

# CANCER IMAGING AND TRACER DEVELOPMENT RESEARCH PROGRAM



*Meixiang Yu, PhD, at work in the lab.*

THE CANCER IMAGING AND TRACER DEVELOPMENT RESEARCH PROGRAM (CITDRP) was established at the University of Tennessee Medical Center in Knoxville, Tennessee in February 2003 under the direction of David Townsend, PhD. Complementing Positron Emission Tomography (PET) initiatives at UT Medical Center since the early nineties and benefiting from the support of nearby CTI Molecular Imaging, the recognized world leader in PET technology and innovation based in Knoxville, the mission of the CITDRP is to create a world-class center for translational research using molecular imaging. The establishment of the CITDRP at the University of Tennessee was the inspiration of Ron Nutt, PhD, formerly President and CEO of CTI Molecular Imaging in Knoxville. This program involves the development of new molecular biomarkers, evaluation of such biomarkers in appropriate animal models, and their subsequent introduction into the clinical arena for patient imaging. The CITDRP is based within the UT Graduate School of Medicine with faculty members holding appointments in the Departments of Medicine and Radiology.

The program is organized into three principal components: Physics and Methodology, Radiopharmaceutical Development, and Applications for both animals and humans. The Physics and Methodology component is directed by Dr. Townsend in association with Bjoern Jakoby, MS who is responsible for a number of PET instrumentation and methodology projects.

Meixiang Yu, PhD was recently recruited from Harvard University to lead the radiotracer and biomarker development program with the participation of organic chemist Fang Gao, PhD. This recently-established PET radiochemistry program shares the operation of a cyclotron with PETNET radiopharmaceutical production and a research hot cell with Department of Radiology faculty.

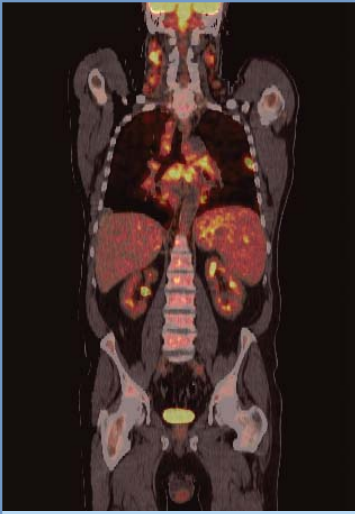


Figure 1: A 31 year-old male with lymphoma staged on the Sensation 16 PET/CT scanner in the UT Cancer Institute prior to commencing chemotherapy. The PET/CT scan reveals the extent of malignant disease.

Claude Nahmias, PhD recently joined the program to head both the animal and human research applications component with the close participation of Karl Hubner, MD. The new, \$600,000 animal imaging

facility will be managed by Xukui Wang, MD, also recruited recently from Harvard. The facility has four scanning suites with PET and SPECT/CT imaging capability, animal holding rooms and laboratory workspace. Veterinary technologist James Avenell, BVSc LVMT directs the operation of these imaging devices. The animal imaging program involves close collaboration with the UT College of Veterinary Medicine and with the amyloid imaging program of Alan Solomon, MD and Jon Wall, PhD, who will also be responsible for operation of the animal imaging equipment, in particular the SPECT/CT. Establishing a strong animal imaging initiative for translational research is an essential part of the CITDRP mission. Collaboration with radiologist Greg Daniel, DVM and oncologist Amy LeBlanc, DVM from the UT College of Veterinary Medicine plays an instrumental role in meeting this goal by bridging the gap in translational research between micro imaging of small animal models and the imaging of clinical patients and can only be undertaken in an academic environment that includes a high-level veterinary college such as the one at UT.

In addition to these animal imaging facilities, a state-of-the-art high resolution 16-slice PET/CT scanner has been installed in the Cancer Institute at the Medical Center. The scanner is used for both routine clinical and clinical research studies. Operational aspects of the PET/CT research program are the responsibility of technologist Misty Long, RT(N)(R) and Chris Carr, RT(R), CNMT as the lead technologist responsible for operation of the scanner for clinical PET/CT studies. All administrative aspects are managed by Linda

Paschal, BS. The primary focus of the CITDRP is the imaging of cancer (Figure 1), with a current workload of 5-7 clinical PET/CT scans per day and 1-2 research studies. However, the importance of PET imaging in other areas of clinical research is demonstrated by ongoing projects in both cardiology with the collaboration of Woody Besozzi, MD, and in neuroscience with John Dougherty, MD, Kent Hutson, MD and Yongxia Zhou, PhD. Current research projects in cancer imaging include monitoring response to chemotherapy with medical oncologist Wahid Hanna, MD, and staging head and neck cancer prior to surgery in collaboration with surgeon Eric Carlson, DMD, MD, FACS (see article in this issue). Radiation oncologist Khanh Nguyen, MD has recently joined the University of Tennessee in Knoxville to focus on both his clinical practice and on research with image-guided radiation therapy planning. In early 2006, the CITDRP will acquire a second, state-of-the-art PET/CT scanner as part of an NIH-funded collaborative initiative with Siemens Molecular Imaging. The new scanner will be an advanced design offering improved sensitivity for PET imaging.

After more than two years at UT, the Cancer Imaging and Tracer Development Program is now well-established and is expanding to contribute to other areas of research in which PET and PET/CT can play a significant role, and also offer potential for peer-reviewed NIH funding.

David Townsend, PhD



Xukui Wang, MD, explains how the animal imaging PET operates.