Title: Feasibility of Use of Portable, Wireless EEG Measurement in Individuals with Fragile X Syndrome

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Introduction: Recently theta-gamma modulation decreases that are task-dependent were reported in the mouse model of fragile X syndrome (FXS). These findings suggest that task-dependent and resting-state neural synchrony (temporal and amplitude coordination of oscillations in theta and gamma frequencies) may be impaired in FXS human subjects. If so, this would identify a cognitive pathway that could possibly be manipulated by therapeutic treatment. However, we cannot test this hypothesis without a feasible method to accurately measure this impairment in humans. This presentation will provide a summary of a feasibility study exploring the use of a portable, wireless microEEG system with individuals with FXS in their homes, administered by trained research assistants with no prior EEG measurement experience.

Method: Participants in a larger NIH funded study on decisional capacity and informed consent in FXS were approached about participating in a short feasibility study on use of the wireless microEEG system. If they agreed, they the caregivers provided consent and the participants were provided a social story about the EEG and then assent was obtained. We used a very low threshold for refusal, allowing participants to decline following review of social story or at any point the participants wanted to stop. Participants who agreed wore the microEEG while completing simple eye open/eye close task, two cognitive tasks (Tower and Verbal Learning), and for some, while interacting with games on an ipad. Information about reasons for declining or terminating participation were collected by those who withdrew from participation. For those who completed the protocol, questions regarding comfort and willingness to wear it for longer periods were asked.

Results: Of the 55 participants assessed for the larger study during the EEG study time period 18 were unable to participate in the EEG study due to timing or lack of parent to provide consent on site. Of the 37 eligible, only 6 (16%) declined outright. Of the 31 who said yes, 9 experienced technical challenges; 23 wore the microEEG for at least 20 minutes; 16/22 (72%) had clinically readable data and 9/16 (56%) had data capable of being used for advanced analyses. Most of the documented problems with data were due to computer based artifacts, not participant movements or errors. Details regarding who was more likely to tolerate the EEG as well as reasons for declining and participant’s reports of their experience will be shared in this presentation as well as implications for future studies.

Discussion: microEEG is a wireless, portable, FDA approved EEG system that can be set up in 5 minutes and used by novice techs. Based on this pilot study, microEEG is a promising methodology for measuring neural synchrony in individuals with FXS and could also serve as a potential outcome measure in targeted trials for the FXS population.

References: