Abstract

Maintaining energy homeostasis at reduced temperatures is essential for the survival of the organisms. In this diploma thesis, we determined the impact of cold stress and cold adaptation on the rat immune system. A number of different factors participate at the process of thermoregulation, but the adrenergic signalling plays a crucial role. The binding of norepinephrine to β-adrenergic receptors leads to the formation of brown adipose tissue, which is necessary for non-shivering thermogenesis, as well as for energy balance. Bioactive products of adipocytes subsequently modulate the immune system, this process is significantly influenced by signalling of nerve cells. In order to understand neuro-immune interaction during the cold adaptation, we monitored changes in immune cell populations and the production of soluble products in rats treated with specific inhibitors of β-adrenergic receptors. Relationship between the immune and nervous system seems to be very important in many biological processes. Deciphering basic mechanisms of the influence of cold adaptation on immune cells can therefore explain other clinically relevant topics, such as treatment of obesity.

Key words: immune system, cold adaptation, norepinephrine, adrenergic receptor, cytokines, brown adipose tissue, non-shivering thermogenesis