

Publication

VascuFit: vascular effects of non-linear periodized exercise training in sedentary adults with elevated cardiovascular risk - protocol for a randomized controlled trial

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Background: Early vascular aging (EVA) is increasingly prevalent in the general population. Exercise is important for primary cardiovascular prevention, but often insufficient due to ineffective training methods and a lack of biomarkers suitable to monitor its vascular effects. VascuFit will assess the effectiveness of non-linear periodized aerobic exercise (NLPE) in a non-athletic sedentary population to improve both established and promising biomarkers of EVA. **Methods:** Forty-three sedentary adults, aged 40–60 years, with elevated cardiovascular risk will either engage in 8 weeks of ergometer-based NLPE ($n=28$) or receive standard exercise recommendations ($n=15$). The primary outcome will be the change of brachial-arterial flow-mediated dilation (baFMD) after versus before the intervention. Secondary outcomes will be the change in static vessel analysis (SVA; clinical biomarker of microvascular endothelial function), endomiRs (microRNAs regulating key molecular pathways of endothelial cell homeostasis) and circulating cellular markers of endothelial function (mature endothelial cells, endothelial progenitor cells). Tertiary outcomes will be the change in sphingolipidome, maximum oxygen capacity, and traditional cardiovascular risk factors (blood pressure, triglycerides, cholesterol, fasting glucose, high-sensitivity C-reactive protein). **Discussion:** We expect an improvement of baFMD of at least 2.6% and significant pre-post intervention differences of SVA and endomiRs as well as of the tertiary outcomes in the intervention group. VascuFit may demonstrate the effectiveness of NLPE to improve endothelial function, thus vascular health, in the general sedentary population. Furthermore, this project might demonstrate the potential of selected molecular and cellular biomarkers to monitor endothelial adaptations to aerobic exercise. **Trial registration:** The trial was registered on www.clinicaltrials.gov (NCT05235958) in February 11th 2022.

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