Stroke and Stroke Mimics: Plains to Peaks

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Objectives

01 Review: Types of Stroke
- Importance of Rapid Stroke Identification
- History & Assessment

02 Define “stroke mimic” and understand the importance of recognizing and treating stroke mimics

03 Review the most frequently encountered stroke mimics

04 Recognize difficulties in diagnosing mimics and the considerations that make us suspect a stroke mimic

What is a stroke?

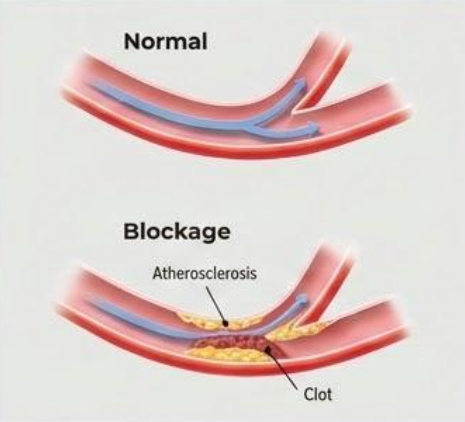
- Lack of blood flow to the brain caused by a sudden blockage or rupture of a blood vessel
- Up to 2 million neurons die every minute during a stroke
- Every minute lost increases the chance of a person experiencing permanent neurological damage, stroke-related disability, or death

EVERY MINUTE COUNTS!

Two Types of Stroke

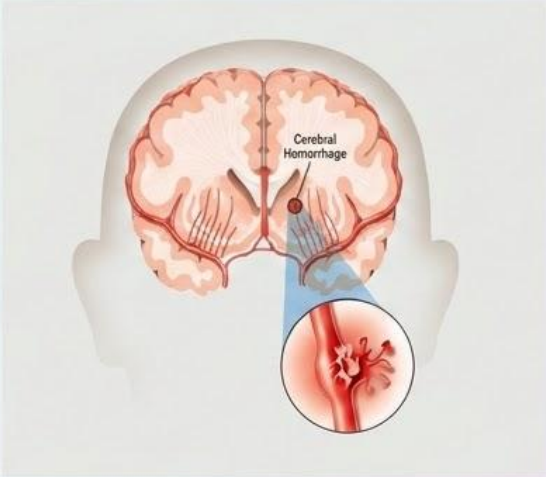
Ischemic strokes - 87%

- Caused by a lack of blood flow to the brain resulting in death of brain tissue



Hemorrhagic strokes - 13%

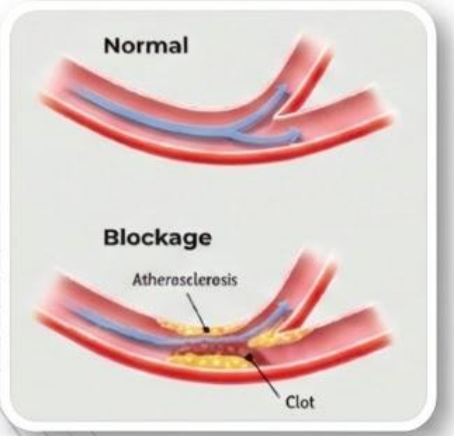
- Caused by spontaneous bleeding in the brain



All strokes are emergencies and require rapid treatment!
Treatment is based on identification of the type and cause of the stroke.

Types of Ischemic Stroke

An ischemic stroke deprives the neurons of blood flow, which carries much needed oxygen and glucose



Thrombotic

- Thrombus formation in an artery produces a stroke either by reduced blood flow distally (low flow) or by an embolic fragment that breaks off and travels to a more distant vessel
  - **Atherosclerosis**

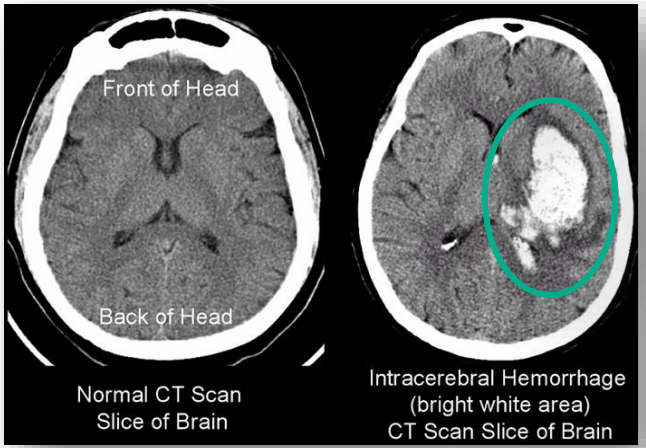
Embolic

- **Cardiac** – Thrombus due to atrial fibrillation, wall motion abnormality caused by AMI or cardiomyopathy, valvular abnormality (e.g., endocarditis)
- **Artery to Artery** – Thrombus or atheroma from a plaque, or clot from a dissection
- **Paradoxical** – Clot from venous circulation crosses to left heart via patent foramen ovale (PFO), ASD, or pulmonary AVM

Types of Hemorrhagic Stroke

Intracerebral Hemorrhage (10% of all Strokes)

- Bleeding into deep structures
- Related to small vessel disease



Subarachnoid (3% of all Strokes)

- Bleeding into subarachnoid space (between the arachnoid and pia mater)
- Caused by aneurysm or AVM rupture
- Often presents with "worst headache of my life"

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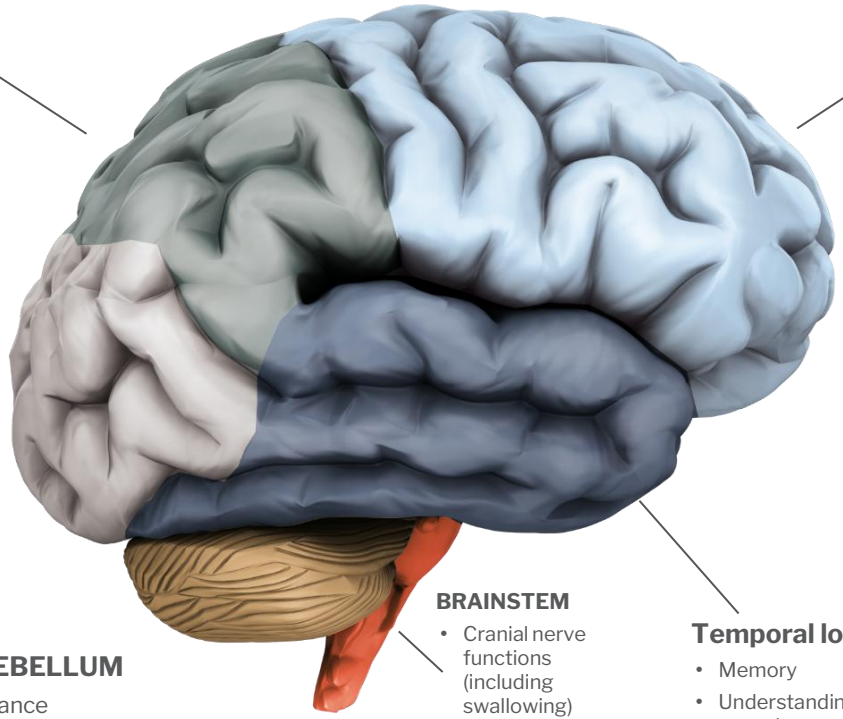
MOST COMMON CAUSE IS UNCONTROLLED HYPERTENSION

Transient Ischemic Attack (TIA)

- A transient episode of neurologic dysfunction caused by ischemia (without infarction)
- Some refer to them as “mini strokes,” but this terminology is not accurate as there is no permanent damage to the brain with a TIA
- Average duration of a TIA is **10–15 minutes**, usually clears in an hour – **Symptoms resolve without progressing to stroke**
- **Warning sign for stroke…**
- **1 in 3** will go on to have a stroke within a year
- **10.5%** within 90 days, half of these within 2 days
- TIAs need medical attention as soon as possible to prevent a stroke

Neuroanatomy



Parietal lobe
- Sensation of touch, pain and temperature
- Awareness of body parts
- Naming objects

Occipital lobe
- Ability to see
- Reading

Frontal lobe
- Voluntary movement such as lifting arm and leg
- Ability to speak
- Ability to focus attention
- Emotional, social and sexual control
- Decision-making

Cerebrum

Temporal lobe
- Memory
- Understanding speech
- Recognizing faces
- Behavior

BRAINSTEM
- Cranial nerve functions (including swallowing)
- Heart rate
- Blood pressure
- Breathing
- Alertness

CEREBELLUM
- Balance
- Coordination
- Fine motor movement

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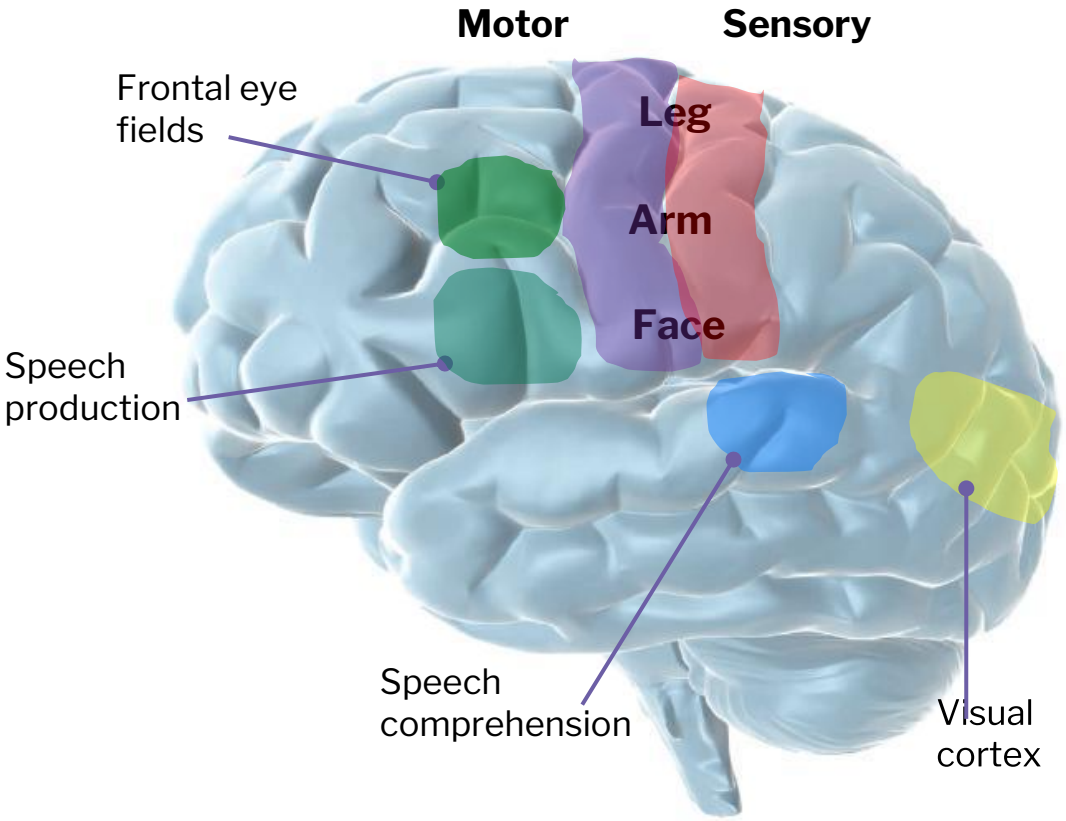
Neuroanatomy



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Recognition Tool: BEFAST

Key Considerations

- Balance and Eyes added to detect posterior circulation stroke
- Consider sudden severe headache in your stroke screening
- Followed by a secondary stroke assessment to screen for LVO
  - Local protocol for stroke alert criteria

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BE FAST

Any one of these sudden signs could mean a stroke:

BALANCE

Sudden loss of coordination or balance

EYES

Sudden change in vision or loss of vision in one or both eyes

FACE

Sudden weakness on one side of face, facial droop

ARMS

Sudden arm or leg weakness, numbness, or drift (when elevated)

SPEECH

Sudden slurred speech, trouble speaking, or understanding speech

TIME

TIME TO ACT, Call 911 and get patient immediately to nearest certified stroke center

Sudden, severe headache with no known cause could also signal a stroke.

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Stroke Screening Tool

Cincinnati Prehospital Stroke Scale

	Normal	Abnormal
Facial Drool 	Both side of the face move equally	One side of the face does not move as well as the other
Arm Drift 	Both arms move the same or both arms do not move at all	One arm drifts down compared to the other arm or does not move at all
Speech 	Says correct words with no slurring of speech	Slurs words, says wrong words, unable to speak

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May miss posterior circulation strokes!

SAMPLE History

- Signs and Symptoms
  - Follow local protocols for stroke assessment scales/scores
  - **PRIMARY** vs **SECONDARY STROKE ASSESSMENT**
- Allergies
  - Iodine (Many CT contrast dyes contain iodine)
- Medications
  - Bring the patient's medications to hospital
  - Ask about blood thinners (**anticoagulants** & **antiplatelets**)
  - Assess for ACE-inhibitors (ie: Lisinopril, Enalapril, etc)
    - *Can cause oral edema when combined with TNK*

Anticoagulants vs Antiplatelets

- **Anticoagulants** ("blood thinners" are substances that prevent or reduce coagulation in the blood, prolonging the clotting time
  - Warfarin/Coumadin
  - Apixaban/Eliquis
  - Enoxaparin/Lovenox
  - Dabigatran/Pradaxa
  - Rivaroxaban/Xarelto

- **Antiplatelets** are substances that decrease platelet aggregation and inhibit thrombus formation
  - Aspirin
  - Clopidogrel/Plavix
  - Dipyridamole/Aggrenox

Simply taking an anticoagulant or antiplatelet medications does not necessarily exclude patients from treatment

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SAMPLE History

- **Past Medical History (PMHx)**
  - Prior stroke/TIA with residual deficits, recent hospitalizations/surgeries, clotting issues, diabetes, Afib, other risk factors?
- **Last intake**
  - Possible hypoglycemia, dehydration
- **Events**
  - Last Known Well/Normal (HxPI)
  - What lead-up to this event, how were they feeling?
  - Trauma, seizure?
- **Additional Neuro Assessments**
  - Changes in LOC/AVPU, AMS, GCS
  - Changes in pupil size and responsiveness

Last Known Well (LKW)

No Witness

Looking for clues to last actions performed by patient can help establish your LKW/LKN.

- Is meal/coffee prepared?
- Were they dressed, or still in pajamas?
- Look at a calendar, did they miss something on their schedule?
- If they were in a MVA, did they have weakness on one side? Could they have had a stroke, then a traumatic event?
- Did they make a phone call on their cell phone to talk to someone like a neighbor or another family member?

Witness on Scene

Ask questions that lead you to a narrowed timeline.

- Were they up in the middle of the night to use the bathroom?
- If they woke up with symptoms, what time did they go to bed? Were they normal at that time?
- Did you talk to them on the phone today, did they sound normal then?
- Did they have an appointment they missed?
- ***Important: Trauma patients may still be eligible for stroke treatment, but we need to recognize the deficits of a stroke!***

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Most Common Stroke Mimics:

- Metabolic Disorders (Hypoglycemia/Hyperglycemia)
- Seizure (Postictal, Todd's Paralysis)
- Migraines (Auras, numbness, visual disturbances)
- Functional Neurological Disorders (Stress related, Psychiatric)
- Infections (Sepsis, Encephalitis, Meningitis)
- Brain Tumors/Lesions

Hypo/Hyperglycemia

neurologic symptoms as a result of low / high glucose

- CLUES:
  Can often cause focal neurologic deficit
  - Associated autonomic symptoms
  - Agitation / Delirium

- OTHER:
  Can lead to recrudescence
  - If still have neurologic symptoms after glucose correction, we may still be thinking stroke

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Signs usually reverse after glucose treated – typically minutes, but up to a few hours.
Could lead to permanent neurological sequelae.

Functional Neurological Disorder

problem with the functioning of the nervous system and how the brain and body send and receive signals.

Physical and/or psychological risk factors can cause functional symptoms which include a variety of physical, sensory, and cognitive symptoms that have yet to be explained by a recognized disease.

- **CLUES:** Emotional event / trigger 
- Inconsistencies in exam 
  -  arm drift without pronation
  -  sensory disturbance in a nonanatomical distribution
  -  stuttering speech

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Infection/Toxic Metabolic

Most often presents as **encephalopathy / altered mental status**

- Clues:
  - Vital signs: hypotension, tachypnea, fever
  - General examination is key
    - ABCs
    - Respiratory status/ABG
    - Cardiac auscultation/EKG
  - Helpful info:
    - Recent ingestion
    - Recent surgery

- Other:
  - ‘Altered mental status’ is frequently encountered and often difficult to distinguish from ‘Aphasia’
    - This can make it difficult to complete other portions of the exam as well AND difficult to obtain imaging / other diagnostics
  - ‘Chameleons’:
    - Basilar occlusion
    - Thalamic stroke
    - ACA territory stroke (abulia, akinetic mutism)

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Reactivation of Prior Deficits (Recrudescence)

Re-emergence of previous stroke-related deficits in setting of metabolic, infectious, or toxic dysfunction

CLUES

- Previous history of stroke
- Symptoms in the distribution of previous injury

(ask about original symptoms/recovery)

- **Triggers:** infection, hyponatremia, hypotension, benzodiazepines, insomnia, stress, ...

DIAGNOSIS

check_circle MRI Brain shows old stroke and no new DWI-MRI deficits

Prognosis & Recovery

Symptoms are usually short-lived. Most improve within **24 h** of treating the underlying disturbance.

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Bell's Palsy

unilateral peripheral facial weakness
(weakness in both the upper and lower facial area)
Typically comes on over hours to days

Nasolabial fold flat

-Mouth downturned

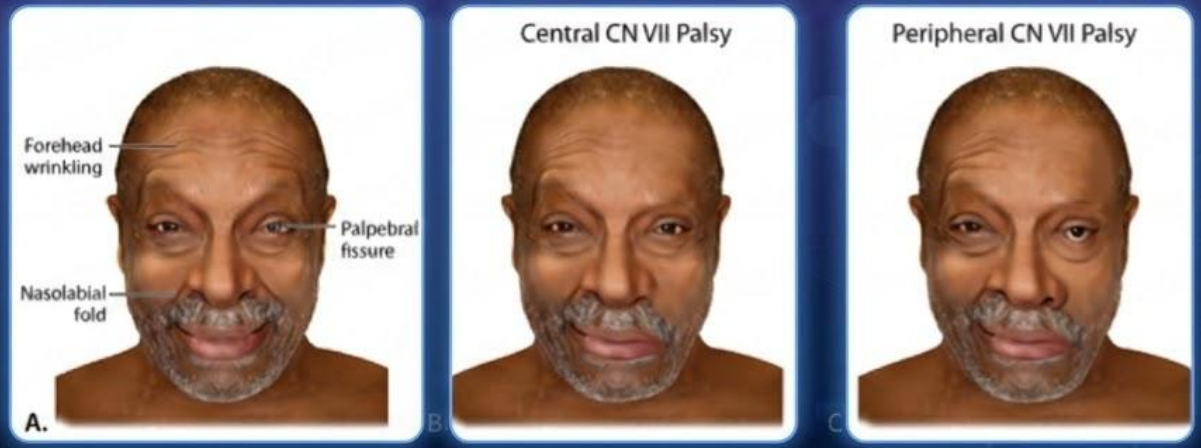
-Forehead wrinkles intactNasolabial fold flat

-Mouth downturned

-Forehead not wrinkled

-Palpebral fissure widened

-Palpebral fissures symmetric



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Neurologists Considerations in Management

- obtain history and exam, include old deficits and LKW
- Sudden, abrupt onset increase the odds of stroke
- Generalized symptom/ symptoms that don't match a vascular distribution may be more likely to be due to a mimic
- Positive symptoms might mean it is a mimic (but not always)
- Older patients with comorbidities are more likely to have a stroke
- We accept the risk of treating a few mimics. We'd rather treat mimic than miss/delay on a stroke
- Presence of a stroke mimic does NOT mean a patient is not a candidate for thrombolytics
- If a stroke mimic is readily apparent (e.g. hypoglycemia, hypotension) correct the problem, reevaluation
- Stroke vs mimic is difficult - your friendly stroke team is here to help

STROKE: RISK FACTORS

TRADITIONAL RISK FACTORS

Hypertension

Hypercholesterolemia

Smoking

Obesity

Diabetes mellitus

STROKE IN YOUNG ADULTS

UNIQUE RISK FACTORS

Migraine

Pregnancy and postpartum

Oral contraceptives

Illicit drug use

Hypercoagulable state

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In Summary: Stroke is an Emergency

Prioritize Stroke & Mimics

Consider both. Mimics carry high mortality risk if untreated.

Err on the Side of Caution (EMS)

High suspicion. Always alert receiving hospital.

Essential Follow-up

Imaging & Neurologist assessment critical for diagnosis.

Consider Rotorwing Transport

Evaluate for LKN <4hr, <24hr, or unknown. Follow guidelines.

"Time is Brain"

Treat with trauma urgency. “Every minute counts.”

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Questions?

Thank you!

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