Jefferson
Philadelphia University + Thomas Jefferson University
HOME OF SIDNEY KIMMEL MEDICAL COLLEGE

# JeffPost

*(Jefferson Research Facilities for Postdocs, Students and Faculties)*

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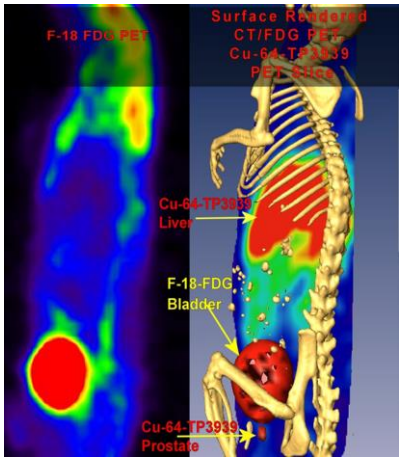
## Jefferson Molecular Biomedical Imaging Core Facility




The Jefferson Molecular and Biomedical Imaging Core Facility is a state- of-the-art in vivo imaging lab dedicated for small animal research. It houses the:

- Siemens Inveon Computed Tomography (CT) system
- Siemens Inveon Positron Emission Tomography (PET) system
- Bruker In Vivo MS FX Pro Optical Imager
-

They provide accurate molecular and anatomical fused imaging. These imaging modalities offer unprecedented opportunities to study small animal models of disease in vivo, providing a more accurate assessment of disease progression and response to therapy. The lab will work with investigators to define experiments, imaging protocols, and quantification techniques to meet their individual needs. Please contact the facility for more information.

**Department of Radiology**
**Mathew Thakur, PhD**
mathew.thakur@jefferson.edu
***OFFICE (215) 503-7874***
**Sushil Tripathi, PhD**
sushil.tripathi@jefferson.edu
***LAB (215) 503-7879***
**Joshua Saylor**
***IMAGING FACILITY***
joshua.saylor@jefferson.edu
***(215) 503-1750***

**Siemens Inveon Dedicated PET**

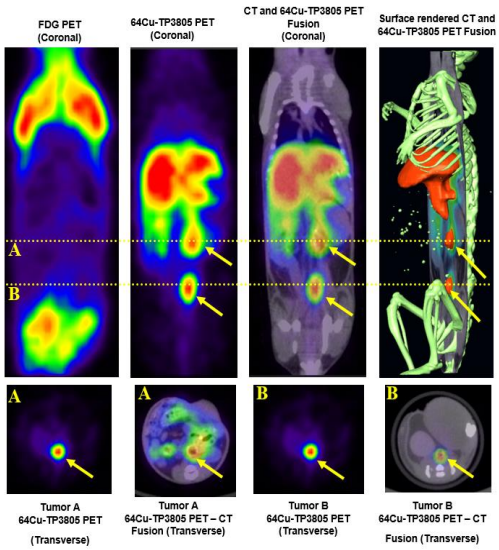
- Exceptional Sensitivity
- High Resolution
- High Count Rate Performance
- Large FOV

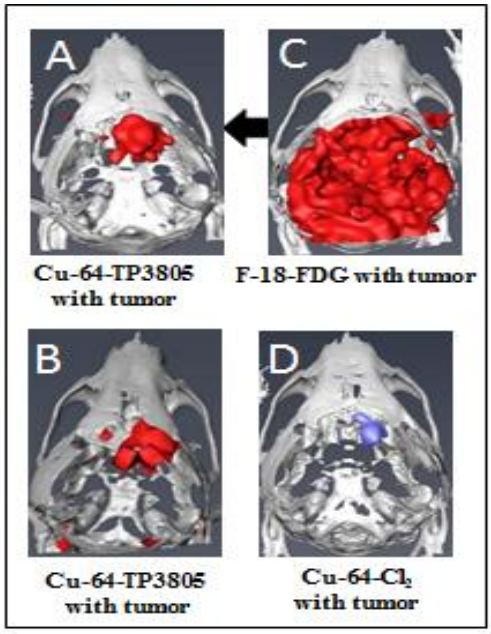

**Siemens Inveon MicroCT Scanner**

- Standard X-ray and variable focus Source
- Respiratory and Cardiac Gating

**Bruker MS FX PRO**

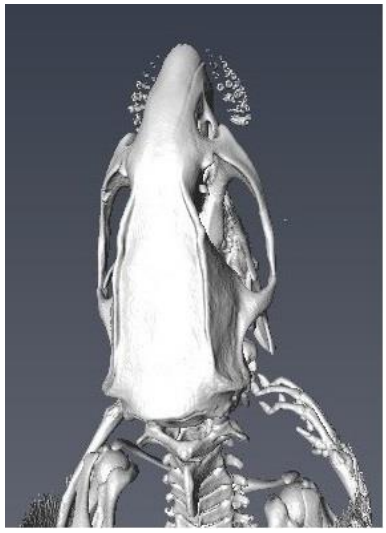
- Fast f/0.95 Lens
- Quantifiable X-ray Images
- Radioactivity Detector



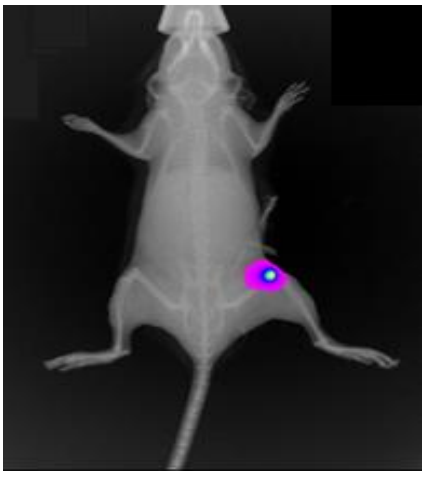

Figures (Left & Right): PET/CT render of mouse brain using various labels

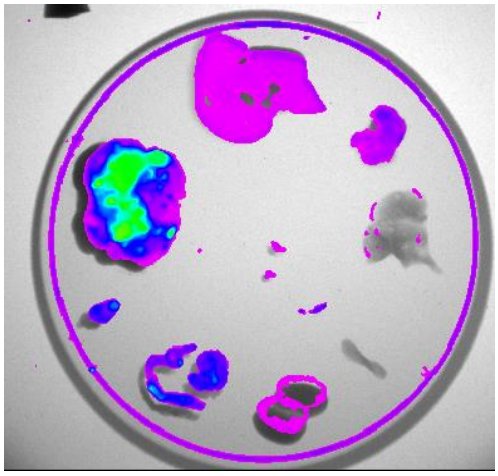
**PET** imaging provides in vivo functional images of molecular processes offering potential to detect disease at the cellular level before anatomical changes occur. To generate an image, a tracer amount of a radio-labeled probe is injected into the subject. The distribution of the probe is acquired and reconstructed into 3D volumeric images.



CT image renderings of rat, showing calcification around the whiskers

**CT** imaging provides high resolution, in vivo, anatomical images. Images are generated using an external x-ray source that is rotated around the subject. The attenuation projections are acquired and reconstructed into volumetric 3D images of tissue densities. The CT images can be further enhanced by using contrast dye. CT images can be analyzed alone or can be fused with PET images to provide more precise localization and quantification.



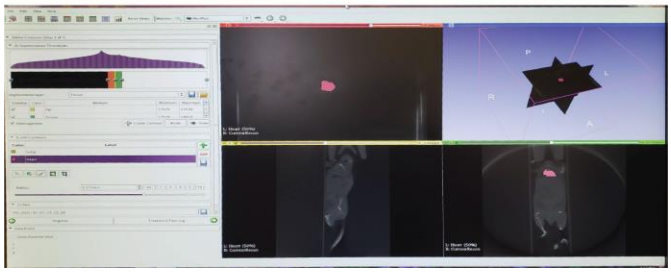


Left and Right, optical imaging of mouse super imposed with scan of Luciferase.

**Optical Imaging** offers quantitative imaging using luminescent, radio isotopic, and multi-wavelength fluorescent labeled biomolecules. These can be combined with the x-ray capabilities of the imager in order to create superimposed images which provide greater detail and more precise localization.

# SARRP, the Next-Generation Pre-Clinical System for Radiation Therapy Studies


**The SARRP team: Left to right: Bo Lu, MD, PhD; Michael Chaga, Master's Student; Dennis Leeper, PhD; Reza Taleei, PhD.**

**Top: Small Animal Radiation Research Platform (SARRP); Bottom: Data acquisition and imaging software.**

As the understanding of cancer biology progresses, improved pre-clinical studies have become an urgent need. Although the technology for clinical radiation therapy has advanced significantly in the past decades, radiation delivery methods have lagged in laboratory settings. Radiation therapy is a crucial component in cancer treatment regimens, and targeted radiation is a proven method. To keep up with modern clinical practice, cancer researchers need to mimic clinical practice as closely as possible.

An instrument here at Jefferson, the Small Animal Radiation Research Platform (SARRP), enables researchers to perform clinically relevant and translational radiation experiments with an accuracy equivalent to clinical radiotherapy. The SARRP provides state-of-the-art, 3D, volumetric bioluminescent tomographic imaging guidance for targeted localization and radiation dose delivery. Using onboard high-resolution cone beam-CT imaging, the SARRP can precisely irradiate small orthotopic or spontaneous tumor volumes or ablate targeted normal tissues to an accuracy of 200 µm. The CT feature can be used to measure deep-seated tumor volumes to determine tumor growth delay curves after radiation or chemotherapy treatments. Of additional interest, this equipment can minimize radiation exposure of non-targeted normal tissues and organs and is a non-invasive procedure.

Finally, the SARRP can also improve the accuracy and reproducibility of in vitro experiments. While radiation platforms usually have a fixed X-ray source, the SARRP possesses a 360-degree rotating gantry. This allows investigators to irradiate cells from above or underneath the flask, thereby preventing beam attenuation and uneven dose distribution to cell suspensions or adherent layers.

The SARRP instrument is located on the fourth floor of the Jefferson Alumni Hall, room 442. It was purchased with an NIH Shared Instrumentation Grant submitted by Dr. Leeper (S10) and made available to all Jeffersonians, including postdoctoral fellows. If you are interested in using this state-of-the-art technology, you can contact Dr. Lu at Bo.Lu@jefferson.edu. or Dr. Taleei at Reza.Taleei@jefferson.edu. Dr. Lu and his dedicated team of scientists will help you to figure out pricing, experimental design, and instrument operation!

***-Aurore Lebrun, PhD***

Interested researchers please share details of your facilities available for use for postdocs, students and other faculties in Jefferson and other institutes

***-Ankit Rochani, PhD***
(VP Communication, JPA)