

Pro-inflammatory Cytokine Interleukin-6 is Upregulated in Early Stage Type 1 Diabetic Rats

YU HUO, MICHELLE L. HARRISON, and AUDREY J. STONE

Autonomic Control of Circulation Laboratory; Department of Kinesiology and Health Education; University of Texas at Austin; TX

Category: Master

Advisor / Mentor: Stone, Audrey (audrey.stone@austin.utexas.edu)

ABSTRACT

Type 1 diabetes (T1DM) is an autoimmune disease characterized by systemic inflammation. T1DM patients are at a higher risk of cardiovascular disease and chronic inflammation, and this is reflected by increased levels of circulating pro-inflammatory cytokines IL-6, IL-1 β , and TNF- α . However, the time point at which these pro-inflammatory cytokines become elevated is not known. **PURPOSE:** The purpose of this study was to determine the concentration of circulating pro-inflammatory cytokines IL-6, IL-1 β , and TNF- α in the early stage of T1DM. **METHODS:** We injected (i.p) 50mg/kg of Streptozotocin (STZ) or the vehicle (CTL) into male and female Sprague Dawley rats and waited one to three weeks before drawing blood. Blood was drawn from the carotid artery into a serum separator vacutainer, centrifuged, and then the serum was aliquoted into tubes and frozen at -80°C for subsequent batch analyses. A rat cytokine multiplex kit (RADPKMAG, EMD Millipore) was used to determine cytokine concentrations in the aliquoted samples. Samples were analyzed using a Luminex 200 instrument (Luminex Corp) according to manufacturer's instructions. **RESULTS:** STZ rats had significantly higher blood glucose (CTL=200 \pm 15 mg/dl, n=14; STZ=523 \pm 14 mg/dl; n=14; p<0.01) and % HbA1c (CTL=4.3 \pm 0.1%, n=10; STZ=8.7 \pm 0.7%; n=11; p<0.01) than CTL rats. STZ rats had significantly lower insulin (CTL=1259 \pm 500 pg/ml, n=8; STZ=200 \pm 182 pg/ml, n=14; p<0.01) than CTL rats. We found that serum IL-6 was increased in STZ rats (222 \pm 205 pg/ml; n=11; four samples with undetectable concentrations were excluded) compared to CTL rats (116 \pm 69 pg/ml; n=10; one sample with undetectable concentration was excluded), p=0.06. In contrast, we found that IL-1 β (STZ: 4.9 \pm 4 pg/ml, n=14; CTL: 4.6 \pm 3 pg/ml, n=7, p>0.05) and TNF- α (STZ: 15.6 \pm 12 pg/ml, n=14; CTL: 14.3 \pm 9 pg/ml, n=13, p>0.05) were not significantly different between STZ and CTL. **CONCLUSION:** We conclude that serum IL-6 concentrations are trending toward being greater in the early stage of T1DM. However, serum levels of IL-1 β and TNF- α do not appear to be elevated at this stage of the disease. Further studies are needed to determine if concentrations of pro-inflammatory cytokines fluctuate during the progression of the disease.