



# Hippocampus Smaller in Veterans Not Recovered From PTSD, Study Shows

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The hippocampus, a brain area associated with memory and stress, was about six percent smaller on average in veterans with current chronic PTSD than in veterans who had recovered from PTSD, in a study conducted by researchers at the San Francisco VA Medical Center and the University of California, San Francisco.

The study of veterans of the 1990-91 Gulf War – 41 with current PTSD and 41 recovered – was led by Brigitte A. Apfel, MD, a researcher with the mental health service and the Center for Imaging of Neurodegenerative Diseases at SFVAMC.

The brain volumes of the veterans, who were participants in a larger study of the health effects of the Gulf War on the brain, were measured by magnetic resonance imaging.

The study appears in the March 15, 2011 issue of *Biological Psychiatry*.

Apfel, who is also a UCSF clinical instructor of psychiatry, said that there are two ways to interpret the results: either that the hippocampus gets smaller in PTSD and resumes normal size with recovery, or that people with smaller hippocampal volumes to begin with are less likely to recover from PTSD.

Some evidence supports the first hypothesis, Apfel said. "We know from animal studies that hippocampal volume can change," she noted. "If some animals are exposed to stress, their hippocampal volume will shrink and then recover later in the absence of stress. This gives hope that, in people, hippocampal damage in PTSD is reversible once they have recovered."

Apfel stressed that, because the subjects' brain volumes were measured only once, the researchers cannot conclusively interpret the results. "To begin to do that," she said, "we need a longitudinal study, in which we do brain imaging either before and after trauma or before and after treatment for PTSD. This way, we can follow how symptoms develop and see if hippocampal volume changes over time."

She and her colleagues plan such a study, Apfel said.

CIND director Michael Weiner, MD, a co-author, said that the current study "adds to the general body of knowledge that PTSD is associated with significant changes in the brain, and is thus a biological disorder."

Weiner, a UCSF professor of radiology, medicine, psychiatry, and neurology, added that such changes "might make people with PTSD more vulnerable to disorders such as Alzheimer's disease by reducing the brain's reserve capacity to resist and recover from damage leading to degeneration."

Co-authors of the study are Jessica Ross, MD, of SFVAMC and UCSF; Jennifer Hlavin, MS, of SFVAMC; Dieter J. Meyerhoff, Dr.rer.nat., and Thomas J. Metzler, CPhil, of SFVAMC and UCSF; Charles Marmar, MD, currently of New York University and on the faculty at SFVAMC and UCSF at the time of the study; and Norbert Schuff, PhD, and Thomas C. Neylan, MD, of SFVAMC and UCSF.

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