Background: While most individuals are resilient in the aftermath of trauma, a substantial minority go on to develop post-traumatic stress disorder (PTSD). Previous work indicates white matter integrity may be a useful biomarker in predicting PTSD. Specifically, the integrity of the cingulum bundle, corpus callosum (CC), and uncinate fasciculus (UF) may be related to negative trauma outcomes. Therefore, the current study investigated the predictive utility of white matter integrity in the acute stages of trauma to chronic PTSD symptoms and examined how white matter integrity varies with PTSD symptoms over time.
Methods: Fifty-seven trauma survivors (27 male; Mage=31.67) were recruited from the emergency department at Froedtert Hospital (Milwaukee, WI). Participants completed the PCL-5 to assess severity of PTSD symptoms and underwent diffusion-weighted MRI 2 weeks (T1) and 6 months (T2) post-trauma. Tract integrity measures of the three aforementioned tracts were analyzed using FreeSurfer's TRACULA.
Results: Results show increased integrity of the anterior cingulum and UF at T1 is related to greater reexperiencing (t=2.63, p=0.01) and arousal symptoms at T2 (t=2.36, p=0.02), respectively. In addition, increased integrity of the CC from T1 to T2 was related to decreased total PTSD symptoms (t=-2.61, p=0.01), and more specifically, decreased cognitive (t=-2.37, p=0.02) and arousal symptom severity (t=-2.89, p=0.005). Increased integrity of the posterior cingulum over time was also related to increased arousal symptom severity (t=-2.69, p=0.01).
Conclusions: Results of this study help elucidate the structural brain changes related to PTSD and may provide a potential biomarker for clinicians to help identify those at risk for PTSD development.
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Keywords: PTSD, Diffusion Tensor Imaging (DTI), Trauma, White Matter Integrity

T31. Amygdala and Hippocampal Activation to Conditioned Stimuli During Extinction Following Threat Avoidance

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Background: Models of anxiety suggest that avoidance of a conditioned fear stimulus prevents new safety learning, thereby serving to maintain fear. However, there is little empirical data in humans on the impact of avoidance of conditioned fear stimuli on subsequent fear extinction. Functional magnetic resonance imaging (fMRI) studies in humans have implicated the amygdala and hippocampus in the extinction of fear through classical conditioning paradigms. In the present study we investigated the effect of avoidance of threat on amygdala and hippocampus activity during a subsequent extinction phase using ultra high-resolution (7T) fMRI.
Methods: 29 undergraduate participants completed a classical conditioning task, followed by either avoidance of threat (N=15) or a non-avoidance control (N=14). To investigate the impact of avoidance on subsequent fear extinction, we compared BOLD activation evoked by the conditioned stimulus (CS+) during extinction in the avoidance vs. non-avoidance groups.
Results: There was a significant effect of avoidance of threat, such that participants who were previously able to avoid the shock associated with the CS+ showed reduced activation in the central amygdala and hippocampus (ps<.05) in response to the CS+ during extinction compared to those who did not receive the instruction to avoid the CS+.
Conclusions: These findings suggest that avoidance of threat may be associated with attenuation of activity in the central amygdala and hippocampus during extinction. This may represent preliminary evidence of a mechanism through which avoidance of threat interferes with subsequent extinction learning.
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Keywords: Avoidance, Fear Extinction, BOLD Functional MRI

T32. Characterizing the Cardiovascular Response to Fear Extinction in PTSD

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Background: Posttraumatic stress disorder (PTSD) is a highly impairing condition that negatively impacts cardiovascular functioning. While there is a known association between PTSD and cardiovascular risk, little is known about underlying physiological mechanisms. Fear extinction is a well-established biomarker that is impaired in PTSD, and fear conditioning paradigms are a highly useful way to examine this phenomenon. Thus, the current study used fear conditioning to probe the cardiovascular response to extinction among individuals with PTSD.
Methods: Participants were 51 trauma-exposed adults with significant PTSD symptoms. All participants underwent a fear conditioning paradigm that included an extinction phase, during which heart rate (HR) was collected. We examined HR in response to the danger signal (over 6 seconds of conditioned stimulus presentation) that was previously paired with an aversive unconditioned stimulus.
Results: For HR across 6 seconds, there were significant quadratic effects ($F[1,50] = 18.83$, $p < .001$). Consistent with a typical fear response,.5-2s after stimulus onset, there was a pattern of HR deceleration during early extinction. When comparing early vs. late extinction, there was a significant interaction for the HR response, in that the deceleration diminished over the course of extinction ($F[1,50] = 25.22$, $p < .001$).
Conclusions: This is the first study examining the cardiovascular response and heart rate dynamics to fear extinction in PTSD. Consistent with prior research, HR initially decelerated, and this decreased over the course of extinction. Future studies will determine whether cardiovascular markers of fear