“Ubiquitin as a modulator of the mitochondrial protein import process”

Proteins perform key functions in all living organisms, acting as enzymes, structural elements, transporters, signal carriers or receptors. Proteins naturally wear out and must be replaced by new proteins. At any time, the cells of our bodies produce and remove thousands of different proteins. More than half of the proteins that a cell produces must be delivered to a specific place in the cell where it will perform its function. The proper balance of cellular proteins protein depends on the proper course of this transport and is necessary for the proper functioning of the body. The process of removing damaged proteins is equally important for shaping the protein balance, and its failure has serious health consequences.

One of the basic cellular systems that allow the dismantling of abnormal proteins is the ubiquitin-proteasome system. Proteasome is a powerful protein shredder. Proteins for destruction are labeled by attaching ubiquitin particles. Studies by many research teams indicate that the ubiquitin-proteasome system has tight control over new proteins that are on their way to their destination. The cell has a complex architecture in which specialized and organized compartments called organelles are distinguished. Protein transport to these compartments often occurs through specialized "tunnels" that help to cross the organelle boundary. It happens that proteins labeled with ubiquitin will avoid being destroyed by the proteasome and will continue their journey through such "tunnels". The consequences of this situation remain unclear.

The SONATA BIS project “Ubiquitin as a modulator of the mitochondrial protein import process” funded by the National Science Center, aims to establish a research team that under the lead of Dr. Piotr Brągoszewski will examine the effect of proteins with ubiquitin attached on the mechanisms of protein transport to cell organelles.