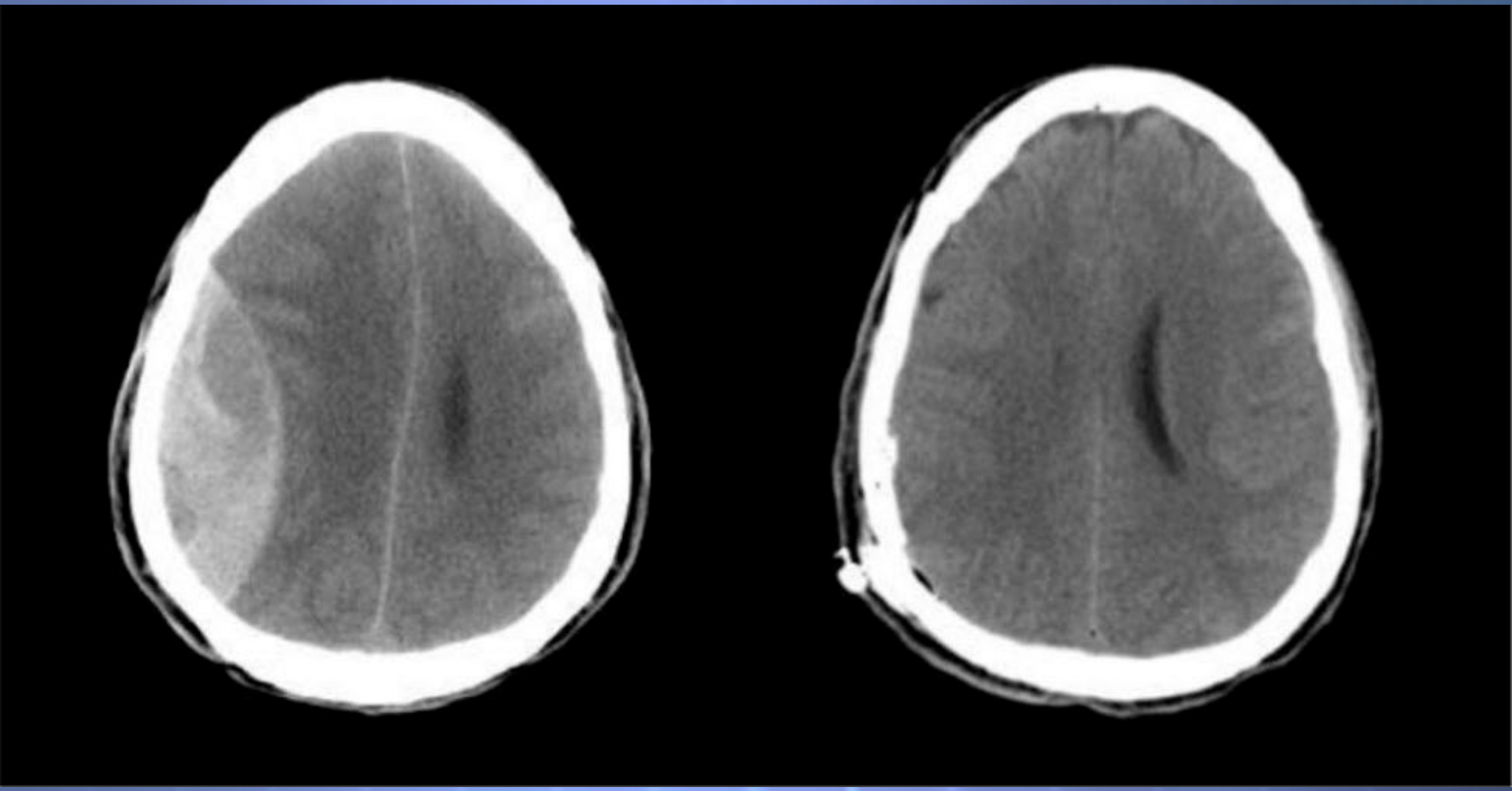
1. Computerized Tomography (CT)

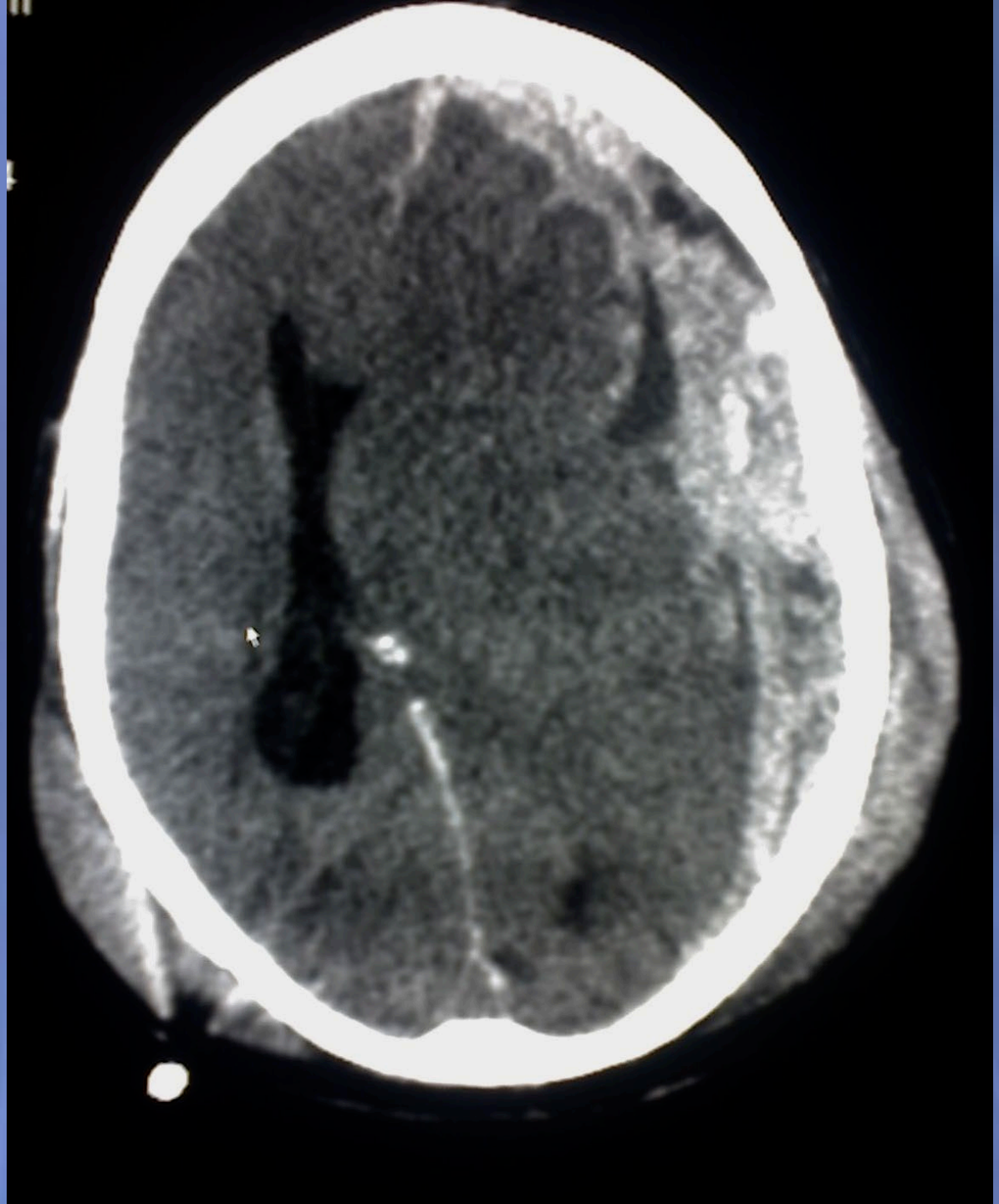
CT is best emergency modality

2. Magnetic Resonance Imaging (MRI)


Study Time:9:50:09 A
MRN:47009
]
[
[PF]
C4
W6


UNIV.





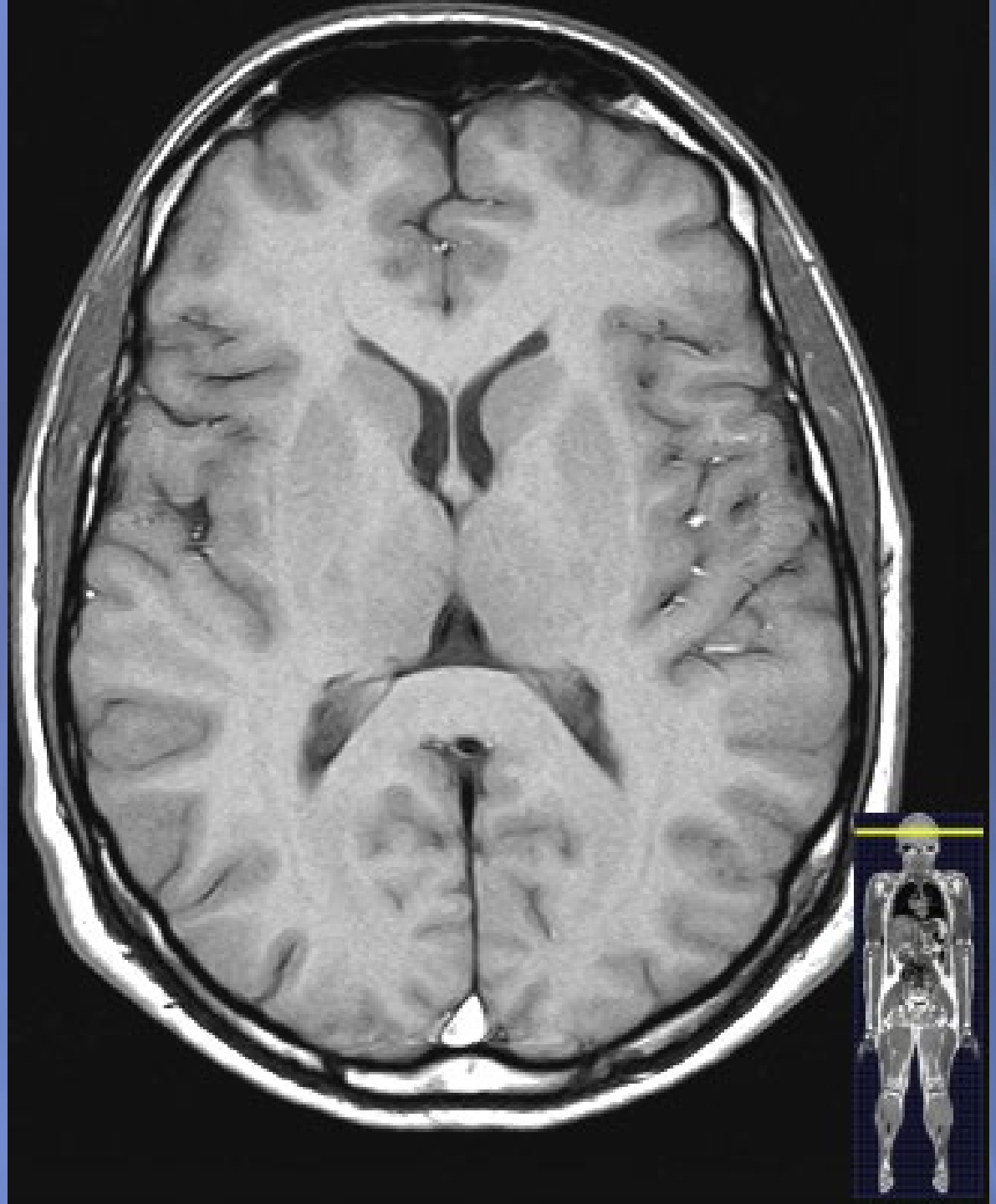
Diagnosis

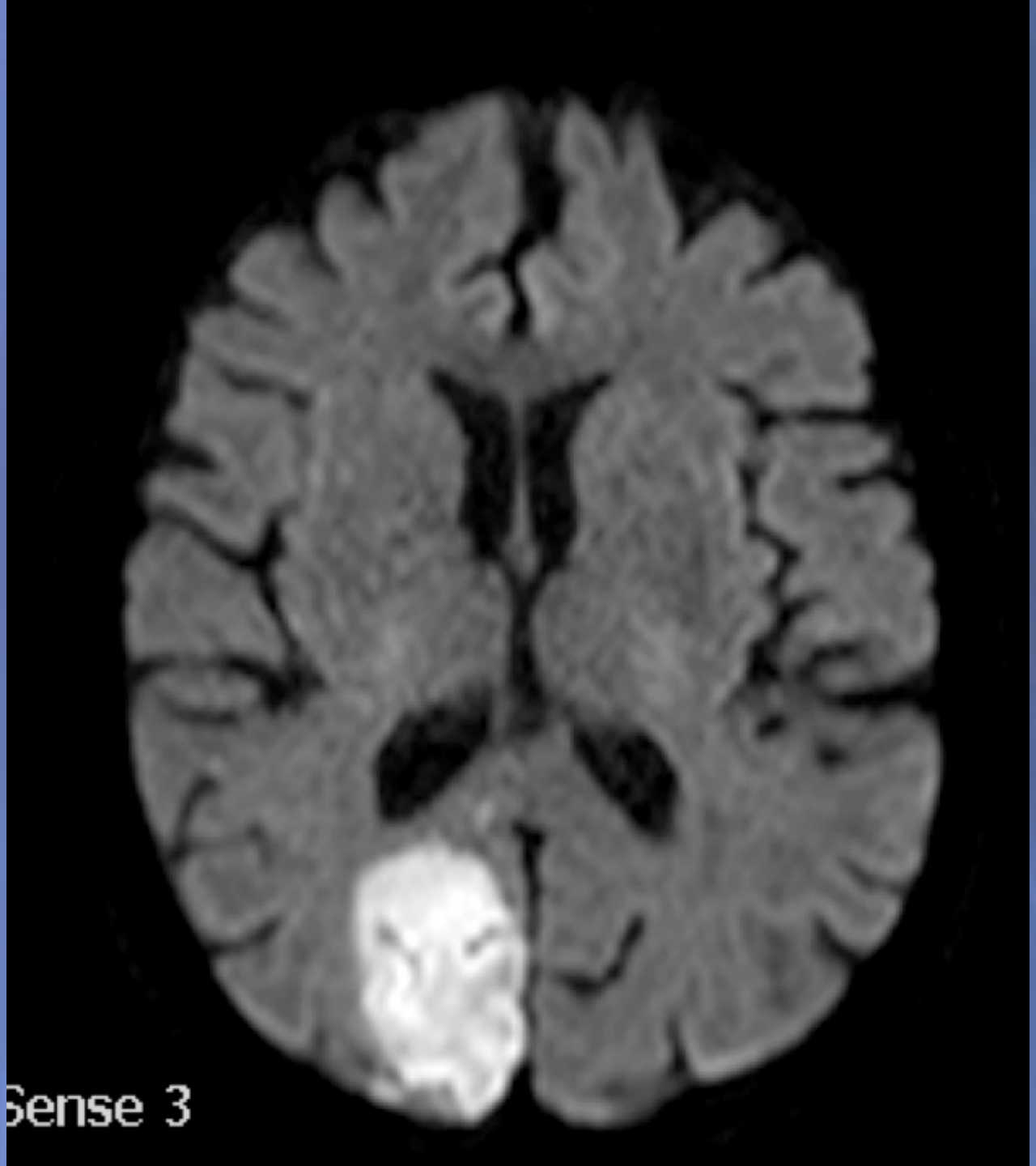
History and Physical Examination

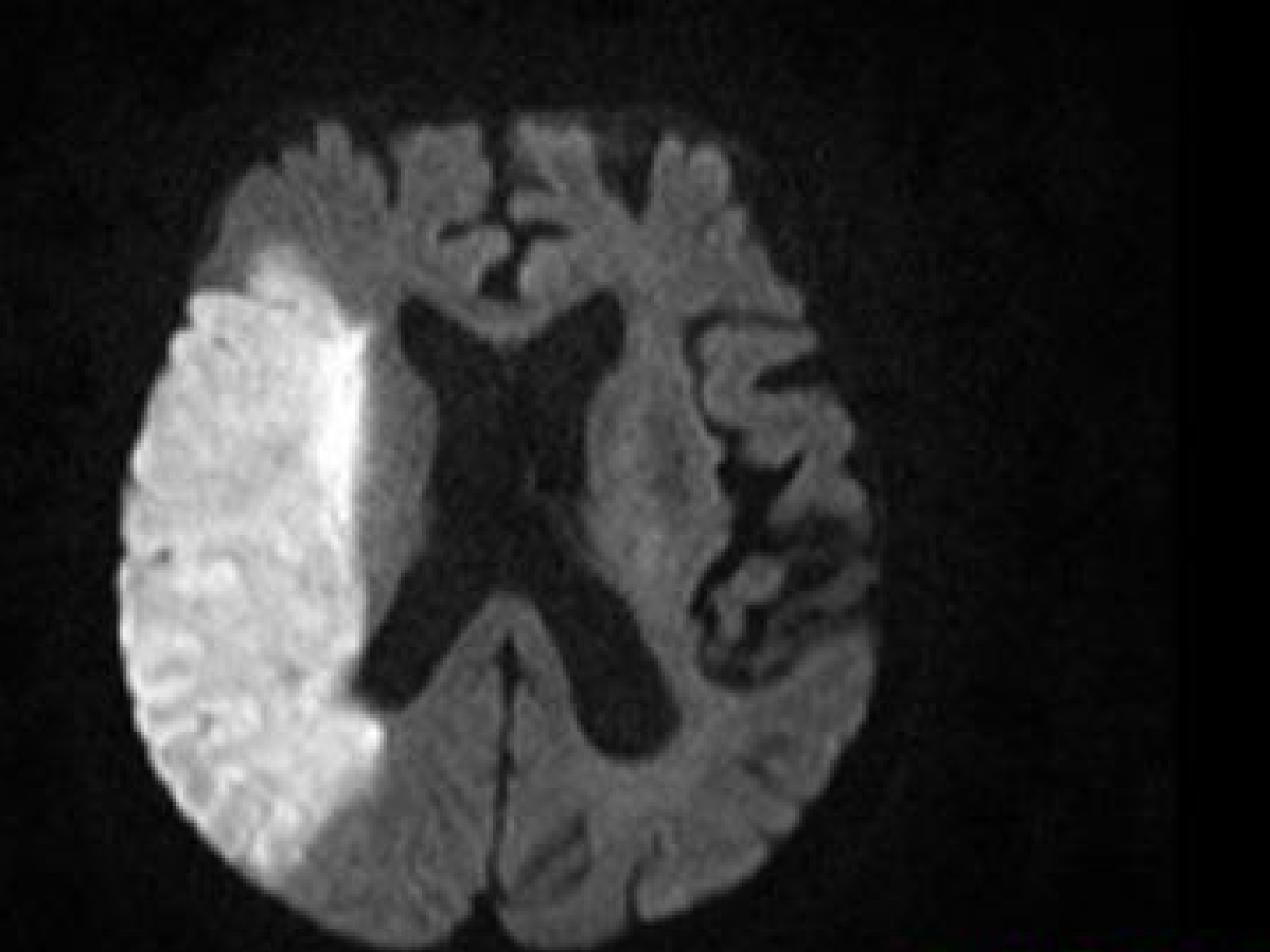
Brain Imaging:

1. Computerized Tomography (CT)

2. Magnetic Resonance Imaging (MRI)




Sense 3



Evaluation (What caused the stroke?)

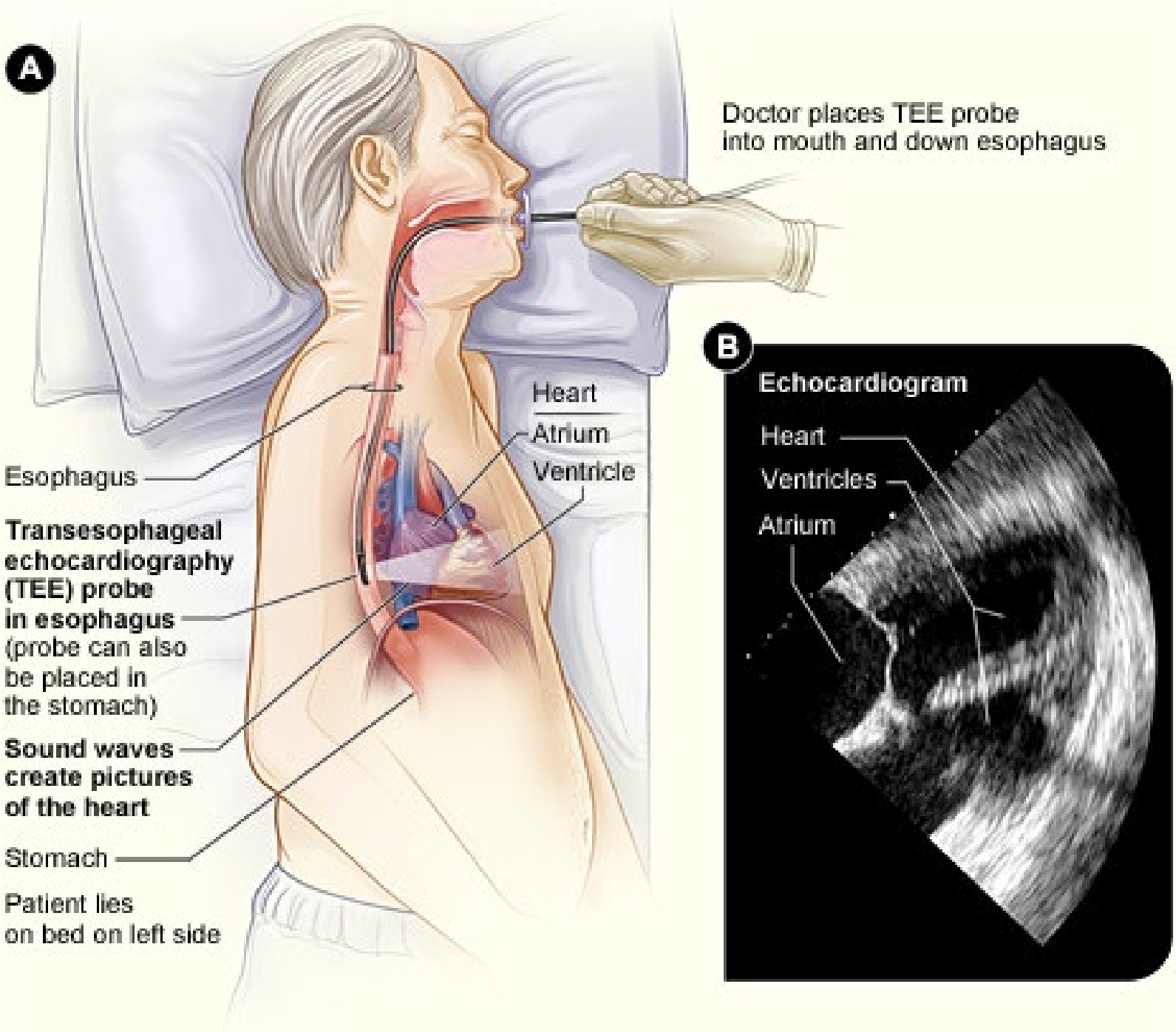
Laboratory Testing:

- Blood counts
- Blood Sugar
- Lipids
- Toxicology
- Hypercoagulable State
- Increased Inflammation

Evaluation (What caused the stroke?)

Echocardiogram:

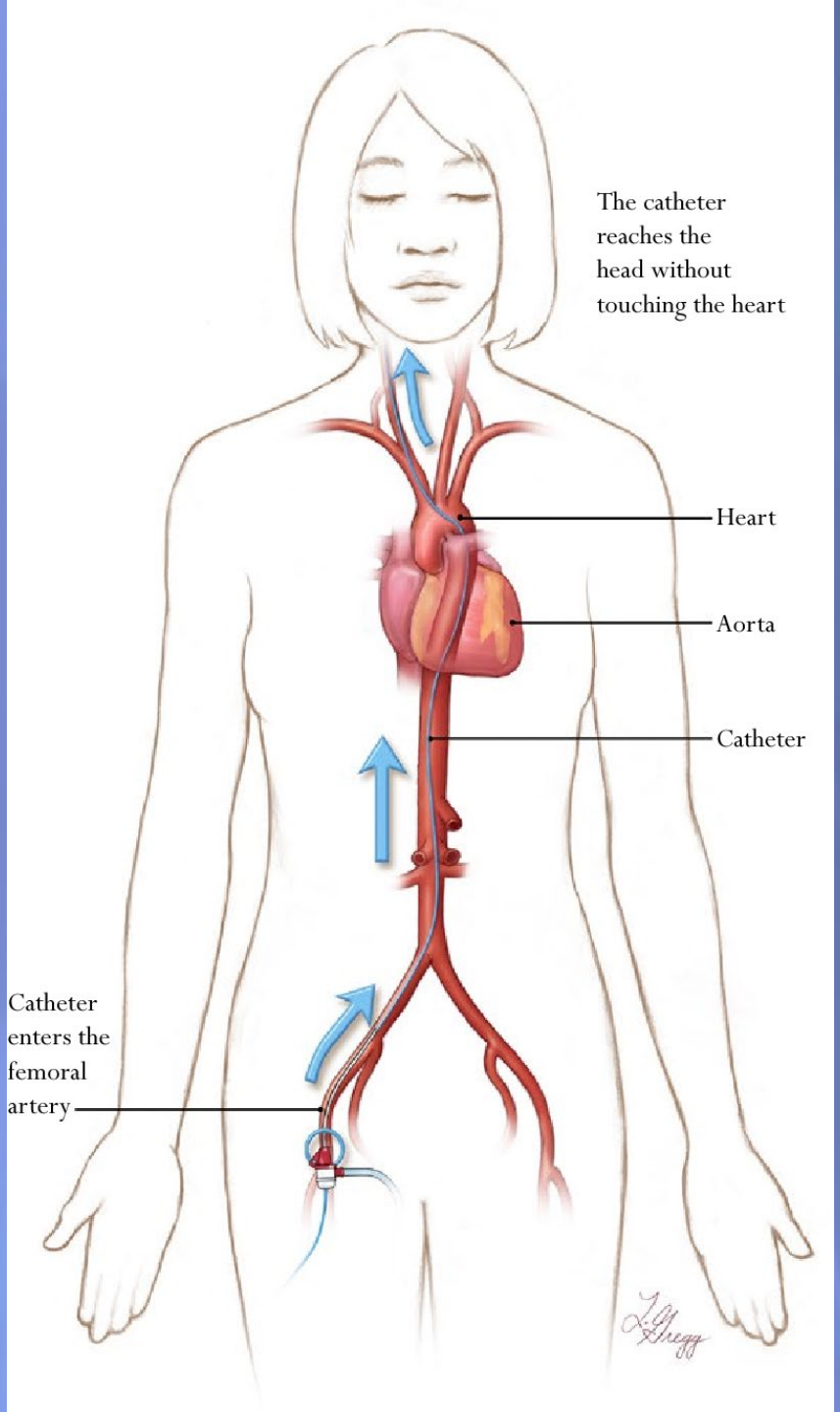
- Transthoracic
- Transesophageal (TEE)


A
Doctor places TEE probe into mouth and down esophagus
Heart
Atrium
Ventricle
Esophagus
Transesophageal echocardiography (TEE) probe in esophagus (probe can also be placed in the stomach)
Sound waves create pictures of the heart
Stomach
Patient lies on bed on left side
B
Echocardiogram
Heart
Ventricles
Atrium

Evaluation (What caused the stroke?)

Angiography (Picture of the Arteries)

- **Catheter**
- **CT Angiography**
- **MRI Angiography**


The catheter reaches the head without touching the heart
Heart
Aorta
Catheter
Catheter enters the femoral artery

Evaluation (What caused the stroke?)

Angiography (Picture of the Arteries)

- **Catheter**
- **CT Angiography**
- **MRI Angiography**


H
A
L
F
10

Evaluation (What caused the stroke?)

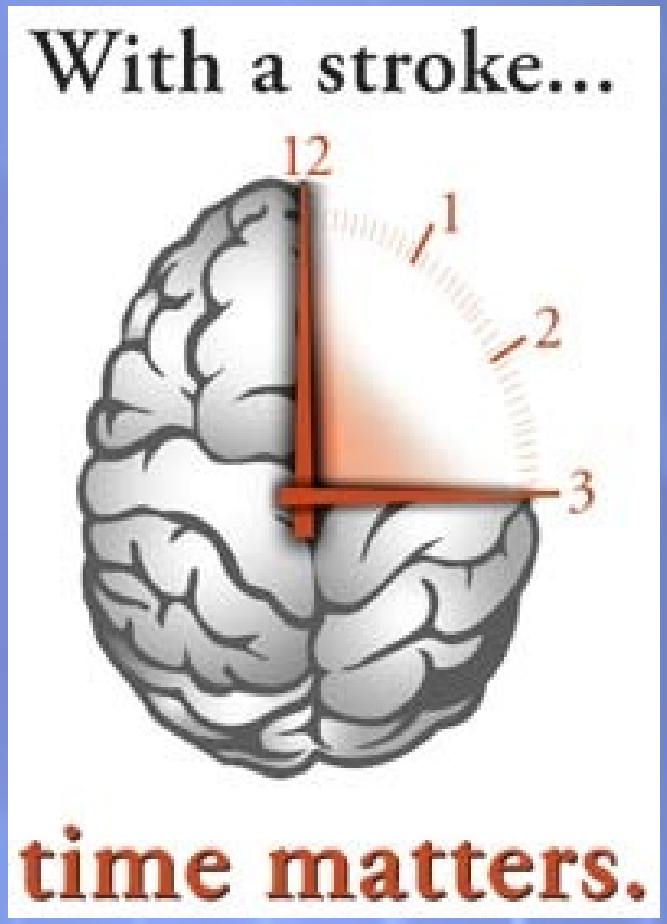
Angiography (Picture of the Arteries)

- **Catheter**
- **CT Angiography**
- **MRI Angiography**

Treatment of Acute Stroke

- Bedrest
- Head Position
- Oxygen
- Intravenous Fluids
- Consider Aspirin or Clot Dissolving Medication

Time is Brain!



Call 911!

Clot Buster

TPA (Tissue Plasminogen Activator)/Tenecteplase

- **Promote Lysis of Blood Clot**
- **Must be Given Within 4.5 Hours - *The Sooner the Better!!***
- ***FDA Approved for 3.0 Hours***
- **2 Million Brain Cells Lost Every Minute**

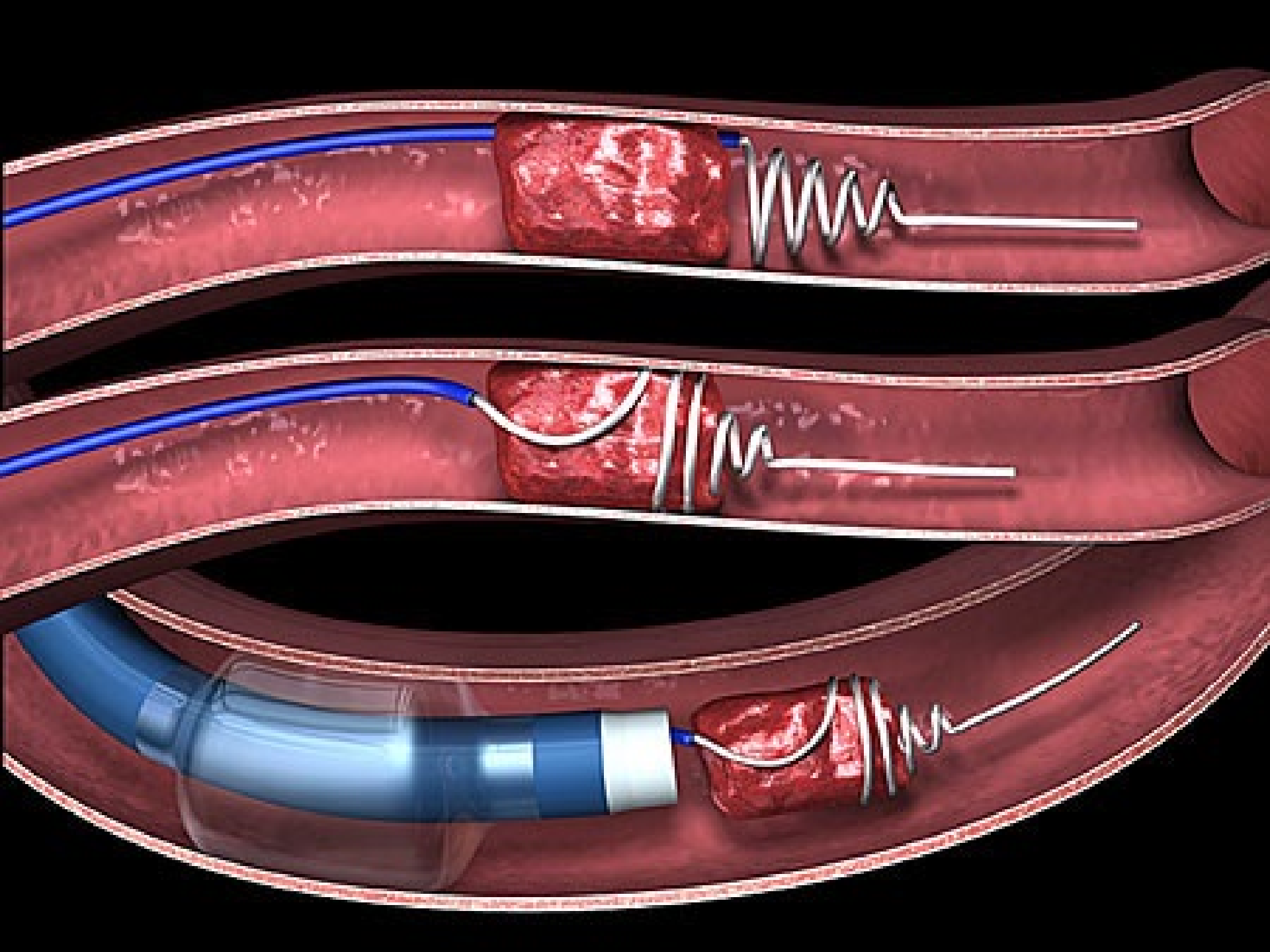
Treatment of Acute Stroke

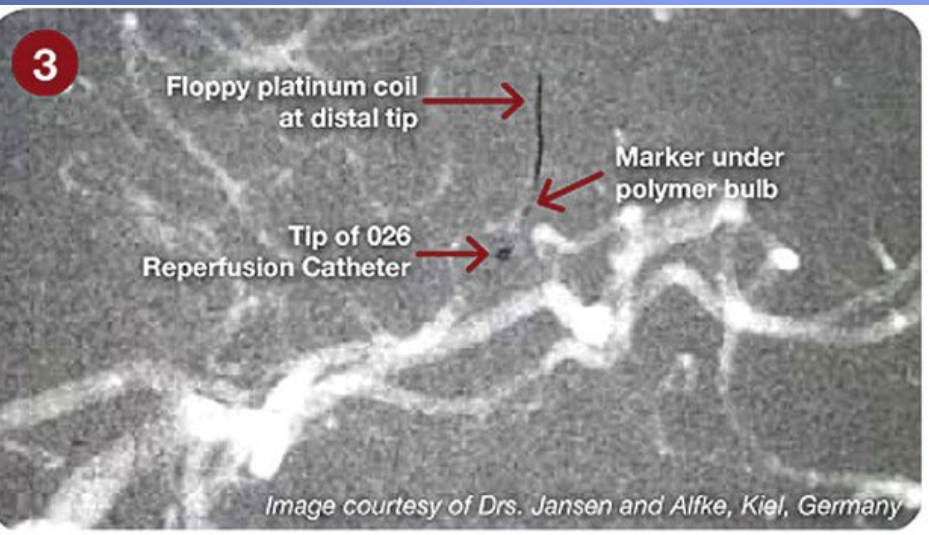
Intra-Arterial Therapy

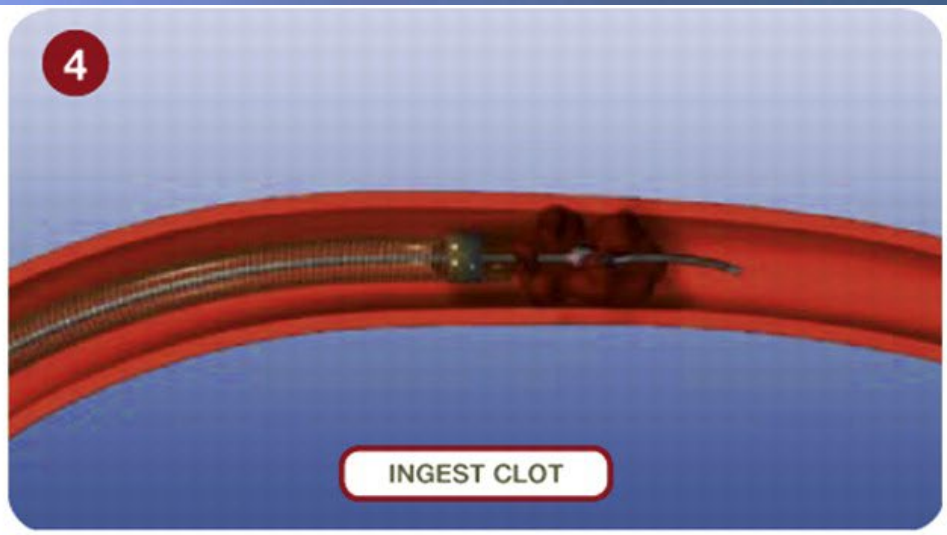
1. Direct Application of Clot Dissolving Medication

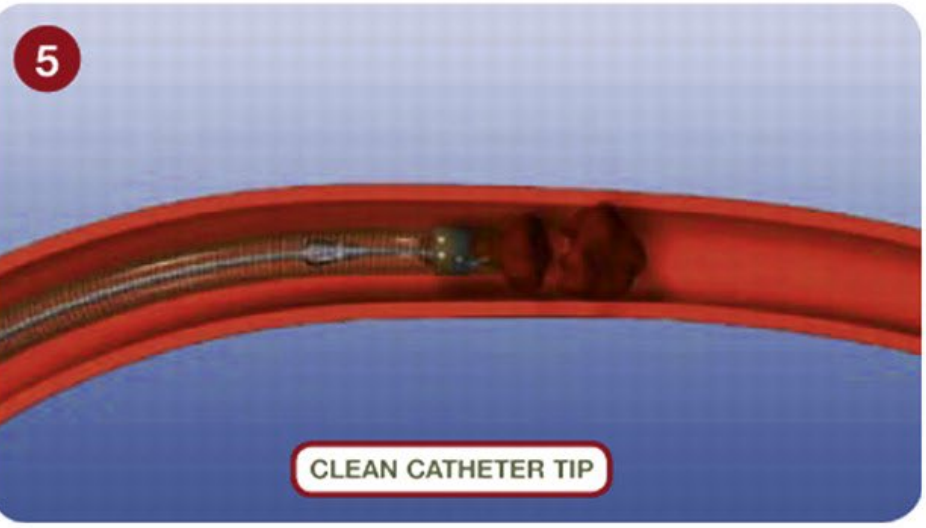
2. Mechanical Removal of Blood Clot

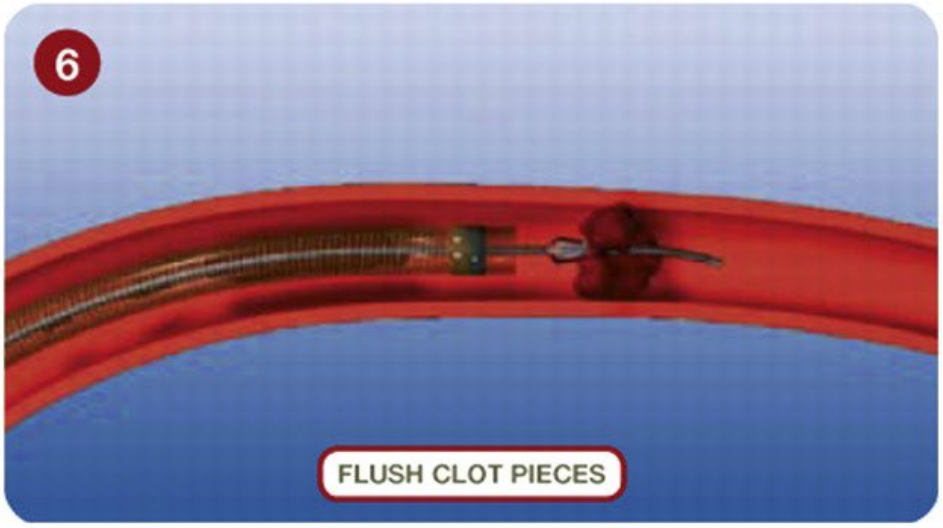
3. Improves Long Term Disability after Moderate to Severe Ischemic Stroke

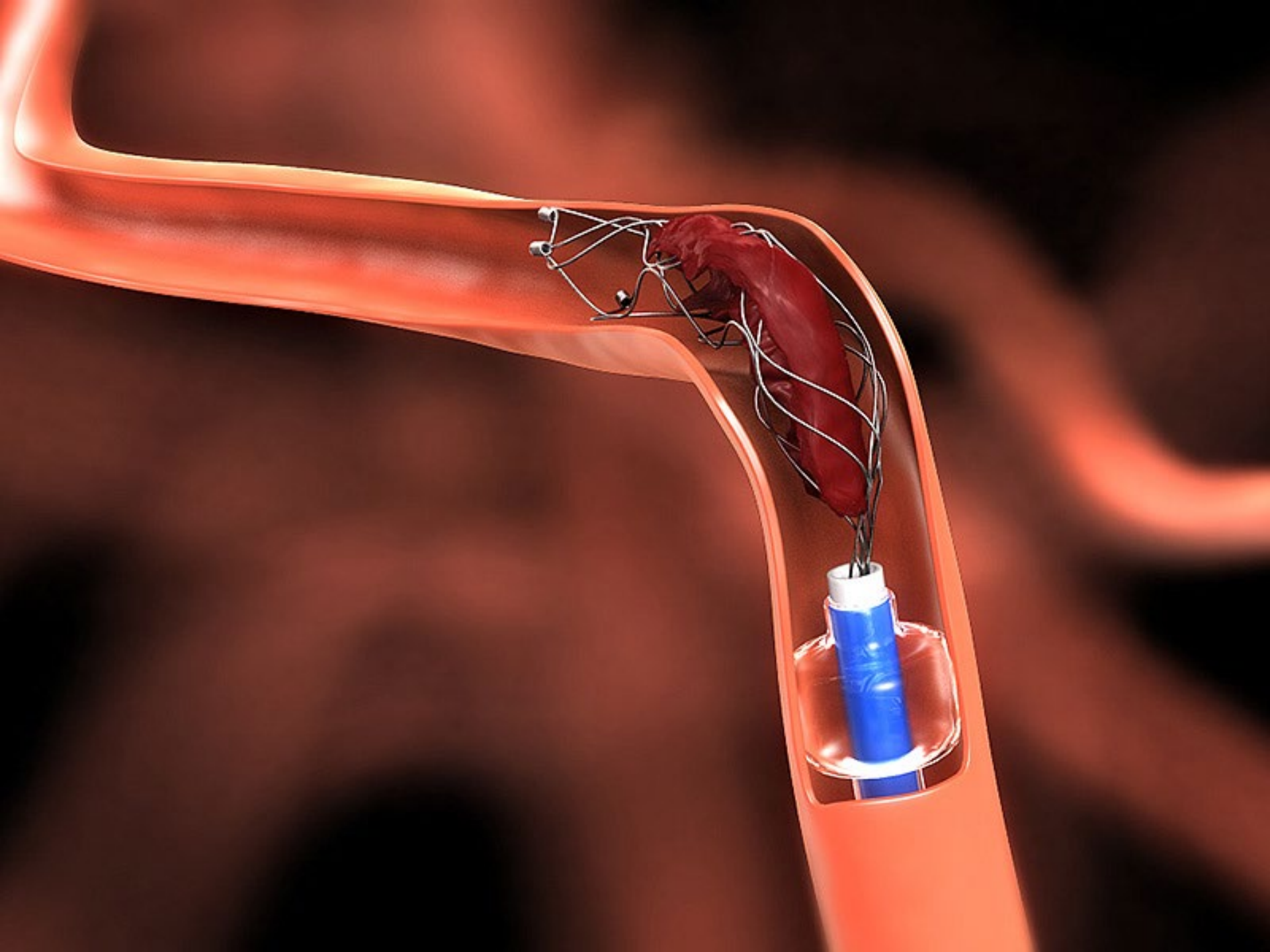



3
Floppy platinum coil at distal tip
Marker under polymer bulb
Tip of 026 Reperfusion Catheter
Image courtesy of Drs. Jansen and Alfke, Kiel, Germany


4
INGEST CLOT


5
CLEAN CATHETER TIP


6
FLUSH CLOT PIECES



Stroke Prevention

- Primary - Modify Risk Factors

- Secondary
  * Surgery
  * Stents
  * Risk Factor Modification
  * Blood Thinners
  * Lipid Lowering
  * Lifestyle Modification

Stroke Prevention

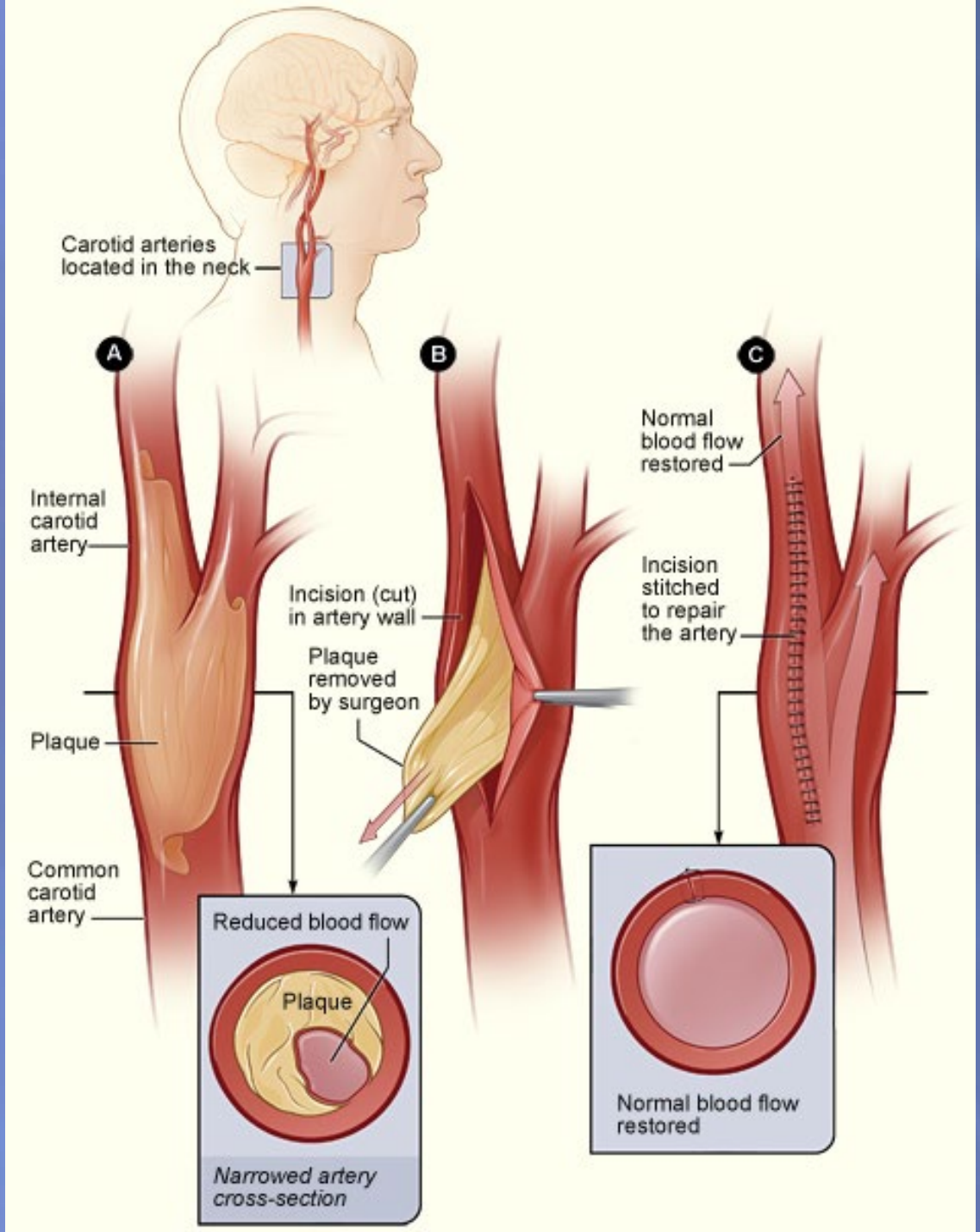
Primary – Modify Risk Factors

1. Control Blood Pressure
2. Stop Smoking
3. Control Diabetes
4. Control Lipids
5. Exercise
6. Weight Loss
7. Avoid Excess Alcohol
8. Treat Sleep Apnea

Stroke Prevention

Secondary

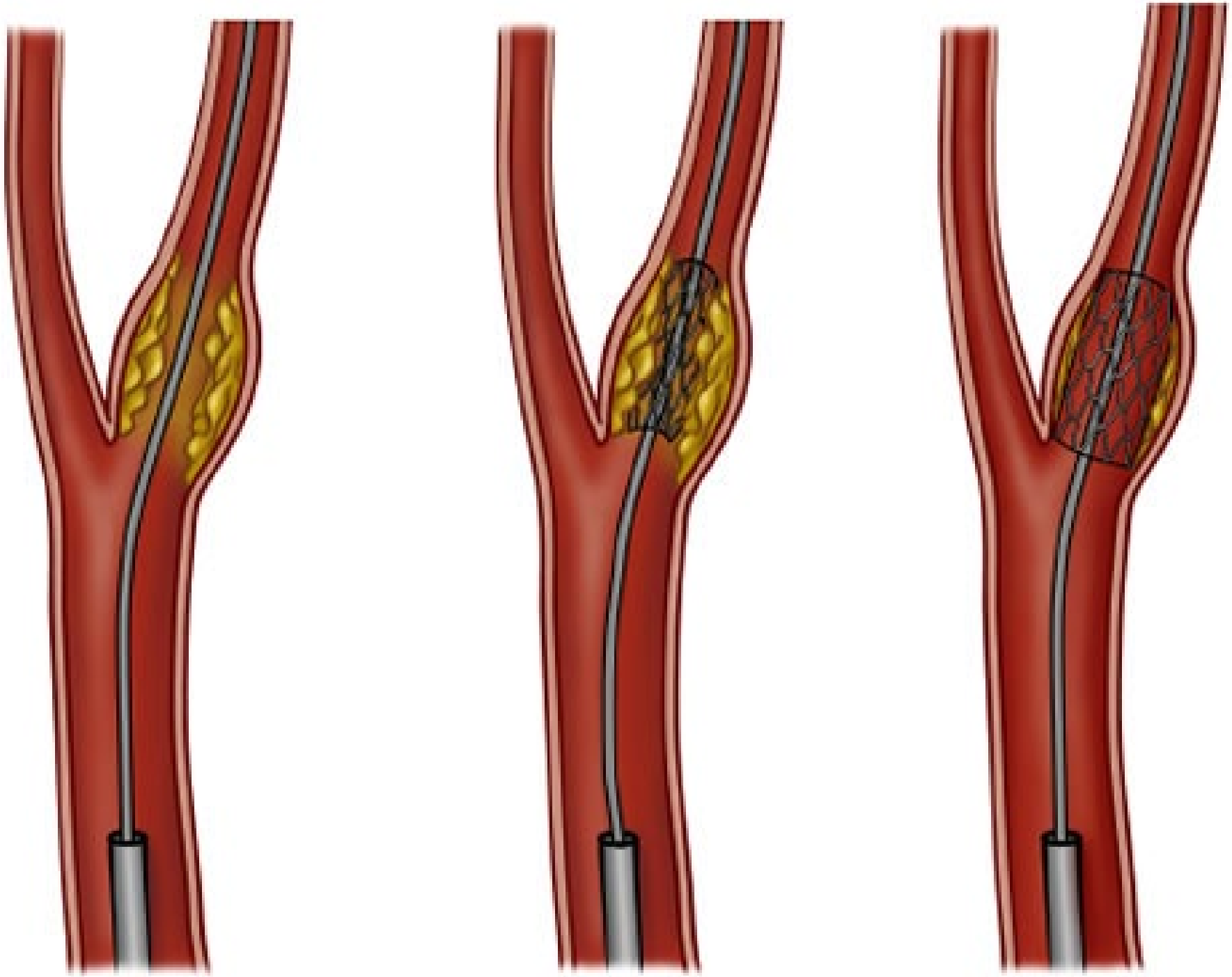
1. Surgery - Carotid Endarterectomy


Carotid arteries
located in the neck
A
B
C
Internal
carotid
artery
Plaque
Common
carotid
artery
Incision (cut)
in artery wall
Plaque
removed
by surgeon
Normal
blood flow
restored
Incision
stitched
to repair
the artery
Reduced blood flow
Plaque
Narrowed artery
cross-section
Normal blood flow
restored

Stroke Prevention

Secondary

1. Open Carotid Artery with Stent



Stroke Prevention

Secondary

Blood Thinners: Antiplatelet Drugs

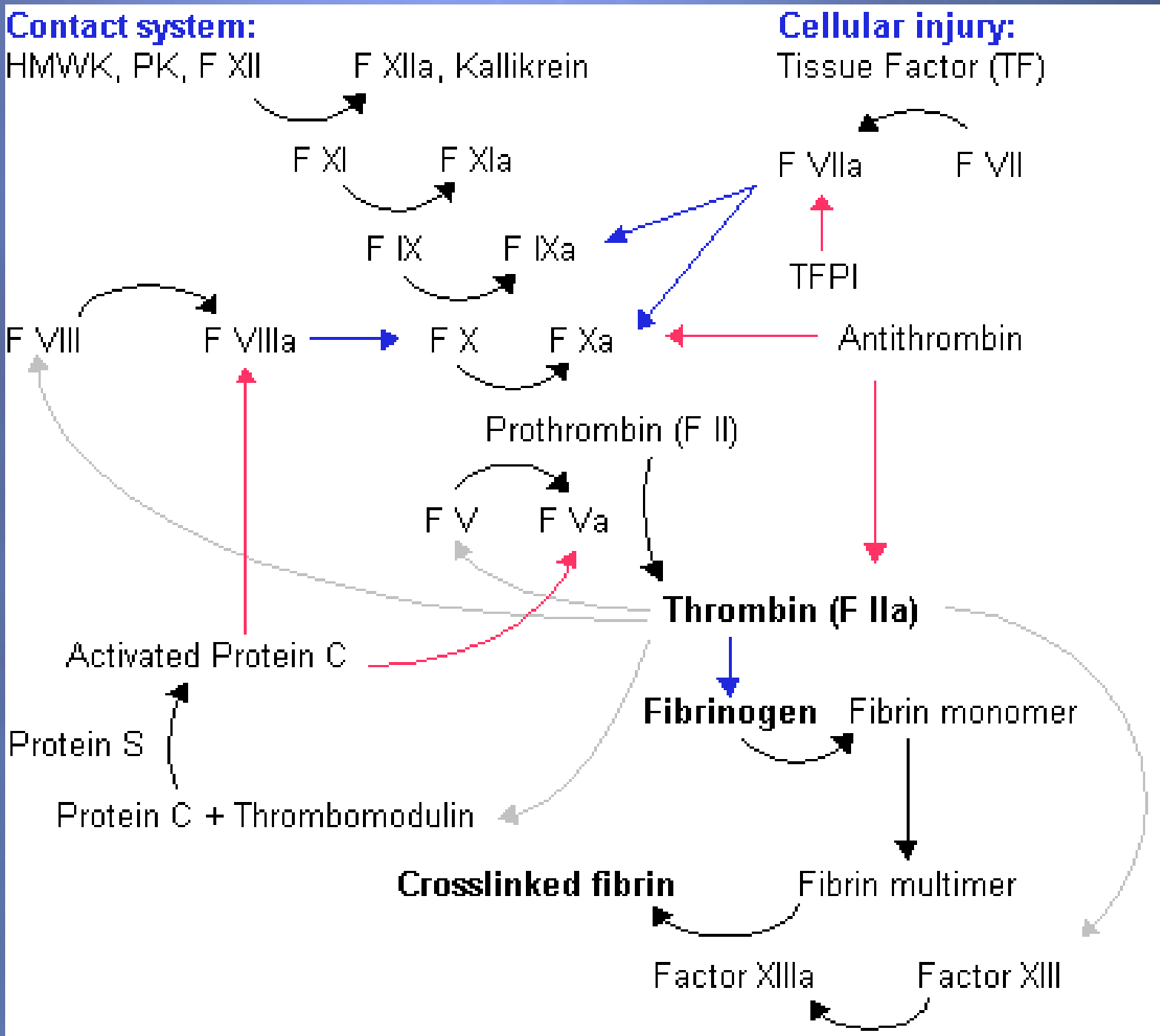
1. Aspirin
2. Plavix (Clopidogrel)
3. Aggrenox (Aspirin and Dipyridamole)

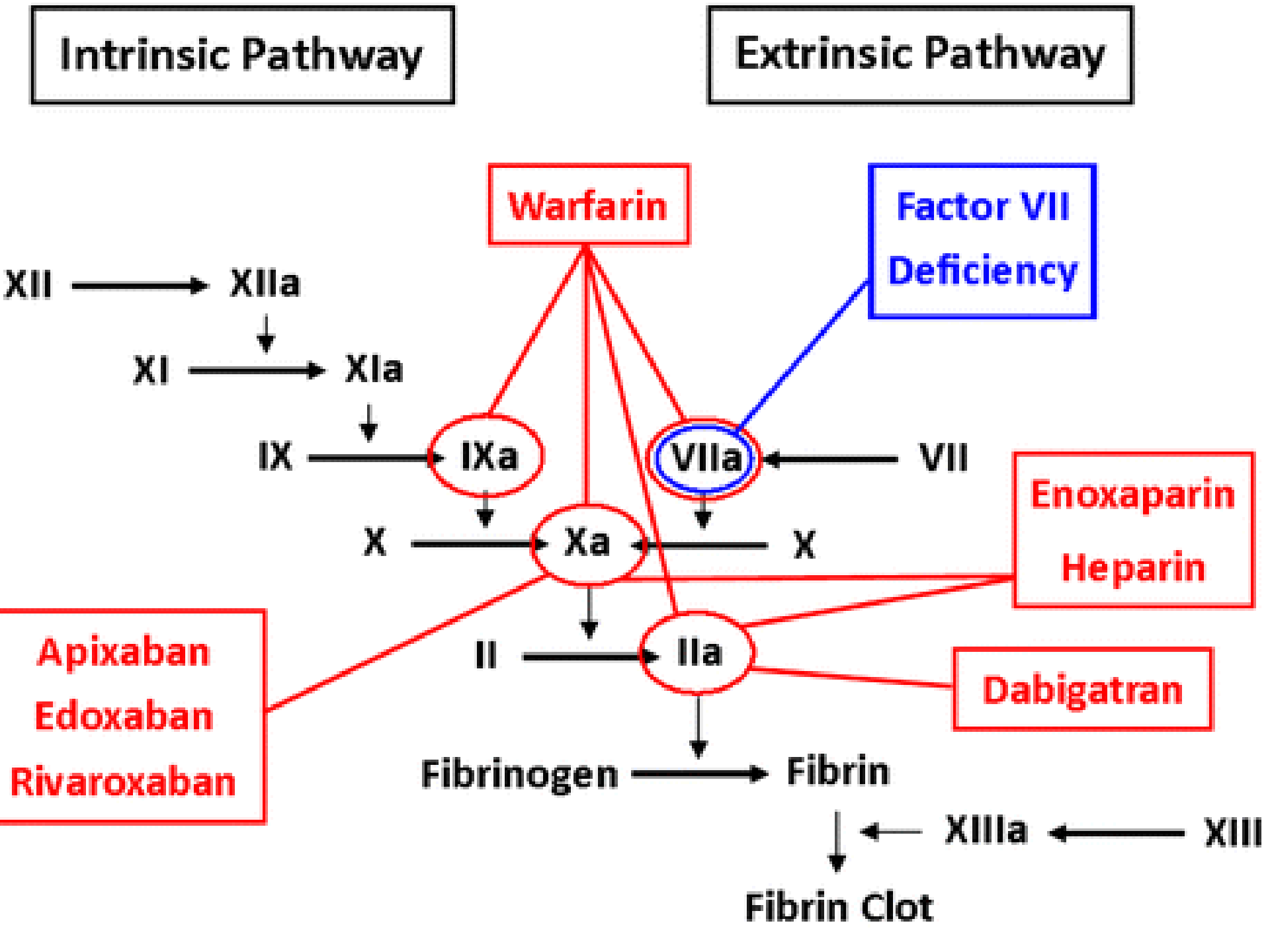
Stroke Prevention

Secondary

Blood Thinners:
Clotting Factor Inhibitors

1. Coumadin (Warfarin)
2. Pradaxa (Dibigatran)
3. Eliquis (Apixaban)
4. Xarelto (Rivaroxaban)
5. Savaysa (Edoxaban)

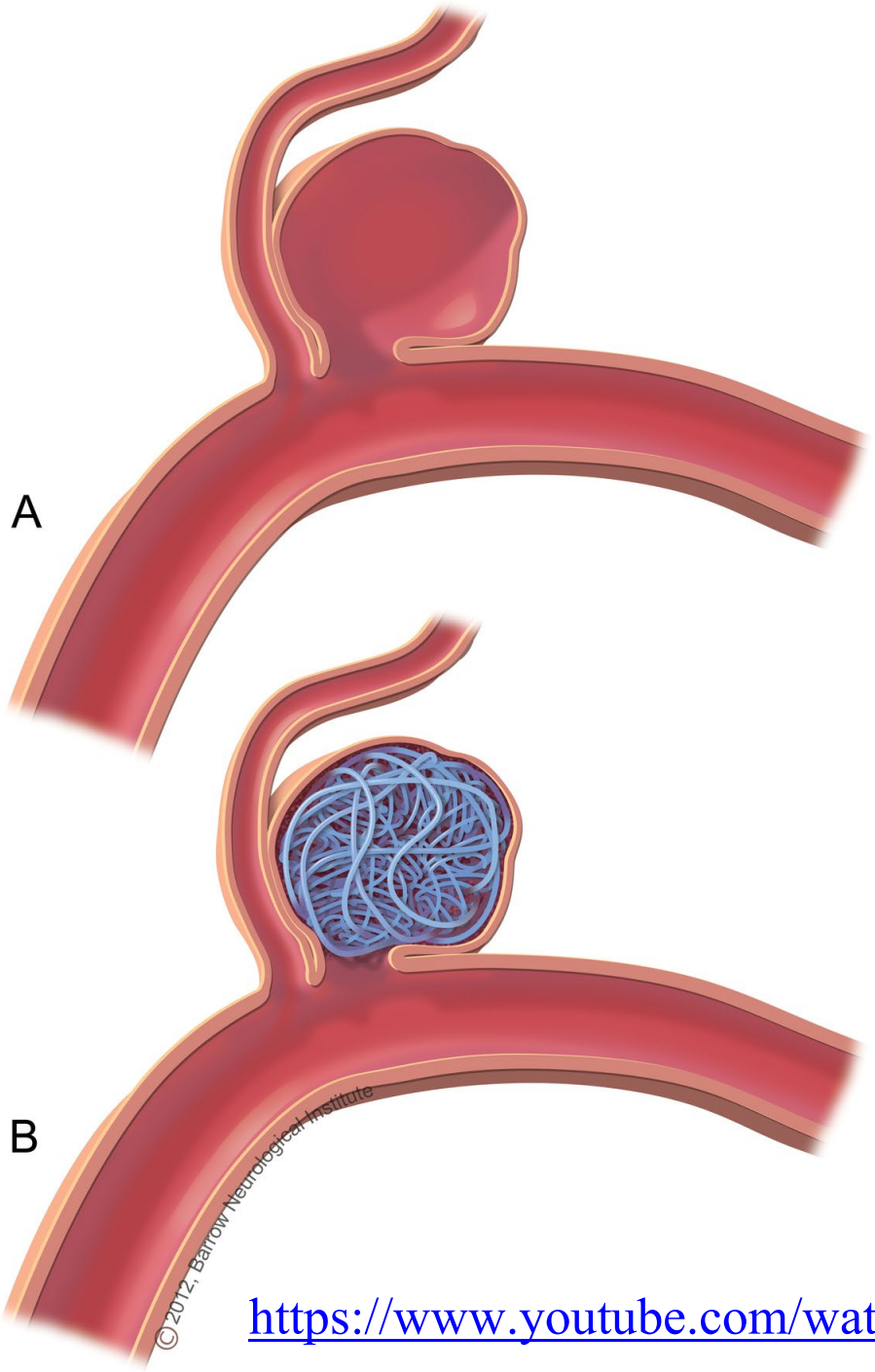

Contact system:
HMWVK, PK, F XII
F XIIa, Kallikrein
F XI
F XIa
F IX
F IXa
F VIII
F VIIIa
Cellular injury:
Tissue Factor (TF)
F VIIa
F VII
TFPI
F X
F Xa
Antithrombin
Prothrombin (F II)
F V
F Va
Thrombin (F IIa)
Activated Protein C
Protein S
Protein C + Thrombomodulin
Fibrinogen
Fibrin monomer
Crosslinked fibrin
Fibrin multimer
Factor XIIIa
Factor XIII


Intrinsic Pathway
Extrinsic Pathway
Warfarin
Factor VII Deficiency
XII
XIIa
XI
XIa
IX
IXa
VIIa
VII
X
Xa
X
Enoxaparin
Heparin
Apixaban
Edoxaban
Rivaroxaban
II
IIa
Dabigatran
Fibrinogen
Fibrin
XIIIa
XIII
Fibrin Clot

Signs and Symptoms of Stroke

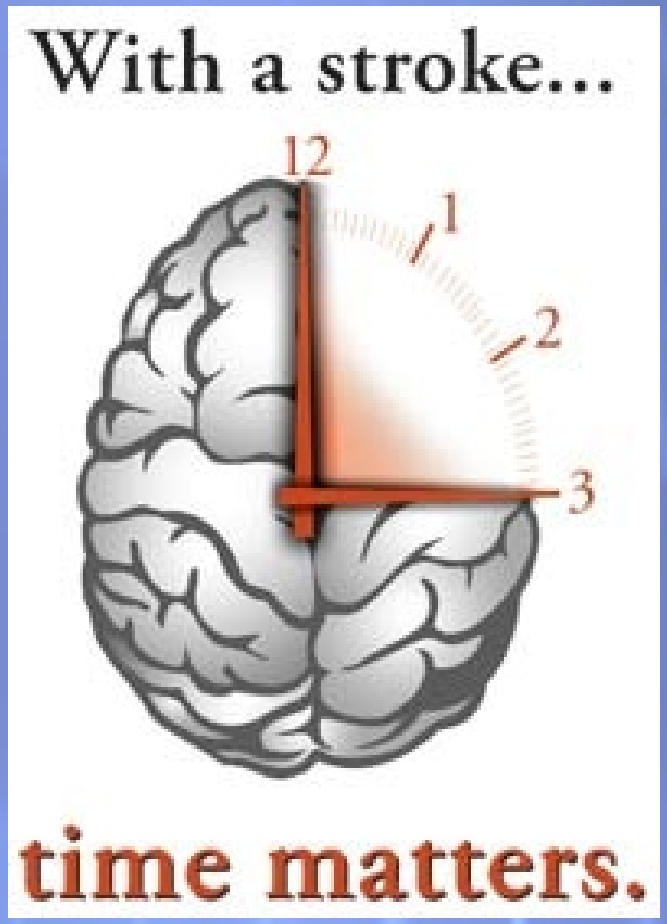
Sudden Onset of:

- Weakness
- Numbness
- Change in Vision
- Change in Speech
- Severe Headache
- Balance
- Level of Consciousness

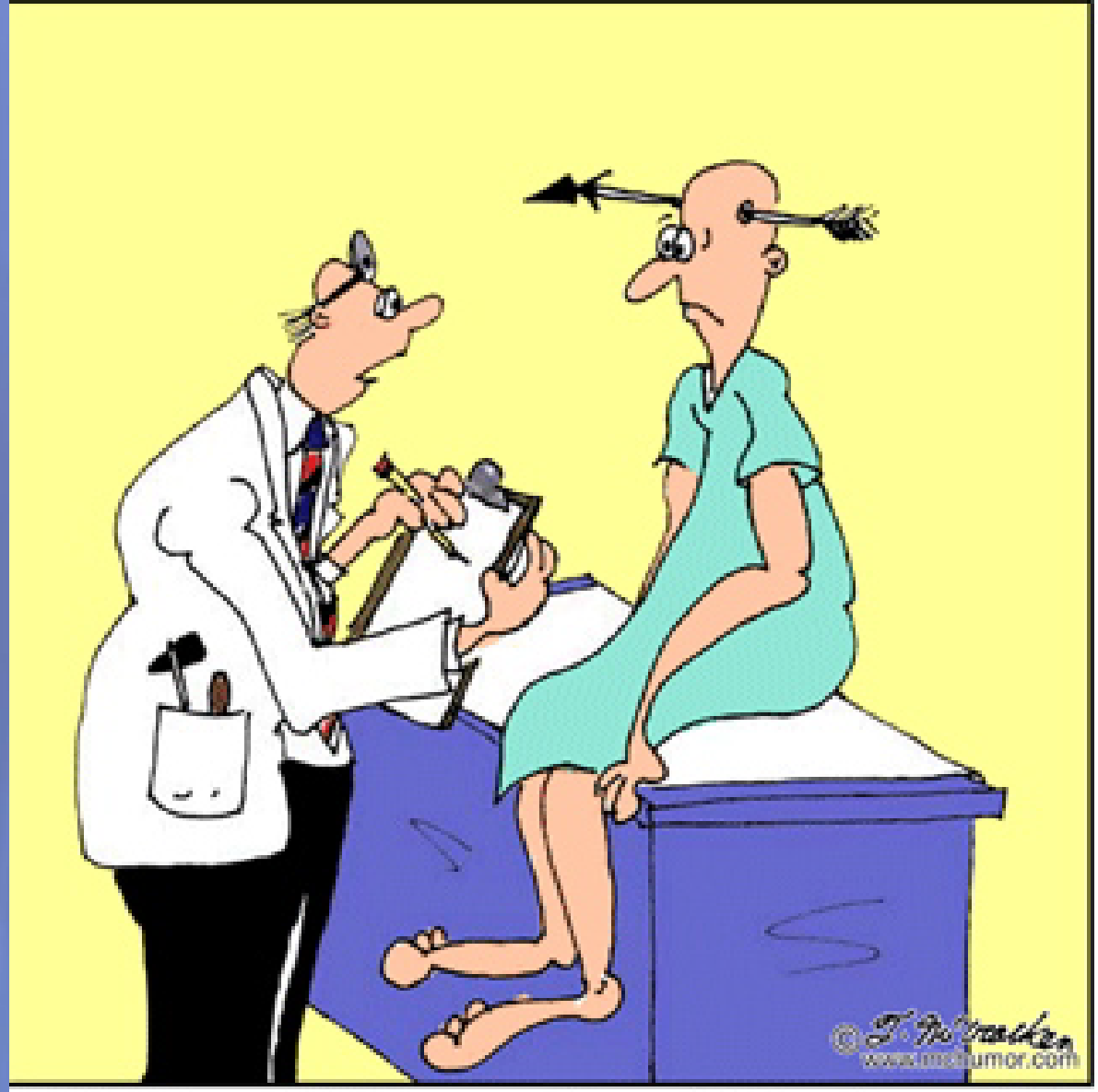


https://www.youtube.com/watch?v=kCE1zSM1TaA

Time is Brain!



Call 911!



"Off hand, I'd say you're suffering from an arrow through your head, but just to play it safe, I'm ordering a bunch of tests."