INFLUENCE OF EXERCISE MODALITY ON CEREBRAL-OCULAR HEMODYNAMICS AND PRESSURES

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Introduction

- Exercise training is beneficial for cardiac, muscle and bone health; however, its effects on the development of visual impairment due to intracranial pressure (VIIP) remain controversial.
- Resistive exercise without a valsalva has been shown to increase intracranial pressure (ICP) by 3mmHg, while with a valsalva the increase is 18mmHg.1
- Similar increases in intraocular pressure (IOP) have been observed during weight lifting.2
- Aerobic exercise also induces hemodynamic changes that impact ICP and IOP. During moderate-intensity exercise, increases in cerebral blood flow and velocity occur, suggesting that moderate-intensity exercise could further increase intracranial blood volume and therefore ICP.3
- In contrast, high intensity exercise (>60% of peak oxygen uptake) lowers cerebral blood flow and velocity, a consequence which could ultimately decrease ICP.3
- Importantly, however, the impact of exercise modality on ICP and IOP during a cephalad fluid shift has not been evaluated.

Purpose

To characterize the changes in cerebral-ocular hemodynamics and pressures during and following resistance, low intensity, and high intensity aerobic exercise with a cephalad fluid shift.

Methods

- Following instrumentation, subjects will be positioned in a 15° HDT and complete 10 minutes of rest, the exercise protocol, and 20 minutes of rest following exercise.
- Cerebral blood flow and velocity, jugular pressure, and intraocular pressure will be measured at rest, at the end of each resistance or interval set, and every 5 minutes during continuous exercise (Figure 1).

Equipment Modifications

Leg Press (Figure 3)

- The subject platform was raised up to a 15° tilt by adding a wedge that was fabricated using 80/20 structural aluminum framing.
- The subject foot plate was raised 8” and extra 80/20 framing was added for additional support.
- The shoulder supports were tilted forward 15°.
- A new head support was added both for subject comfort and positioning of ultrasound probe.
- Handles were added to the support frame. The handles are adjustable front to back for various subject sizes.

Discussion

- We expect to begin data acquisition in January (Figure 4).
- This project will provide essential data and methods to quantify the impact of exercise on ICP and IOP during a cephalad fluid shift.

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REFERENCES: