Adiponectin and BAT

Structure and Morphology of Brown Adipose Tissue in Adiponectin Transgenic Mice

by
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Abstract

In 2016, over 1.9 billion adults were overweight or obese and the obesity epidemic, often associated with high-income societies, is now on the rise in low- and middle-income countries. In recent years, it has been shown that the adipokine adiponectin (ApN) is highly involved in several metabolic processes that overall increases systemic insulin sensitivity. Moreover, brown adipose tissue (BAT), a unique heater organ found in both rodents and humans, has a substantial ability for nutrient and energy dissipation through uncoupling of the respiratory chain. Increased activation of BAT may thus have the potential to counteract hyperglyceamia/lipidemia, obesity and thereby prevent the development of metabolic diseases. Using a mouse model overexpressing ApN, this pre-study investigates correlations between elevated ApN levels and BAT structure. BAT was examined by histological analysis that included collagen, and lymphatic vessel staining of sections from prenatal, young, and aged animals as well as by gene expression analysis of several key browning markers. The results show that mice overexpressing ApN increased their BAT mass prenatally and a development of fibrosis in the aged group. A potential side effect of ApN replacement therapy, a widely recognised promising treatment to combat obesity, has thus been found. The results also suggest a potential ApN-pathway which stimulates the proliferation and differentiation of mesenchymal stem cells leading to an increased number of adipocytes but also increased collagen production in adulthood. A new area of research that could increase our understanding of ApN effects on stem cell expansion and differentiation as mechanisms of obesity has hence been identified.

Keywords

Brown adipose tissue; BAT; Adiponectin; ApN; Obesity; Mesenchymal stem cells; MSC; Fibrosis; Adipose tissue; Endocrine peptides; Adipokines; Adipose tissue hyperplasia;