

**BIOMEDICAL & VETERINARY SCIENCES  
GRADUATE PROGRAM**



**ANNOUNCES**

The Doctor of Philosophy Seminar and Examination of

**Xavier Cabana Puig**

**“Characterizing the roles of gut microbiota, probiotic  
Lactobacilli and CX3CR1 in the development of  
autoimmunity in MRL/lpr mice”**

**Tuesday, July 26th, 2022**

**1:00PM**

**Classroom 100**





## **Bio**

I was born and raised in Barcelona, Spain. Since very young I had two passions, science and soccer. Although soccer is not working out, I am on my way to become a scientist. I received my bachelor's degree at the Autonomous University of Barcelona with a focus in Microbiology. It helped me to find my passion for small living creatures like bacteria. After that, I earned my master's in Pharmaceutical Drugs Research, Development and Control at the University of Barcelona. After working in the food industry for a few years, I realized I needed to take a step further on my scientific career. Leaving behind my country, I accepted a PhD position in Dr. Xin M. Luo's Lab. Here, I have had the opportunity to use my background in microbiology, combine it with immunology, to study the relationship between the gut microbiota and autoimmune disease.

## **Funded by**

National Institutes of Health (NIH) R01AR073240  
VMCVM Office of Research and Graduate Studies

## **Awards and Academic Achievements**

AAI Trainee Abstract Award (2021)

## **Lay Language Abstract**

Systemic lupus erythematosus (SLE) is an autoimmune disease with no known cure. Commensal microbiota, mostly bacteria living in our gut, and the immune system have a strong relationship in maintaining a healthy state of the gut as well as the whole body. Alterations in the gut microbiota, known as dysbiosis, can facilitate SLE in human and animal models. Current treatments for SLE are primarily focused on using immunosuppressants, but the side effects are still a concern. The use of long-term nonselective immunosuppressant conducts a higher incidence of severe infections in SLE patients. It is thus necessary to develop new approaches and treatments against SLE. My dissertation research is focused on understanding how commensal bacteria influence in the pathogenesis of SLE. My studies have shown that environmental factors can manipulate the gut microbiota leading to different disease outcomes. In addition, following upon previously published studies from our laboratory, I have delineated the mechanism how a mixture of probiotic Lactobacilli can exert a beneficial effect against lupus. Finally, I have revealed a new, CX3CR1-mediated mechanism through which the gut microbiota controls kidney disease in the MRL/lpr lupus-prone mouse model.

## Publications

- [Lactobacillus spp. act in synergy to attenuate splenomegaly and lymphadenopathy in lupus-prone MRL/lpr mice.](#) **Cabana-Puig X**, Mu Q, Lu R, Swartwout B, Abdelhamid L, Zhu J, Prakash M, Cecere T, Wang Z, Callaway S, Sun S, Reilly C.M., Ahmed SA, Luo XM. *Front Immunol.* Accepted July (2022).
- [Analyses of Proteinuria, Renal Infiltration of Leukocytes, and Renal Deposition of Proteins in Lupus-prone MRL/lpr Mice.](#) **Cabana-Puig X**, Luo, X. M. *J. Vis. Exp.* (184), e63506, doi:10.3791/63506 (2022).
- [Analysis of Fecal Microbiota Dynamics in Lupus-Prone Mice using a Simple, Cost-Effective DNA Isolation Method.](#) **Cabana-Puig X**, Reilly, C. M., Luo, X. M. *J. Vis. Exp.* (183), e63623, doi:10.3791/63623 (2022).
- [Phenotypic Drift in Lupus-Prone MRL/lpr Mice: Potential Roles of MicroRNAs and Gut Microbiota.](#) **Cabana-Puig X**, Bond JM, Wang Z, Dai R, Lu R, Lin A, Oakes V, Rizzo A, Swartwout B, Abdelhamid L, Mao J, Prakash M, Sangmeister C, Cheung N, Cowan C, Reilly CM, Sun S, Ahmed SA, Luo XM. *Immunohorizons.* 2022 Jan 17;6(1):36-46. doi: 10.4049/immunohorizons.2100082.PMID: 35039434
- [Regulation of neonatal IgA production by the maternal microbiota.](#) Mu Q, Swartwout BK, Edwards M, Zhu J, Lee G, Eden K, **Cabana-Puig X**, McDaniel DK, Mao J, Abdelhamid L, Brock RM, Allen IC, Reilly CM, Luo XM. *Proc Natl Acad Sci U S A.* 2021 Mar 2;118(9):e2015691118. doi: 10.1073/pnas.2015691118.PMID: 33619092
- [Gut Microbiota and Bacterial DNA Suppress Autoimmunity by Stimulating Regulatory B Cells in a Murine Model of Lupus.](#) Mu Q, Edwards MR, Swartwout BK, **Cabana Puig X**, Mao J, Zhu J, Grieco J, Cecere TE, Prakash M, Reilly CM, Puglisi C, Bachali P, Grammer AC, Lipsky PE, Luo XM. *Front Immunol.* 2020 Nov 10;11:593353. doi: 10.3389/fimmu.2020.593353. eCollection 2020.PMID: 33240280
- [Quaternary Ammonium Compound Disinfectants Reduce Lupus-Associated Splenomegaly by Targeting Neutrophil Migration and T-Cell Fate.](#) Abdelhamid L, **Cabana-Puig X**, Mu Q, Moarefian M, Swartwout B, Eden K, Das P, Seguin RP, Xu L, Lowen S, Lavani M, Hrubec TC, Jones CN, Luo XM. *Front Immunol.* 2020 Oct 21;11:575179. doi: 10.3389/fimmu.2020.575179. eCollection 2020.PMID: 33193366
- [Retinoic Acid Exerts Disease Stage-Dependent Effects on Pristane-Induced Lupus.](#) Abdelhamid L, **Cabana-Puig X**, Swartwout B, Lee J, Li S, Sun S, Li Y, Ross AC, Cecere TE, LeRoith T, Werre SR, Wang H, Reilly CM, Luo XM. *Front Immunol.* 2020 Mar 20;11:408. doi: 10.3389/fimmu.2020.00408. eCollection 2020.PMID: 32265909
- [Pregnancy and lactation interfere with the response of autoimmunity to modulation of gut microbiota.](#) Mu Q, **Cabana-Puig X**, Mao J, Swartwout B,

## Presentations

- American Association of Immunologists (AAI) Portland – 2022 “Importance of microRNAs and gut microbiota in the characterization of a phenotypic drift in lupus-prone MRL/*lpr* mice”.
- Biomedical and Veterinary Sciences Seminar Series (BMVS) – 2021 “Roles of CX<sub>3</sub>CR1 and probiotic Lactobacilli on the development of autoimmunity in MRL/*lpr* mice”.
- AAI Virtual – 2021 “Roles of CX<sub>3</sub>CR1 and probiotic Lactobacilli on the development of autoimmunity in MRL/*lpr* mice”.
- BMVS Symposium – 2021 “Roles of CX<sub>3</sub>CR1 and probiotic lactobacilli on the development of autoimmunity in MRL/*lpr* mice”.
- VCOM – 2020 “Characterizing the role of *Lactobacillus* spp. in systemic lupus erythematosus”.
- BMVS Symposium – 2019 “Characterizing the role of *Lactobacillus* spp. in systemic lupus erythematosus”.
- Southeastern Immunology Symposium Atlanta – 2019 “Characterizing the role of *Lactobacillus* spp. in systemic lupus erythematosus”.

## Examination Graduate Committee

### **Major Advisor/Chair:**

Xin M. Luo, Ph.D.  
Associate Professor of Immunology  
Department of Biomedical Sciences and Pathobiology

### **Graduate Advising Committee Members:**

Christopher M. Reilly, PhD  
Professor and Chairman for Biomedical Sciences  
Edward Via College of Osteopathic Medicine  
Research Associate Professor  
Virginia-Maryland College of Veterinary Medicine, Virginia Tech

Irving C. Allen, MBA, PhD  
Associate Professor of Inflammatory Diseases  
Department of Biomedical Sciences and Pathobiology

Clay C. Caswell, PhD  
Associate Professor of Bacteriology  
Department of Biomedical Sciences and Pathobiology



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