

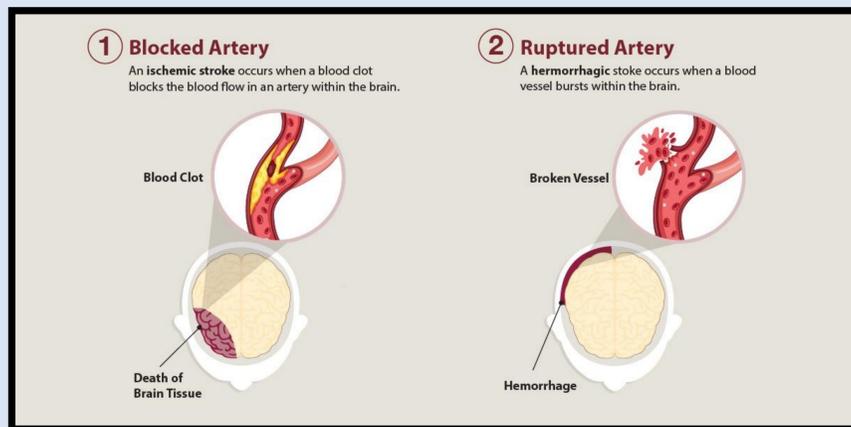
S44 – CT Stroke Protocols – Why Timing Matters

Objectives

1. Define a stroke and describe CT protocols used for stroke diagnosis
2. Discuss the importance of timing for patient prognosis

Define a Stroke

- A stroke is caused by a disruption of blood flow to the brain that can result in cellular damage and impaired brain function.
- Strokes detrimentally affect people each year and are the fourth leading cause of death in the United States (CDC, 2024)
- **Signs & Symptoms:**
 - Unilateral numbness and weakness in the face, arms, legs, speech difficulty, loss of balance
 - The FAST acronym is a test commonly used to quickly recognize stroke symptoms and take immediate action
 - Face- drooping, Arms-dripping downward, Speech- slurred, Time- if any of these signs appear, call 911



[About Stroke | Stroke | CDC](#)

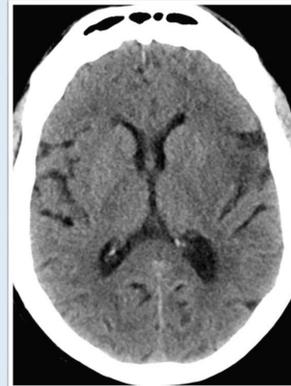
The image above demonstrates two ways a stroke can happen, specifically, they can be classified into an ischemic stroke and a hemorrhagic stroke.

PURPOSE & TIMING of STROKE PROTOCOLS IN CT IMAGING

- The phrase "time is brain" emphasizes the role that timing has in limiting mental and physical brain damage a stroke can cause (Marco de Lucas et al., 2008)
- 3 hours of without blood flow and oxygen to the brain significantly increases the chances of permanent damage and death to the brain cells (Marco de Lucas et al., 2008)
- Current guidelines recommend that patients should be scanned within 60 minutes of arrival (Marco de Lucas et al., 2008)
- Preparation is crucial prior to imaging
 - CT power injector should be loaded with 125 mL on nonionic contrast and 50 mL of saline (Marco de Lucas et al., 2008)
 - Information and images from the scan should be completed within 10-15 minutes and immediately sent to the neurologist for diagnosis and reporting (Marco de Lucas et al., 2008)

Protocol

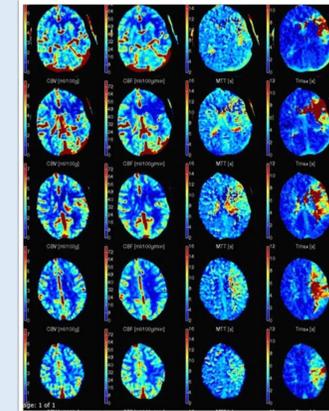
Nonenhanced CT



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- The first scan that should be performed in the series immediately after the activation of the stroke code
- Purpose of scan is to rule out hemorrhage or other neurological signs, such as trauma or the presence of a tumor (Goldemund, 2025)
- Also demonstrates ischemic signs when an infarction is present (Marco de Lucas et al., 2008)

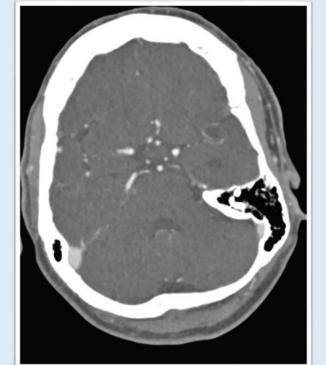
Perfusion CT



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- The second scan that should be performed in the series
- Monitors the first pass of contrast through the brain's blood flow
- As contrast passes through, it is attenuated to the region of interest
- Outlines the damaged brain tissue when a stroke is present (Marco de Lucas et al., 2008)
- Differentiates ischemic brain tissue that is salvageable from damaged infarcted tissue (Radiopaedia, n.d.)

CT Angiography



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- Last scan to be completed in series
- Shows the status of the
 - Cerebral arteries
 - Occlusion site
 - Possible dissections
 - Blood flow
 - Atherosclerotic disease
 - Improves detection of acute infarction
 - Only requires about 15 minutes more than a non-enhanced scan (Marco de Lucas et al., 2008)

Risk-Benefit Evaluation of Contrast-Enhanced Scans

- Contraindications include: Kidney impairment and contrast allergies
- Most physicians order contrast-enhanced scans before renal testing is done because their diagnostic benefits outweigh the time required for laboratory tests, especially when timing is critical in stroke diagnosis
- Additionally, contrast reactions such as Contrast-Induced Nephropathy (CIN) is a rare complication in acute stroke patients (Marco de Lucas et al., 2008)
- On scans, contrast demonstrates more visibility of cerebral blood vessels, the presence of a filling defect, and differentiates normal penumbral tissue from infarcted brain tissue that is already damaged from the stroke (Marco de Lucas et al., 2008)

Conclusion

Efficient stroke evaluation and accurate imaging are crucial steps for early detection and optimal patient prognosis. Precise knowledge of CT stroke protocols is essential for timely and accurate imaging in stroke patients. Each scan plays a vital role in detecting the presence and determining the extent of a stroke. Patient prognosis is truly reliant on time; every minute counts.