

ABSTRACT

The ability to keep constant body temperature is necessary for mammals. There are effective strategies developed during the evolution – shivering and nonshivering thermogenesis, which start during cold exposure. This thesis is focused on the nonshivering thermogenesis which occurs in brown adipose tissue and is controlled by norepinephrine released from the sympathetic nerves if the cold stress persists for a long time. The principle of the heat production is based on function of the uncoupling protein 1 which disrupts the proton gradient in mitochondria thereby releasing heat the waste product. Similar mechanism of energy dissipation is used not only during cold exposure but also after digestion of high fat diet, which may provide clues for potential therapeutic treatment of obesity and associated metabolic diseases. This study summarizes current knowledge about the role of adrenergic signalling in the process of cold acclimation.

Key words: cold acclimation, nonshivering thermogenesis, brown adipose tissue, sympathetic nerve system, uncoupling protein 1 (UCP1), obesity