

**Project 1.9. The role of mitochondria and endoplasmic reticulum interactions in the regulation of cancer cells metabolism.**

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**Background:**

The cellular compartment comprising the contact sites between the outer mitochondrial membrane and the endoplasmic reticulum, often called mitochondria associated membranes (MAM) fraction, forms a unique niche for many key cellular processes. Among them are: phospholipid metabolism,  $\text{Ca}^{2+}$  signalling, maintenance of  $\text{Ca}^{2+}$  homeostasis and regulation of apoptosis initiation. Contact sites between mitochondria and endoplasmic reticulum are also involved e.g. in autophagy process and cellular energetic metabolism regulation. Recently, MAM fraction is of interest in many laboratories investigating neurodegenerative and metabolic diseases as well as metabolism of cancer cells.

**Aim:**

The main goal of the project is to investigate the scale of interactions between mitochondria and endoplasmic reticulum and to understand their functions in cancer cells (e.g. HepG2 and HepG2 / C3A derived from human hepatocellular carcinoma). We are going to identify differences in the level of proteins crucial for the function of the MAMs fraction as well as their lipid profile in cancer cells and their "healthy", non-cancer counterparts. An extremely important element involved in the initiation of apoptosis in cancer cells caused by various chemotherapeutics, is the appropriate modulation of the calcium signals at the contact sites between mitochondria and endoplasmic reticulum. Therefore, we plan to investigate also the changes in the proteomic and lipidomic profiles describing MAM fraction that occurs in response to the chemotherapeutic treatment and to elucidate whether changes observed in cancer cells at the level of mitochondrial and endoplasmic reticulum interactions may in some cases contribute to cancer drug resistance.

**Requirements:**

- A master's degree (or an equivalent) in biology, biochemistry, molecular biology, molecular biomedicine, medicine, genetics or biotechnology,
- good command of spoken and written English,
- knowledge of the standard biochemistry and molecular biology techniques,
- a strong motivation and ability to drive the project independently,
- well-developed collaborative skills,
- curiosity for discovery of biological processes. Knowledge of statistics, experience of working with laboratory animals, documented scientific activity (e.g. publications, presentations at conferences, research internships, awards, scholarships) will be an additional advantage.