Neurobiology of Stress, Depression and PTSD and Applications to Mechanisms in Cardiovascular Disease

J. Douglas Bremner, MD
Emory University,
Atlanta, Georgia

www.dougbremner.com
Stress and Psychopathology

Stress may lead to a range of outcomes that do not have validity as discrete constructs. These trauma-related disorders have been termed *Trauma Spectrum Disorders*. 


- Avoidance
- Foreshortened future (*suicidality*)
- Alcohol/substance abuse (*self destructiveness*)
- Panic
- Somatization
- Eating Disorders
- Flashbacks (*depersonalization, derealization*)
- Amnesia
- Identity disturbance (*dissociative identity d.o.*)
- Genetics, prior stressors
- Dissociative Disorders

- PTSD
- Depression
- Numbing (*anhedonia*)
- Feeling worse with reminders (*Depressed mood*)
- Intrusive memories (*ruminations*)
- Feeling cut off (*flat affect*)
- Hyperarousal, hypervigilance (*agitation*)
- Startle
- Nightmares
- Decreased concentration
- Feeling cut off
- Decreased interest
- Decreased concentration

*Stress*
Hippocampal Volume Reduction in PTSD

NORMAL

PTSD

J Douglas Bremner, MD, Emory University
Increased Hippocampal Volume With Paxil in PTSD

Medial Prefrontal Cortical Dysfunction with Traumatic Memories in PTSD

Decreased function in medial prefrontal cortical areas Anterior Cingulate BA 25, BA 32 in veterans with PTSD compared to Veterans without PTSD during viewing of combat-related slides & sounds Z score >3.00; p<.001
Increased Blood Flow with Fear Acquisition versus Control in Abuse-related PTSD

Yellow areas represent areas of relatively greater increase in blood flow with paired vs. unpaired US-CS in PTSD women alone, $z>3.09$; $p<0.001$
Stress Induced Ischemia in a Representative Subject with Depression and Trauma
Decreased Anterior Cingulate Function with Stress in Depressed CHD Patients

CHD with Depression

CHD without Depression
Decreased blood flow in anterior cingulate (arrow) in patients with CHD and depression during stress-induced myocardial ischemia (N=5) relative to patients with CHD and depression without stress-induced myocardial ischemia (N=8). There were also decreases in hippocampus.