The department of pharmacodynamics is highly integrative and collaborative, spanning the gap between cellular and systems pharmacology and physiology. Faculty study drug action at the molecular, physiological and behavioral levels across normal and disease states, with interests in stress, anxiety, addiction, pain, neuroinflammation, cardiovascular and metabolic dysfunction.

**Education and Training**

The Ph.D. in Pharmaceutical Sciences is offered with a concentration in pharmacodynamics, allowing aspiring scientists to study under the direction of the department’s faculty and collaborate across UF Health, the university’s academic health center.

Faculty are currently principal investigators or co-investigators on grants from the National Institute of Mental Health, the National Institute on Drug Abuse, the National Heart, the Lung and Blood Institute, the National Institute of Child Health and Human Development, the National Institute on Alcohol Abuse and Alcoholism, the Department of Defense, the American Heart Association, and the Evelyn F. and William L. McKnight Brain Institute at UF. Faculty in the department of pharmacodynamics use a wide variety of in vitro and in vivo techniques and approaches, including genomics, transcriptomics, proteomics, metabolomics, electrophysiology, behavioral pharmacology, microdialysis testing, optogenetics and genome editing to develop novel animal models and understand drug action across a range of conditions.

Faculty have notable skills, funding and focus in three core areas of neurobiological research, including:

- **Stress/Endocrinology**: Projects focus on oxytocin and stress responsiveness, limbic system physiology as it relates to mood disorders, neurological regulation of cardiovascular function and systemic responses to chronic stress.

- **Addiction/Reward/Pain**: Projects focus on drug addiction, dopamine signaling in the mediation of behavioral reward, novel therapeutics for the treatment of substance use disorders and promotion of abstinence, and the role of opioid and cannabinoid signaling in pain.

- **Neurodegeneration/inflammation/toxicity**: These projects focus on aging, Parkinson’s and Alzheimer’s disease, human immunodeficiency virus, or HIV, including significant work on the role of HIV-1 Tat protein in promoting HIV-associated neurologic disease, and alcohol neurotoxicity.

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**Top 10**

UF is ranked among the top pharmacy colleges by U.S. News & World Report

**DEPARTMENTAL FACTS**

- 14 pre and postdoctoral trainees
- 7 research faculty members
- 46 peer-reviewed journal articles
- $2.1 million in annual research awards

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Department of Pharmacodynamics · Charles Frazier, Ph.D., Associate Professor and Graduate Coordinator
P.O. Box 100487 · Gainesville, FL 32610 · 352.273.7686 · frazier@cop.ufl.edu

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Research Faculty

Lance McMahon, Ph.D., M.S.,
Professor and Chair

The McMahon lab uses quantitative in vivo pharmacology to develop nicotinic acetylcholine receptor ligands as treatments for tobacco dependence and cognitive dysfunction, and cannabinoid receptor ligands and endocannabinoid degradative enzyme inhibitors as analgesics devoid of cannabis side effects.

Charles Frazier, Ph.D.,
Associate Professor and Graduate Coordinator

The Frazier lab focuses on cellular neurophysiology, leveraging state-of-the-art electrophysiological and optical tools to better understand how aging alters cortical signaling and to reveal novel central effects of endogenous oxytocin relevant to stress response and social behaviors.

Maureen Keller-Wood, Ph.D.,
Professor and Associate Dean for Research and Graduate Education

Dr. Keller-Wood's research interest is maternal-fetal interactions in health and disease. Her current research focus is the adverse effects of glucocorticoids and maternal hyperglycemia on fetal cardiac maturation and risk of stillbirth and the development of therapeutic strategies to reduce these adverse effects.

Eric Krause, Ph.D., Associate Professor

The Krause lab focuses on integrative systems neuroscience and neuropharmacology and uses a variety of advanced genetic, anatomical and behavioral approaches to identify novel therapeutic targets for stress-related pathologies like anxiety, depression and cardiovascular disease.

Bin Liu, Ph.D., Associate Professor

The Liu lab uses molecular, cellular and animal models to study the role of neuroinflammation in the pathogenesis of neurological disorders induced by environmental toxicants and substances of abuse for the ultimate goal of identifying novel therapeutic targets.

Jay McLaughlin, Ph.D., Associate Professor

The McLaughlin lab screens novel compounds for safer painkillers with fewer liabilities of use and as new treatments to counter opioid and substance abuse. Additional research examines mechanisms by which HIV mediates neuropathology and alters behavior.

Joanna Peris, Ph.D., Associate Professor

The Peris lab studies the neurobiology of addiction, including regulation of ethanol reward signaling. One goal is to assess the impact of binge ethanol intake on neuronal activity in reward circuitry using optogenetic and microdialysis techniques.

Recent Postdoctoral Placement

Andrew Antolic, Ph.D. | University of Arizona
Mack Hoffman, Ph.D. | University of Pennsylvania
Kyle Kelly, Ph.D. | Northwestern University
Justin Smith, Ph.D. | Boston College