

Abstract

Ageing is associated with changes in body composition, which is caused by decreases in muscle mass and a progressive increase of fat mass. It is also associated with redistribution of adipose tissue with increased visceral and ectopic fat deposition. These changes are related to insulin resistance and other metabolic disturbances. Adipose tissue dysfunction is important contributor to the disturbed metabolic status of elderly and it is characterized by altered adipogenesis, metabolic flexibility and changes in secretory activity.

Regular exercise is indisputably a key part of a healthy lifestyle. It was shown to improve muscle function, cardiovascular fitness and metabolic health of elderly. The aim of this thesis was to investigate whether a regular physical exercise can influence characteristics of an adipose tissue in elderly women, and if these changes in the adipose tissue can contribute to an improvement in an insulin sensitivity.

In the two groups of elderly women, a long-term trained and a sedentary, the subcutaneous adipose tissue was analyzed for a gene expression of number of metabolic genes, an adipocyte size and a lipolytic rate at the basal state and after the isoproterenol stimulation. Anthropometric parameters and insulin sensitivity were also determined.

Outcomes of this thesis present, that regular physical exercise improves fitness of elderly. Physical exercise counteracts the age dependent increase of fat mass and it also influences the distribution of adipocyte size with increased number of smaller adipocytes and decreased percentage of big adipocytes. The RNA expression of several metabolic genes was modulated by physical activity (namely CGI58, ADRB2, DGAT2, PCK2, CPT1A, ACOX1, SIRT1). Moreover, the isoproterenol-stimulated lipolysis was higher in the trained women. Most of these parameters correlated with the physical performance, the insulin sensitivity and the adipocyte size. Our results indicate that the regular physical activity induces changes in the adipose tissue, which are associated with better metabolic profile in the trained elderly women.