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TITLE: Treatment of Memory Disorders in Gulf War Illness with High-Definition Transcranial Direct Stimulation

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CONTRACTING ORGANIZATION: The University of Texas at Dallas
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The University of Texas at Dallas
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14. ABSTRACT

The present study consists of the application of 1 ma anodal HD tDCS over the preSMA for 20 minutes a session for 10 sessions over a two week period. The treatment is hypothesized to lead to improvement in verbal retrieval, detectable in both performance measures of verbal retrieval tasks and in ERP markers of verbal retrieval processing. Our objective is to determine if 10 sessions of 1 ma anodal HD tDCS to the preSMA for 20 minutes a session are an effective treatment for verbal retrieval deficits in GWI. We have established the research team, laboratory setting, obtained approval of all regulatory documents for the study, and established recruiting procedures. In the past year, we have screened 26 veterans for the study and enrolled 10 in the baseline testing and treatment phase of the study; 8 have completed the study, 0 have withdrawn, and the remaining 2 are currently active in the study.

15. SUBJECT TERMS
Gulf War Illness; High Definition Transcranial Direct Current Stimulation; word finding; semantic memory

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1. INTRODUCTION:

The present study consists of the application of 1 ma anodal HD tDCS over the preSMA for 20 minutes a session for 10 sessions over a two-week period will lead to improvement in verbal retrieval that will be detectable in both performance measures of verbal retrieval tasks and in ERP markers of verbal retrieval processing. Our objective is to determine if 10 sessions of 1 ma anodal HD tDCS to the preSMA for 20 minutes a session are an effective treatment for verbal retrieval deficits in GWI.

2. KEYWORDS:

Gulf War Illness; High Definition Transcranial Direct Current Stimulation; word finding; semantic memory

3. ACCOMPLISHMENTS:

What were the major goals of the project?

1. Approval of Regulatory Documents for use of HD tDCS in Therapeutic Setting
    a. UTD IRB approval – 100% complete
    b. HRPO approval – 100% complete
    c. Obtain lab space, purchase and set-up HD tDCS and EEG, test units – 100% complete
    d. Train staff in EEG and HD tDCS – 100% complete
    e. Establish recruiting procedures – 100% complete, but we continue to expand all recruiting efforts
2. Recruiting and Screening Patients for Study
    a. Recruitment of patients – 53% complete (64 patients recruited and screened out of 120 goal)
    b. Screening of patients – 53% complete (64 patients recruited and screened out of 120 goal)
3. Performing Pre-Treatment Assessments
    a. Perform pre-treatment neuropsychological assessments - 25% completed (have completed 20 out of 80 goal)
    b. Perform pre-treatment EEGs - 25% completed (have completed 20 out of 80 goal)
4. Performing HD tDCS vs. Sham HD tDCS Treatment
    a. Randomize patients to 10 sessions of active or sham 1 ma anodal preSMA HD tDCS - 25% completed (have completed 20 out of 80 goal)
    b. Perform 20 minutes of active or sham 1 ma anodal HD tDCS over the preSMA region for 10 daily sessions - 19% completed (have completed 15 out of 80 goal)

5. Perform Follow-up Neuropsychological and EEG Studies of Treatment Effect
    c. Perform post-treatment neuropsychological assessments – 18% completed (have completed 14 out of 80 goal)
    d. Perform post-treatment EEG tests of word retrieval - 18% completed (have completed 14 out of 80 goal)
6. Data Analysis
    a. Perform longitudinal analyses of neuropsychological and EEG measures for treatment efficacy- 0% complete
7. Dissemination of Findings – Manuscript and Report Preparation – 0% complete

What was accomplished under these goals?

This year, we strengthened our recruitment efforts and reached over 50% of our goal by refining our social media presence, inviting groups to tour our lab, and connecting with Gulf War groups at workshops, other events and through scheduled meetings. We continue to cultivate our social media presence on Facebook, Twitter, and Instagram. We hope to add Reddit and Tumblr to our future efforts.

In quarters one to three, we established a relationship with the Veterans Coalition of North Central Texas (VCNCT) and the Dallas Vet Center, and they agreed to distribute and post materials for this project through their social media platforms. We have also published an advertisement in the Texas Department of Veterans of Foreign Wars magazine for this Gulf War study. Northwood University, the Veteran's Institute for Film and Media, Vets4Heroes, and LeaderQuest have toured our lab.

Our Project Coordinator, Dr. Ellen Morris, has increased our presence at resource fairs, job fairs, workshops and other events. We have attended events for Veterans held by 22Kill, Military Inclusion, American GI Forum, LeaderQuest, Wounded Warrior Military Miles, Federal Aviation Administration, Texas Mission of Mercy, Dallas Veterans Business Morning Formation, and the Military Veteran Peer Network. We have also reconnected with past organizations such as Equest, Carry the Load, and Apache Warriors to enhance our ongoing relationship and to remind them about referral options.

We have held meetings with Ret. Lt. Col. Allen Hahn of Apache Warrior Foundation, the CEO of Boots to Heels – Attitudes and Attire, the lab manager at the Dallas TMS clinic, National Cemetery staff members, IAVA (Iraq and Afghanistan Veterans of America), and Hooves for Heroes. These organizations are receptive to displaying recruiting materials for this project. Dr. Morris also attended the day-long teleconference for the Research Advisory Committee on Gulf War Illness. This committee advises the Secretary of the VA on proposed research and helps understand & treat Gulf War Illness.

Recruiting presentations have been given to Endeavors (a nonprofit that connects vulnerable populations to a wide range of services), 22Kill, Brookhaven Community College, the Dallas VA Medical Center, and the Veteran's Court of Denton. We have met with the University of North

Texas's Student Veterans Association and they have agreed to display information about the study in their meeting room. In addition, Dr. Morris partnered with another UT Dallas Neurology lab that conducts research with Veterans. The two labs have worked together this year on several of the recruiting efforts and are collaborating on referral efforts.

A member of our team was interviewed on Alliance 4 the Brave, a weekly radio program dedicated to U.S. Active Duty Military, Veterans, and First Responder Communities. Another team member was interviewed on Breaking Down Barriers, a podcast led by a retired Army Colonel and former DARPA employee who is now at the University of North Texas Health Science Center. This podcast focuses on helping people with physical and mental disabilities.

In the fourth quarter, we invited the members of the Boot Campaign to tour our lab and learn about our studies. This is a Veteran's Service Organization focusing on the comprehensive health & wellness for service members. On July 25th we attended "Mind Games: The State of Veterans Mental Health" Community Forum as not only vendors, but also as speakers. We discussed all of the research opportunities in our lab and distributed promotional materials for our study. We have made new contacts at many of the local colleges, hoping to find GW Veterans who are also students. We spoke to the Counseling Center Team at the University of Texas, Arlington on July 26th to promote our study. In September, we went to University of North Texas Veteran Fraternity to speak at the executive board meeting and distribute flyers for our study. On August 2, we invited Warrior Spirit Project to our lab to discuss our studies and ways to partner. They took our materials for distribution. In August, we attended a meeting at local VFW #8235 and spoke about our study to a large group of attendees. We distributed hard-copy as well as electronic versions of our study materials. We also attended several different sessions of Veteran's Treatment Court in Dallas, Denton, and Fort Worth. This is a specialized program for Military members who are entering the Justice System. It provides oversight, mentoring, and programs suited for Military. We spoke to the forum and the presiding judges to promote our studies. On August 13, we attended a Resource Fair for Veterans and distributed study materials as an exhibitor. In September, we spoke at the Veterans Coalition Gulf War Summit, and provided study materials for the audience. Co-investigator, Dr. Michael Motes, spoke at The University of Texas at Dallas Center for Vital Longevity on issues facing Veterans to bring awareness to this project. Overall, we continue to work with other labs who have studies for GW Veterans. We refer to one another when appropriate. In addition, we continue with social media platforms and ads in the VFW magazine and increasing our presence at events for Veterans.

Participants Screened, Consented, Enrolled, and Tested during this reporting period
Screened: 26
Consented, enrolled, and tested: 10
Completed: 8
In progress: 2

Stated Goals Not Met
The project is still behind in enrollment, but we are making multiple efforts to increase screening and enrollment and have decreased the gap. Participants are reluctant to participate due to time/monetary costs of participating in the study or because they live too far away for 10 daily sessions of HD tDCS. Veterans suffering from Gulf War Illness have also proven to be difficult to locate. This is why we have ramped up our recruiting efforts by hiring Dr. Morris, involving more Veteran Services Organizations, expanding our social media presence, and partnering with another lab at UT Dallas that is also doing research on Gulf War Illness.

What opportunities for training and professional development has the project provided?

See Goal 1 above. Approval of Regulatory Documents for use of HD tDCS in Therapeutic Setting, Tasks 3-5 consisted of training of staff in EEG and HD tDCS usage as well as training in recruiting procedures and regulatory issues. Training in these tasks has been successfully

How were the results disseminated to communities of interest?

Nothing to Report.

What do you plan to do during the next reporting period to accomplish the goals?

See Goal 2 above: 2. Recruit and Screen Patients, 3. Perform Pre-Treatment Assessments, 4. Perform HD tDCS vs. Sham HD tDCS Treatment, and 5. Perform Follow-up Neuropsychological and EEG Studies of Treatment Effects. These will all be performed to meet target recruitments.

4. **IMPACT:**

What was the impact on the development of the principal discipline(s) of the project?

Nothing to Report.

What was the impact on other disciplines?

Nothing to Report.

What was the impact on technology transfer?

Nothing to Report.

What was the impact on society beyond science and technology?

Nothing to Report.

5. CHANGES/PROBLEMS:

Changes in approach and reasons for change

Nothing to Report.

Actual or anticipated problems or delays and actions or plans to resolve them

Nothing to Report.

Changes that had a significant impact on expenditures

Nothing to Report.

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Significant changes in use or care of human subjects

Nothing to Report.

Significant changes in use or care of vertebrate animals

Nothing to Report.

Significant changes in use of biohazards and/or select agents

Nothing to Report.

6. PRODUCTS:

- **Publications, conference papers, and presentations**

Journal publications.

Nothing to Report.

Books or other non-periodical, one-time publications.

Nothing to Report.

- **Other publications, conference papers and presentations.**

Nothing to Report.

- **Website(s) or other Internet site(s)**

Nothing to Report.

- **Technologies or techniques**

Nothing to Report.

- **Inventions, patent applications, and/or licenses**

Nothing to Report.

- **Other Products**

Nothing to Report.

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?

Name: John Hart, Jr., MD
Project Role: Principal Investigator
Nearest person month worked: 1
Contribution to Project: Dr. Hart oversees all aspects of the study and coordinates testing protocols and data analysis.

Name: Robert Haley, MD
Project Role: Subcontract Principal Investigator
Nearest person month worked: 1
Contribution to Project: Dr. Haley oversees the UT Southwestern aspects of the study and aids in patient recruitment

Name: Michael Motes, PhD
Project Role: Co-Investigator, PhD
Nearest person month worked: 2
Contribution to Project: Dr. Motes oversees the EEG protocol.

Name: Jeffrey Spence, PhD
Project Role: Co-Investigator
Nearest person month worked: 1
Contribution to Project: Dr. Spence participates in and advises on computational models and statistics.

Name: Maria Lewis
Project Role: Subcontract Project Coordinator
Nearest person month worked: 1
Contribution to Project: Ms. Lewis manages the UT Southwestern aspects of the study and aids in recruitment

Name: Elizabeth Ellen Morris, PhD
Project Role: Project Coordinator
Nearest person month worked: 6
Contribution to Project: Dr. Morris oversees the clinical aspects of the study and manages the recruitment effort.

Name: Rachel O'Hair, BS
Project Role: Research Technician
Nearest person month worked: 6
Contribution to Project: Ms. O'Hair screens and consents participants, conducts neuropsychological assessments, administers EEG and HD tDCS.

Name: Justin Jacqmain, BS
Project Role: Research Technician
Nearest person month worked: 6
Contribution to Project: Mr. Jacqmain screens and consents participants, conducts neuropsychological assessments, administers EEG and HD tDCS.

Name: Kelsey Watson
Project Role: Research Assistant
Nearest person month worked: 3
Contribution to Project: Ms. Watson screens and consents participants, conducts neuropsychological assessments, administers EEG and HD tDCS.

Name: Sarah Sprinkle
Project Role: Coordinator
Nearest Person Month Worked: 1
Contribution to Project: Ms. Sprinkle handles all IRB regulatory issues for the study and creates progress reports.

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

Nothing to Report.

What other organizations were involved as partners?

UTSW Department of Epidemiology
6000 Harry Hines Blvd.
Dallas, TX 75235
Collaboration: Subject recruiting and enrollment.

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS: *For collaborative awards, independent reports are required from BOTH the Initiating Principal Investigator (PI) and the Collaborating/Partnering PI. A duplicative report is acceptable; however, tasks shall be clearly marked with the responsible PI and research site. A report shall be submitted to* ***https://ers.amedd.army.mil*** *for each unique award.*

QUAD CHARTS: *If applicable, the Quad Chart (available on https://www.usamraa.army.mil) should be updated and submitted with attachments.*

9. **APPENDICES:** *Attach all appendices that contain information that supplements, clarifies or supports the text. Examples include original copies of journal articles, reprints of manuscripts and abstracts, a curriculum vitae, patent applications, study questionnaires, and surveys, etc.*