



Department of
Biomedical Engineering

UNIVERSITY OF WISCONSIN-MADISON

Celebrating 25 Years

Spring 2025
Seminar Series

Metabolic Adaptations of Drug-Tolerant Persister Cells

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My research focuses on understanding drug-tolerant phenotypes, particularly persister cells, in both prokaryotic and eukaryotic systems. Persister cells are temporarily tolerant to drugs and contribute significantly to disease recurrence. We investigate their molecular makeup, including metabolite profiles, RNA expression, protein composition, and regulatory networks, to identify key survival mechanisms and potential therapeutic targets. Our ongoing projects include investigating self-digestion-mediated tolerance in bacterial persisters, host-pathogen interactions in drug tolerance, metabolic and repair pathways in bacterial and cancer persisters, and the immunomodulatory potential of microbial cells to harness host-pathogen interactions for cancer therapy.

In this talk, I will highlight our strategies to study and target persister cell metabolism in bacteria and cancer. Contrary to the belief that persister cells in bacteria have suppressed metabolism, we show that their survival depends on energy metabolism, particularly oxidative phosphorylation. In bacteria, the cyclic-adenosine monophosphate and its receptor protein redirects metabolism from anabolism to oxidative phosphorylation, highlighting the importance of the tricarboxylic acid cycle, electron transport chain, and ATP synthase. Similarly, in melanoma persisters, chemotherapy-induced stress increases mitochondrial activity, revealing a dual role of treatment—inducing apoptosis in most cells while promoting a dormant, drug-tolerant subpopulation. Understanding these metabolic adaptations opens new avenues for therapeutic interventions, aiming to eradicate persister cells and prevent disease recurrence.

ABOUT the SPEAKER

Dr. Orman is an Associate Professor in the Chemical and Biomolecular Engineering Department at the University of Houston. He earned his Ph.D. in Chemical and Biochemical Engineering from Rutgers University-New Brunswick and completed postdoctoral research at Princeton University and the Memorial Sloan Kettering Cancer Center before joining the University of Houston in 2017. He received the National Institute of Allergy and Infectious Diseases Career Transition Award in 2017 and was honored with the National Science Foundation CAREER Award in 2021. Dr. Orman has also been recognized with the Cullen College of Engineering Teaching Award and the Assistant Professor Excellence (APeX) Series Award.

Monday, February 24 at Noon
1003 Engineering Centers (Tong Auditorium)

