

Effects of Acute Aerobic Exercise on Circulating sTLR and sRAGE Profiles in Normoglycemic and Insulin-Resistant Individuals

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ABSTRACT

Impaired blood glucose regulation as a consequence of insulin resistance is linked to development of many clinical conditions, including cardiovascular disease, Alzheimer's, and skeletal muscle wasting via inflammatory processes. Recent evidence suggests circulating solubilized Toll-Like Receptor (sTLR) and Receptor for Advanced Glycation Endproducts (sRAGE) originate from skeletal muscle and are related to glucose management and inflammation. **PURPOSE:** The purpose of this investigation was to explore 1) relationships among sTLR and sRAGE profiles and indices of metabolic health and 2) sTLR and sRAGE responses to an acute bout of aerobic exercise (AE) in normoglycemic (NG) and insulin-resistant (IR) individuals. We hypothesized sTLR and sRAGE would be related to indices of health and acute AE would increase circulating sTLR and sRAGE to a greater degree in the IR than NG group. **METHODS:** BMI-matched NG (n=10; 41±12 y; 36±1 kg/m²) and IR (n=16; 51±10 y; 34±2 kg/m²) participants were studied during 2 visits separated by at least 72 h. The first visit included an oral glucose tolerance test (OGTT), DEXA scan, and VO₂max test. The second visit consisted of a baseline blood draw, treadmill exercise at 65% VO₂max for 30 min, and a 30 min post AE blood draw. sTLRs, sRAGE and isoforms were assessed in plasma via ELISA. **RESULTS:** IR individuals exhibited greater (P<0.05) body fat (+22%), HbA1c (+16%), OGTT AUC (+59%), and HOMA-IR (+57%). At baseline, IR had lower (P<0.05) sTLR2 (IR: 5.0±1.0; NG: 8.6±1.9 ng/mL), whereas sTLR4 was trending toward a difference (P=0.07) between groups (IR: 3.3±0.5; NG: 4.7±1.5 ng/mL). sRAGE (IR: 1190±110; NG: 1264±577 pg/mL) and esRAGE (IR: 306±50; NG: 274±47 pg/mL) and cRAGE (IR: 901±78; NG: 990±144 pg/mL) isoforms were similar (P>0.05) at baseline. Acute AE did not change (P>0.05) sTLR, sRAGE and isoform levels. Baseline sTLR2 was correlated (P<0.05) with multiple indices of metabolic health, including body fat (r=-0.406), HbA1c (r=-0.510), basal blood glucose (r=-0.505), OGTT AUC (r=-0.687), and relative VO₂max (r=0.414), while sTLR4 was correlated (P<0.05) with OGTT AUC (r=-0.402) and HDL (r=0.453). **CONCLUSION:** These novel findings show the circulating soluble receptor profile is disrupted in individuals with insulin resistance and related to indices of metabolic health.