
ENHANCING FORCE READINESS

Biotechnology Enhanced
Performance with
TAC-STIM (nVNS)



ENHANCING FORCE READINESS:

Biotechnology Enhanced Performance with TAC-STIM (nVNS)

Goals¹⁻³



TRAINING

Accelerate training and knowledge acquisition

- Accelerate skill attainment
- Superior retention
- Lower washout rates
- Increase training throughput
- Address workforce shortages



MISSION

Sustain, optimize, and enhance task performance

- Elevate vigilance, accuracy and threat detection
- Eliminate/minimize performance degradation
- Decrease fatigue
- Mitigate operational stress



RECOVERY

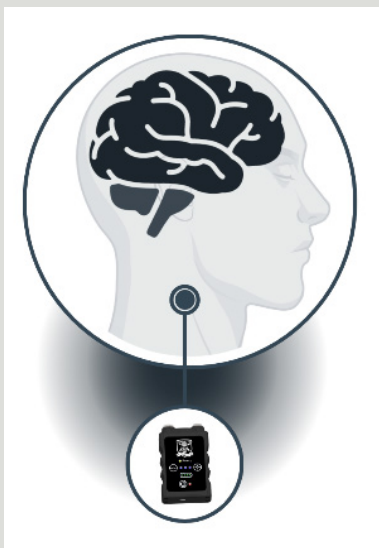
Restore abilities to baseline

- Improve resilience
- Reduce downtime
- Maintain operational readiness
- Optimize warfighter brain health



The technology - TAC-STIM™

TAC-STIM™ is a portable device that is being designed specifically for use by the Military. It stimulates the vagus nerve, only needs a few minutes to administer, and has long-lasting benefits.



Non-Invasive Vagus Nerve Stimulation (nVNS)

The vagus nerve projects to the brain, where it modulates multiple neural connections and the balance of key neurotransmitters involved in learning and memory, motivational and emotional states, and pain and inflammation. TAC-STIM (nVNS) activates the vagus nerve with mild pulses of electrical energy delivered to the neck.



Why TAC-STIM™

Warfighters undergo intensive, fast-paced training that causes fatigue. Sleep deprivation and fatigue lead to slower reaction times, reduced ability to multitask, and increased lapses of attention.⁴

Prolonged military operations in harsh and adverse conditions can compromise the perceptual, cognitive, and emotional resources necessary to sustain performance on mission-related tasks across operational units.²

Cognitive neuroenhancement tools and techniques, such as TAC-STIM, that can accelerate training, sustain attention, reduce fatigue, and improve mood are being explored by various Military units and is considered a critical need to promote readiness and performance across the force.⁵

TAC-STIM can offer benefits in many areas related to mission performance enhancement and optimization. nVNS has been shown to facilitate learning and memory,⁶⁻⁹ enhance multiple elements of cognition, such as arousal, attention, multi-tasking, decision-making, and memory,^{4,6,10,11} improve the ability to learn a new language,^{12,13} boost mood after prolonged periods of activity,¹⁴ and improve fatigue and sleepiness.¹⁵

electroCore™, the manufacturer of TAC-STIM, is a part of multiple collaborative research and grant efforts to demonstrate ways that nVNS can improve performance, combat fatigue without negative side effects, and accelerate training.

US Air Force Research
Laboratory Learning Enhanced
Accelerated Plasticity (LEAP)

Augmenting and Assessing
Performance in Extreme
Environments (A2PEX)

2017

2022

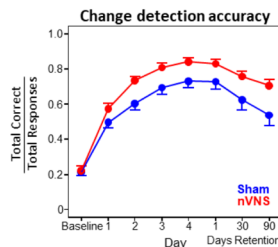
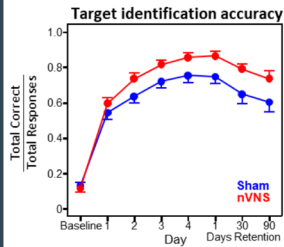
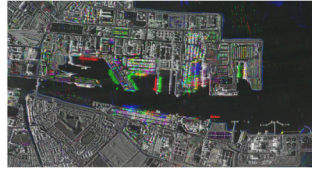
2023

Biotech Optimized for
Operational Solutions and
Tactics (BOOST)



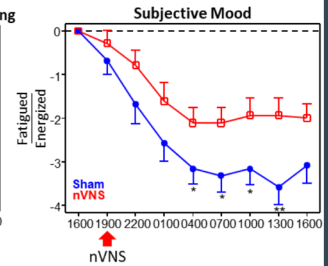
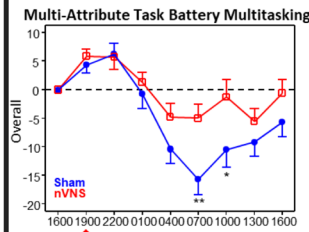
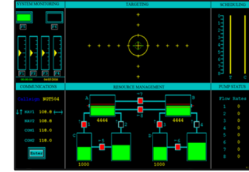
Force and Mission Relevant Results

TAC-STIM Enhances ISR Synthetic Aperture Radar Training¹⁶



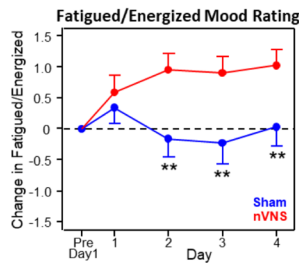
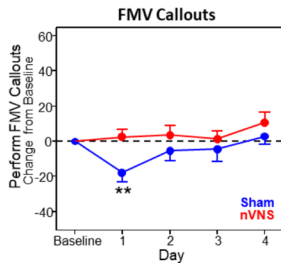
- TAC-STIM improved target identification accuracy and change detection accuracy without affecting speed of target identification
- Benefit was retained up to 90 days post-stimulation

TAC-STIM Improves Cognitive Skill After Sleep Deprivation⁴



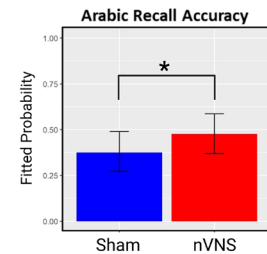
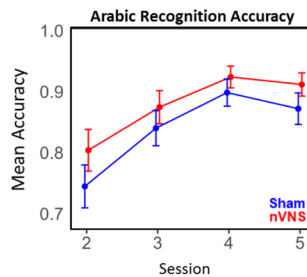
- Long-lasting benefit for multitasking activities
- Active group performed significantly better on the PVT task
- TAC-STIM-treated participants reported less fatigue and more energy

TAC-STIM Boosts Mood and Performance During ISR FMV Training¹⁷



- Active group demonstrated improved FMV-related tasks
- TAC-STIM boosted mood ratings; trainees were significantly more energetic and more able to perform training tasks

TAC-STIM Improves Difficult Language Recall and Recognition¹⁸



- Arabic recall rate was significantly improved with TAC-STIM
- Enhanced acquisition of a difficult vocabulary
- TAC-STIM boosted mood despite rigorous training environment

* $p \leq 0.05$; ** $p \leq 0.01$

Abbreviations: FMV, full motion video; ISR, Intelligence, Surveillance and Reconnaissance; PVT, psychomotor vigilance test



TAC-STIM in the Field

TAC-STIM has the potential to mitigate multiple challenges. There is substantial need to accelerate training and improve performance across the force.

- The demand for ISR analysts to support ongoing operations has grown exponentially over the past decade in the face of analyst attrition due to operational burnout.¹⁸
- The Air Force is attempting to accelerate pilot production while helping airmen retain more information to overcome the serious pilot shortage.¹⁹
- Foreign language skills and cultural expertise are critical capabilities needed by today's military to face the challenges of our present security environment.²⁰

Completed research demonstrates that TAC-STIM offers utility in military training environments. Additional research and training efforts are underway to further examine the benefits of TAC-STIM in other deployment environments, such as active mission support and post-mission recovery.

Training

Foreign Language Initial Acquisition Program
School Houses
Special Ops training
Other specific training environments

Mission Support

Preparation
Increase vigilance
Decrease fatigue
Improve performance

Post Mission

After action debrief
Facilitate decompression
Learning consolidation
Physical and mental restoration

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