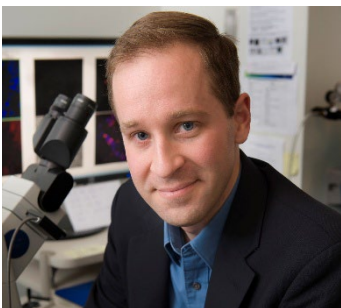**RUTGERS**

Center for Dermal Research
Innovations in Dermatological Sciences Conference 2025

"Pharmacokinetic and Pharmacodynamic Topical Product Imaging and Quantification"

Dr Conor Evans

Tracking the uptake and effects of drugs on the microscale in tissue is challenging. Coherent Raman scattering (CRS) microscopy provides a label-free means to visualize specific molecules and their effects in tissue, making these methods well suited for solving challenges in drug development. Our research seeks to link the microscale information from CRS imaging to the macroscale measurements made in traditional pharmacokinetic and pharmacodynamic studies to understand drug flux and flow, the impact of structure and formulation on permeation, and how these parameters ultimately lead to drug efficacy. Our work combines CRS imaging with novel hyperspectral approaches, data science, and deep learning methods for the automated and quantitative analysis of drug permeation within tissue. These approaches have been validated and now tested on numerous drugs in a range of formulations, demonstrating how CRS imaging tools can reveal new, previously inaccessible pharmacokinetic information. We have worked closely with academia, regulatory, and industry collaborators to explore the many ways CRS can be applied in particular in the investigation of topical drug products. This has included animal and human skin studies investigating the interactions of drugs and formulation components, as well as the use of CRS as tool to optimize topical drug product selection and formulation. Working closely with the FDA, we recently demonstrated CRS imaging for the determination of topical product bioequivalence, a critical need in the development of generic drug products. Further leveraging machine learning, we have developed methods to qualify topical product drug response, offering a path towards non-invasive assessment of both pharmacokinetics and pharmacodynamics in human studies

Keynote Speaker
Dr. Conor Evans