STATISTICAL ESTIMATION OF ACCELERATED BIOLOGICAL BRAIN AGING AFTER MILD TRAUMATIC BRAIN INJURY IN OLDER ADULTS

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Estimating biological brain age (BA) has the potential of identifying individuals at relatively high risk for accelerated neurodegeneration. This study compares the brain's chronological age (CA) to its BA and reveals the BA rate of change after mild traumatic brain injury (mTBI) in an aging cohort. Using T1-weighted magnetic resonance imaging (MRI) volumes and cortical thickness, volume, surface area, and Gaussian curvature obtained using FreeSurfer software; we formulated a multivariate linear regression to determine the rate of BA increase associated with mTBI. 95 TBI patients (age in years (y): μ = 41 y, σ = 17 y; range = 18 to 83) were compared to 462 healthy controls (HCs) (age: μ = 69 y, σ = 18 y; range = 25 to 95) over a 6-month time period following mTBI. Across the initial ~6 months following injury, patients' BAs increased by ~3.0 ± 1.2 years due to their mTBIs alone, i.e., above and beyond typical brain aging. The superior temporal and parahippocampal gyri, two structures involved in memory formation and retrieval, exhibited the fastest rates of TBI-related BA. In both hemispheres, the volume of the hippocampus decreased (left: μ=0.28%, σ=4.40%; right: μ=0.12%, σ=4.84%). These findings illustrate BA estimation techniques' potential to identify TBI patients with accelerated neurodegeneration, whose rate is strongly associated with the risk for dementia and other aging-related neurological conditions.

TESTING CELLULAR PROLIFERATION RESPONSES TO OXIDATIVE, GLUCOCORTICOID AND METABOLIC CHALLENGES IN THE BABOON

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Aging is associated with progressive loss of cellular homeostasis which results from intrinsic and extrinsic challenges. Testing how such challenges relate to the aging process is often limited by the available model systems. We use primary cells (fibroblasts) isolated from baboons as a non-human primate cellular model to address how stressful challenges affect resilience. Using a real-time live-cell imaging system, we characterized a protocol for testing the effects of pro-oxidant compounds (e.g hydrogen peroxide (H2O2), paraquat and thapsigargin), dexamethasone and low glucose environment on cellular proliferation in fibroblasts derived from baboons across the life-course. The inhibitory effect of H2O2 (50 and 100µM), an oxidative stress, on cell proliferation was dose-dependent, with a higher impact in old males (age 14.52-14.80 years; average life span 21 years) compared to young males (6.35-6.39 years). Exposure to a different oxidative stress, paraquat (100 and 200µM) tended to reduce cell proliferation rate with age in males but not females. Inhibitory effects of thapsigargin, an endoplasmic reticulum stress inducer, on cell proliferation were dependent on challenge duration (2 vs 24h), concentration (0.1 and 1µM) and donor age, with greater resilience in young males than young females (4.33-6.70 years). Dexamethasone (100 and 500µM), a glucocorticoid, reduced cell proliferation dose-dependently, with older males exhibiting more resilience than females. In response to low glucose (1mM), cell proliferation reduced with age. Donor's chronological age and sex are important variables in cellular response to challenge compounds faced during aging, which will guide our on-going studies on the cellular transcriptome and proteome.

SESSION 10170 (LATE BREAKING POSTER)

CHRONIC DISEASE MANAGEMENT

A MOBILE APP FOR TRACKING NON-MOTOR SYMPTOMS OF PEOPLE WITH PARKINSON'S DISEASE: A USABILITY STUDY

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Smart phone-based technology for people with Parkinson's disease has been developed worldwide. Unmonitored non-motor symptoms decrease quality of life of people with Parkinson's disease, so the needs for technology to manage non-motor symptoms are increasing. The technology is needed to detect subtle changes in non-motor symptoms by healthcare professional. There is no mobile app which manage comprehensive symptoms of Parkinson's disease including non-motor symptoms. It is necessary to develop a new tracking system that can effectively manage non-motor symptoms as well as motor symptoms of Parkinson's disease. We developed a prototype of mobile app for Android smartphones, with cooperation with Mazelone company. we also have shaped functions for monitoring of motor symptoms and medication adherence. It also provided a section for caregivers to use on behalf of people with Parkinson's disease who have difficulty to use app due to hand tremor. Through Delphi technique, we obtained content validity from eight medical and nursing experts on the contents of the application. We provided regular telephone counseling to improve and encourage their app usage. Fifteen participants used the app for 6 weeks. To evaluate usability of mobile app, we provided constructed questionnaire and conducted individual telephone interview. A mobile app for tracking non-motor symptoms demonstrated high usability and satisfaction. We learned lessons about facilitators and barriers when implementing an app such as perception and acceptance of mobile technology. The mobile app will improve continuum of care. Future studies need to improve the contents and refine technical approach for people with Parkinson's disease.

DYNAMICS OF MULTIMORBIDITY RESILIENCE AND HEALTH OUTCOMES OVER TIME IN COMMUNITY-RESIDING OLDER ADULTS

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