Deep brain mapping to isolate evidence of Gulf War syndrome

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Researchers at Southern Methodist University in Dallas are pioneering the use of spatial statistical modeling to analyze brain scan data from Persian Gulf War veterans, aiming to pinpoint specific areas of the their brains affected by Gulf War Syndrome.

Richard Gunst, Wayne Woodward and William Schucany, professors in SMU's Statistical Science Department, are collaborating with imaging specialists at UT Southwestern Medical Center to compare brain scans of people suffering from the syndrome with those of a healthy control group. The SMU team is working with renowned UTSW epidemiologist Dr. Robert Haley, one of the foremost experts on the syndrome.

A congressionally mandated study has revealed that one of every four veterans of the 1991 Gulf War suffers from neurological symptoms collectively referred to as Gulf War Syndrome. The Research Advisory Committee on Gulf War Veterans' Illnesses began work in 2002 and presented its lengthy report to Secretary of Veterans Affairs James Peake on Monday.

Persian Gulf War veterans from across the country are being tested at UTSW using a type of brain imaging called functional Magnetic Resonance Imaging (fMRI) while they perform tasks intended to activate specific regions of the brain. The SMU team is analyzing brain activation signals reflected from the multiple images taken of each subject's brain to determine which variations are naturally occurring and which are due to the syndrome. Previous analyses have been unable to

separate real distinctions from "noise."

The SMU team's primary challenge is in identifying differences in brain activation from locations deep within the brain using measured brain signals that are weak and vary from location to location. Spatial modeling uses information from neighboring locations to strengthen the weak signals in active brain locations so the signal can be detected as real.

"Spatial modeling in brain imaging is new," Gunst said. "This has not been done the way we are doing it." Rapid technological advances in medical imaging of the human brain are imposing demands for new statistical methods that can be used to detect small differences between normal and dysfunctional brain activity, Gunst said.

Source: Southern Methodist University