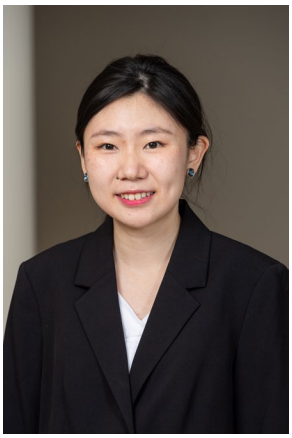
COLLEGE OF PHARMACY
PHARMACEUTICAL SCIENCES
UNIVERSITY OF MICHIGAN

Department of Pharmaceutical Sciences
Ph.D. Dissertation Defense Seminar

Thursday, November 30, 2023
1:00PM
NCRC Building 520, Room 3140
Join Zoom Meeting
https://umich.zoom.us/93580740897
Passcode: 107663

"Machine Learning Guided Drug Discovery: Application in Janus Kinase Inhibitor Design"

Presented by:



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Abstract: Traditional drug discovery faces challenges like high resource consumption, efficacy issues, safety concerns, and suboptimal pharmacokinetics (PK). Meanwhile, machine learning (ML) is revolutionizing the field by enabling precise predictions and efficient drug design, reducing the need for costly experiments. We embarked on our journey by employing ML in conjunction with the Structure-Tissue Selectivity-Activity-Relationship (STAR) approach to develop MMT3-72, a gastrointestinal (GI) Janus kinase (JAK) inhibitor tailored for treating ulcerative colitis (UC).

We also introduced CoGT, an ensemble ML method for identifying JAK inhibitors. Employing CoGT, we identified MMT3-72-M2, major metabolite of MMT3-72, as a potent JAK inhibitor. Experimental validation confirmed ML prediction and demonstrated MMT3-72's efficacy in animal model. We then developed a comprehensive ML framework for assessing Absorption, Distribution, Metabolism, Excretion, and Toxicity (ADME-T) profiles cost-effectively. This approach facilitates concurrent prediction of multiple ADME-T properties with dynamic weight strategy and speeds up drug candidate identification. In summary, our research highlights how ML can accelerate drug discovery, making it more efficient and effective in delivering promising drug candidates.