Attention Bias Modification Treatment for Combat-Related PTSD

A Randomized Clinical Trial Magnetoencephalography Study
Project Overview

Attention bias modification is a new therapy for anxiety disorders rooted in cognitive models of anxiety and experimental data on threat-related attention biases (Bar-Haim, 2010). The At Ease USA project will operate in collaboration with the Tel-Aviv University / National Institute of Mental Health Attention Bias Modification Treatment program, to study the efficacy of attention bias modification treatment (ABMT) in a randomized-controlled manner, by researchers from Tel-Aviv University (Israel) under the direction of Yair Bar-Hiam, PhD and the National Institute of Mental Health (USA) under direction of Daniel Pine, MD.

As part of this international effort, the At Ease USA project will: 1) collaborate with researchers around the world using standardized attention bias measurement and training tools; 2) contribute our results to the international ABMT results database in hopes of validating the utility of this novel treatment; and 3) become one of only two studies testing the effectiveness of ABMT in treating PTSD.

This project will recruit veterans from the recent wars in Iraq and Afghanistan to participate in our study. Hopefully some recruiting will occur through At Ease USA contacts. Advertising will also be conducted in the community and on-line. Potential participants will be informed about the study including its risks and benefits and invited to consent to participate in the study.

At the next meeting, veterans will be assessed for PTSD using the CAPS structured interview, for general anxiety symptoms with the STAI, and for depression with the BDI. Veterans will be asked about their psychiatric and medical histories, and veterans with traumatic brain injuries will be excluded from this study.

The results will be used to recruit a total of 40 veterans with PTSD and 20 healthy veterans without PTSD. Those veterans with PTSD will be randomly assigned to the attention training group or placebo control group for ABMT. The same measures of psychological symptoms and attention bias will also be collected post training. If the treated group improves, active ABMT will be offered to those veterans assigned to the placebo group.

This double-blind randomized clinical trial will provide the best possible evaluation of the effectiveness of ABMT in treating PTSD. Additionally the At Ease USA project will contribute important new knowledge regarding real-time brain functioning of PTSD, threat, attention, and memory by comparing a baseline sample of healthy veterans and veterans with PTSD both before and after ABMT and placebo control training in the MEG.
The dot-probe task forms the basis for both threat bias assessment and attention bias modification treatment. Threat-related attention bias will be measured before and after the ABMT and placebo sessions. In the dot-probe task, pairs of faces, one angry and one neutral, are presented one above the other on a computer screen and immediately followed by a small visual probe appearing in the location vacated by one of the faces (see figure above). Participants are required to respond as quickly as they can indicating the location of the probe without compromising accuracy. Response times on the task provide a “snap-shot” of the veteran’s attention. Participants respond more quickly when the probe is shown in the previously attended to location. Attention bias toward threat is evident when participants respond faster to probes replacing angry faces than neutral faces. Because people with anxiety have a bias toward threat that sustains their anxiety symptoms (Bar-Haim, et. al, 2007), ABMT teaches participants to focus on neutral information by systematically placing the probe in the space vacated by the neutral face.

The ABM/Placebo protocol consists of 160 trials (120 angry-neutral face pairs and 40 neutral-neutral face pairs). In the placebo condition, angry-neutral locations and probe locations appear equally. In the ABMT condition, the probe appears in the space vacated by the neutral face in all angry-neutral trials. In short, the treatment teaches the veteran to focus on the neutral face and away from the threatening face by making it easier to respond to the probe if they focus on the neutral face.

Hakamata and colleagues (2010) meta-analyzed 12 published studies utilizing the dot probe task to research ABMT for anxiety reduction. This review found that ABMT resulted in very strong reductions in threat bias, and that ABMT significantly reduced anxiety symptoms. Hallion and Ruscio (2011) conducted a meta-analysis of 45 studies and also found that cognitive bias modification training reduced anxiety symptoms. Despite successful anxiety reduction with cognitive retraining, no published studies have investigated the utility of ABMT to treat PTSD. The At Ease USA project will fill that void.
Magnetoencephalography

The magnetoencephalograph (MEG) is considered the most advanced test of brain function in the world (Singh, 2007). MEG is a non-invasive neurophysiological technique that uses extremely sensitive magnets to measure signals generated by the brain’s neuronal activity. Very literally the MEG will allow us to see which parts of the brain are active when a veteran participates in the attention bias, memory, or executive function tests.

The MEG recordings are done in a special shielded room much like a bank vault that allows the ultra sensitive machine to only detect those magnetic fields generated by the brain. The veteran sits comfortably upright in the yellow chair pictured above and will be asked to complete specific tasks to map which brain regions become active during the test. The MEG is so sensitive that it can essentially see a thought move through a test subject’s mind down to the milliseconds – in real time. MEG data from this study will improve our understanding of PTSD, its effects on the brain, and drive future treatments.

Our study will compare whole brain recordings and region of interest analyses of healthy combat veterans and both our active AMBT and control group of PTSD veterans. The MEG will allow us to (1) discover which brain regions differ based on the presence of PTSD, and (2) show at a neurophysiological basis for any observed effect of ABMT treatment through pre and post MEG recordings for the PTSD groups. Brain regions of interest include the prefrontal cortex, amygdala, hippocampus, ACC, and insula. These are brain regions known to be involved in attention, planning, memory, emotion, and fear.
Project Timeline

Budget approval from At Ease USA 12-11
IRB approval from Creighton & UNMC 2-12
Begin recruitment 3-12
Recruitment and data collection continues until target numbers are met 8-13
Data analysis and write up of findings for papers and presentations 12-13
Submission of large NIMH grant proposal 2-14

Project Budget

80 hours of MEG time at $600 per hour:
- 16 healthy veterans baseline
- 16 pretreatment PTSD - ABMT
- 16 pretreatment PTSD - placebo
- 16 posttreatment PTSD - ABMT
- 16 posttreatment PTSD - placebo
  - $48,000
Participant Compensation
- 60 pretreatment psychological testing interviews at $75 each
- 40 ABMT training programs involving 8 sessions (2x per week for 4 weeks) at $20 each
- 80 MEG sessions at $75 each
- 40 posttreatment psychological testing sessions at $50 each
  - $18,900
Advertising for Participant Recruitment
  - $1,000
Graduate Assistant Academic Year & Summer Compensation
  - $10,000
Undergraduate Assistant Summer Compensation
  - $2,500
Primary Investigator Summer Compensation
  - $5,000
Primary Investigator Psychologist License (mitigate against risk of PTSD testing & intervention)
  - $200

Year 1 Total: $85,600

Unless recruitment is easier than expected and data collection is complete in 2012, we will seek renewal of Graduate Assistant Compensation and PI Summer Compensation and License for 2013.

Year 2 Total: $15,200

Outcomes and Possibilities

(1) Determine if ABMT is an effective new therapy for PTSD and hopefully reduce impairing PTSD symptomology in combat veterans.
(2) Collaborate with international research in ABMT as an early site.
(3) Provide new information on the neurophysiological bases of PTSD which will inform theories, therapies and medications for PTSD.
(4) Provide foundation for future large scale government grants.
(5) Because ABMT is deliverable over the computer, if effective, the possibilities are endless including provision of distance medicine, military field intervention, and novel therapeutic access through marketable Apple and Android applications.

America's present need is not heroics but healing; not nostrums but normalcy; not revolution but restoration.
~Warren G. Harding
Collaboration Among Partners to Reduce Combat-Related PTSD and Improve Understanding of Brain Functioning Associated with PTSD

Creighton University Psychology & UNL Education
Amy Badura Brack, PhD, Maya Khanna, PhD, Theodore Bartholomew

At Ease USA
Scott Anderson, James Sorrell, MD

TAU-NIMH ABMT
Yair Bar-Haim, PhD; Daniel Pine, MD

UNMC Department of Pharmacology & Experimental Neuroscience
Tony Wilson, PhD