

Project 9.5. Cellular adaptation to cold (NCN/GRIEG)

Supervisor: Wojciech Pokrzywa, PhD, DSc

Institute: International Institute of Molecular and Cell Biology in Warsaw

Laboratory: Laboratory of Protein Metabolism

www: <https://www.iimcb.gov.pl/en/research/laboratories/31-laboratory-of-protein-metabolism-in-development-and-aging-pokrzywa-laboratory#tab2>

Background:

Environmental stressors can seriously jeopardize animals' ability to survive and reproduce. One, potentially dangerous, environmental stressor is acute cold. To counteract cold, affected organisms mount various types of responses, ranging from cold avoidance to adaptation.

The latter strategy is used by hibernating animals, which, in extreme cases, can survive subzero temperatures for many days. Here, we propose to utilize a simple animal model, the nematode *Caenorhabditis elegans*, as a rapid tool to understand cellular adaptations to cold. We will focus on mechanisms altering the abundance and types of cellular messenger RNAs and proteins, as these kinds of molecules are critical for the live-or-die decision of the cell. In some disease states, like stroke, cooling can facilitate patient's recovery. Moreover, hibernation is of interest to ageing research, as animals tend to live longer at lower temperatures. Thus, understanding how cells adapt to cold has the potential to influence treatments of human disorders.

Aim:

As a Ph.D. student, you will use the powerful genetic model of *Caenorhabditis elegans*, which can display a hibernation-like behavior, to determine the mechanism and role of the UCS domain-containing proteins and co-working chaperones in the regulation of cross-talk between translation and proteostasis in the cold. To develop the preliminary results, you will use, e.g., polysome profiling, tissue-specific ribosome imaging, RNA sequencing, in vitro assays on purified proteins, and more.

Requirements:

- holds a master's degree in biology, biochemistry or related field
- solid knowledge of the principles of cell and molecular biology, genetics, and/or biochemistry
- hands-on experience in laboratory work and familiarity with basic molecular biology techniques
- keen interest in translation and proteostasis regulation
- prior experience or knowledge of *C. elegans* or similar model organisms will be an advantage
- proficiency in written and spoken English
- willingness to learn and take new challenges, ability to work independently, analytical thinking