

Publication

Short-term high-intensity interval training improves micro- but not macrovascular function in hypertensive patients

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Arterial hypertension is a global health burden that affects vascular structure and function. Assessment of endothelial function can improve cardiovascular (CV) risk stratification. Exercise treatment reduces over all CV risk and improves vascular health. However, it is still not clear which part of the vascular bed is most sensitive to exercise treatment in patients with CV risk. This study aimed to investigate the effects of an 8-week walking based and supervised high-intensity interval training (HIIT) on macro- and microvascular endothelial function as add-on therapy in patients with arterial hypertension.; Forty patients (mean age 58 \pm 7 years) treated for arterial hypertension were randomized in the HIIT (3CE/week) or control group (CG) receiving standard physical activity recommendations. Arteriolar (aFID) and venular (vFID) flicker light-induced dilatation for retinal microvascular and flow-mediated dilatation (FMD) for macrovascular endothelial function were assessed. In addition, standardized assessments of patients' characteristics were performed before and after 8 weeks.; Both groups reduced weight and body mass index but only the HIIT group reduced body fat, visceral fat, and increased peak oxygen uptake after 8 weeks. The control group reduced diastolic blood pressure. No blood pressure changes were found in the HIIT group. Arteriolar FID increased in the HIIT group independently of confounders (pre: 2.40 \pm 0.98%, post: 3.19 \pm 1.31%, $p < 0.001$) but not in the control group (pre: 3.06 \pm 1.50%, post: 2.90 \pm 1.46%, $p = 0.280$). No changes were found for FMD in either group.; Arteriolar FID was found to be a sensitive vascular biomarker to assess exercise-induced microvascular improvements even in a short time setting of an 8-week exercise therapy with HIIT. Short-term exercise training affects microvascular endothelial function but not large artery endothelial function. Thus, retinal aFID appears to be a sensitive biomarker to detect short-term exercise efficacy on a vascular level. Dynamic retinal vessel analysis as a diagnostic approach may prove to be an ideal candidate vascular biomarker to monitor treatment effects of exercise in patients with hypertension on top of standard clinical care and may support clinical decision-making in the future.

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