

## **In search of spectroscopic markers of autophagy based on pharmacologically induced phospholipidosis in endothelial cells**

It has been observed that patients taking psychotropic drugs from the CADs (cationic amphiphilic drugs) group have an increased risk of developing the cardiovascular diseases. These drugs can cause phospholipidosis in the cells. **I hypothesize that the drug-induced phospholipidosis mechanism is the result of modulation of autophagy in endothelium, which is a barrier between vessel wall and blood. In addition, the research hypothesis to be verified here is the possibility of finding spectroscopic markers of autophagy in endothelial cells.**

Autophagy is a process, in which the components of cells, viruses and bacteria are surrounded by membranous vesicles (autophagosomes) and transported to lysosomes, where they are degraded. The participation of autophagy in drug-induced phospholipidosis and lipid metabolism in the endothelium is still an unexplored area.

Spectroscopic methods, such as the main analytical method proposed here - Raman microscopy, allow for non-destructive testing of biological material without the use of labels. Thus, it is possible to identify lipids, their content and distribution in cells, simultaneously studying other cellular components and drugs that cells are treated with. The project plan is to study phospholipidosis, which occurs when phospholipids accumulate excessively in cells and tissues. CADs, i.e. those used to treat depression, psychosis, malaria and arrhythmias can induce phospholipidosis in cells. **The aim of the project is to find specific spectroscopic markers of autophagy by studying *in vitro* the effect of selected CADs drugs on endothelial cells using Raman spectroscopy, fluorescence microscopy, and biological tests.**

In particular, the emphasis will be put on searching for these spectroscopic markers, that will allow identifying early biochemical changes in endothelial cells caused by drug-induced phospholipidosis. From the point of view of endothelial pharmacology, the term and understanding the mechanism of phospholipidosis along with its identification, may be a response to the growing concerns about the CADs administration. In order to obtain comprehensive information about the toxic effects of these drugs, it is necessary to conduct the number of studies using modern analytical techniques that will allow determining biochemical, morphological and physicochemical changes in cells, triggered by the drugs reaction.