

Mitochondrial uncoupling proteins (UCPs) belong to the superfamily of mitochondrial anion-carriers. The longest known is UCP1, predominantly expressed in brown adipose tissue, where it takes part in nonshivering thermogenesis. In the late 1990s were discovered other sequence homologs of UCP1 with tissue specific distribution. The Function of these „new“ uncoupling proteins is still uncertain. It is assumed that each of the isoforms has a specific function depending on the type of tissue.

This thesis showed differences in tissue transcription pattern between rat and mice using RT-PCR absolute quantification. Significant differences in pattern were found in lungs, brain and muscle. In each case UCP expression was higher in mice tissues. Mice lungs express mainly UCP2. The difference in mice brain is caused by *ucp4* and *ucp5* genes transcription and finally in muscle is highest content of UCP3 mRNA. We investigated whether any of *ucp* transcript can complement *ucp2* transcript in spleen or lungs of *ucp2*^{-/-} mice. We did not find any difference which can explain, that in isolated lung mitochondria of fasted *ucp2*^{-/-} mice were uncoupled in state 4. In the last project, we found relationship between *ucp2* transcription in insulinoma INS-1E cells and oxygen levels of the cultivation atmosphere.