Description for the general public 'The role of neuropeptide B in the regulation of rat and porcine preadipocytes function'

The fat tissue – it's growth and metabolism are the omni subject of study in the world of diverse needs. On the one hand, oversupply of food and consumer lifestyle in the developed countries leads to far-reaching the consequences of problems arising from obesity as a result of excessive growth of body fat – the health, economic and social problems. Different aspects are associated with problems caused by energy shortages which apart of the obvious life-threatening condition may leads to insufficient fat accumulation which also result as disruption of homeostasis and, for example, can lead to lower fertility. Moreover, modern techniques of farming and animal nutrition are focused on achieving the expected proportion of meat and fat in the carcass. In connection with such a wide range of issues relating to the regulation of energy balance in humans and animals, in which a key aspect is fat metabolism and its regulation by factors of neuroendocrine origin, it is important to accurate knowledge and the advancement of knowledge about regulation, formation and functioning of fat tissue. Scientists still reach the newly discovered endogenous or synthetic compounds trying to verify their potential impact on the regulation of energy metabolism. On the other hand, they are discovering new areas of activity of already known compounds. The subjects of our interest is peptide neurohormone: neuropeptides B, identified in 2002, which is known for it effects on appetite, social interactions and inflammatory pain. Our earlier research showed that NPB has an effects on the metabolism and endocrine functions of fat cells (adipocytes) - studies were performed *in vitro* on isolated, mature rat adipocytes. We have shown that NPB reduces secretion of leptin (the hormone which regulates satiety and food intake) and increases lipolysis (breakdown of lipids stored in fat cells). Except metabolism of mature adipocytes important aspect of adipose tissue function is the possibility of proliferation or the formation of new fat cells from precursor cells called preadipocytes. Until now, the impact of neuropeptide B on the biology and development of progenitor cells giving the population of new adipocytes is unknown, **therefore the theme of proposed project is the role of NPB in adipogenesis.**

It is very interesting to compare the physiology of two fat tissues types - white and brown. While the white fat tissue is primarily responsible for the storage of energy by the accumulation of lipids, brown adipose tissue promotes energy expenditure by burning of accumulated lipids to obtain in this way energy and heating of the body. The scientific reports from the recent years are extraordinary interesting showing the possibility of transdifferentiation: changes status of the cells in white adipose tissue to brown and vice versa, which may influence the change in the energy balance of the body (burning versus fat accumulation). As proposal research it is planned, therefore, to study the potential impact of NPB on growth and metabolism both, white and brown, adipose tissue cells on two selected experimental models: the rat and pig. **Assumed research hypothesis is, neuropeptid B has an effect on the growth, differentiation and metabolism white and brown adipocytes in rats and pigs.** The results will improve our better understanding of the effects of these peptides and open avenues for their use as potential biotherapeutics in the fight against obesity and obesity associated complications. Experiments conducted in the project will be performed using modern tools of molecular and cellular biology. They not only reveal the effects of the neuropeptides B and W on the growth and formation of fat cells (influence on the proliferation, differentiation, accumulation of lipid droplets in the cell, the expression of genes involved in these processes), moreover, the mechanism of intracellular pathways responsible for signal transduction from receptor will be assessed. A new study from 2014, demonstrated the presence of brown adipose tissue in the pig kidney fat denying the existing data showing the lack of brown adipose tissue in this species. An innovative aspect of the project will therefore be the molecular characterization of differentiation adipocytes isolated from perirenal fat pads and its possible tranformation into the brown fat - its growth/metabolism.