

- **Josefina del Marmol, Ph.D.**

Harvard Medical School

“Structural Determinants of Odor Transduction in the Disease Vector Mosquito
Anopheles gambiae”

Key Words: Olfactory receptors, Mosquito olfaction, Cryo-

- Josué Flores Kim,

- **Richard Liu, Ph.D.**

Assistant Professor of Chemistry and Chemical Biology

Harvard University

“Breaking the Metal Barrier: Safe and Rapid Radiopharmaceutical Synthesis Using Organic Pseudometals”

Key Words: Chemical Synthesis, Radiotracers, Positron Emission Tomography, Medical Imaging, Drug Discovery, Organocatalysis, Late-Stage Functionalization, Green Chemistry

Positron Emission Tomography (PET) is a promising precision imaging technology with both clinical and basic science applications. In PET, a radioisotope-tagged tracer compound is injected into a subject and its distribution, metabolism, and/or target is investigated by observing gamma ray emission from radioactive decay. A longstanding obstacle toward the widespread adoption of this technique has been the challenging synthesis of desirable radiopharmaceuticals. The most general approaches involve toxic transition metals such as palladium and copper, which necessitates cumbersome purification and analysis steps to ensure complete metal removal before administration.

We propose an unconventional approach to late-stage tagging of pharmaceuticals with radioisotopes, primarily ^{18}F , involving the design of bio-inspired organic catalysts capable of mimicking the redox reactivity of transition metals. Using a combination of in silico screening and high-

- **Jessica Spinelli, Ph.D.**

Assistant Professor

University of Massachusetts Chan Medical School

“Elucidating Novel Circuits of Electron Flow in the Mammalian Electron Transport Chain”

Key Words: Mitochondria, Metabolism, Hypoxia, Stable Isotope Tracing, Liquid Chromatography Coupled to High Resolution Mass Spectrometry, Biochemistry, Chemical Biology

Textbook depictions of the mammalian ETC involve a single circuit, in which electrons enter at complexes I and II, are carried by ubiquinone, and deposited on oxygen as the terminal electron acceptor via complexes III and IV. In preliminary work, I discovered a novel and tissue-specific circuit of electron flow in the ETC that is facilitated by a previously uncharacterized mammalian metabolite. The proposed work will elucidate the fundamental role of distinct ETC circuits in mammals. First, my lab will determine the impact of each ETC circuit on canonical mitochondrial functions and explore potential novel mitochondrial functions that this metabolite may promote. Second, we will leverage genetic and pharmacologic tools optimized in preliminary work to create a mouse model in which electrons can be redirected on a different ETC circuit in tissues. This model will be instrumental in understanding the physiological and disease relevance of distinct ETC circuits. Third, this proposal tests a novel strategy to treat mammalian disease whereby electrons are redirected on a new path in the ETC to mitigate hypoxia-induced tissue damage. Taken together, this work sets the stage for a new field of mammalian biology on the physiological and disease relevance of distinct ETC circuits.

- **Meg Younger, Ph.D.**

Assistant Professor

Boston University

"Non-Canonical Odor Coding in Mosquitoes"

Key Words: Olfaction, Mosquito, Sensory neurobiology, Chemosensation, Odor coding, Non-model organism

Detection of humans by mosquitoes relies heavily on olfaction. Understanding the mechanisms through which the mosquito olfactory system detects human odor is the inroad to preventing mosquitoes from smelling humans and therefore preventing mosquito biting behavior and disease transmission. We found that the olfactory system of the Yellow-fever mosquito, *Aedes aegypti*, is organized in a way that completely(t)-179