**The Effects of Neurocognitive and Physical Tasks on End-Tidal Carbon Dioxide Levels in Healthy Reserve and Concussed Special Forces Military Members**

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**BACKGROUND/OBJECTIVES:** Within the Canadian Military Special Forces Unit, active duties expose individuals to dangers such as explosive devices, loud gunfire, and hand-to-hand physical combat. Due to the inherited risks, individuals are at constant risk of various injuries including concussion. Damage may occur to neural and vascular tissue that can cause physiological changes in the brain. Abnormal breathing patterns may emerge if there is damage to the brainstem or middle cerebral artery reducing blood flow to the thalamus, brainstem, and respiratory control centres.The purpose of this proposed study is to examine differences between healthy reserve and concussed special forces military members when completing a neurocognitive and physical task on measures of breathing function.

**METHOD**: Prospective participants will be asked to complete the self-report Nijmegen Questionnaire (NQ) to assess the individual’s breathing pattern. Participants will be fitted with a single-use nasal cannula and worn throughout the entire data collection process and connected to the CapnoTrainer® capnography breath analyzer. A neurocognitive test will be completed via the Immediate Post-concussion Assessment and Cognitive Test® (ImPACT) battery designed specifically for measuring executive function. End-tidal CO2(ETCO2)measures will be collected during the different tasks. The second task will involve participants walking on a treadmill under two different walking speeds for 3 minutes. The participants will be equipped with a 13.6-22.6kg weight pack to simulate a standard work environment. The variables of interest will be analyzed using descriptive and inferential statistics for each specific condition with an alpha level of *p< .05*.

**CONCLUSION**: It is hypothesized that after completing a physical and neurocognitive task, there will be a statistically significant difference between groups for ETCO2measures. Based on the possible damage to the brain caused by the concussion, breathing dysfunctions may be present and be an area that needs to be addressed from a treatment perspective.

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