

The first day of the Molecular Imaging Symposium (MI-1) will focus on the technology aspects of molecular, functional, and small animal imaging. Modalities which will be discussed include micro-CT, micro-PET, and high resolution MRI for small animal imaging. The presentation on micro-CT technology will include an introduction to the basic requirements of the scanner hardware, examples of the images and biological applications in which micro-CT is useful, and the radiation dose to the small animal undergoing micro-CT will also be discussed. Micro-CT techniques require longer acquisition times than human scanners, and thus maintaining the animal in a viable but motionless state is of clear importance. Therefore, issues surrounding animal support including anesthesia and respiratory gating will also be presented.

Micro-PET systems are widely used in small animal imaging for genome research, and represent probably the mainstay of truly molecular imaging modalities at this point in time. The presentation on micro-PET will include a description of micro-PET scanner hardware, a discussion of PET-radiotracers, and an overview of current small animal PET systems. The limitation of current micro-PET system design will be discussed, and ideas for overcoming some of these limitations will be presented.

High resolution MRI systems have the benefit of delivering exquisite contrast with excellent spatial resolution, with no ionizing radiation. The presentation on micro-MRI techniques for phenotype imaging will describe the integration of physics, biology, chemistry, engineering, and computer science which is necessary to achieve state-of-the-art small animal MRI imaging. The use of hyperpolarized gases for lung imaging and MR histology will be discussed as well.

The availability of small animal imaging systems across a number of modalities has proved essential for a large number of research applications. The primary goal of MI-1 is to help familiarize medical physicists with the technical design and capabilities of these high resolution small animal imaging systems, and to highlight research applications of their use. Different modalities are used to address different research questions, and this symposium will emphasize the strengths and weaknesses of each modality in regards to various research applications. Differences between animal imaging and human scanners will also be discussed.