

## **DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)**

TOR (Target of Rapamycin) kinase is an enzyme which allows to precisely control cell growth in favorable environmental and nutritional conditions. This enzyme, which is present in all eucaryotes, is a subject of intense study in yeast, animals, human and plants. TOR kinase is the subject of intense researches in almost all eucaryotes, beginning from yeast and ending at plants. In mammals TOR is responsible for the maintenance of metabolic balance and cell growth, so any impairments in its function lead to serious metabolic diseases like i.e. type II diabetes. Hyperactivation of this enzyme is frequently observed in other severe diseases like clear cell renal cell carcinoma, a type of kidney cancer. The TOR inhibitors, like everolimus, are frequently used for the treatment of these diseases. Therefore, this enzyme is an important therapeutic target. Also in plants impairment of the activity of this enzyme has a dramatic consequences, because it leads to the death at the early stages of embryonic development.

It has been recently demonstrated that this enzyme, which was believed as a cytoplasmic protein localizes also in the nucleus, however its nuclear function has not been yet well recognized. Given the TOR kinase pathway regulates the gene activity, it is highly probable that exists the functional interdependence between this pathway and various machineries responsible for gene expression control. The preliminary results obtained by our Team indicated that most likely the nuclear fraction of this enzyme is responsible for the control of gene activity, however how it happens still remains unknown.

In this project we plan to use the most modern and highly advanced methods enabling addressing the question how TOR controls gene activity, what are its protein partners and which are processes involved in. During our study we will use Arabidopsis model plant and everolimus, a drug used in the cancer treatment to inactivate the TOR kinase and assess using large-scale methods how it influences the genome activity and organization.

Results of the project will be presented on domestic and international scientific conferences, published in international scientific journals addressed to broad audience, including medical field, as well as used during organized by our Team workshops for students and scholars. Additionally, these results will be used in the PhD dissertation and will serve as a basis for the construction of new research projects.