Glial Fibrillary Acidic Protein (GFAP) is Associated with Sympathetic Nervous System (SNS) Hyperactivation in an Acutely Trauma Exposed Population

AC Conti[1], T Jovanovic[1], SD Norrholm[1], A Seligowski[2], OM Holmes[3], TC Neylan[4], GD Clifford[5], SD Linnstaedt[6], JS Stevens[7], SL House[8], KJ Ressler[9], RC Kessler[10], X An[6], SA McLean[3]

[1]Dept of Psychiatry and Behavioral Neurosciences, Wayne State University, [2]Massachusetts General Hospital, Harvard University, [3]Dept of Psychiatry, University of North Carolina, [4]Dept of Psychiatry, University of California, San Francisco, [5]Dept of Biomedical Informatics, Emory University, [6]Dept of Anesthesiology, University of North Carolina, [7]Dept of Psychiatry and Behavioral Sciences, Emory University, [8]Dept of Emergency Medicine, Washington University in St. Louis, [9]Department of Psychiatry, McLean Hospital, Harvard University, and [10]Dept of Health Care Policy, Harvard University

WAYNE STATE School of Medicine

D²ISENTANGLE

D²ISENTANGLE Discovering DIagnostics, SubtypEs, and NaTurAl history of traumatic brain iNjury (TBI) vs. non-TBI Recovery to Gain MiLitary advantagE

AURORA

BACKGROUND

- TBI and stress exposure/stress system activation cause acute and persistent somatic and stress symptoms
- Sympathetic nervous system (SNS) activation is positively correlated with posttraumatic stress disorder (PTSD) and anxiety
- Challenges with identifying individuals with TBI, and separating out the influence of TBI from other factors on adverse outcomes after trauma exposure, have limited the identification of vulnerability to acute symptoms and functional decline
- A reliable index of SNS hyperactivity is skin conductance response (SCR)
- **Goal**: To characterize the influence of stress exposure vs. TBI on psychophysical markers of SNS function and assess whether TBI moderates the association between sympathetic hyperactivity and posttraumatic stress symptoms in the immediate aftermath of trauma

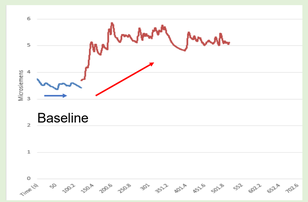
METHODS

Glial fibrillary acidic protein (GFAP) was used as a blood-based TBI severity biomarker to assess trauma-related sympathetic reactivity across multiple GFAP cutoffs, including American Congress of Rehabilitation Medicine (ACRM) clinical criteria.

Procedure: SNS reactivity to trauma was assessed using skin conductance response (SCR), collected using eSense, a mobile SCR recording device, during an emergency department visit in which individuals reported head injuries

Participants: Total sample size with emergency department (ED) eSense data, N=2,164; Responders (baseline SC >1.0), N=1,838

eSense SCR electrodes



Example SCR recording (µS)

RESULTS

Data Processing and Quality Control

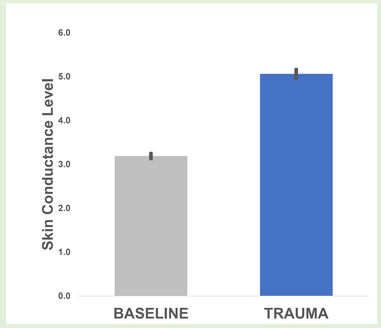
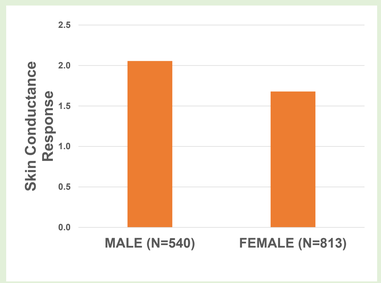
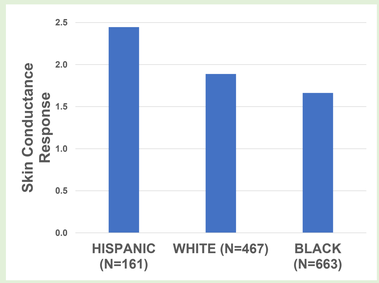


Figure 1: Skin conductance level increases during the trauma interview relative to baseline

Within subject F(1,1837)=848.24, p<.00001



Sex at birth F(1,1353)=6.54, p=.01



Race/Ethnicity F(2,1290)=5.70, p=.003

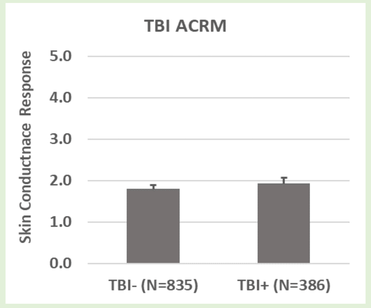
Figure 2: Demographic differences in SCR (trauma-baseline)

CONCLUSIONS

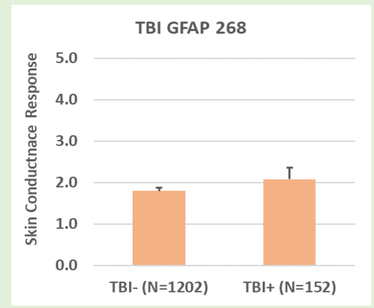
- eSense is an effective tool for objectively assessing physiological responses to trauma reactivity
- Blood-biomarkers of higher levels of neural deterioration are associated with SNS hyperactivity after trauma
- Elevated TBI biomarker levels may be potential early identifiers of individuals vulnerable to trauma sensitivity

RESULTS

ACRM clinical criteria or a lower GFAP cutoff of 268 pg/ml did not result in group differences in SCR



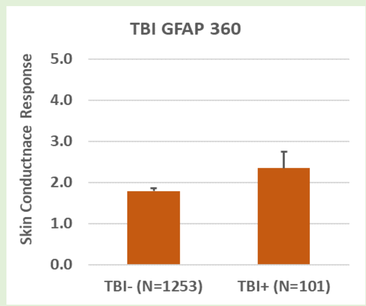
F(1,1220)=0.53, NS



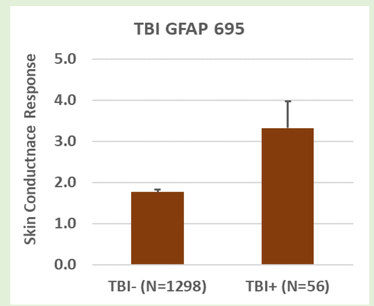
F(1,1352)=1.52, NS

Figure 3: TBI group comparisons using ACRM or lower GFAP cutoffs

Higher GFAP cutoffs of 360 and 695 pg/ml resulted in group differences in SCR



F(1,1353)=4.16, p=.04



F(1,1353)=18.73, p<.0001

***SIGNIFICANT AFTER COVARYING FOR SEX, RACE, AND AGE**

Figure 4: TBI group comparisons using higher GFAP cutoffs

ACKNOWLEDGEMENTS

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