

MREDI Quarterly Report: SYNERGISTIC IMPROVEMENT IN THE DIAGNOSIS & TREATMENT OF MENTAL ILLNESS, DEMENTIA, & CHRONIC PAIN

This progress report is organized “by project” for each of the Center’s four funded projects.

Objective 1: Combine EEG and fNIRS for clinical diagnostic development for anxiety and depressive disorder.

Overview:

To date, Objective 1 is approximately 60 days behind schedule as the result of an arising need to renegotiate the prices of the equipment being purchased with our Montana-based business partner (Neuralynx, Inc.). Following the release of funds, our research team was provided with new quotes which reflected a substantial increase on the original agreement. The terms of purchase have been re-established and equipment has been ordered from both Neuralynx, Inc. and TechEn, Inc.

To prepare for the immediate implementation of the research plan following equipment installation, three undergraduate research assistants have been identified and trained for electroencephalography (EEG) data collection on the equipment currently being used in Dr. Brooker’s lab; the EEG procedures used in the current project will be highly similar. Approval for the study has been obtained from Montana State University’s Institutional review board, and recruitment materials for both community and campus-based participants. A project coordinator has been identified and will be hired in January/February 2016, such that their hire coincides with equipment installation, training, and the beginning of participant recruitment.

Dr. Brooker has also traveled to the laboratory of Dr. Aaron Buss at the University of Tennessee for feedback on the setup and use of fNIRS with young children. Given the amount of preparation that has taken place, the remainder of the timeline should proceed as anticipated following hardware setup.

Hirings:

No hirings have been made prior to the arrival of study hardware (functional Near Infrared Spectroscopy [fNIRS] and EEG setup). Three undergraduate students have been trained on existing EEG equipment (Bio Semi Active Two), which is similar to the EEG setup being purchased from Neuralynx, Inc. A project coordinator has been identified and will be hired in January/February 2016.

Equipment purchased:

Purchase orders have been sent to Neuralynx, Inc. and TechEn, Inc. for the equipment purchases that are necessary for this research.

Progress towards milestones:

- Equipment has been ordered from the Montana-based business (Neuralynx, Inc.) and external business partner (TechEn, Inc.) identified in the proposal.
- Undergraduate research assistants have been recruited and trained.
- A project coordinator has been identified for hire.
- Dr. Brooker has sought external advisors with familiarity in the use of the proposed fNIRS technique with children.
- IRB approval has been obtained
- Recruitment procedures have been identified and recruitment materials prepared.

Total amount of expenditures by report date:

Purchasing orders have been released for the following:

- Neuralynx, Inc. : \$76,000 for EEG setup and caps
- TechEn, Inc. : \$133,650 for fNIRS setup

Objective 2: Conduct a breakthrough study on the use of Deep TMS for Alzheimer's Disease (AD) in order to improve the lives of Montana families affected by AD and make Western Montana Mental Health Center in Butte a treatment destination for patients from across Montana.

Overview:

As with Objective 1 that is also using the EEG-fNIRS technology, Objective 2 is approximately 60 days behind schedule as the result of an arising need to renegotiate the prices of the equipment being purchased with our Montana-based business partner (Neuralynx, Inc.). Following the release of funds, our research team was provided with new quotes which reflected a substantial increase on the original agreement. The terms of purchase have been re-established and equipment has been ordered from both Neuralynx, Inc. and TechEn, Inc.

Hirings:

Research staff hiring, including part-time support of a research managing director and research business manager have been completed. These two hires will be responsible for overall study management and business aspects (e.g., contracting, accounting) related to the project. A research study coordinator will be hired by Western Montana Mental Health Center to lead the local activities of the study (recruitment, assessment, general study coordination) as soon as contracting is in place (anticipated to be completed within the next few weeks). We are nearing completion of contracting for our Alzheimer's disease clinical research consultant. Contracting has not yet been set with our EEG consultant (Philip Zeman), but will be completed by the time the EEG-fNIRS equipment is ready for the study.

Equipment purchased:

Purchase orders have nearly completed the process at MSU and will be sent to Neuralynx, Inc. and TechEn, Inc. within the next few weeks for the equipment purchases that are necessary for this research.

Progress towards milestones:

- Equipment will soon be ordered from the Montana-based business (Neuralynx, Inc.) and external business partner (TechEn, Inc.) identified in the proposal.
- Several of the needed hires/consultants are in place and remaining needed hires will be completed and in place by the time needed equipment is available.
- Dr. Brooker, who will be supporting our EEG-fNIRS assessments, has sought external advisors with familiarity in the use of the proposed fNIRS technique (she is already an expert in EEG assessment).
- IRB submission is in preparation and approval should be received by the time needed equipment is available.
- Recruitment procedures have been discussed with Western Montana Mental Health Center and our Alzheimer's research consultant and a recruitment plan will be in place by the time needed equipment is available.
- We have met with Western Montana Mental Health Center and agreed to procedures and plans for personnel to conduct the study, which will include the hiring of a research study coordinator by Western Montana Mental Health Center (contracting is nearly completed). Western Montana Mental Health Center has already identified a

treatment room and has adapted this according to the TMS manufacturer's specifications.

Total amount of expenditures by report date:

- Neuralynx, Inc. : \$71,000 for EEG setup and caps
- TechEn, Inc. : \$133,650 for fNIRS setup
- Support of Research Managing Director: \$3,090.95

Objective 3: Establish efficacy and safety in a non-human primate model to facilitate clinical candidate selection of non-opioid therapeutic agents for acute and chronic pain, common correlates of anxiety, depression and neurodegeneration.

Overview:

Dr. Yeomans has successfully completed two test runs of the primate model in conjunction with MSU's ARC staff and the procedures and protocols have been verified. In early December, SiteOne's first potential non-opioid drug candidate was successfully evaluated in the primate model, demonstrating analgesia with no noted off-target toxicities. These results provide proof of concept in primates and is providing the catalyst for SiteOne's next round of financing discussions. Additional drug candidates will be tested in early 2016.

Hirings:

Potential hires specifically supporting these activities are being evaluated for 2016.

Equipment purchased:

Cardiac/respiratory monitor at \$3,000.

Progress towards milestones:

- Selection of a non-opioid drug candidates for initiation in IND enabling studies has been successfully completed (timeline of December, 2015).

Total amount of expenditures by report date:

- Total expenditures to date are \$51K

Objective 4: Investigate the ability of the Youth Aware of Mental Health Program (YAM) to prevent suicidal behaviors and improve mental health in freshmen high school students in Montana.

Overview:

Objective 4 is entirely on track for timelines.

Hirings:

Research staff hiring, including part-time support of a research managing director and research business manager have been completed. These two hires will be responsible for overall study management and business aspects (e.g., contracting, accounting) related to the project. A research study coordinator will be hired by February at MSU to coordinate the study as a whole. Hiring of the youth experts who will become trained in and deliver YAM will be completed by March (in time for April training) and the technology contractors that will build smart phone and online enhancements to YAM will be hired by March.

Equipment purchased:

None.

Progress towards milestones:

- Have met with and obtained support from the Office of Public Instruction and DPHHS for the proposed study.
- Have met with and obtained support to conduct the study in 5 high schools currently (Browning general and alternative schools, Kalispell and Glacier High Schools, and Butte Alternative High School). We have had strong interest expressed by Gardner Schools with a meeting planned in early January. We will be seeking approval from 2-4 additional schools through March.
- We are in the process for developing a bid for the contractor that will build in internet and smart phone enhancements to YAM.
- We have set a YAM deliverer training for April 4-8 and are planning to begin delivering YAM in the fall of 2016 to 8-10 high schools.

Total amount of expenditures by report date:

- Personnel and travel costs totaling \$5,540.60.