

Project 1.17. The role of the mitochondrial potassium channels in damage caused by urban particulate matters (PM) - search for a new cytoprotection strategy

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Laboratory: Intracellular Ion Channels, the project will be implemented in cooperation with Department of Physics and Biophysics, Institute of Biology, Warsaw University of Life Sciences-SGGW.

WWW: <http://en.nencki.edu.pl/laboratory-of-intracellular-ion-channels>

Background:

One of the toxic factors adversely affecting the functioning of the respiratory tract are those associated with air pollution. Long-term exposure to urban dust (particulate matter, PM), which is one of the main components of smog, has been shown to be a significant cause of death. Recent studies indicate that one of the potential causes of PM-induced cytotoxicity may be mitochondrial damage of respiratory epithelial cells.

It seems that the activation of potassium channels located in the inner membrane of mitochondria may increase the survival of epithelial cells exposed to PM.

Mitochondrial potassium channels regulate mitochondrial functions by affecting mitochondrial potential and the synthesis of reactive oxygen species. In addition, pharmacological activation of these channels has been shown to alleviate the effects of hypoxia/reperfusion injury of heart or brain tissue. It therefore seems that mitochondrial potassium channels in the airway epithelium may be a new, interesting pharmacological target for therapies related to respiratory diseases developing as a result of prolonged exposure to air pollution.

Aim:

PhD student will be mainly focused on analysis of mechanisms of PMs induced cell death and cytoprotective role of the mitochondrial potassium channels against PMs induced injury. We plan to use existing experimental models based on cell lines of epithelial origin. Additionally, the fellow will work on development of new cellular models using modern tools (e.g. CRISPR/Cas9 technology, gene silencing, gene overexpression).

Apart from above it is planned to use a variety of other experimental techniques (e.g. cell death assays, biochemical and molecular biology methods) allowing for description of PMs induced mitochondrial damage and cell death.

Requirements:

- We are looking for a motivated, creative and cooperative person with chemical, biological and biotechnology or related education,
- We expect basic knowledge of biochemical techniques and/or molecular biology methods,
- In addition, we expect a good command of spoken and written English.