



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



Acute Exercise-Induced Changes in Extracellular Vesicle Cargo in Adults with or Without Type 2 Diabetes

William S. Evans¹, Stephanie Kronstadt¹, James M. Heilman¹, Dapeng Chen², Steven M. Jay¹, Steven J. Prior¹. ¹University of Maryland, College Park, MD ²Zeteo Tech, Inc., Sykesville, MD

Circulating factors partially mediate the effects of exercise and type 2 diabetes mellitus (T2DM) on cardiometabolic outcomes. Extracellular vesicles (EVs) are lipid bilayer enclosed cargo carriers responsible for intercellular communication, yet EVs are understudied circulating factors in exercise and cardiometabolic disease. **PURPOSE:** To determine whether older adults with T2DM or normal glucose tolerance (NGT) have different circulating EV cargo before and after a bout of aerobic exercise. **METHODS:** Seventeen men (n=10) and women (n=7) 55-72 years of age completed a 30-minute bout of treadmill exercise at 60% of VO_{2max} and blood was drawn before (0 min) and immediately after (30 min) exercise. Plasma samples were collected and frozen at -80°C. EVs were isolated and processed for bottom-up proteomics. Peptide spectra were searched against a database (uniprot.org) and proteins were quantified using label-free quantitation. Data were normalized and the effects of condition and time were compared. Data are expressed as log₂-fold change (FC). **RESULTS:** Three hundred seventy-six proteins were identified. Nine proteins were differently expressed between conditions at baseline including insulin-like growth factor-binding protein complex (IGFBP) (FC=1.3, p<0.05; NGT v. T2DM). Immediately after exercise (30 min), 30 proteins in NGT and 35 in T2DM were significantly different. Fourteen proteins, including clusterin-4, carbonic anhydrase, cholinesterase and several platelet and blood exosomal proteins, were different after exercise in both groups. Changes in 11 proteins were unique to NGT and changes in 16 proteins were unique to T2DM. In T2DM, downregulated proteins of interest at 30 min included IGFBP (30 min:0 min, FC=-0.7 p<0.03) and complement components (C8; FC=-0.736 p=0.036 and C3; FC= -0.436 p<0.01). In NGT, upregulated proteins at 30 min included neural cell adhesion molecule L1-like protein (NCHL1) (FC= 0.316 p= 0.02) and retinol binding protein (RBP) (FC=0.470 p<0.005). **CONCLUSION:** Acute aerobic exercise affects circulating EV cargo, with differential effects on specific proteins related to insulin sensitivity and inflammation in older adults with T2DM vs. NGT. These findings support a potential role of EV-derived mechanisms mediating the cardiometabolic effects of exercise and T2DM.