

# MASS SPECTROMETRY, PROTEOMICS AND POLYMER CHEMISTRY

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## PROTEOMIC ANALYSIS OF MITOCHONDRIAL PERMEABILITY TRANSITION PORES IN RELATION TO CARDIOPROTECTION INDUCED BY METABOLIC PRECONDITIONING

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**Introduction:** Mitochondrial permeability transition pores (mPTPs) are associated with cell death regulation, but also perform physiological role during calcium homeostasis, bioenergetics and redox signalling of cardiac mitochondria. Metabolic preconditioning (MPC) is an experimental cardioprotective model that has demonstrated sufficient protection to compensate for the mitochondrial energy of the heart under pathological conditions.

**Aim:** The purpose is to clarify regulatory components of the mPTP complex by means of proteomic analysis and using mass spectrometry. We have focused also on mitochondrial creatine kinase (mtCK) as one of the proposed mPTP regulators.

**Materials & Methods:** Proteomic analysis was performed using nano high performance liquid chromatography and mass spectrometry (ion mass spectrometer configured with electrospray ionization source (ESI)). Mitochondrial proteins were separated by 1D gel electrophoresis and in-gel trypsin digestion. Male Wistar rats were used for this study. Heart mitochondria were isolated by means of differential centrifugation. MPC was induced for 8-days using single dose of streptozotocin (65 mg/kg b. wt.). At the level of using proteomic analysis, we have focused on proteins currently considered as structural and regulatory components of mPTP. The abundance of the investigated proteins as a whole was significantly lower in the MPC affected group ( $p = 0.048$ ), expressions of individual proteins expressed by fold change parameter were maintained (analysed using TREAT (t-tests relative to a threshold) procedure). An important outcome in terms of cardioprotective regulation is that remaining identified mPTP proteins retained expression at the level of healthy mitochondria without significant change. MPC has been able to preserve the activity of mtCK, one of the key enzymes in the energy metabolism.

**Results:** The results of proteomic analysis under MPC conditions indicate the positive effect of mPTP regulated mechanisms present in the state of increased calcium influx into the mitochondria, thereby contributing to the maintenance of the energy of the pathologically affected myocardium.

## BIOGRAPHY

Ferko M is a researcher who is working at the Department of Biochemistry, Centre of Experimental Medicine SAS as an in charge of the mass spectrometry and fluorescence spectroscopy laboratory. He has 23 publications on the topics like heart mitochondria and cardiac adaptation, endogenous cardioprotection and mitochondrial proteomic analysis published in various journals that have been cited 100 times and his H-index is 11. He is expertise in heart mitochondria proteomic analysis, LC/MS, heart mitochondria function, bioenergetics, heart failure and cardiovascular physiology.

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