Adipose Tissue Differs and Correlates to Carbohydrate Metabolism and Proinflammatory Adipokines by Level of Spinal Cord Injury

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Level of injury (LOI) and the contribution of visceral (VAT) and subcutaneous (SAT) adipose tissue (AT) to cardiometabolic dysfunction following spinal cord injury (SCI) remains an area of ongoing investigation. Current research recognizes AT as an endocrine organ releasing proinflammatory adipokines that can alter carbohydrate metabolism. **PURPOSE:** The aim of this investigation was to examine differences in AT volume and characterize the relationship of AT with carbohydrate metabolism and proinflammatory adipokines by LOI. **METHODS**: Forty-three chronic motor complete SCI individuals were included (M/F 36/7, age 42.7±10.5, BMI 26.0±6.0) following completion of informed consent in this IRB approved study. Participants were excluded if unable to undergo magnetic resonance imaging (MRI), had pressure ulcers>grade 2, uncontrolled spasticity/autonomic dysreflexia, or thyroid/renal disease. Participants were classified according to their LOI as either tetraplegic (C5-C8; n=11) or paraplegic (T2-L1; n=32) and underwent an intravenous glucose tolerance test to calculate glucose effectiveness (S_g), insulin sensitivity (S_i), and laboratory assessments, including serum levels of fasting plasminogen activator inhibitor-1 (PAI1), high sensitivity c-reactive protein (CRP), interluekin-6, tumor necrosis factor alpha (TNFα), and thrombin activatable fibrinolysis inhibitor. VAT and SAT were quantified using noncontrast MRI and separated by depot**.** Assays and images were analyzed according to previously published methods. *Mann-Whitney U and* Spearman correlations were used to evaluate the data. $\alpha<0.05$. **RESULTS:** VAT was greater in tetraplegia vs. paraplegia (2974±1524 vs. 2022±1247 cm^3, respectively; $p=0.042$). In tetraplegia, SAT correlated with S_g ($\rho=-0.54$, $p<0.05$), while VAT correlated with TNFα ($\rho=0.65$, $p<0.05$). In paraplegia, VAT correlated with S_i ($\rho=-0.47$, $p<0.001$), while both VAT and SAT correlated with PAI1 ($\rho=0.47$, $p<0.001$ & $\rho=0.44$, $p<0.05$, respectively). **CONCLUSION:** The current results show that LOI influences the distribution of AT as well as the relationship between AT depots and both carbohydrate metabolism and proinflammatory adipokines. These findings may help explain the observed differences in body composition and metabolic profiles between tetraplegia and paraplegia.

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