

Effect of intense interval training on blood pressure and hemodynamics in subjects with essential hypertension

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Introduction

Roughly 1 billion people worldwide suffer from hypertension and extensive work has been done to evaluate pharmacological and non-pharmacological interventions. Regular physical activity of moderate intensity is known to reduce blood pressure but the effect of high intensity intermittent exercise on blood pressure is less clear. Moreover, the mechanisms behind the blood pressure lowering effects of exercise remain unsolved. Nitric oxide (NO) and vasodilator prostanoids (PGs) are potent vasodilators that contribute to blood pressure regulation. The present study examined the effect of intensive interval training on blood pressure and the role of the NO/PG system in this response.

Methods

Ten subjects diagnosed with essential hypertension (47±4 years, 171±11 cm, 80±24 kg (S.E.)) and ten normotensive control subjects (46±3 years, 177±8 cm, 76±9 kg), performed 8 weeks of high intensity intermittent exercise training (1 hour cycling sessions 3-4 times per week, ~40% of training time > 80% of heart rate_{max}). Before and after the training period, the subjects participated in an experiment in which intra-vascular blood pressure and leg hemodynamics were measured at rest and during low, medium and high intensity one-leg knee-extensor exercise. The measurements were performed with and without inhibition of NO and PGs by infusion of L-NMMA and Indomethacin into the femoral artery.

Results

Training increased ($P<0.05$) VO_{2max} by ~10% in both groups and decreased ($P<0.05$) mean arterial pressure by 7 mmHg in the hypertensive group only. The reduction in blood pressure was present both at rest and during all exercise

intensities. Blocking the NO/PG system fully reversed the training induced reduction in resting and exercising blood pressure.

Discussion

The finding of a reduction in blood pressure in individuals with essential hypertension highlights that high intensity interval training is an efficient non-pharmacological intervention. The finding of full reversal of the blood pressure reduction by NO and PG blockade strongly indicates that one or both of these systems is up regulated with training in hypertensive subjects and contribute to the training-induced reduction in blood pressure.

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