Carlos Simon Foundation
FOR RESEARCH IN WOMEN´S HEALTH

3rd Edition

CSF SUMMER SCHOOL

FOR YOUNG SCIENTISTS

THE ENDOMETRIAL MICROBIOME: FROM COLONIZATION TO CONCEPTION

20 JULY - 24 JULY

Description:

The human endometrium, once considered a sterile environment, is now known to host a unique microbial community known as the endometrial microbiome, which plays a key role in reproductive health, embryo implantation, and pregnancy outcomes.

Program Leader
Dr. Inmaculada Moreno
Group: The Endometrial Microbiome in Human Reproduction

Our research group has been among the pioneers in identifying its presence and clinical relevance, particularly in the context of assisted reproductive technologies.

During this summer school, participants will be introduced to the experimental and analytical approaches used to study host–microbiome interactions in the female reproductive tract. Through lectures, laboratory shadowing, and group discussions, students will explore how microbial communities influence endometrial physiology and reproductive disorders such as implantation failure, recurrent miscarriage, and endometriosis, while gaining insight into how these discoveries are translated into clinical diagnostics and therapeutic strategies in reproductive medicine.

Learning objectives:

- Understand the role of the endometrial microbiome in reproductive health and disease.
- Describe how microbial communities influence endometrial physiology, implantation, and pregnancy outcomes.
- Become familiar with laboratory methods used to detect and characterize the microbiome, including culture-based and sequencing approaches.
- Gain insight into in vitro host–microbiota models used to study endometrial biology.
- Understand the bioinformatic pipelines and multi-omics strategies used to analyze microbiome datasets.
- Explore how microbiome discoveries are translated into clinical applications in reproductive medicine.

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Provisional Outline Timetable:

20 JULY — INTRODUCTION TO THE ENDOMETRIAL MICROBIOME

- **9:00 -9:30 | Welcome to the Carlos Simon Foundation.** Introduction to the research group and program overview
- **9:30 - 11:00 | Introductory lecture:** Research on the endometrial microbiome in women's health
- **11:00 - 13:30 | Wet lab shadowing:** Preparing the laboratory for bacterial and host culture experiments

21 JULY — BACTERIA AND REPRODUCTIVE DISEASE

- **9:00 -10:00 | Introductory lecture:** The role of bacteria in the development of endometriosis and adenomyosis
- **10:00 - 13:00 | Wet lab shadowing:** Detection of bacteria in endometriosis patient's samples
- **13:00 - 13:30 |** Discussion and wrap-up

22 JULY — MICROBIOME DATA ANALYSIS

- **9:00 -13:30 | Dry lab shadowing:** Bioinformatic analysis of the microbiome data including: 16S rRNA seq, whole metagenomic sequencing (WMS), and integrative multi-omics approaches

23 JULY — HOST–MICROBIOME INTERACTIONS

- **9:00 - 10:00 | Introductory lecture:** Overview of host–bacterial interactions and 3D endometrial models
- **10:00 - 13:30 | Wet lab shadowing:** Working with 3D endometrium models, including model preparation, optimization, and observation of bacterial interactions

24 JULY — FROM MICROBIOME RESEARCH TO CLINICAL PRACTICE

- **9:00 - 11: 00 | Translating the endometrial microbiome to clinical practice:** Real-world applications of microbiome diagnostics in assisted reproduction.
- **11:00 - 13:00 | Group meeting:** update and discussion of ongoing research projects in the group
- **13:00 - 13:30 | Diploma handout and farewell**

(*) Please note that this is a sample program. Since this program follows a shadowing format, the proposed activities and schedules may vary depending on the progress or status of the research at the time the course is conducted.