

Endocrine function of adipose tissue

Adipocytes (adipose tissue cells) also have an endocrine function. They produce substances of a proteinaceous nature called adipokines or adipocytokines. Some of these hormones act directly in adipose tissue (adipocytes or macrophages and fibroblasts of this tissue) or remotely through the bloodstream to organs such as muscles, liver, brain, endothelium. Their effects affect intermediate metabolism, insulin sensitivity, hemocoagulation, immune response, etc.

Adiponectin

It increases the utilization and transport of glucose and non-esterified fatty acids (NEMK) into muscle, liver and fat cells. These effects are provided by AMP-kinase, which restores the energy balance in the cell when cellular ATP decreases (eg β -oxidation of lipids and Glc). It also counteracts the development of atherosclerosis.

Leptin

It affects the hypothalamic satiety centers, thereby reducing food intake and stimulating energy expenditure. Leptin receptors have myocytes, adipocytes, hepatocytes and pancreatic β -cells. It has insulin-like effects on the adipocyte (stimulates storage-glycogen synthesis, inhibition of lipolysis), activates AMP-kinase in the myocyte (increases triglyceride oxidation), and thus protects skeletal muscle from excess TAG. It inhibits insulin production in pancreatic cells.

Adipose tissue is composed not only of adipocytes, but also of fibroblasts, endothelium and immunocompetent substances. These substances, macrophages, are responsible for the production of cytokines. Cytokines are formed in the body and in other tissues. This cytokine is, for example, interleukin 6 (IL6). It inhibits the insulin receptor and enhances lipolysis during exercise. Another cytokine is TNF α (tumor necrosis factor), which increases the level of NEMK in the blood.

Resistin

It suppresses the effect of insulin on glucose utilization and reduces glucose tolerance. These results occurred only in mouse models.

Visfatin

Hormone produced by adipose tissue lymphocytes, increases glucose transport in myocytes, lipogenesis and adipocyte differentiation and reduces glucose production in hepatocytes. Increased lipogenesis and differentiation increases the deposition capacity of visceral adipocytes, which thus hold more lipids that would otherwise disrupt the metabolism of other insulin-sensitive tissues.

Effect on insulin sensitivity

The adipocyte has the task of accumulating unnecessary lipids and releasing them again when there is an increased need or starvation. If a person has an excess of nutrients, the stored lipids increase the volume of the adipocyte. This cannot be done indefinitely, and therefore depends on the number of adipocytes (deposition ability) that arise from mesenchymal cells mainly in childhood and puberty. People who have few of these cells (for example, after liposuction) are at greater risk of developing insulin resistance because the cells are overloaded with stored lipids (and thus become insulin-resistant). And it is the endocrine-active substances formed in adipose tissue that contribute to the way lipids are handled in adipocytes.

Links

Resources

- POLÁK, Jan, et al. *Endokrinní funkce tukové tkáně v etiopatogenezi inzulinové rezistence* [online]. Interní medicína pro praxi, ©2006/10. [cit. 2011-05-09]. <<http://www.solen.cz/pdfs/int/2006/10/06.pdf>>.
- POLÁK, Jan. *Tuková tkáň jako endokrinní orgán* [online]. Vesmír, ©2009/11. [cit. 2011-05-08]. <<http://www.vesmir.cz/clanek/tukova-tkan-jako-endokrinni-organ>>.