

Exercise as a Treatment for Peripheral Vascular Dysfunction caused by Metabolic Syndrome and Depression

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Metabolic Syndrome (MetS) and chronic stress/depression are associated with an increased risk for poor cardiovascular outcomes and impaired vascular function. Both of these diseases are continuously increasing in prevalence, but not much is known about the pathological effects of their comorbidity. Exercise is a widely accepted and supported modality for combating MetS and managing chronic stress. However, a gap in the literature exists regarding the degree to which exercise can mitigate the vascular dysfunction associated with MetS and chronic stress simultaneously. The Unpredictable Chronic Mild Stress (UCMS) model is used as a simulation of daily, prolonged stress. The Obese Zucker Rat (OZR) represents MetS, with Lean Zucker Rats (LZR) paralleling a healthy individual. **PURPOSE:** To determine the degree to which exercise can attenuate vascular dysfunction caused by chronic stress and metabolic syndrome. **METHODS:** OZRs and LZRs were separated into experimental groups including: control (C), exercise (Ex), UCMS, and UCMS with exercise (UCMS+Ex). The gracilis arteriole was isolated and vasodilator/constrictor responses of endothelium and vascular smooth muscle were assessed using acetylcholine (ACh), sodium nitroprusside, and phenylephrine, respectively. **RESULTS:** OZR-C overall reactivity was decreased 10-20% from that of LZR-C. Exercise improved the reactivity of the gracilis in OZRs by 20% compared to OZR-C. OZR UCMS reactivity was impaired compared to OZR-C, but rescued with exercise training. **CONCLUSIONS:** Comorbidity between MetS and chronic stress is a confounding factor on healthy vasculature, but does not increase vascular dysfunction in already impaired vessels. Exercise can be used as an intervention for these two diseases to improve microvascular reactivity.

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