



THE NEUROBIOLOGY OF PTSD

THE ROLE OF THE AMYGDALA, HIPPOCAMPUS, AND PREFRONTAL CORTEX IN POST-TRAUMATIC STRESS DISORDER

Post-traumatic stress disorder (PTSD) is a debilitating mental disorder that has been associated with considerable alterations in a variety of brain regions and connecting circuits. This paper evaluates the alterations observed in three major brain structures, i.e., the amygdala, hippocampus, and prefrontal cortex, and by investigating their connection to the observed symptomatology offers a crucial insight into the neurobiological underpinnings of the disorder.

WHAT ARE THE NEUROBIOLOGICAL UNDERPINNINGS OF PTSD CONCERNING THE AMYGDALA, HIPPOCAMPUS AND PREFRONTAL CORTEX, AND HOW ARE THEY RELATED TO THE SYMPTOMATOLOGY OF THE DISORDER?

PROCEDURE

- Research on topic by reading numerous studies and books
- Limitation of topic with the help of a discussion with an expert
- Interviews with two experts and a patient with PTSD
- > Writing of paper with combination of these resources

WHAT IS PTSD?

PTSD is a mental disorder that develops after experiencing a traumatic or stressful event, and is characterised by a variety of symptoms. Of the patients grappling with the disorder, many have difficulties in coping with daily life and are often unable to work in a traditional working environment.

traumatic/stressful event
 - physical/sexual abuse
 - natural/man-made disasters
 - combat
 - etc.

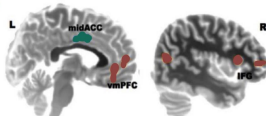
failure to process event
 resulting in prolonged
 stress response

PTSD arises, distinguished
 by four clusters of symptoms
 - intrusion
 - avoidance
 - hyperarousal
 - cognitive impairment

PREFRONTAL CORTEX

central to emotional regulation and inhibition of stress response, seat of executive function

- alterations: hypoactivity, volumetric loss
 -> failure to regulate emotion
 -> failure to inhibit stress response
 -> decrease in performance of executive functions

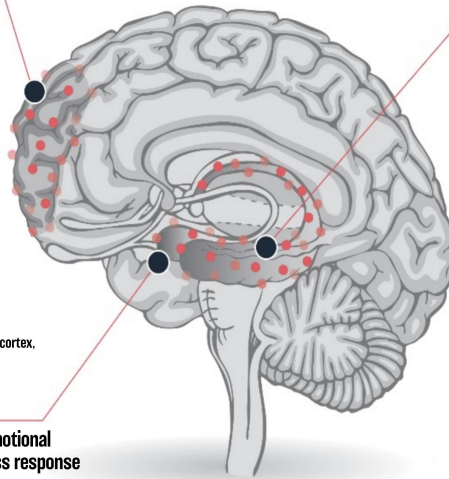


The areas marked in red, such as part of the prefrontal cortex, are distinguished by a hypoactivity in PTSD.

AMYGDALA

centre for emotional responses, formation of emotional memory, threat detection and activation of stress response

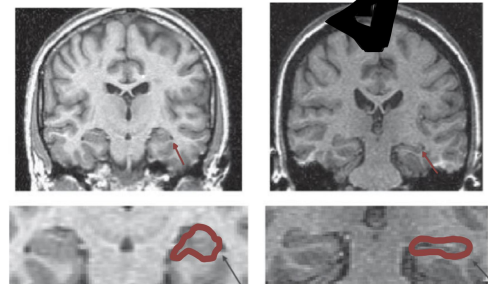
- alteration: hyperactivity (inconsistency in findings!)
 -> hyperarousal = exaggerated stress response
 -> hypervigilance = increased responsiveness to threat
 -> increased formation of emotional memory



HIPPOCAMPUS

central to learning and memory processes

- > contextualizes + activates memory
 alterations: volumetric loss
 -> failure to contextualize memory
 -> memory stored as fragments, not autobiographical memory
 -> memory becomes highly triggering!



HEALTHY

PTSD

This figure compares the volume of the hippocampus in healthy individuals compared to those with PTSD, marking a significant volumetric loss in the hippocampus of PTSD patients.

- > Role of the amygdala becomes predominant
- > Failure to inhibit emotional responses leading to hyperarousal and -vigilance
- > Failure to contextualize memory and increased consolidation over the amygdala leading to highly triggering memories
- > **INDIVIDUALS HIGHLY EXPOSED TO EMOTIONS AS THEY CANNOT PROPERLY REGULATE THEM**