This thesis has been worked out in The laboratory for study of mitochondrial disorders (Departement of Pediatrics, 1st Faculty of Medcine, Chales university in Prague) and in cooperation with The Institute of Inherited Metabolic Disorders.

Mitochondrial disorders represent a heterogeneous group of diseases with the onset at any age from neonatal period till adulthood, mostly presented with very severe clinical courses of disease. The mammalian organism is fully dependent on mitochondrial oxidative phosphorylation system as on the major energy producer of the cell. Therefore the mitochondrial disorders affect mainly high energy demanded tissues such as brain, heart or muscle. Simillar phenotype is observed in many lysosomal storage disorders.

Despite of expanding knowledge of molecular basis of mitochondrial and lysosomal disorders, it may be still difficult to explain the exact pathogenesis of disease as well as the prognosis for patients and their families.

Mitochondrial functions affect more than just energy production; they contribute in initiation of apoptosis, in cellular calcium homeostasis, and in production of reactive oxygene species. Disturbed mitochondria become a goal of autophagy mediated by the lysosomal compartement.

The results of our study enable:

1. better understanding of the tissue specific impact of selected mtDNA mutations on the mitochondrial function in autoptic tissues

2. better understanding of the relations between mitochondrial ultrastructure and functions in selected mitochondrial and lysosomal storage disorders on level of cultured fibroblasts.