

DESCRIPTION FOR GENERAL PUBLIC

The long-term objective of this project is to obtain a new and original knowledge regarding participation of proteins in physiological and biochemical processes of male reproductive tract of carp as well as disturbances to semen proteome in relation to storage. Moreover redox and phosphoproteomic methods will be applied for the first time as a new tool for the studies of protein phosphorylation and oxidation in relation to reproductive physiology of carp males. The specific objectives include: **(1)** analysis of seminal protein changes and their relationship with physiological characteristics of semen upon maturation of carp sperm, **(2)** the effect of hormonal stimulation on the protein composition and physiological parameters of carp semen **(3)** analysis of alteration in carp semen during short-term storage and **(4)** characterization of the oxidative modification of seminal proteins in response to oxidative stress during storage of carp semen.

This study is based on identifying knowledge gaps related to specificity of reproduction of fish, including cyprinids. There is no data regarding the dynamic changes in the protein composition and protein posttranslational modifications in carp sperm during maturation, hormonal stimulation and storage. The main methodology will be based on proteomics analysis such as two dimensional difference in gel electrophoresis combine with mass spectrometry. These analysis will be enhanced by analysis of protein modifications such as oxidation and phosphorylation. First aim will focus on obtaining detailed information concerning changes in protein profile and quality of carp semen during sperm maturation. Next step of the project will focus on evaluation of changes in protein component and quality and quantity parameters of carp semen upon hormonal stimulation. Completion of these aims will allow to identify proteins involved in mechanism of fish sperm maturation and hormonal stimulation. Moreover we plan to analyze the alteration in protein composition and semen parameters during storage. Next experiment will include the introduction of redox proteomics methods to comprehensive examination of the changes in seminal protein oxidation upon storage. The comprehensive characteristic of semen quality and quantity (sperm concentration, semen volume, sperm motility, viability, oxidative stress, ATP content) will be performed.

The realization of this project should significantly participate to extent our basic knowledge concerning identification of seminal proteins and their modifications implicated in mechanism of fish sperm maturation and hormonal stimulation. The proposed studies are the first to unravel the biochemical basis of mechanism of sperm maturation and hormonal stimulation as well alteration in semen protein composition upon storage. The identification of seminal proteins subjected to oxidation during storage should provide a new insights into mechanism of oxidative damage in fish sperm. The obtained results can also be important for further experiments of applied science, especially regarding development of semen storage methods aimed to control seminal protein oxidation.