stroke patients paretic limb use using inexpensive virtual reality and exoskeleton devices. METHODS/STUDY POPULATION: We conducted a feasibility study with 2 hemiplegic stroke participants. They reached for targets in a virtual reality environment using both hands. They completed 162 reaches divided into 3 blocks. Following baseline, we used an exoskeleton to provide 50% arm weight compensation to the paretic limb and used wrist weights to provide 50% arm weight resistance to the non-paretic limb. We removed the exoskeleton and wrist weights during the retention block. We used electromyography to approximate muscle activity in the biceps brachii. Relative contribution (RC) was calculated as the displacement of the paretic arm divided by the sum of displacements for both arms. Muscle contribution (MC) was calculated as the root mean square of paretic arm muscle activity divided by the sum of activity for both arms. RESULTS/ANTICIPATED RESULTS: During baseline, RC of the impaired limb was 44% and 48%, and MC of the impaired bicep was 43% and 35% in two mild to moderately impaired patients (Fugl-Meyer Upper Extremity scores of 43 and 37, respectively). During loading, RC increased by 5.6% and 1.1% and MC decreased by 8.3% and 11.8%. These data suggest hemiplegic stroke participants alter limb coordination when our device normalizes muscular output asymmetries between limbs. Importantly, these results closely match data from our previous work in 12 healthy controls, where we found a 2% increase in RC is significantly predicted by a 11% decrease in MC. By collecting more data on stroke patients, we will quantify this tradeoff between coordination and muscle activity modulation, allowing us to optimize the exoskeleton mechanics to maximize paretic limb use. DISCUSSION/SIGNIFICANCE: We demonstrate our platform is well tolerated by mild to moderately impaired stroke patients; this feasibility study forms the basis for low cost at-home technologies for stroke rehabilitation. With further development, clinicians can use our platform to fine-tune the level of limb constraint based on the individual needs of the patient.

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Development of a Mobile Software Application to Promote Education, Self-Care, and Treatment Follow-Up among Puerto Rican Breast Cancer Patients

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OBJECTIVES/GOALS: This project will design, develop and pilot-test a Spanish-mobile application for breast cancer patients. It is intended that patients will improve treatment adherence, have a personal information storage system for their follow-up healthcare and can have greater control in the processes of diagnosis, treatment, education, and recovery. METHODS/STUDY POPULATION: In the first phase, a team of undergraduate engineering students was recruited to work on the areas of: Front End, Database Development, Security Protocols, and Integration. Team Venus will provide the cancer-related content. In the second phase, the engineering team will identify bugs, usability, satisfaction, and workability of the application among a pilot convenience sample of 20 participants from four cancer clinics and the community. The inclusion criteria are being > 21 years old and having a cell phone. The exclusion criterion is not knowing how/being able to use a mobile application. Participants will complete a questionnaire on sociodemographic data, mobile phone and application use, efficacy, usability, and security. Univariate and bivariate statistical analysis will be performed using SPSS. RESULTS/ANTICIPATED RESULTS: The researchers are defining specific visual and content features they would like the application to have. They are also searching and collecting reliable information about cancer from primary sources to incorporate into the tools available to the application's users. In addition, they have also begun to identify potential cancer treatment facilities and medical personnel to assist in the recruitment of patients for pilot-testing the application. The researchers have divided them into geographical areas in Puerto Rico and each Team Venus member will approach and orient patients and medical personnel about the project. DISCUSSION/SIGNIFICANCE: It is intended that patients will improve treatment adherence, have a storage system for their follow-up healthcare and greater control in their processes of diagnosis, treatment, education, and recovery. Future goals include use of the database feature by researchers and expanding the testing of the application with a larger patient-base.

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Frontal-cerebellar EEG source localization and functional connectivity as predictors of Alzheimer's disease-related cognitive decline

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OBJECTIVES/GOALS: Novel EEG source localization and functional connectivity will assess frontal and cerebellar activity as predictors of subsequent memory and executive functioning (EF) decline in healthy, asymptomatic older adults who carry the Apolipoprotein-E Îµ4 allele (Îµ4+), which conveys up to 12x increased risk for Alzheimers disease (AD). METHODS/STUDY POPULATION: Healthy, cognitively intact Îµ4+ older adults (n = 23; ages 65-89) completed neuropsychological testing (focus on memory and EF) and EEG at Time 1, returning an average of one year later for neuropsychological retesting. EEG data during successful stop-signal inhibitory control trials will be used for advanced source localization and functional connectivity, with a focus on frontal and cerebellar regions of interest (ROIs). Source analyses will focus on the N200 time window (~200-350ms) to assess conflict processing and P300 (~300-550ms) for performance evaluation. Connectivity analyses are frequency-based, and will focus on theta band connectivity to assess conflict processing and delta to assess performance evaluation. RESULTS/ANTICIPATED RESULTS: Using hierarchical linear regression models, the magnitude of source activation within ROIs and connectivity metrics between ROIs will be used to predict residualized change in memory and executive function metrics between Time 1 and Time 2. We anticipate that 1) greater, compensatory activation in frontal ROIs during the N200 window, and 2) less cerebellar activation during P300, will predict memory and executive decline over the retest interval. Decline will also be predicted by 3) greater inter-hemispheric frontal connectivity in the theta band (conflict processing) and 4) less frontal-cerebellar delta connectivity (performance evaluation). DISCUSSION/SIGNIFICANCE: At most, ~50% of Îµ4 carriers will develop AD. Thus, identifying which carriers will decline is crucial to enabling successful, early intervention. Cerebellar dysfunction and impaired connectivity may be among the earliest indicators of incipient AD. Cutting-edge cerebellar EEG may enable an accessible option for early discernment of AD risk.

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