

## 5. SWACSM Abstract

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### Effect of Moderate Intensity Cycle Ergometer Exercise in Normoxia and Hypobaric Hypoxia on Markers Related to Autophagy – A Pilot Study

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#### ABSTRACT

Autophagy is a process by which damaged and dysfunctional cellular components are transported to and decomposed in the lysosome, which is integral for maintenance of healthy cellular function and homeostasis. Among many health benefits, exercise is shown to catalyze autophagy. However, limited research exists on the effect of high-altitude exercise (>2500m) on autophagy in humans. **PURPOSE:** To determine the effect of exercise in hypoxia (HYP) on autophagic markers compared to intensity-matched exercise in normoxia (NORM). **METHODS:** 8 healthy and active males ( $23.3 \pm 2.4$  yrs,  $75.2 \pm 10.7$  kg,  $49.6 \pm 6.5$  ml/kg/min) completed 1hr of moderate intensity cycling (65% normoxic  $\text{VO}_2\text{max}$ ) in normoxia (1600m) and hypobaric hypoxia (4300m), in a randomized counterbalanced crossover design, separated by two weeks. Venous blood samples were collected pre and post exercise, from which peripheral blood mononuclear cells (PBMCs) were isolated and analyzed for expression of a regulatory autophagic protein (p62) and an upstream contributor to hypoxia-inducible factor  $1\alpha$  (HIF1 $\alpha$ ) mediated autophagy (PHD2). Comparisons between conditions were made using paired t-tests. **RESULTS:** Post exercise decreases in protein expression were similar between HYP and NORM for p62 ( $0.50 \pm 0.2$  vs  $0.70 \pm 0.5$  Fold Change) and PHD2 ( $0.15 \pm 0.17$  vs  $0.21 \pm 0.16$  Fold Change), respectively ( $p > 0.05$ ). **CONCLUSION:** Decreased expression of p62 following exercise is suggestive of upregulation in autophagy regardless of exercise condition. Further, inhibition of PHD2 in immune cells post exercise may be due to exercise induced hypoxemia, and activation of autophagy via the HIF1 $\alpha$ /BNIP3 pathway. These data suggest that oxygen sensing occurs in PBMCs as a result of physiological stressors such as altitude and exercise which increase autophagic processes. Autophagic flux may occur similarly following exercise in hypoxic and normoxic environments, however more comprehensive analyses of multiple autophagic markers measured in heterogenous participant sample sizes are warranted.