Abstract

Mitochondrial diseases are serious hereditary metabolic disorders caused by insufficient energy function of mitochondrion. The cause of the disorders is biogenesis and structure of oxidative-phosphorylation system (OXPHOS) fault. Mitochondrial diseases have extensive clinical implications with a very poor prognosis. Incidence of these diseases is approximately 1: 5000 and thus they ranks among one of the most common congenital metabolic disorders. Given it that treatment is still unavailable, the only way to help the affected families is properly and early find out the true cause of the mitochondrial diseases to ensure the possibility of genetic counseling in affected families. In recent years, although novel genes that are responsible for the MO are discovered, the majority of the genes causing the disease still remains unknown. The only possibility is the analysis of mitochondrial functions at the biochemical level.

This thesis focuses on the analysis of biochemical parameters of mitochondrial enzymes in skeletal muscle sample. The thesis describes the biochemical diagnosis process involving the collection of tissue, isolation of mitochondria and analyses for enzymatic activity of OXPHOS complexes. Mitochondrial fraction of native muscle was isolated by the differential centrifugation. The protein concentration in the samples was determined by the method according to Lowry. Activities of OXPHOS complexes were analyzed by spectrophotometry. Activities of OXPHOS complexes in the group of patients were compared with a set of control samples. Pathological findings were evaluated in relation to the phenotypic manifestations of patients.

Keywords: mitochondria, mitochondrial diseases, oxidative phosphorylation system, spectrophotometry.