

# The influence of pesticides to bioenergetics of the cells

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## Summary

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*In order to feed the growing population on the Earth, the usage of pesticides in agriculture is inevitable. At the same time, the substances which are toxic for pests could similarly harm human health. Several previously used pesticides are found to cause serious health issues and now restricted in EU. The effects of long-term exposure of the pesticides we are using at the moment may have latent adverse effects and should be extensively studied. For example, increased incidences of the cardiovascular diseases are detected among the people who are working with the pesticides. The aim of the project is to investigate how the pesticides, found in our food, influence our cells and health. In our laboratory we have expertise in the energy metabolism regulation in the heart muscle and cancer studies. From this knowledge we want to move on, to clarify environmental aspects that could trigger pathological changes. For that we want to perform functional studies and map possible changes in cells energy metabolism in respond to pesticides.*

Research field:	Chemistry and biotechnology
Supervisors:	Dr. Tuuli Käämbre Dr. Kersti Tepp
Availability:	This position is available.
Offered by:	National Institute Of Chemical Physics And Biophysics
Application deadline:	Applications are accepted between June 01, 2022 00:00 and June 30, 2022 23:59 (Europe/Zurich)

## Description

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The aim of the project is clarify what bioenergetic pathways could be possibly involved in interaction of pesticides with mammalian cell metabolism. In the first stage of the study we will investigate the alterations in colonocyte and heart muscle cell cultures in response to exposure to long-term low-dose of pesticides. The used pesticides are among the most used in Estonia. The bioenergetic profiling (ATP production, oxidative stress, proportion of glycolysis in energy production, alterations in cells cytoarchitecture etc.) is performed after the introduction of the certain pesticide concentration to the cell. The cell culture conditions will be optimized to mimic in vivo situation in respect to metabolism and antioxidant defense mechanisms.

### Supervisors:

Main supervisor: Dr. Kersti Tepp  
Co-supervisor: Dr. Tuuli Käämbre

### Responsibilities and (foreseen) tasks

- Be involved in study design, especially work with cell cultures,
- To carry out oxygraphic measurements,
- Perform immunohistochemistry and confocal microscopy analyses,
- Use of other common biochemistry methods to determine parameters of energy metabolism
- Data analysis
- Writing manuscripts
- Presenting the results in conferences and international meetings

### Applicants should fulfil the following requirements:

- Master`s degree
- Competence in areas of the biological sciences relevant to this research (biochemistry, cell biology)
- Interest in cell metabolism.
- Advanced English



- Capacity to work both as an independent researcher and as part of an international team
- Capacity and willingness to provide assistance in organizational tasks relevant to the project

**The following experience is beneficial:**

- Previous work experience with cell cultures

**We offer:**

- 4-year PhD position
- High-level interdisciplinary research with supporting colleagues
- Conference visits and research stays in leading universities in the field

**About the laboratory**

The main emphasis of the research in the Laboratory of Chemical Biology in NICPB is cellular regulation of energy metabolism. The aim of current projects is to define the mechanisms that cause critical shifts in the regulation during pathological alterations in comparison with normal cells. The research activities range from studying fundamental aspects to applications. A strong emphasis is also given to the deployment of modern physical methods in chemistry and biochemistry.

<https://kbfi.ee/cb/research/research-projects/?lang=en>

**Additional information**

For further information, please contact Kersti Tepp [kersti.tepp@kbfi.ee](mailto:kersti.tepp@kbfi.ee)



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