Secretory function of adipose tissue

J. Kuryszko¹, P. Sławuta², G. Sapikowski²

¹ Department of Animal Physiology and Biostructure, Histology and Embryology Unit, Faculty of Veterinary Medicine, Wrocław University of Environmental and Life Sciences, Norwida 31, 50-375 Wrocław
² Department of Internal Diseases, Faculty of Veterinary Medicine, Wrocław University of Environmental and Life Sciences, pl. Grunwaldzki 47, 50-366 Wrocław

Abstract

There are two kinds of adipose tissue in mammals: white adipose tissue – WAT and brown adipose tissue – BAT. The main function of WAT is accumulation of triacylglycerols whereas the function of BAT is heat generation. At present, WAT is also considered to be an endocrine gland that produces bioactive adipokines, which take part in glucose and lipid metabolism. Considering its endocrine function, the adipose tissue is not a homogeneous gland but a group of a few glands which act differently. Studies on the secretory function of WAT began in 1994 after discovery of leptin known as the satiation hormone, which regulates body energy homeostasis and maintenance of body mass. Apart from leptin, the following belong to adipokines: adiponectin, resistin, apelin, visfatin and cytokines: TNF and IL 6. Adiponectin is a polypeptide hormone of antidiabetic, anti-inflammatory and anti-atherogenic activity. It plays a key role in carbohydrate and fat metabolism. Resistin exerts a counter effect compared to adiponectin and its physiological role is to maintain fasting glycaemia. Visfatin stimulates insulin secretion and increases insulin sensitivity and glucose uptake by muscle cells and adipocytes. Apelin probably increases the insulin sensitivity of tissues. TNF evokes insulin resistance by blocking insulin receptors and inhibits insulin secretion. Approximately 30% of circulating IL 6 comes from adipose tissue. It causes insulin resistance by decreasing the expression of insulin receptors, decreases adipogenesis and adiponectin and visfatin secretion, and stimulates hepatic gluconeogenesis. In 2004, Bays introduced the notion of adiposopathy, defined as dysfunction of the adipose tissue, whose main feature is insulin and leptin resistance as well as the production of inflammatory cytokines: TNF and IL 6 and monocyte chemoattractant protein. This means that excess of adipose tissue, especially visceral adipose tissue, leads to the development of a chronic subclinical inflammatory condition, which favours the development of insulin resistance and Type 2 diabetes. Obesity is a systemic illness caused by energy transformation homeostasis disorder which results in an increase in the amount of body fat mass. It affects approximately 40% of dogs and 20% of cats. Illnesses which accompany obesity result, to a great extent, from the secretive role of adipose tissue, which is still little known, which should be included when planning treatment of an obese animal.

Key words: adipose tissue, insulin resistance, adipokines

Correspondence to: J. Kuryszko, e-mail: jan.kuryszko@up.wroc.pl