



TITLE

2023/2024 Master internship at UCA

LAB & PEOPLE

- Name of the hosting lab: Exercise Physiology, Nutrition, and Health Research Group.
- General activities of the lab: Research on Exercise Physiology, Nutrition, and Health.
- Website: <https://produccioncientifica.uca.es/grupos/29092/detalle>
- Number of staff / PhD: 8
- Supervisor name and contact: Cristina Casals, cristina.casals@uca.es

TOPIC OF THE INTERNSHIP

- Scientific context of the internship (max 20 lines)

The internship takes place within the ExPhy Research Group, which is currently engaged in three nationally-funded projects that involve the comparison of various exercise programs, with or without nutritional interventions, for the management and control of type 2 diabetes and obesity. These projects emphasize a gender perspective to determine the distinct responses and adaptations between men and women.

We delve into the fields of exercise physiology, sports science, and nutrition, aiming to understand the physiological responses and adaptations on the metabolism of fats, mitochondrial function of skeletal muscle, and insulin resistance, among others, seeking to unravel their implications for health and disease. We aim to uncover the specific physiological pathways and biomarkers associated with improved outcomes in diabetes and obesity management, including the regulation of appetite and the impact of the gut microbiota on overall health (gut-brain axis).

Our research utilizes state-of-the-art omics techniques and biomarker analysis in blood, muscle tissue, and fecal samples to gain a comprehensive understanding of the metabolic and molecular changes induced by exercise and nutrition interventions, in order to gain insights into individualized patient care. Finally, we also explore topics related to menopause, aging, and other pathologies such as cancer. Therefore, we conduct studies on lifestyle interventions and therapeutic adherence, focusing on improving clinical outcomes in chronic conditions such as cancer and diabetes.

Keywords: Exercise physiology; Human nutrition; Omics techniques; Gut microbiota; Skeletal muscle; Insulin resistance; Fat metabolism; Sex differences; Biomarkers.

- Tasks and duties entrusted to the student:

The student participating in this internship will have the opportunity to engage in a wide range of tasks and duties related to our research projects. These may include:

- ✓ Assisting in the recruitment and coordination of study participants, ensuring compliance with ethical guidelines.
- ✓ Assisting in the administration and interpretation of maximal effort tests, such as maximal exercise stress tests and maximal fat oxidation assessment using indirect calorimetry.
- ✓ Participating in the evaluation of physical fitness and body composition.
- ✓ Assisting in the collection and analysis of nutritional data, including dietary analysis and assessment of nutrient intake.
- ✓ Contributing to the analysis of physical activity and sleep patterns using accelerometry.
- ✓ Participating in laboratory work, including the processing and analysis of blood, muscle tissue (*vastus lateralis* biopsies), and fecal samples.
- ✓ Participating in the administration of oral glucose tolerance tests.
- ✓ Assisting in the analysis of multiple markers in blood and muscle samples. Techniques involved may include ELISA, HPLC, mitochondrial respiration with Oroboros, western blotting, qPCR, and immunohistochemistry among others.
- ✓ Assisting in the interpretation and synthesis of data collected, contributing to the preparation of research reports and presentations.
- ✓ Conducting literature reviews and synthesizing scientific information relevant to the research projects.
- ✓ Attending research team meetings, seminars, and scientific conferences to enhance knowledge and exchange ideas.
- ✓ Collaborating with other members of the research group to support ongoing investigations and share findings.

- Skills to be acquired or developed:

The internship provides a unique opportunity to actively contribute to ongoing research projects and gain hands-on experience in data collection, analysis, and interpretation. By working closely with our multidisciplinary team, interns will be exposed to cutting-edge scientific methodologies and contribute to advancing our understanding of the intersection between exercise, nutrition, and the management of type 2 diabetes and obesity with a gender approach. During this internship, the student will have the opportunity to acquire and develop various skills, including:

- ✓ Proficiency in conducting and interpreting various physiological tests, such as maximal exercise stress tests and indirect calorimetry for maximal fat oxidation assessment.
- ✓ Understanding of the principles and techniques involved in assessing physical fitness and body composition.
- ✓ Familiarity with nutritional analysis and the evaluation of dietary intake.
- ✓ Knowledge and experience in analyzing physical activity and sleep patterns using accelerometry and questionnaires.

- ✓ Proficiency in laboratory techniques for the analysis of multiple biomarkers in blood and muscle samples.
- ✓ Proficiency in scientific research methodologies, data collection, and analysis techniques.
- ✓ Understanding of the interplay between gender and exercise, nutrition, and health outcomes in chronic diseases.
- ✓ Ability to critically review scientific literature and synthesize relevant information.
- ✓ Experience in interdisciplinary collaboration and effective communication within a research team.

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: Bachelor or similar Degree.
- Field(s) of study: Exercise Physiology, Nutrition, Molecular biology, Biomedicine, Nursing or related.
- Scientific skills: While prior experience in the techniques mentioned earlier will be valued, it is not a prerequisite for the student to have prior knowledge or expertise in these areas.
- Language skills required: English or Spanish.

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): Between 2 and 12 months.

Desired Starting date of the mission: October-November 2023, although we are open to considering alternative start dates based on flexibility and mutual agreement.

Indicative weekly schedule: 25h / week.

Remuneration: None.

Erasmus grant: These practices are funded by the Erasmus+ internships program.

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, crisrina.casals@uca.es before the date 15/07/2023.