ENG

Title of the project:

Delayed Embryo Development in Obese Mothers: The Crosstalk Between Leptin and mTOR Signaling Pathways

Competition: SONATA 20

PI: Dr. Karolina Wołodko

Project Overview

This research project aims to investigate how alterations in oocyte quality contribute to impaired early embryonic development in obese mothers. Obesity, a recognized global health issue of the 21st century, significantly increases the risk of infertility in women, primarily through hormonal and metabolic disturbances that adversely affect oocyte maturation and embryonic developmental potential. As adipose tissue expands, leptin levels rise, leading to ovarian leptin resistance establishment during obesity and causing disruptions in multiple physiological processes. The research will focus on the analysis of the effects of varying activation levels of leptin and mTOR signaling pathways in oocytes on the occurrence of blastocyst developmental delays. The potential for reversing these disruptions to restore normal embryonic development in obese mothers will also be explored. The study will utilize C57BL/6J mice subjected to dietary protocols, as well as B6.Cg-Lepob/J and B6.BKS(D)-Leprdb/J mice strains. Analyses will include embryo morphology assessments, molecular techniques such as immunofluorescence staining, metabolite profiling, and gene expression assessment using high-throughput RNA-Seq. One of the project's goals is to determine whether mTOR pathway activation can restore normal development in embryos from obese mothers. The outcomes may pave the ground for the new therapeutic strategies for obesity-related infertility and improving offspring health.

Key Responsibilities

The PhD candidate will participate in the following tasks:

- Studying relevant scientific literature and applying this knowledge to advance own research work
- Coordinate and perform animal experiments in collaboration with the animal facility staff;
- Performing *in vitro* experiments, including *in vitro* fertilization and embryo culture;
- Laboratory analyses utilizing molecular biology techniques and bioenergetic parameter measurements, microscopic analysis, hormone assays;
- Collecting, analysing, and interpreting experimental data;
- Ability to document and report research results clearly;
- Disseminating research findings through scientific publications, conference presentations, and science outreach activities;
- Preparing and defending the doctoral dissertation.

Candidate Requirements

- Master's degree in biology, medical biology, biochemistry, biotechnology, or a related field (degree must be obtained before commencing the project, i.e., before October 1, 2025);
- Background in animal physiology, reproductive biology, and embryology;
- Familiarity with basic techniques in molecular biology, microscopy, and embryo culture;
- Fluency in English, both spoken and written;
- Motivation for scientific work, strong analytical thinking, proficiency in database searches, good organizational skills, high accuracy and details- orientation, the ability to work both independently and as part of a team; ability to take actions, make decisions and solve problems independently;
- Additional assets: experience in working with laboratory animals (including PolLASA certificate), confirmed internships at other scientific institutions, participation in scientific societies or conferences, scientific articles record.

Recruitment Process

1. Applications will be evaluated according to the regulations for awarding research scholarships in projects funded by the National Science Centre.
2. Only online applications will be considered.
3. Top-ranked candidates will be invited for an interview, which may be conducted in person or online.
4. During the interview, candidates will be asked to deliver a 10-minute presentation on their master's thesis and research interests.
5. Recruitment results will be published on the IAR&FR PAS website within 10 days of the final decision.

Important information:

- **Application deadline:** September 5th, 2025, 23:59 (Eastern European Time)
- **Application method:** application form
- **Interviews:** September 10-12, 2025 (via Zoom)
- **Location:** Olsztyn, Poland
- **Duration of the scholarship:** 36 months
- **Date of position opening:** October 1st, 2025
- **Number of positions:** 1