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### Ischemic Stroke

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# Ischemic Stroke

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## Pathophysiological Processes

### Signs and Symptoms

Different disease states can mimic signs and symptoms of a stroke including primary angitis, reversible cerebral vasoconstriction syndrome, moyamoya disease, and fibromuscular dysplasia (Al Kasab et al., 2018, p. 1725). Healthcare providers must be able to identify diagnostic tests needed to rule out other possible causes for a patient's symptoms and clinical presentation.

Several symptoms of ischemic stroke include:

- Balance issues
- Blurred vision
- Visual field cuts
- Double vision
- Facial droop
- Facial weakness
- Numbness
- Tingling
- Arm/leg weakness
- Arm/leg heaviness
- Slurred/garbled speech
- Dizziness
- Headache

(Recognizing the most common warning signs of a stroke, 2017)

### Underlying Pathophysiology

- Vascular compromise causes infarction that is present in an ischemic stroke
- Excitotoxicity, oxidative stress, nitrate stress, inflammation, and apoptosis cause cell death during an ischemic stroke event (Khoshnam, Winlow, Farzaneh, Farbood, & Moghaddam, 2017, p. 1167)
- Many genes are activated in the brain following an ischemic stroke that are both neuroprotective and also damaging to the brain
- Penumbra less affected by cell death whereas the core of the brain is more likely to experience cell death (Khoshnam et al., 2017, p. 1168)
- Glutamate receptors (NMDA and AMPA) in the brain have been shown to promote excitotoxicity which further damages brain tissue (Khoshnam et al., 2017, p. 1168)
- Inflammatory response involved following an ischemic stroke: microglial cell activation in efforts to protect brain tissue; cytokine and toll-like receptor (TLR) response in the inflammatory process results in additional brain trauma but also provide protective qualities (Khoshnam et al., 2017, p. 1172)
- Men and women experience many diseases differently, including stroke, and men appear to experience stroke earlier in life whereas women have higher incidences later in life (Roy-O'Reilly & McCullough, 2018, p. 3121)
- Estrogen and progesterone protect women from experiencing ischemic stroke

### Significance of Pathophysiology

- If the symptoms of an ischemic stroke are not recognized quickly, the consequences could be overwhelming
- Healthcare providers should have an understanding on risk factors associated with ischemic stroke. Some of those risk factors include hypertension, diabetes mellitus, smoking, heart disease, previous stroke, elderly individuals, gender, and race
- Knowing these risk factors, HCP's have the opportunity to educate their patients if they are at risk, and management and lifestyle modifications that they could make to prevent a stroke
- According to McCance & Huether (2018), "cerebrovascular accidents are the...third cause of death in women, and the fifth cause of death in men in the United States...the yearly incidence of new and recurrent stroke is 795,000...about 128,932 deaths each year" (p. 565).

## Introduction

### What is your topic?

Stroke is one of the leading causes of death in the United States, and a very large percentage of those who suffer a stroke experience an ischemic stroke. Ischemic stroke occurs when an artery is occluded by plaque or poor perfusion, which is secondary to many diseases, especially atherosclerosis, heart failure, hypertension, and diabetes mellitus (McCance & Huether, 2018, p. 566).

### Why did you pick this topic?

This researcher chose this topic for discussion because working in a stroke-certified emergency department, many patients present with stroke-like symptoms. It is detrimental that the healthcare providers caring for these patients are proficient in understanding the pathophysiology and treatment of a stroke to preserve maximal function of the brain and promote a full recovery. It is also crucial that providers are aware of risk factors for stroke, events leading up to an ischemic injury, and the events that follow an ischemic injury.

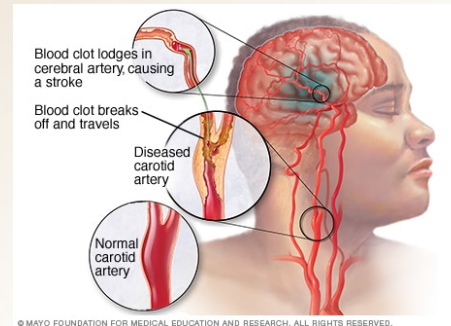


Figure 1. Ischemic Stroke. Retrieved from <https://www.mayoclinic.org/diseases-conditions/stroke/symptoms-causes/syc-20350113>

## Presentation of Case/Process

A fifty-one year old male presents to the emergency department at 1300 with complaints of left sided weakness, left facial droop, slurred speech, dizziness, and tingling in the left arm. Patient's wife relays that she first noticed her husband's speech was "slightly off" around 1145 and then symptoms rapidly progressed. Patient has a past medical history of hypertension, type II diabetes mellitus, asthma, migraines, and cholecystectomy. Pt is also a 1.5 pack per day smoker for 25 years. The providers order a CBC, CMP, troponin, PT/INR, POC glucose, EKG, and a CT of the head without contrast. The nurse caring for the patient completes neuro checks and vital signs every 15 minutes to carefully monitor for any change in patient status. The radiologist calls to the provider with critical results showing a right sided middle cerebral artery (MCA) occlusion. With the patient being in the 6-hour window from symptom onset, the ED and the neurology providers discuss the benefits and risks of administering tPA with the patient and his wife. Contraindications for tPA are also taken into consideration. After thorough discussion, the patient agrees to tPA administration and the patient is quickly transferred to a stroke unit.

## Implications for Nursing Care

- It is detrimental that healthcare providers are able to rapidly recognize the signs and symptoms of an ischemic stroke.
- Testing and diagnosis must be performed immediately to preserve as much brain tissue as possible so nursing staff involvement to carry out testing is crucial.
- As soon as ischemia is detected, a thorough history and physical exam must be completed.
- Simultaneously, numerous tests ordered by the provider must be initiated immediately in order to make a diagnosis and begin treatment as quick as possible.
- After the diagnosis of ischemic stroke, intensive care nursing staff must closely monitor the patients blood pressure, oxygen saturation, body temperature, blood glucose, and neurological status (Hamzah, Airlangga, Machin, & Rehata, 2019, p. 131).
- Understanding the pathophysiologic process involved in ischemic stroke allows the nurse and healthcare providers to identify the most appropriate treatment options as well as contraindications; this deeper understanding also permits healthcare providers to anticipate possible complications during stroke recovery
- After recovery following an ischemic event, the nurse can be given the opportunity to educate the patient and family on prevention methods and strategies for the future

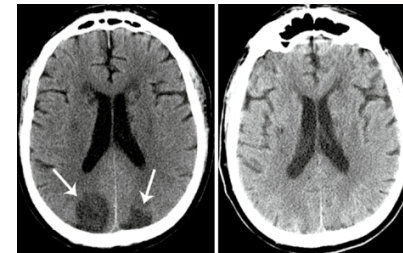


Figure 3. 36hrs post ischemic stroke (left). 18 days post ischemic stroke (right). Retrieved from <https://teddybrain.wordpress.com/2013/02/11/time-course-of-ischemic-stroke-on-non-enhanced-ct/>

## Conclusion

Ischemic stroke is a disease that affects many individuals worldwide and if it is not recognized early, the prognosis can be extremely poor and result in death. With the advancements in healthcare and technology, we have been able to reduce the mortality rate drastically over the last few decades. Between the years 1995 to 2005, the mortality rate for stroke patients decreased by approximately 30 percent (Stroke Center, n.d.). Continuous education and research is needed to discover additional medications and interventions to prevent and treat ischemic strokes.

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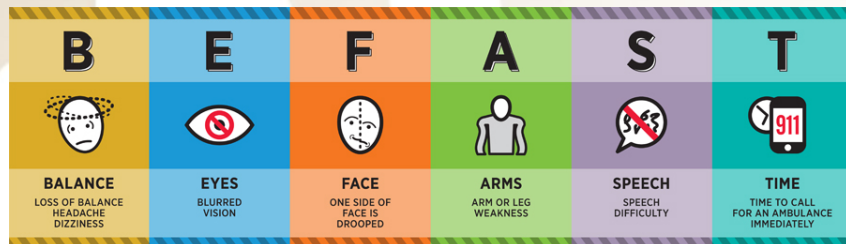


Figure 2. BE FAST Mnemonic. Retrieved from <https://bonsecours.com/richmond/our-services/neuroscience/conditions/stroke-and-aneurysm/be-fast-to-prevent-stroke-damage>