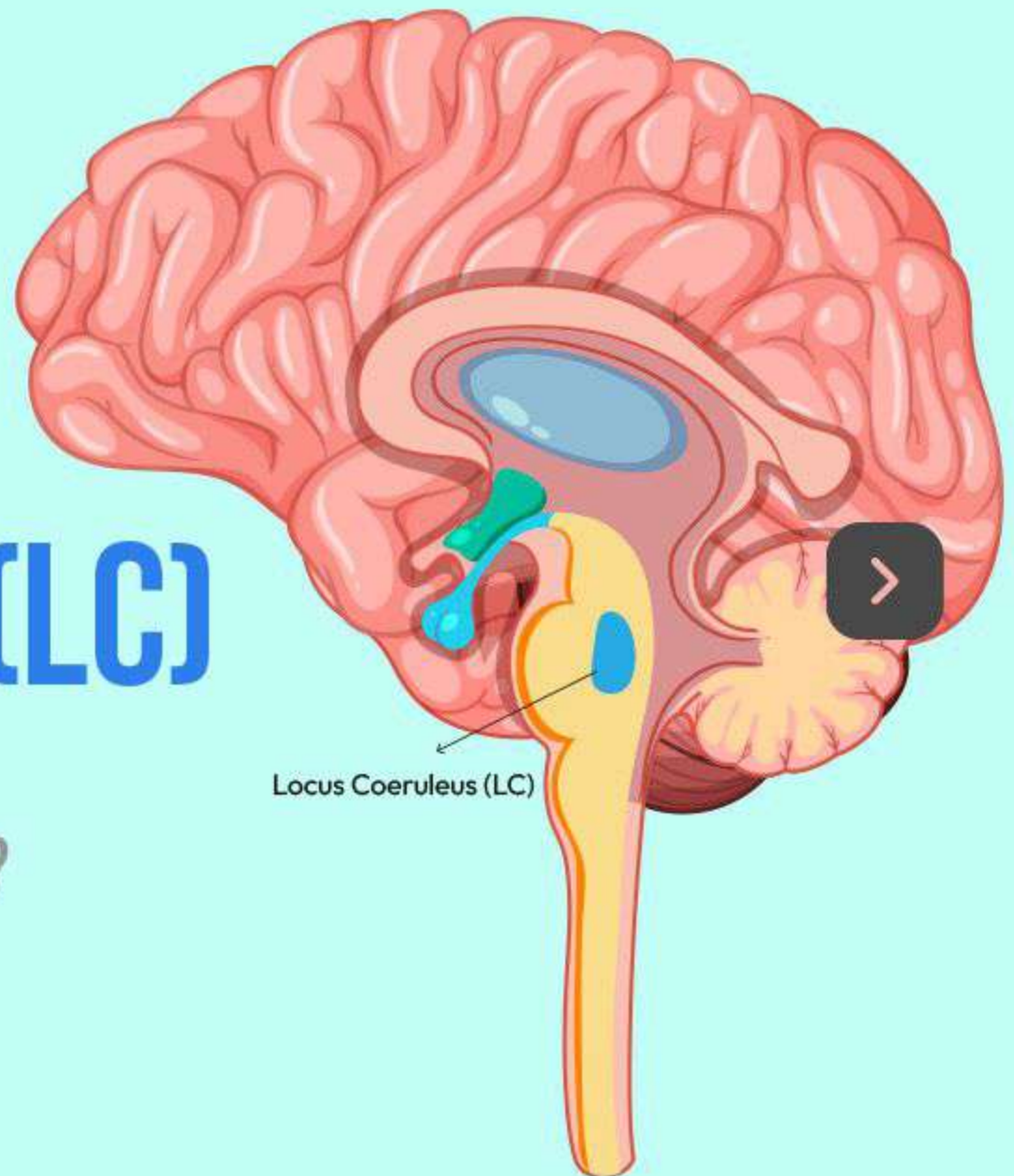


LOCUS COERULEUS (LC)

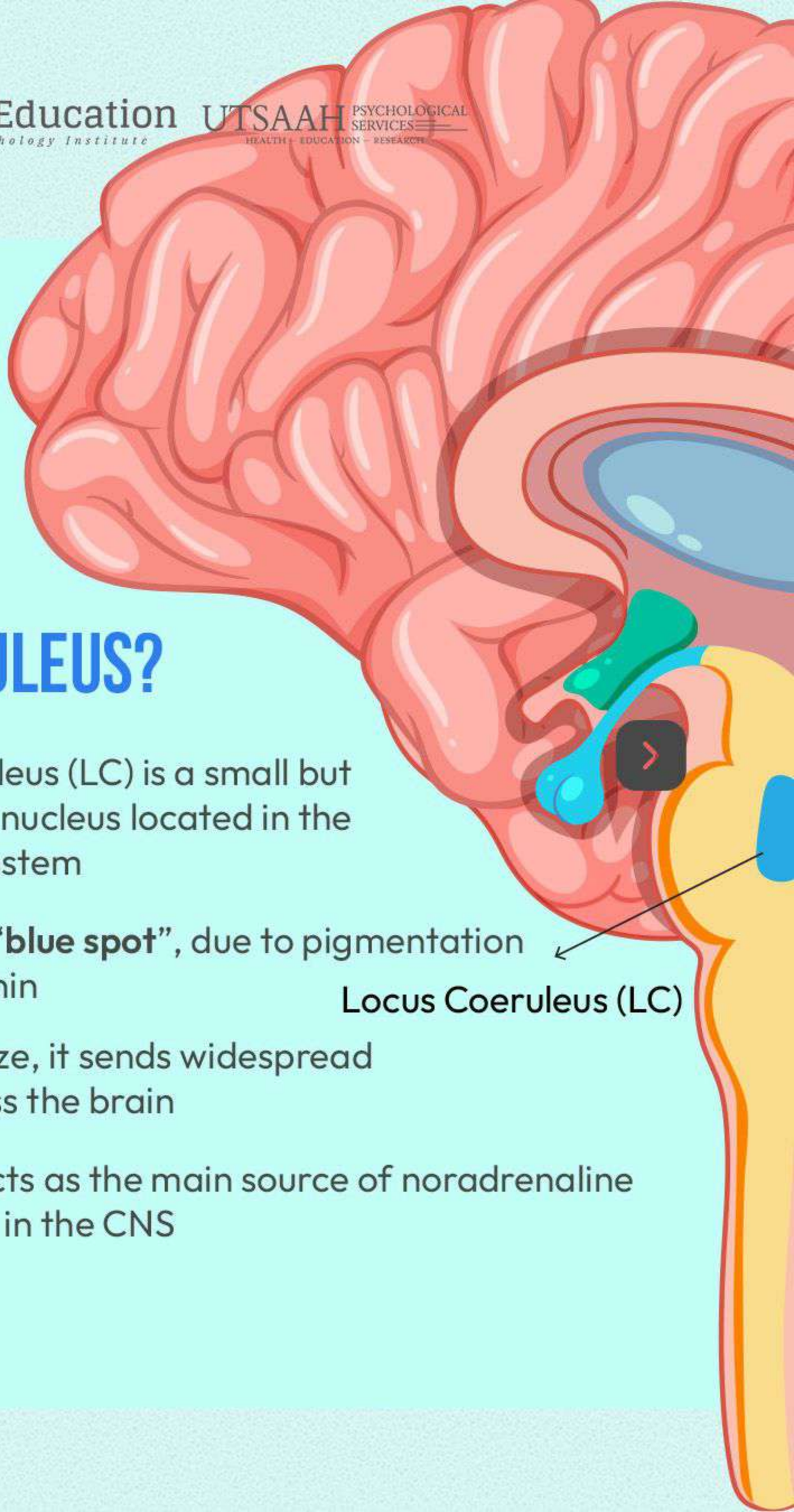
WHAT'S THIS TINY **BLUE SPOT**
IN YOUR BRAIN ACTUALLY DOING?



WHAT IS THE LOCUS COERULEUS?

- ❑ The Locus Coeruleus (LC) is a small but highly influential nucleus located in the pons of the brainstem
- ❑ Its name means “**blue spot**”, due to pigmentation from neuromelanin
- ❑ Despite its tiny size, it sends widespread projections across the brain
- ❑ Functionally, it acts as the main source of noradrenaline (norepinephrine) in the CNS

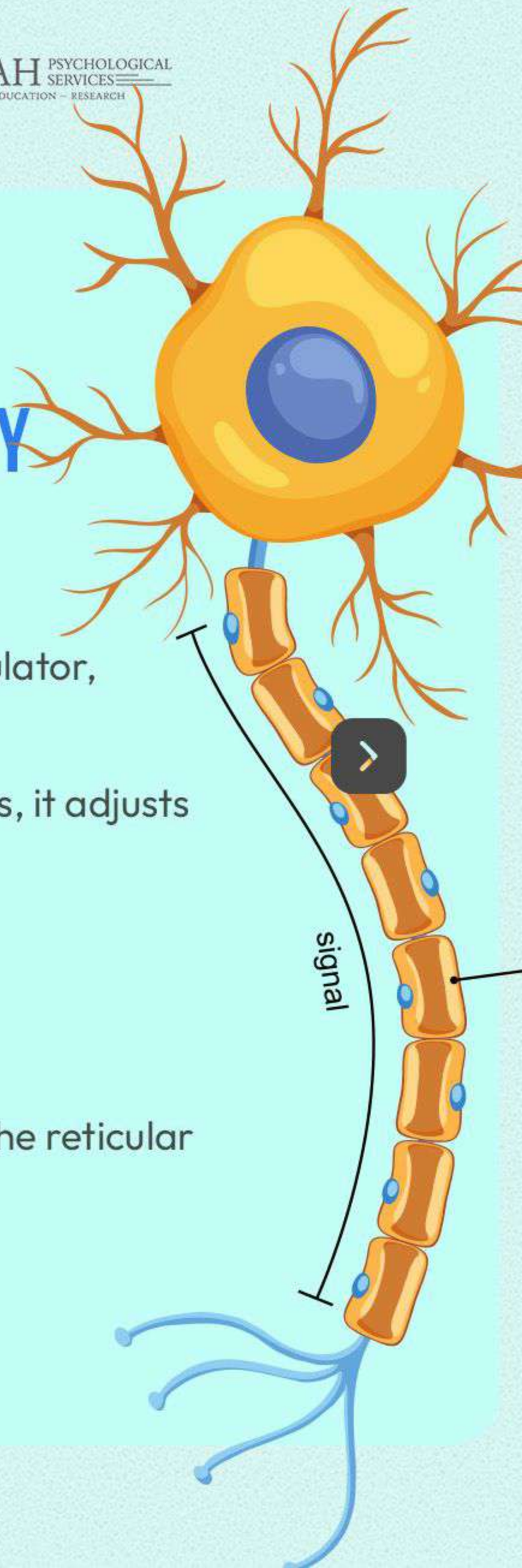
Locus Coeruleus (LC)



NEUROCHEMICAL IDENTITY

- ☑ LC neurons are noradrenergic
- ☑ Noradrenaline acts as a neuromodulator, not just a fast synaptic transmitter
- ☑ Instead of triggering specific actions, it adjusts brain states:
 - Alertness
 - Vigilance
 - Responsiveness to stimuli

Closely linked to arousal systems and the reticular activating system

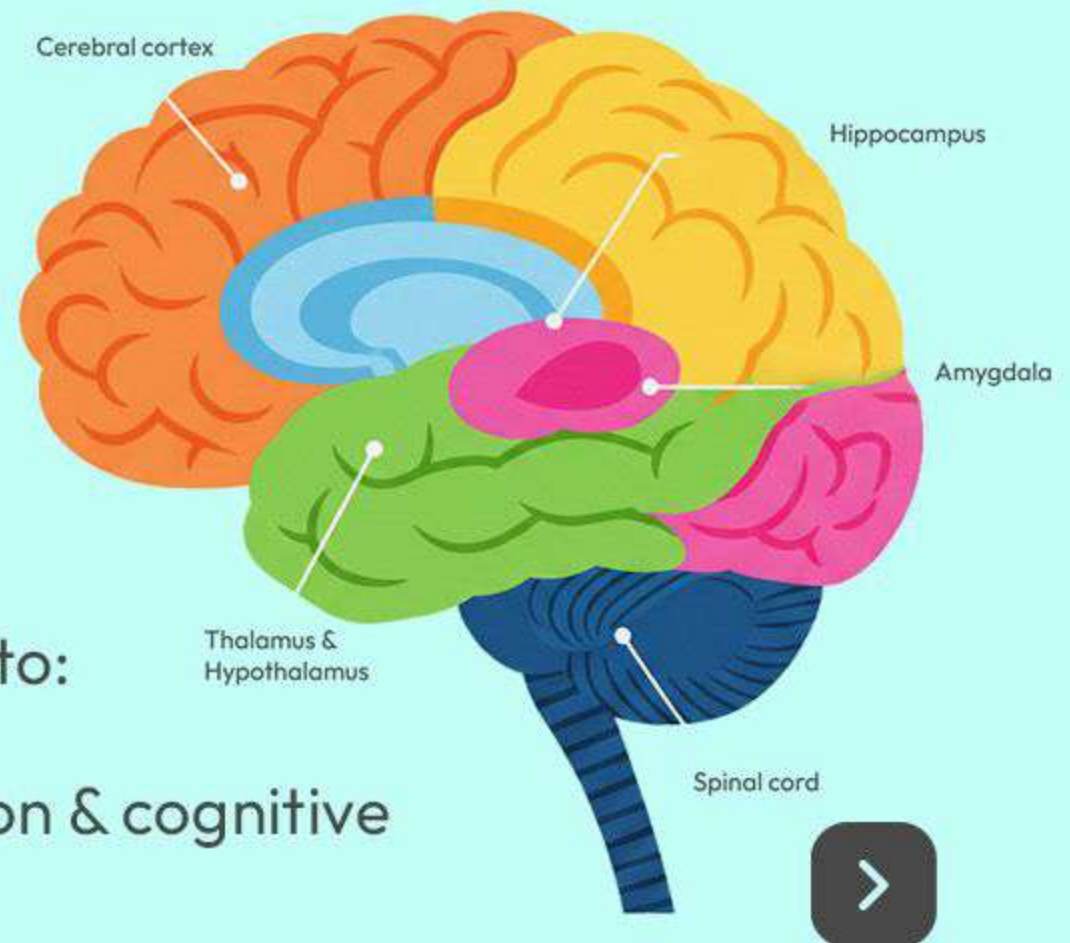


MAJOR BRAIN CONNECTIONS

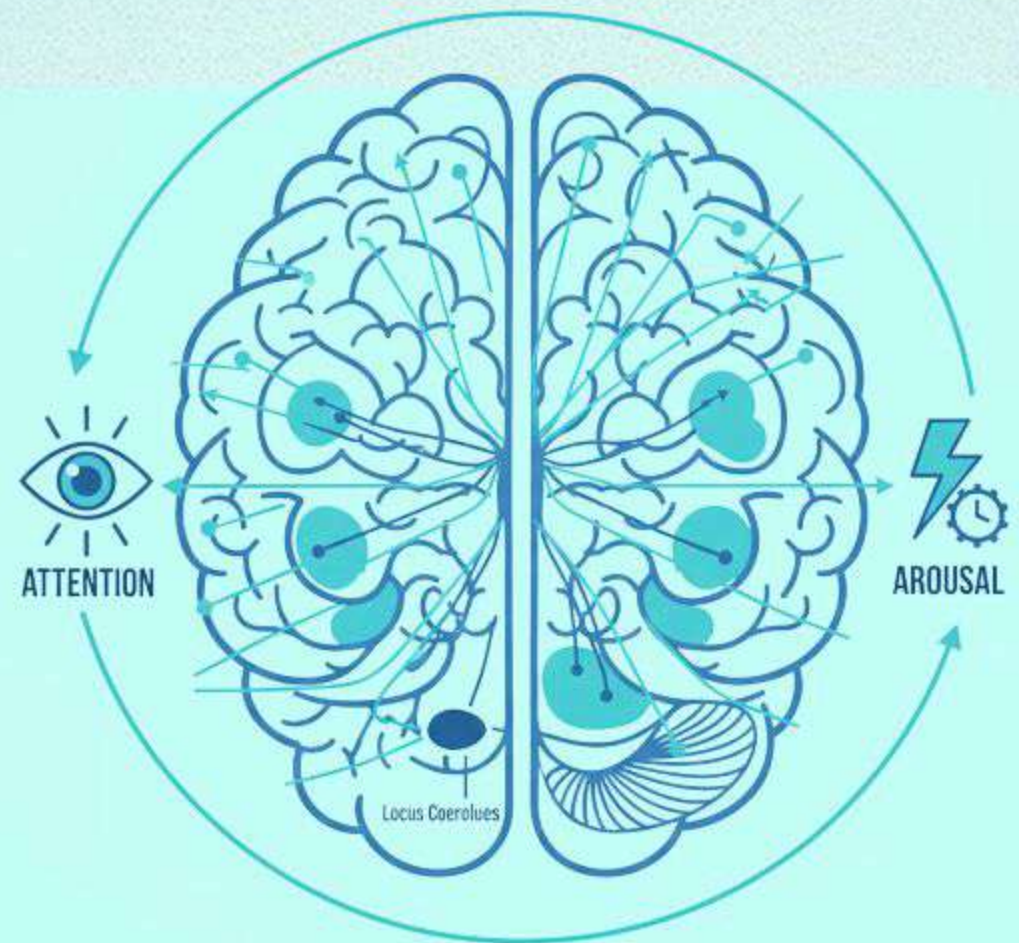
The Locus Coeruleus projects to:

- ☑ **Cerebral cortex** → attention & cognitive flexibility
- ☑ **Hippocampus** → memory consolidation
- ☑ **Amygdala** → emotional salience & fear
- ☑ **Thalamus & hypothalamus** → arousal & autonomic control
- ☑ **Spinal cord** → pain modulation

Closely linked to arousal systems and the reticular activating system



ROLE IN AROUSAL & ATTENTION



- ☑ LC firing rate changes with behavioral state:
 - Low during sleep
 - Moderate during focused attention
 - High during stress or novelty
- ☑ Helps shift the brain from drowsy → alert
- ☑ Optimizes the signal-to-noise ratio in sensory processing

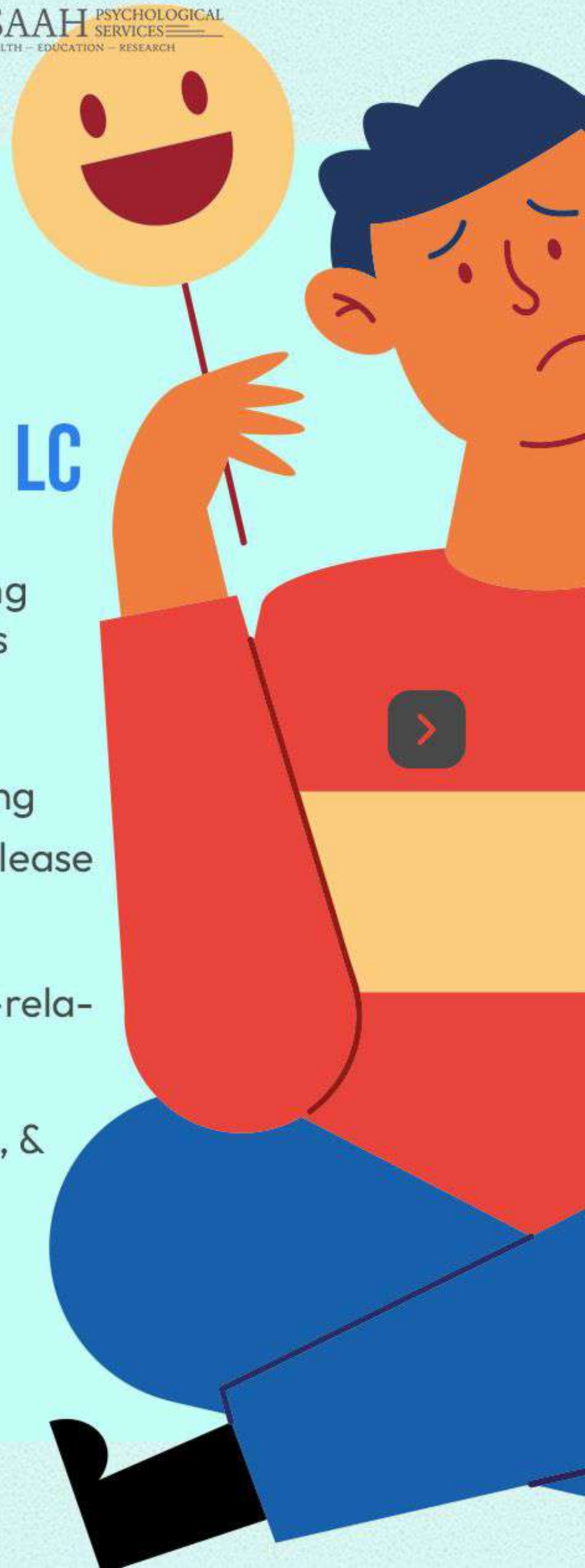


This is why LC is central to selective and sustained attention

STRESS, EMOTION & THE LC

- ☑ The LC is strongly activated during stressful or threatening situations
- ☑ It interacts with:
 - Amygdala → emotional tagging
 - HPA axis → stress hormone release
- ☑ Acute activation = adaptive
- ☑ Chronic overactivation = anxiety-related disorders

Frequently linked with anxiety, PTSD, & hypervigilance





LET'S TEST YOUR LEARNING WITH THIS QUICK FAQ



QUES. Damage to the Locus Coeruleus is MOST likely to impair:

A Procedural memory

B Sustained attention and arousal regulation

C Language comprehension

D Motor coordination

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