

Project 1.18: Light-regulated mitochondrial potassium channels: searching for new cytoprotective mechanisms.

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Background:

Mitochondria provide cells with energy to carry out fundamental organism functions. In addition to the synthesis of ATP, as an energy carrier, mitochondria are involved in such important phenomena as apoptosis, necrosis or lipid oxidation. The proper functioning of mitochondria depends on the maintenance of transmembrane potential ($\Delta\Psi$) associated mainly with the difference in proton concentration across the inner mitochondrial membrane and ion transport and a number of substrates. One of the groups of proteins involved in ion transport are, discovered relatively recently, potassium channels of the inner mitochondrial membrane. Our initial research suggests that mitochondrial potassium channels change their activity when exposed to infrared light.

Especially the increase in potassium ion transport across the inner mitochondrial membrane has aroused the interest of many researchers. It has been shown that the activation of mitochondrial potassium channels in various cell types can lead to cell protection against damage, a phenomenon known as cytoprotection, especially in tissue hypoxia. The mechanism of this process is not fully understood, and the proposed research project aims to identify new infrared light-induced cytoprotective mechanisms.

Aim:

The aim of the project is to resolve the possible mechanism by which mitochondrial potassium channels activity are regulated by light (in IR range). To achieve our goals we plan to use variety of modern techniques including advanced electrophysiological, biochemical and molecular biology methods. Additionally, we plan to develop new experimental models with use of newest tools allowing for mammalian genome editing and selective expression of chosen proteins.

Requirements:

We are looking for a motivated, creative and cooperative person with chemical, biophysical, biological, biotechnological or related education. Basic laboratory practice is welcome. In addition, we expect a good command of spoken and written English.