

## Biostatistics, Epidemiology, and Research Design

### Sex Differences in Middle Cerebral Artery Velocity in Patients with Persistent Post-Concussion Convergence Insufficiency (PPCS-CI)<sup>†</sup>

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**OBJECTIVES/GOALS:** The objective of this study is to investigate the neurophysiological mechanism of vision therapy in male and female adolescents with persistent post-concussion convergence insufficiency (PPCS-CI). This study may improve diagnostics and inform more effective personalized point of care treatment strategies to remediate symptoms. **METHODS/STUDY POPULATION:** Participants (ages 11-25) were diagnosed with PPCS by a physician, CI was diagnosed by an optometrist and OBVAT was performed by certified therapists. Patients with PPCS-CI were randomly assigned to a therapy type (immediate therapy or natural recovery). Hemodynamic measures were examined in patients with PPCS-CI at baseline (1-3 months post-concussion), and post OBVAT to evaluate recovery outcomes. Non-invasive techniques were used to measure middle cerebral artery velocity (MCAv), blood pressure, heart rate, and end-tidal CO<sub>2</sub> at rest and during objective symmetrical convergence step eye movements. Functional magnetic resonance imaging (fMRI) was acquired during convergence step eye movement experiments contrasted to sustained fixation and resting state data collection. **RESULTS/ANTICIPATED RESULTS:** To investigate the neural mechanism of OBVAT, eye movements, fMRI and physiological measures were collected in 8 patients with PPCS-CI (4 men and 4 women). Results show a 10% decrease in the MCA during 4-degree symmetrical convergent eye movement responses in males post-OBVAT and a 19% increase in MCA during convergent eye movement responses in females. Furthermore, there was a group level activation of the frontal eye fields, which improves post-OBVAT. The beta weights in the left frontal eye fields show a trending decrease in male patients post-OBVAT and trending increase in females. Males had a decrease in MCAv post OBVAT (baseline  $83.6 \pm 7.5$  cm/sec &  $75.7 \pm 12.5$  cm/sec post-OBVAT), while females show a significant increase post-OBVAT (baseline  $53.77 \pm 5.2$  cm/sec & post-OBVAT  $65.13$  cm/sec  $\pm 12.5$ ). **DISCUSSION/SIGNIFICANCE:** This initial pilot demonstrates there may be different underlying pathophysiological outcomes associated with a concussion dependent on sex. This work may have direct implications on treatment strategies for male and female adolescent patients with PPCS-CI.

\*Blue Ribbon Awardee; <sup>†</sup>Gold Ribbon Awardee

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### A mobile health-supported bundle to improve routine childhood vaccine completion rate in Nigeria

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**OBJECTIVES/GOALS:** Barriers to childhood vaccine completion include forgetting vaccine appointments, lack of clinic access (distance and funds), and vaccine hesitancy. We tested the impact of automated and real-time appointment reminders, vaccine hesitancy counseling, and targeted vaccine drives on receiving the third dose of the diphtheria vaccine. **METHODS/STUDY POPULATION:** An implementation study to determine the feasibility and impact of implementing a mobile health-supported intervention bundle. A digital vaccine registry was developed to manage vaccine uptake data. The intervention bundle was applied sequentially: each registered parent received an automated appointment phone reminder (text and voice). If they delayed for >5 days, they received a real time reminder phone call. If during the real time call vaccine hesitancy was deemed to be a barrier, counseling was provided. If access - lack of funds or long distance - to the clinic was the barrier, vaccination was performed at patient's home on the monthly vaccine drives. We compared vaccine completion (all childhood vaccines before 18 months) during the implementation to the preceding three years. **RESULTS/ANTICIPATED RESULTS:** We anticipate the implementation will be feasible as >90% of all eligible children will be registered. We expect providers will be accepting and would recommend the intervention to other providers. We anticipate the intervention will result in a >10% increase in childhood vaccine completion compared to the average of the past three years. **DISCUSSION/SIGNIFICANCE:** We anticipate applying a multifaceted intervention will be acceptable to providers, feasible to implement, and significantly improve childhood vaccine completion rates moving Nigeria closer to achieving the global target of >95% childhood vaccine completion rate.

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### Janus Kinase 1/2 inhibition Effect on Cytokine Levels in Tears of Patients with Ocular Graft Versus Host Disease

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**OBJECTIVES/GOALS:** The goal of this study is to identify if ocular graft versus host disease (oGVHD) patients treated with a systemic JAK inhibitor have a change in their tear cytokine profile (a possible bio-marker) and oGVHD score. oGVHD is a severe inflammatory dry eye disease and major cause of morbidity after a hematopoietic stem cell transplant. **METHODS/STUDY POPULATION:** Janus Kinase (JAK) is an upstream regulator of cytokine production. A JAK 1/2 inhibitor, Ruxolitinib, was recently FDA approved for the treatment of chronic GVHD. We propose that JAK inhibition results in cytokine changes in tears and improvement of oGVHD. To study

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