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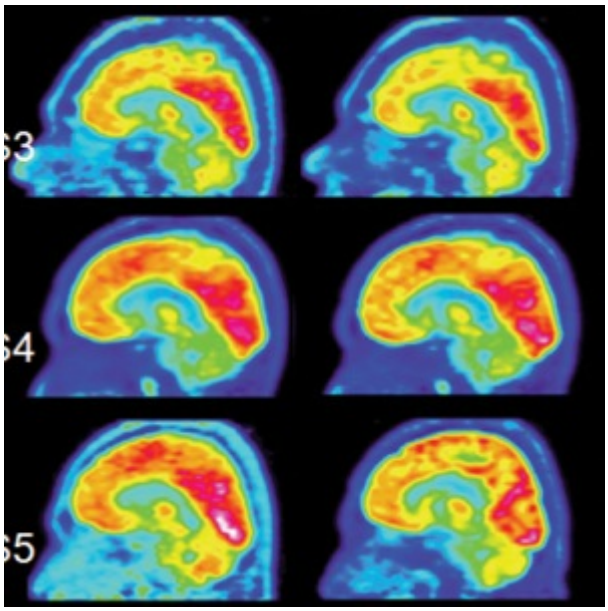
Effect of Stellate Ganglion Block For PTSD Is Real, Immediate And Can Be Startlingly Robust

San Diego—Once thought to be a pipe dream, stellate ganglion block has been demonstrated in many trials to improve post-traumatic stress disorder (PTSD), sometimes radically. A pilot study at the VA Long Beach Healthcare System and the University of California, Irvine (UCI) not only confirmed these findings, but has taken it one step further by investigating the neurobiology of the disorder and how the block works.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Researchers there have concluded that the right amygdala and hippocampal complex appear to be relatively overactive when PTSD symptoms are prominent.

“We’ve known since 2003 that blocking the sympathetic system might help with PTSD symptoms,” said Michael T. Alkire, MD, professor in-residence in the Department of Anesthesiology & Perioperative Care at UCI. “That’s when a surgeon performed a thoracic sympathectomy and reduced PTSD-associated anxiety for some patients.

“The person pioneering the case for stellate ganglion block in PTSD is Eugene Lipov, MD,” Dr. Alkire said.

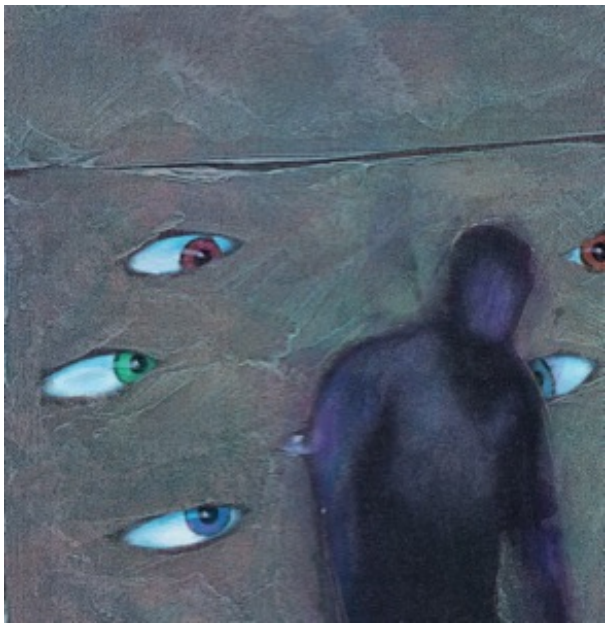
“In 2008, Dr. Lipov was performing a stellate ganglion block for a pain patient who also happened to have PTSD. When he got off the table, the patient’s PTSD was dramatically improved.” Although several studies have confirmed these findings, the neural mechanisms

behind the block's efficacy remain unknown.

Response Can Be Sudden and Profound

To help fill this knowledge gap, Dr. Alkire and his colleagues used PET before and after the block to image functional brain metabolic activity. The investigators enrolled 17 informed and consenting veterans (mean age, 37±11 years) into the trial; each was suffering from chronic combat-related PTSD, with prominent hyperarousal symptoms.

All 17 received the single, right-sided stellate ganglion block, which comprised 8 cc of 2% lidocaine and 0.25% bupivacaine. Five patients (mean age, 31±4 years) underwent two separate fluorodeoxyglucose PET brain scans, one week before and one week after the block. All patients had their PTSD symptoms assessed using the Clinician-Administered PTSD Scale (CAPS).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As Dr. Alkire reported at the 2015 annual meeting of the American Society of Anesthesiologists (abstract BOC02), all patients tolerated the procedure well.

Overall, the CAPS showed a 40% reduction in PTSD symptom severity at one week after the block, with a baseline mean score of 82±15 (severe PTSD) that was reduced to 49±24 (mild/moderate PTSD) after the block ($P<0.0001$).

More specifically, patients were characterized as nonresponders, moderate responders and excellent responders. "Some of the excellent responders hopped off the table, said their PTSD symptoms were essentially gone and went out to dinner that night for the first time in years," Dr. Alkire noted. Depression also was found to resolve rapidly and markedly.

Although it's difficult to determine why certain patients respond and others don't, Dr. Alkire offered some suggestions. "It might be that the block actually didn't get to the right spot to work," he said. "There could also be some physiology that's different, too. Finally, there seems to be some relationship between their baseline anxiety and response. If baseline anxiety is low to begin with, it doesn't seem like those patients respond as well."

Brain Scans Performed

Brain scans revealed that the orbital frontal cortex was more active before the block than after (Figure). “This is an interesting finding because it replicates about 20 years’ worth of work that’s been done in psychiatry PTSD neuroimaging,” he noted. At the same time, brain regions that were relatively less active included the left insula, right frontal cortex, left dorsolateral prefrontal cortex and bilateral portions of the posterior hippocampus.

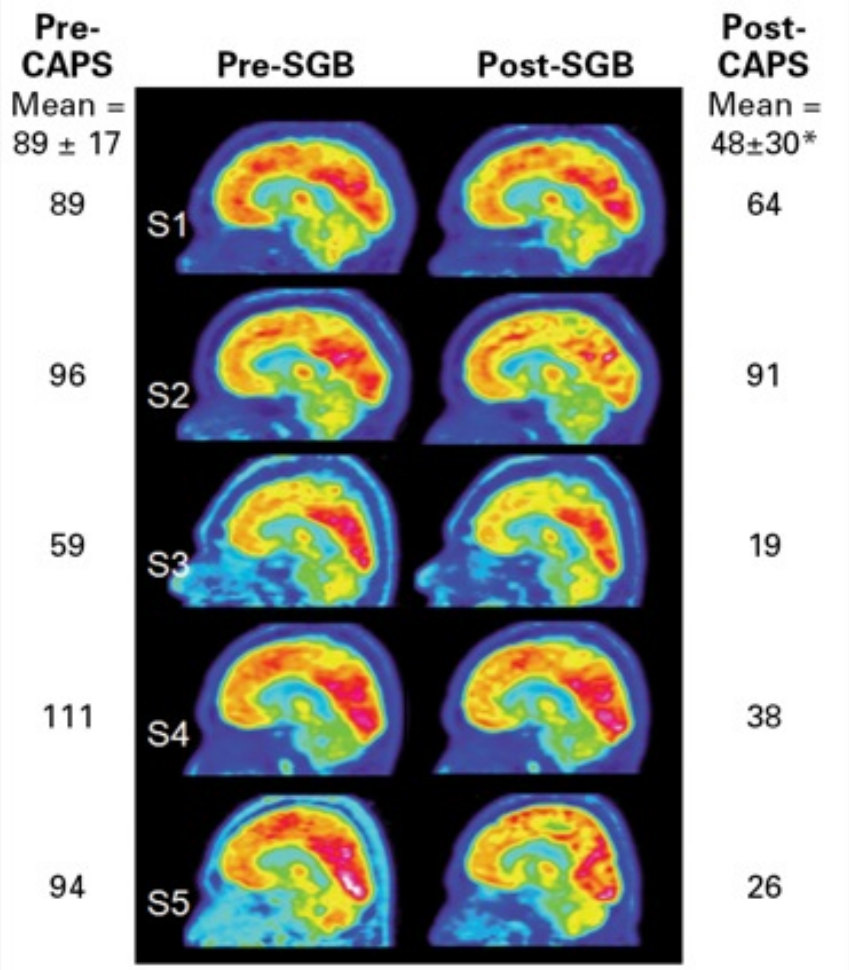

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Figure. PET scans before and after SGB.

×$P<0.05$, paired t-test

CAPS, Clinician-Administered PTSD Scale; **SGB,** stellate ganglion block

“We also went back and looked at functional connectivity, [and] then related it to the changes in behavior,” Dr. Alkire added. “And when we did that correlation, we found that what’s changed the most is in the amygdala and hippocampal regions, primarily in the right hemisphere.” This, the investigators hypothesized, may be due to the observed differences in orbital frontal cortex activity, which suggests that a dysregulation of orbital frontal cortex-to-amygdala inhibition likely exist s when PTSD symptoms are severe.

"So, we can conclude that the stellate ganglion block really does seem to work," Dr. Alkire said. "It lasts about three months, and also brought about significant reductions in depression and anxiety. Finally, these pilot neuroimaging data suggest that it's the change in functional action of the amygdala and hippocampus with other networked regions that's driving PTSD symptoms."

While the study's lack of placebo controls may give pause for caution, that didn't seem to lessen Dr. Alkire's regard for the block's promise.

"I was among the nonbelievers," he noted, "but when you see a guy who can barely function get the block and is like a new person, you start to believe pretty quickly."

—Michael Vlessides

Dr. Alkire reported no relevant financial disclosures.