Mid Atlantic Regional Chapter
of the
American College of Sports Medicine

Annual Scientific Meeting, November 5th- 6th, 2021
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 10

The Effects of Elevated Sodium on Mitochondrial Function in Peripheral Blood Mononuclear Cells

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Sodium has been shown to accumulate in the interstitium as a result of high salt diets. Exposure of macrophages to excess interstitial sodium alters mitochondrial function and has been shown to contribute to alterations in inflammation. However, it is unclear if exposure to elevated sodium also alters circulating peripheral blood mononuclear cells (PBMC) mitochondrial function. **PURPOSE:** To test the hypothesis that PBMCs incubated in medium with elevated sodium have lower mitochondrial respiration than those in incubated in isotonic medium. **METHODS:** PBMCs were separated from whole blood of six (5 men/1 women) healthy subjects (18-30 yrs.; blood pressure, ≤ 130/80mmHg; BMI < 30 kg/m^2). PBMCs were then counted via trypan-blue staining and seeded at 2x10^5 cells/well in 8-well Poly-D-lysine treated cell culture plates. Plated cells were incubated for 24-hr in RPMI 1640 medium with 10% FBS at 140 mM sodium (normal sodium, NS) or 180 mM sodium (high sodium, HS). Basal and maximal oxygen consumption rate (OCR) were assessed post-incubation by respirometry via Seahorse XFp analyzer (Agilent). Spare respiratory capacity (SRC) was calculated as the difference between maximal and basal OCR. Data were analyzed using two-tailed paired T-tests. **RESULTS:** Basal OCR was reduced in HS compared to NS (35.4 ± 8.5 vs. 47.7 ± 7.5 pmol/min, p = 0.01), as was maximal OCR (121.2 ± 39.3 vs. 169.2 ± 46.0 pmol/min, p = 0.04). SRC in HS was also reduced compared to NS (85.9 ± 31.4 vs. 121.4 ± 38.9 pmol/min, p = 0.03). **CONCLUSION:** Diminished basal and maximal OCR and SRC provide evidence for reduced mitochondrial function in PBMCs exposed to elevated sodium. These findings warrant further investigation into the specific cell types affected, and the potential systemic effects of sodium induced immune cell mitochondrial dysfunction.
This work was supported by NIH grant R01HL104106 and AHA 20POST35080171