

2023 Fogarty GID Graduate Web-Based Course **“Pathobiology of Intracellular Infections”**

1. Course Description

Infections caused by intracellular microorganisms exemplify the complexity of host-microbe interactions that result in susceptibility or resistance to disease associated with the pathogen. The management of these infections presents important challenges for several reasons including: 1) The diverse mechanisms that intracellular microorganisms have developed over millennia allowing them to evade innate and acquired immune responses; 2) Treatments that uniquely target the pathogen are likely to have high rates of treatment failure; 3) Latent or asymptomatic infections constitute a reservoir of microorganisms having potential to reactivate and to be transmitted.

Molecular analyses of the pathologies provoked by microbial infection have revealed mechanisms and molecular mediators of both the microbial pathogen and the host, which contribute to the process of infection and disease. This process can be described in the following stages: interaction and entry of the microorganism into the host cell; modulation of cell signaling; evasion of the innate immune response; microbial propagation; tropism and invasion or colonization of tissues; tissue damage; and transmission to new hosts. Understanding the molecular mechanisms involved in these processes is the basis for the development of novel therapies and vaccines.

2. Course Objectives

The objective of this course is to provide the most recent knowledge on the complex molecular processes instigated by intracellular microbial pathogens, in the establishment of infections and development of disease, and to apply these concepts to the design of therapeutic and prophylactic strategies.

1. To understand the molecular mechanisms of pathogenesis of infections caused by intracellular microbial agents, and to examine the experimental strategies that have unraveled them.
2. To review, in depth, the concepts of eukaryotic cell signaling and its modulation by intracellular microorganisms
3. To explore and analyze the host-pathogen interactions that instigate susceptibility or resistance to disease

3. Methodology

The course methodology includes lectures and discussions in a weekly web-

based format presented by Colombian and international experts and faculty for each topic, and review sessions of research papers presented by graduate students according to the topics developed by the speakers. Both lectures and student presentations are delivered within a virtual network of graduate programs in biomedical sciences and tropical diseases. Students will review recommended references by the speakers and faculty (of its own graduate program) and will participate in discussions after each lecture. Guided by the faculty (course coordinators at each institution) students will conduct related literature reviews of the recently published literature. Students will present two exams: one quiz and a final evaluation. The course coordinator at each institution will receive the collected grades of students. Participating universities may include additional academic activities and define the criteria for the final grade of students in their graduate programs.

4. Recommended Literature

Recommended research articles or literature reviews for each topic will be published in the Moodle course platform www.cideim.org.co/moodle.

5. Evaluation

a. Participation:

- Attendance 25%
- Reading report 25%

Previous to lecture attendance, an article report must be submitted electronically including the following points:

1. Describe the research question
2. Identify two to three key research findings that support the conclusions of the article
3. Critical analysis: Describe at least one strength and one weakness of the research and/or methods reported in the article.
4. Prepare at least two questions for the speaker on the material reviewed

Reports submitted after the conference will not be accepted. For the evaluation, the reading reports will be taken into account according to the number of articles reviewed, and two random reports will be selected for evaluation.

- b. Exam 1. 25%
- c. Final Evaluation. 25%

6. Credits: 3

2 hours weekly, 18 weeks = 36 class hours X (4 hours of independent study by student) 144 horas / 48 = 3 credits.

7. **Pre-requisites:** Basic undergraduate or graduate courses in Cell biology, Biochemistry, Molecular biology, Microbiology and Immunology

8. **Course Schedule (Tuesdays 10-12noon)**

	Date	Topic
1	August 8	Overview of Molecular Mechanisms of Microbial Pathogenesis
2	August 15	Cell signaling: General concepts and principles of signaling pathways
3	August 22	Modulation of Cell signaling: Evasion of the immune response
4	August 29	Mechanisms of internalization, adaptation and intracellular propagation: Virus
5	September 5	Mechanisms of internalization, adaptation and intracellular propagation: Parasites
6	September 12	Mechanisms of internalization, adaptation and intracellular propagation: Bacteria
12	September 19	Pathogenesis and Immunopathogenesis: Parasites
7	September 26	Evolutionary Genetics: viruses
8	October 3	Pathogenesis and Immunopathogenesis: Bacteria
9	October 10	Pathogenesis and Immunopathogenesis: Virus
10	October 17	Quiz
13	October 24	Questions and Answers
13	October 31	T. cruzi and metabolomics
14	November 7	Microbial persistence
15	November 14	Research Strategies/Tools: Imaging
16	November 21	Research Strategies/Tools: Single cell
17	November 28	Research Strategies/Tools: Immune techniques
18	December 5	Final Exam

7. Contacts:

- Maria Adelaida Gomez, PhD. Course Coordinator CIDEIM, Cali
- Course Coordinators in each participating institution
- Alejandra Chamorro, Training Course Portfolio Manager - CIDEIM, achamorro@cideim.org.co