Title	*Design and synthesis of mitochondria-targeted molecular probes to report on or manipulate mitochondrial function and dysfunction*
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Project description:

State-of-the art: Mitochondria are the cell's power producers. Organic chemistry provides unique tools to probe and control mitochondrial function.

Objectives and activity: Mitochondria-targeted molecules will be designed and developed to either report on or manipulate aspects of mitochondrial function. Targeting is achieved by coupling the chemical entity of interest to the lipophilic triphenylphosphonium (TPP) cation which enables small molecules to pass through the phospholipid bilayers and selectively accumulate several hundred fold within the negatively charged mitochondrial matrix in cells and *in vivo*. Specifically, two lines of research are envisioned. One will involve the design, synthesis and characterization of new fluorescent indicators for sensing the mitochondrial concentration of metal cations and will contribute to our understanding of the role of these cations in physiological processes and under pathological conditions. The second will address the synthesis of mitochondria targeted bioactive compounds such as antioxidants, chemotherapeutics and other small molecules which can interact with mitochondria to prevent or treat diseases wherein mitochondrial functions are deregulated.

Skills to be acquired and opportunities: The graduate student will use up-to date procedures and tools for the synthesis and spectroscopic characterization of organic compounds; will have the opportunity to take part in tests of the synthesized compounds through a well established interdisciplinary network of collaborations at the University in Padova and the possibility to spend a stage abroad at some connected laboratories.

Publications:

- Leanza L., Romio M. et al. Direct pharmacological targeting of a mitochondrial ion channel selectively kills tumor cells *in vivo*. Cancer Cell. **2017**, 31, 516-531.
- Mattarei A. et al. Novel lipid-mimetic prodrugs delivering active compounds to adipose tissue. Eur J Med Chem. **2017**, 135, 77-88.
- Mattarei A. et al. Amino acid carbamates as prodrugs of resveratrol. Sci Rep. **2015**, 5, 15216.

Collaborations/Network:

CNR Institute of Neuroscience, Department of Biomedical Sciences, University of Padova
Department of Pharmaceutical and Pharmacological Sciences, University of Padova
Department of Biology, University of Padova

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