

## **DESCRIPTION FOR THE GENERAL PUBLIC**

Statins are drugs used by people struggling with elevated cholesterol level in blood. By lowering this level, statins effectively help in preventing some dangerous cardiovascular diseases, e.g., atherosclerosis. Although some cholesterol is obtained from the diet, most cholesterol is made in the liver and other tissues. Statins are widely used cholesterol-lowering medications. The side-effect of statin administration is hampering coenzyme Q10 production. This chemical compound is necessary in a functioning of mitochondria, which take part in respiratory processes, supplying our cells in energy. Mitochondria are also a source of free radicals, which are helpful for the cells in a low quantity but can disturb their normal functioning in a higher one.

Endothelial cells form an inner layer of blood vessels and are constantly washed by blood and blood-transported substances, including drugs like statins. These cells have serious influence on a whole cardiovascular system, including blood pressure. Dysfunction of endothelial cells and their mitochondria initiates the process of atherosclerosis plaque creation.

**The main objective of this project is to identify the influence of statins on the functioning of endothelial cell mitochondria.**

Within the project, it is planned to cultivate endothelial cells in laboratory conditions. In the first part of the research, living mitochondria will be isolated from the cells cultivated in a statin-free medium. Using a device called oxygraph, a direct response of mitochondria to statins will be analyzed. In the second part of the research, endothelial cells will grow in a medium containing statins. The applied statin concentration will be equal to the one normally observed in body (serum) of persons taking these drugs. After several days, cells will be analyzed, paying special attention to their respiratory (mitochondrial) activity. Coenzyme Q10 production level and free oxygen radical formation level (the one that comes from mitochondria and from other cell compartments as well) will be analyzed.

The results will allow us to answer the following questions:

- To which extent statins hamper coenzyme Q10 production in endothelial cells (including their mitochondria)?
- How mitochondria react to statins? Do statins influence the rate of cell respiration? Do they cause any changes in free oxygen radical formation?

In this way, a new light will be put on these aspects of endothelial mitochondria functioning, which have never been studied before. We will elucidate the biochemical basics of the mitochondria functioning in atherosclerosis development and the consequences of using statins. The acquired information could be very useful in creating new therapeutic strategies and drugs for the people who suffer from cardiovascular diseases.