Sympathetic hyper-reactivity measures following trauma as predictors of stress vulnerability and resilience

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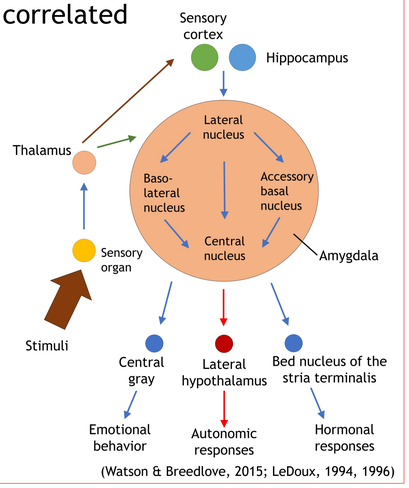
Background

- Early identification of Post Traumatic Stress Disorder (PTSD) biomarkers is necessary to optimize targeting of individuals more prone to develop PTSD post-trauma.
- Heightened skin conductance response (SCR) and amygdala hyperactivity using fMRI are both highly correlated with chronic PTSD.
- Both amygdala reactivity and SCR collected early post-trauma individually predict future PTSD.
- It is unclear whether early collection of SCR (hours after trauma exposure) identifies the same set of at-risk individuals who will show amygdala hyperactivity in the early weeks following the trauma.

Hypothesis: Skin conductance response collected shortly following trauma will be positively correlated with amygdala reactivity 2 weeks post-trauma.



(Watson & Breedlove, 2015; LeDoux, 1994, 1996)

Methods

Participants

- Part of larger, multisite study, AURORA (n=1,618). N=244 Subjects w/ fMRI data, 46 dropped for fMRI quality control, 76 without good SCR data. 13 dropped as SCR non-responders.
- N=108 Participants (69 Female, Ave. Age = 32) recruited within 72 hours of a traumatic event from the Emergency Department (ED).

Measures

fMRI
- Collected two weeks post-trauma.
- Fearful vs. neutral faces task.
- Whole amygdala as well as basolateral amygdala **(BLA)** and central amygdala **(CeA)** nuclei ROIs analyzed.

PTSD Checklist for DSM-5 (PCL-5)
- Self-report measure of PTSD symptoms.
- Collected 3-months post-trauma

Skin Conductance Response to Trauma Challenge (SCR)
- Collected during initial ED assessment.
- Mindfield eSense on Mobile Tablet.
- Baseline SC and Max SC collected, and % Increase from Baseline calculated.

Results

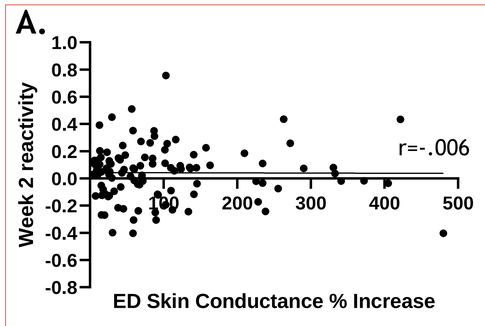
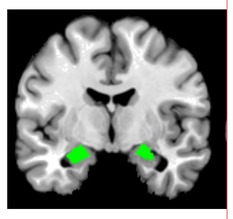


Figure 1. Left (A) and right BLA (B) reactivity and Skin Conductance Response. SCR was not correlated with fMRI responses to threat (Fear>Neutral) in the left BLA (p>.05) or right BLA (p>.05).



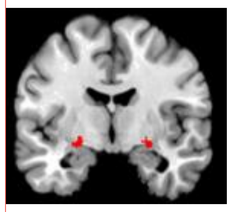
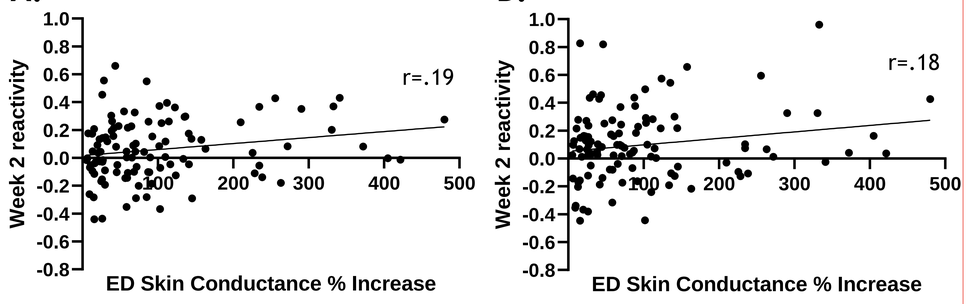


Figure 2. Left (A) and right CeA (B) reactivity and Skin Conductance Response. SCR was positively correlated with fMRI responses to threat (Fear>Neutral) in the left CeA (r=.19, *p=.03), but not right CeA (p =.06).



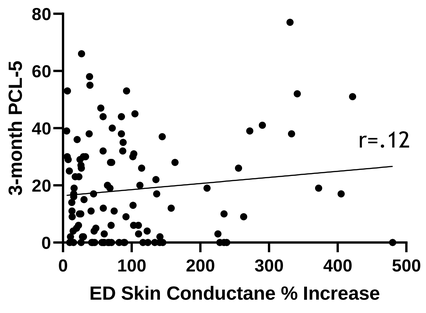


Figure 3. PCL-5 and Skin Conductance Response. SCR was not correlated with PCL-5 (p>.05)

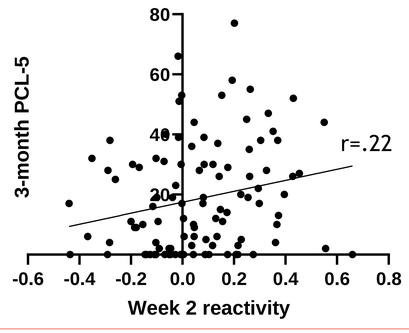


Figure 4. PCL-5 and Left CeA. PCL-5 scores were positively correlated with fMRI responses to threat (Fear>Neutral) in the left CeA (r=.22, *p=.02) but not other ROIs (p>.05)

Conclusions

- ED SCR predicted 2-Week threat hyper-reactivity in left CeA; 2-Week left CeA reactivity then predicted PTSD symptom severity 3-months post-trauma. This supports SCR as a biomarker of heightened fear response.
- SCR during trauma interviews may provide an inexpensive and non-invasive peripheral marker correlating with individual differences in amygdala reactivity.
- Future analyses will allow for assessment of skin conductance and amygdala hyperactivity correlation with PCL-5 scores at later time points and other demographic variables, such as gender and socioeconomic status.

Acknowledgements: This research was funded by NIMH (U01 MH110925) as part of the AURORA study.