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Master's thesis, 75 pages., 20 Figures and 2 Tables.
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Abstract:

There is a growing recognition of brown adipose tissue (BAT) in adult humans. It has been postulated that recruitment of BAT may reduce the prevalence of obesity and type 2 diabetes. Previous rodent studies have suggested that exercise training could induce browning within white adipose tissue (WAT) via myokines like irisin that activate thermogenesis and aid in weight loss. The aim of this master thesis was to evaluate whether exercise training increased cold-induced BAT activity and browning of WAT.

10 healthy sedentary males were recruited (aged between 18-45 years with BMI 20-25 kg/m², VO₂ max < 40ml/min/kg). GU in BAT, WAT, deltoid, hamstrings and quadriceps femoris muscles were measured at baseline, before and after six weeks of combination of endurance and resistance exercise training intervention using positron emission tomography-magnetic resonance imaging [¹⁸F] FDG-PET-MRI. The baseline scan was performed at room temperature and the scans before and after exercise intervention was performed under cold exposure.

The intervention increased VO_{2max} by 27% (p = 0.001) and decreased visceral fat mass by 17% (p = 0.01). GU was higher in visceral fat compared to abdominal WAT at baseline (p = 0.01). Cold increased fat oxidation by 189% (p = 0.02), BAT GU by 279% (p = 0.02) and BAT mass by 350% (p = 0.01) compared to baseline, while after exercise fat oxidation, cold-induced BAT GU and BAT mass remained unchanged. These results indicate that cold exposure increases BAT activity but exercise as such has no impact on BAT activity in humans.

Key words: brown adipose tissue (BAT), exercise, myokines, browning, glucose uptake, non-shivering thermogenesis, positron emission tomography.