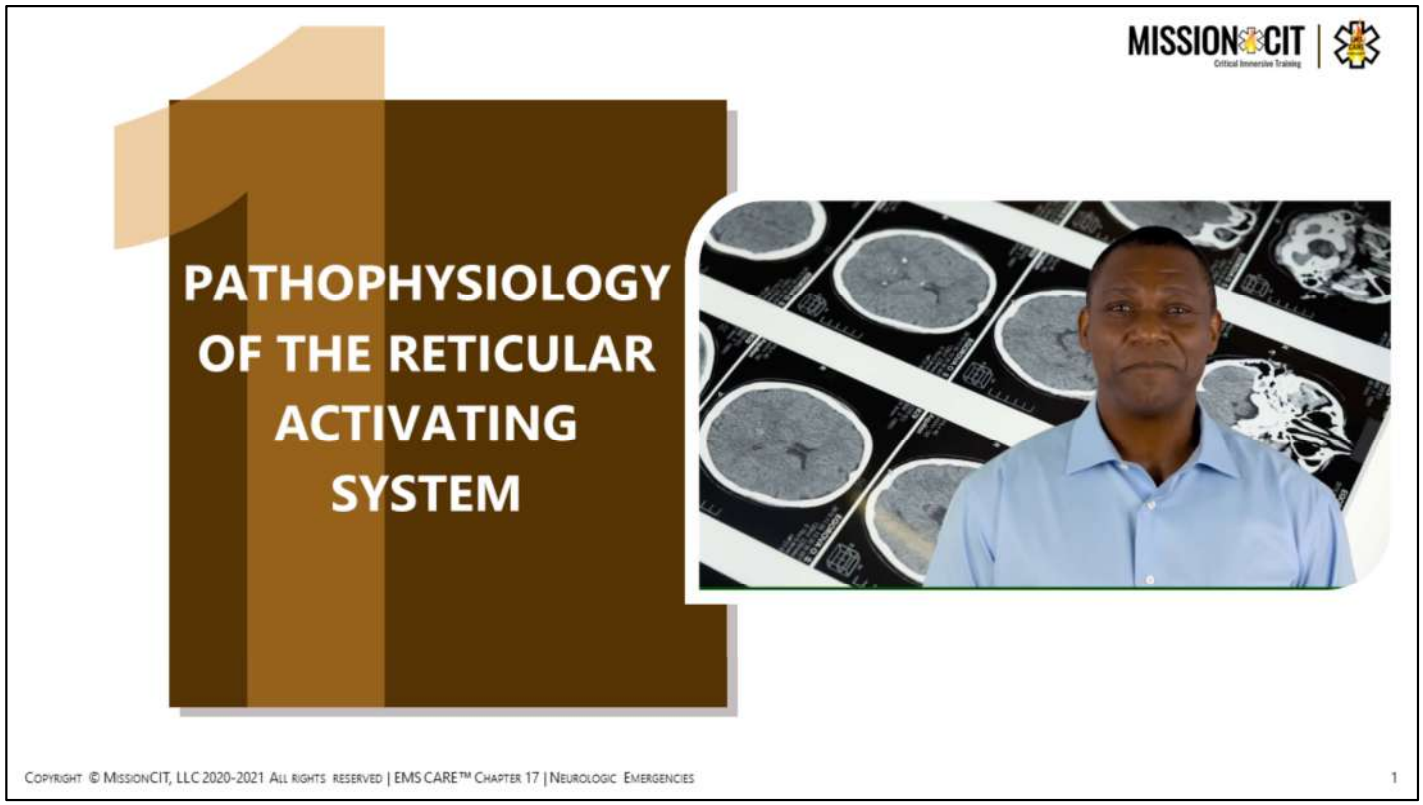
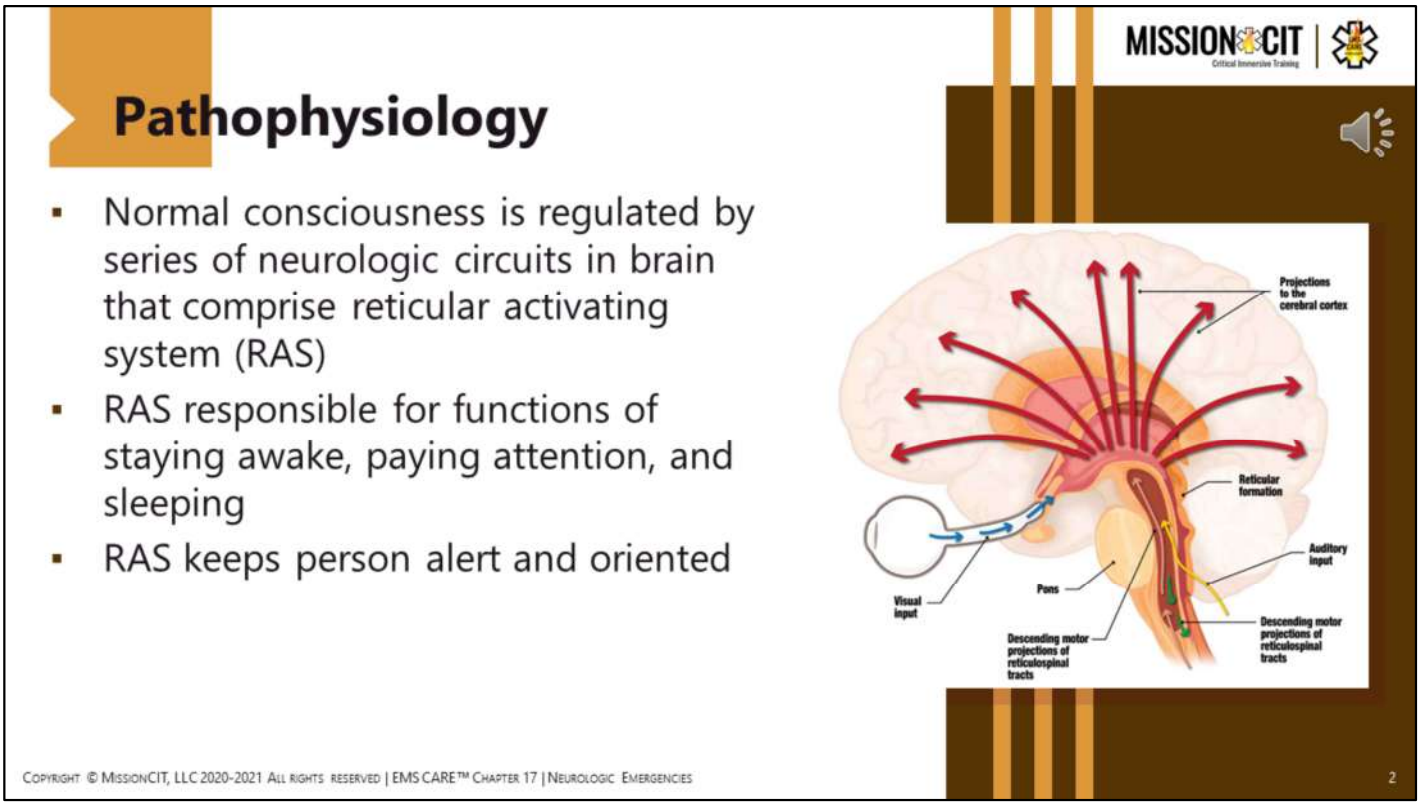


Now, we will begin with the Pathophysiology of the Brain, that affects Altered Mental Status. We will review the general requirements of brain tissue in the context of metabolism. Be sure you understand the reticular activating system's effect on consciousness. And be cognizant of how different conditions ranging from diabetes, to sepsis, to stroke, may affect the brain's neurologic circuits.
Note that this section is foundational for what you are about to learn.

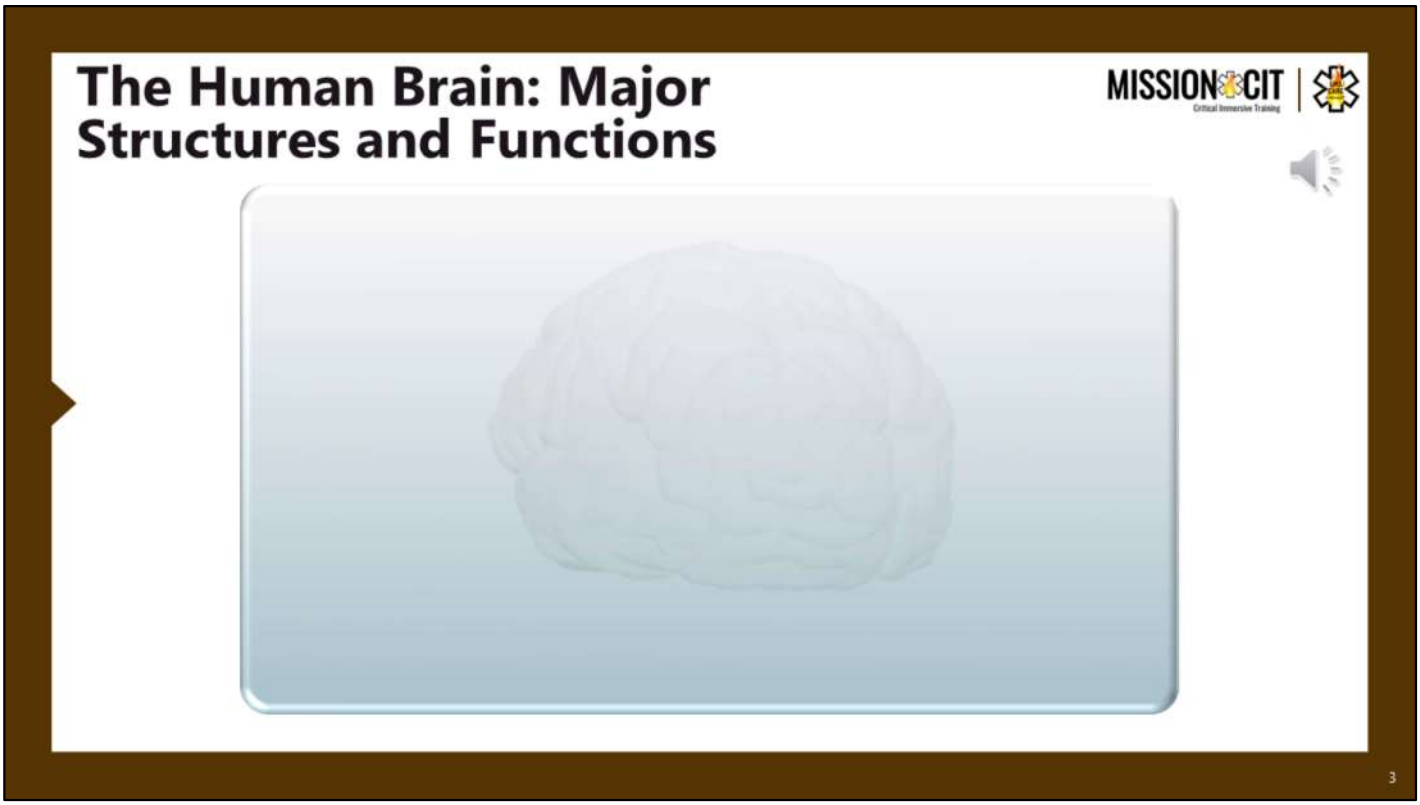


The reticular activating system is a short, pencil-sized piece of the brain, located just above where the spinal cord is attached to the brain. It acts as the gatekeeper of information between most sensory systems, and the conscious mind.

Normal consciousness is regulated by a series of neurologic circuits in the brain that comprise the reticular activating system (RAS). The RAS is responsible for the functions of staying awake, paying attention, and sleeping. And the reticular activating system keeps a person alert and oriented.

The RAS is made up of a network of neurons extending from the top of the spinal cord up to the thalamus. It filters incoming sensory stimuli and redirects them to the cerebral cortex. Its functions include, activating the cortex and influencing our state of physiological arousal and alertness.

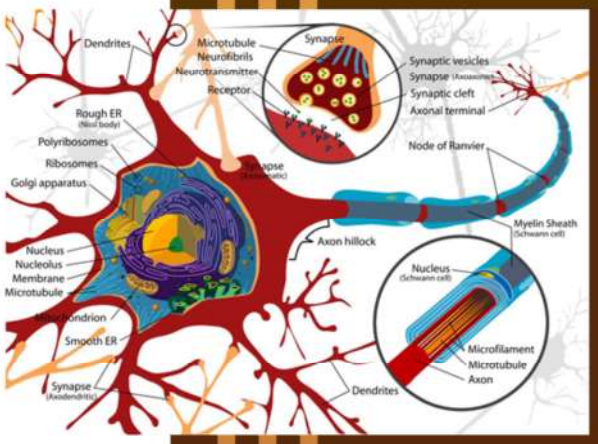
The National Institute of Health (NIH) describes the RAS as a component of the reticular formation, found in the anterior-most segment of the brainstem. The reticular formation receives input from the spinal cord, sensory pathways, thalamus, and cortex and has efferent connections throughout the nervous system.



Watch this video from the National Institute on Drug Abuse (NIDA) to know about the major structures and functions of the human brain.

Requirements for the Brain Tissue of the RAS to Function

- Oxygen to perfuse the brain tissue
- Glucose to nourish the brain tissue
- Water to keep the brain tissue hydrated

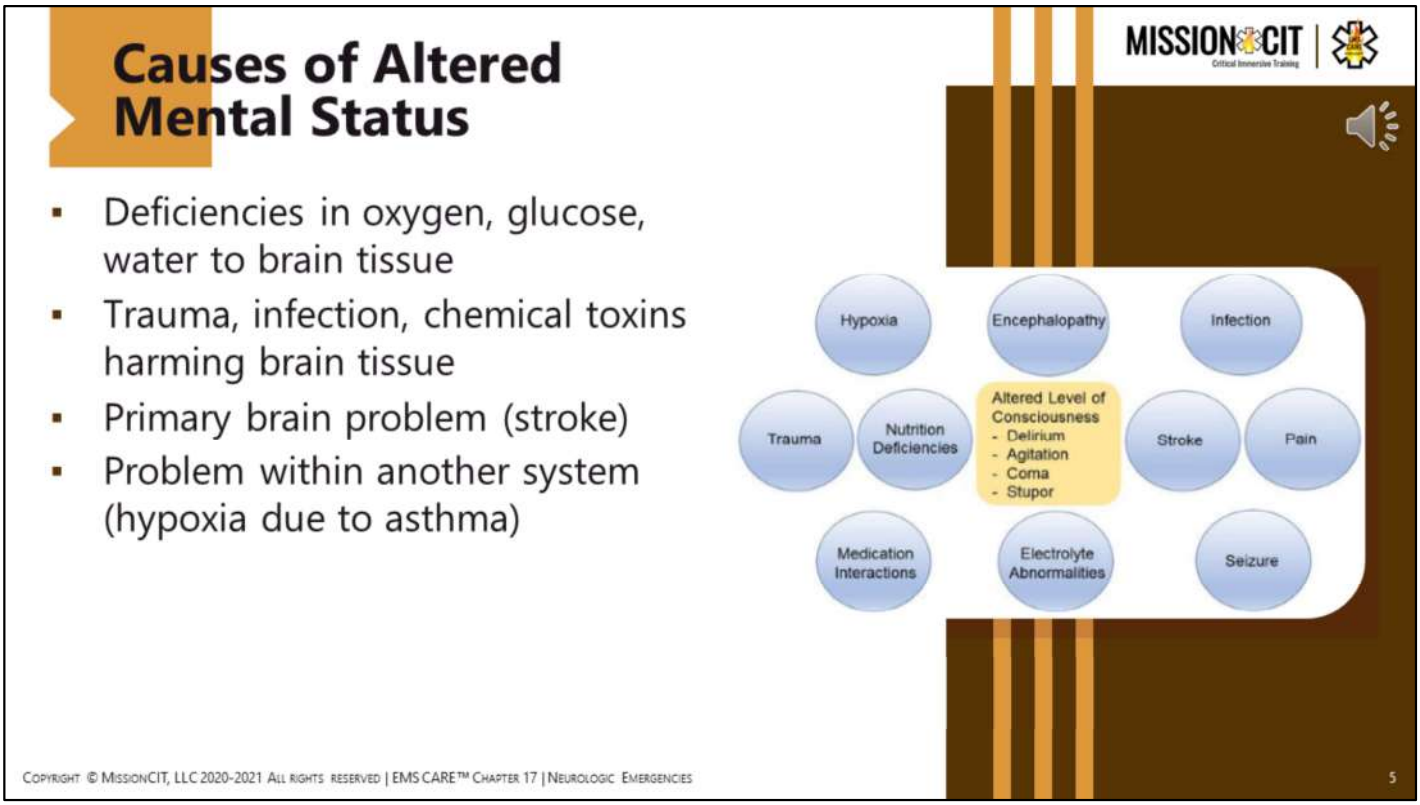


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Brain tissue requires a constant supply of oxygen, glucose, and water to perform its required functions. Oxygen is required to perfuse brain tissue. While glucose is needed to nourish the tissue. In addition, water must be present to keep the brain tissue hydrated.

Hence, brain tissue requires a constant supply of oxygen, glucose, and water to perform its required functions.

The diagram on this slide illustrates the many functions that the brains cells perform.



So, what happens if due to disease or trauma, the reticular activating system is negatively impacted. The RAS is part of the brain's reticular formation which consists of more than 100 small neural networks.

Descending fibers from the reticular formation to the spinal cord regulate the perception of pain, breathing, and muscular reflexes. It controls an individual's levels of wakefulness, enables people to pay attention to their environments, and is involved in sleep patterns.

However, adverse changes to these fibers may result in a coma, stupor, agitation or delirium.

So, Deficiencies in oxygen, glucose, or water to the brain tissue may cause an altered mental status in the patient. Any of the following may result in one of these deficiencies:

- Trauma, infection, chemical toxins harming brain tissue; or
- A Primary brain problem such as a stroke or external trauma; or it could be caused by
- A Problem within another system, such as hypoxia due to asthma.

Hence, when we encounter a patient with an altered mental status, our assessment must be aware of possible underlying causes.