Moderate Exercise Training Blunts Inflammation in Severe Transgenic Sickle Cell Mice

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Sickle cell disease (SCD) is characterized by severe systemic and vascular inflammation. There is strong evidence that moderate exercise training reduces inflammation in healthy people as well as in multiple diseases conditions. The aim of this study was to characterize the effects of moderate exercise training in a severe transgenic mouse model of SCD (Townes). After eight weeks of training, SS mice had a lower hematocrit than untrained SS (UT-SS) but there were only moderate changes in red blood cell count or total hemoglobin between the two groups. The spleen/body mass ratio was lower in the trained SS (T-SS) mice compared to UT-SS. The spleen was less congested in T-SS, and the magnitude of congestion in all animals correlated with the relative spleen mass. Exercise training increased the percent of venous oxyhemoglobin in T-SS and there was a corresponding decrease in the percent carboxyhemoglobin. White cell count and the plasma concentration of macrophage inflammatory protein-1α were decreased in T-SS. The kidney nuclear NF-κB protein expression was increased in UT-SS compared to UT-AA control mice while there was no difference between T-SS and T-AA mice. Kidney IL-1α and P-selectin mRNA expression as well as liver heme oxygenase-1 (HO-1) mRNA expression were blunted in trained mice. Taken together, these results suggest that moderate exercise training may reduce sequestration of sickle erythrocytes/congestion, resting blood deoxygenation and inflammation in SCD.