

Molecular mechanisms driving formation of muscular exophers and their role in proteostasis and life cycle of *C. elegans*

Each part of our bodies is built out of cells - small units that cooperate with each other. Although there are many different types of cells, they all have several things in common. For instance, all cells need proteins. They are basic building blocks that are used to form complicated cell structures. Proteins tend to break down or can get used up. Therefore, they have to be recycled and replaced by new proteins. Otherwise, they can cause serious problems, not only to the particular cell where this happened but also to the whole organism. Such a situation can be observed in Alzheimer's or Parkinson's disease where proteins are not properly degraded and cells start to die. Up to very recently, there were characterized two main systems in the cell that take care of this process: Ubiquitin-Proteasome System and Autophagy. Both of them have one thing in common, the degradation of unnecessary proteins is occurring inside of the cell. However, very recently another mechanism for protein degradation was discovered in which proteins and even whole organelles are thrown out of the cell via round structures called exophers and degraded there. This mechanism was so far only described for neuronal cells of a model organism *Caenorhabditis elegans*, which is a small worm used in laboratories worldwide because of similarities on the cellular level to humans.

In our laboratory, we have discovered that also worms muscles can produce exophers and degrade muscular proteins outside of the cell. Because this mechanism is largely unknown we plan to characterize it and search for genes that can regulate it. Besides that, we also will investigate how this new degradation process can influence worms' lifespan as well as whether it is beneficial for their health and muscles fitness. This knowledge will later help us to understand better processes standing behind different neurological diseases such as Alzheimer's disease. In the future, it will help to create new prevention strategies against them.