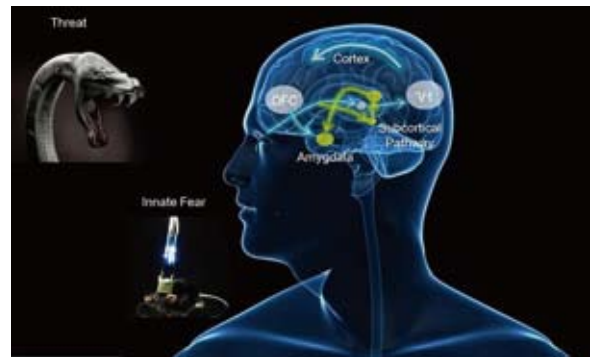


Scientists Reveal Brain Pathway That Mediates Innate Fear

A fundamental question in the fields of neuroscience and cognition science is: how the brain works for sensing, processing and handling the information from external stimulus, especially for emotion-laden stimuli. For the purpose of sustaining life, an animal has as one of its basic abilities to detect the “biological significance” of affective stimuli and decide to approach or avoid from it. More specifically, detection and reaction of an unexpected salient stimuli, especially of potential danger or emergency in the natural environment, is crucial for human and animal’s survival. However, the brain mechanisms underlying these general behavioral phenomena remain largely unclear.

In a recent work published in *Nature Communications*, Dr. WEI Pengfei and his colleagues, led by Prof. WANG Liping at the Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences reported a non-canonical, subcortical circuitry underlying defensive behaviors elicited by predator-like visual stimuli in mice. They first identified a sub-population of neurons in the medial region of the intermediate layers of the superior colliculus (ILSCm) that mediates the innate defensive response of mice to overhead looming stimuli. Then, they optogenetically dissected a subcortical pathway from the glutamatergic projecting neurons in the ILSCm to the lateral posterior nucleus of the thalamus (LP), which can be activated to innately initiate stereotyped long-lasting freezing behaviors. Retrograde trans-synaptic viral tracer labeling revealed that the LP serves as a key intermediate relay between the ILSCm



The schematic diagram of the subcortical visual and emotion processing pathway in the brain.

and the lateral amygdala (LA). Furthermore, they showed that the sustained network activation of the LA mediates the expression of the ILSCm-induced innate fear-related defensive behaviors.

For the first time, the researchers found the unrevealed role of this subcortical circuit on processing visually evoked innate defense responses, and this pathway very specifically encodes a stereotyped unlearned fear-like freezing behavior. Furthermore, the current study on the subcortical innate fear circuit in rodents may lead to new implications regarding the circuit mechanisms that underlie mental disorders in humans.

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