Abstract:

The mammalian organism is entirely dependent on ATP production by oxidative phosphorylation system (OXPHOS) on the inner mitochondrial membrane. OXPHOS is composed of respiratory chain complexes I-IV, ATP synthase and also include two electron transporters cytochrome c and coenzyme Q. Disorders of mitochondrial energy metabolism caused by OXPHOS defects are characterized by extreme heterogeneity of clinical symptoms, variability of tissues affected and the severity of the defect at the level of individual tissues. The mitochondrial disorders are not always clearly expressed at the level of available tissue or most easily available cultured fibroblasts and/or currently available methods are not capable to detect the defects on the fibroblasts level. The aim of this master thesis was to identify by biochemical methods, especially by high sensitive polarography, OXPHOS disorders in cultured fibroblasts. Cell lines from 10 patients with isolated (SURF21, SCO1 ND1, ND5) or combined defects of OXPHOS complexes whose biochemical defect was confirmed in muscle tissue as well as 14 patients with non-mitochondrial diseases (8 patients with Huntington disease, 6 patients with disorder of sulphur amino acids metabolism) were analysed. Furthermore impact of various cultivation conditions on OXPHOS function was studied. Significant disturbances in mitochondrial respiration, ultrastructure and mitochondrial network were found. The results of this thesis will contribute to a more precise identification OXPHOS defects in cultured fibroblasts and thus more successful detection of patients with mitochondrial diseases

.

Key words: mitochondria, oxidative phosphorylation, cultivated fibroblasts, cytochrome *c* oxidase