



# Carlos Jorge Simal Rodrigues: Brazil

## PET/CT Training to Track Biochemical and Physiological Processes in Tumors.



Carlos Jorge Simal Rodrigues, a Nuclear Physician and Associate Professor of Nuclear Medicine at the Medical School of Federal University of Minas Gerais, Brazil, is currently on an IAEA sponsored fellowship. He is receiving advanced training in PET/CT under the supervision of Professor Lale Kostakoglu at the PET/CT facility of the Department of Radiology at Mount Sinai Medical Center of New York City. This three-month training course is part of the Brazilian project entitled “Capacity Building in the Production of Radiopharmaceuticals with a Cyclotron for Clinical Applications”.

The positron emission tomography (PET) is a radiotracer imaging modality, in which biologic tracer compounds labeled with positron-emitting radionuclides are injected into the subject. These biologic

compounds can then be used to track biochemical and physiological processes that occur in malignant tumors, brain or cardiac disorders. PET imaging is based on the principle that a positron, which is emitted by an unstable nucleus, runs erratically until it interacts with an orbital electron and both annihilates, producing two photons of 0.511 MeV that travel in opposite directions. By means of a ring detector these photons are detected and the exact point of the emission can be determined by reconstruction algorithms. These images represent the distribution of various radiotracers in humans and animals. Coupling a PET with a computerized tomograph (CT) one can determine with good precision the position of the sources inside the body. The most widely used tracer in oncology is  $^{18}\text{F}$ -fluoro-deoxy-glucose ( $^{18}\text{F}$ -FDG). It follows a similar metabolic pathway to glucose *in vivo*, except that it is not metabolised to  $\text{CO}_2$  and water, but remains trapped within tissue. This is of interest in oncology because proliferating cancer cells have a high glucose metabolism.  $^{11}\text{C}$ -methionine is also used in oncology, where it acts as a marker for protein synthesis.

During his PET/CT training, Simal routinely attends PET/CT reading sessions as well as closely observes patient handling, radiopharmaceutical administration, data acquisition and processing. At completion of his training, Simal will have observed some 700 PET/CT cases in a full range of oncologic applications as well as brain metabolic studies. Furthermore, his participation in clinical activities is supplemented by weekly clinical conferences, journal clubs, grand rounds as well as general tumor board. At the end of his fellowship program, Simal will be familiar with all aspects of PET/CT, including the performance and interpretation of these studies

As part of his PET/CT training at Mount Sinai Medical Center of New York City, Simal also attended the Twenty-Third Annual Northeast Regional Scientific Meeting of the New England and Greater New York Chapters of the Society of Nuclear Medicine in Rye Brook, NY and the Radiological Society of North America’s 95<sup>th</sup> Scientific Assembly and Annual Meeting in Chicago, IL. These conferences significantly contributed to enrichment of his PET/CT and correlative imaging knowledge.

Simal is the leader of the Nuclear Medicine group participating in the recently created National Institute of Science and Technology in Molecular Medicine (NIST-MM) in Belo Horizonte City, Brazil which will be equipped with a PET/CT scanner for imaging humans as well as with a microPET for small animals. There is a 16.5 MeV cyclotron at the Center for the Development of Nuclear Technology (CDTN), a division of the Brazilian regulatory agency (CNEN). This facility is currently producing  $^{18}\text{F}$ -FDG and will soon start producing  $^{11}\text{C}$ . The development of new PET radiopharmaceuticals is one of the principal missions of NIST-MM and CDTN. The most important medical applications and research are expected to involve the fields of neurology and oncology. Simal hopes to further advance the imaging field with PET/CT in his country with his newly acquired body of knowledge in this exciting and flourishing area.

**Trained 10/19/2009—1/27/2010**