



CASE STUDY

Keeping nuclear medicine workers safe

For workers in a nuclear medicine facility, a key challenge is that you cannot see radiation, and unknowingly, workers can be exposed. For the Department of Molecular Imaging and Therapy at Austin Health, the safety of their staff is paramount. Continuously upgrading radiation monitoring equipment and assessing new technologies to further reduce exposure, is a key element to the hospital's radiation protection program.

BACKGROUND

Austin Health is renowned as one of the largest and leading health care providers in Victoria, Australia, providing a molecular imaging and radionuclide therapy service for over 10,000 patients each year. The Department of Molecular Imaging and Therapy at Austin Health is equipped with state-of-the-art SPECT/CT & PET/CT imaging systems, a medium energy cyclotron and extensive radiochemistry, radiopharmacy, physics and engineering capabilities. The facility has permits for possessing, consigning, and disposing of more than 30 different unsealed and sealed radioisotopes for diagnostic, therapy, research, and quality control purposes.

THE CHALLENGE

The multidisciplinary teams in the Department of Molecular Imaging and Therapy at Austin Health work with radiation each day. As the human eye cannot "see" ionising radiation outside the visible spectrum, a fundamental component of the Department's radiation safety program is to continuously improve radiation measurement and monitoring.

Several CORIS360® scenarios were demonstrated in the Department of Molecular Imaging and Therapy at Austin Health in 2020, to validate operational feasibility and investigate potential applications for the device in the laboratory and clinical areas of this large nuclear medicine department.

THE RESULTS

CORIS360® was firstly set up in a radiopharmacy QC laboratory, with five different low-activity radiation sources placed randomly in different locations. A single acquisition, achieved in under 4 minutes, accurately identified and localised all the sources, including a Co-57 sealed QC source, a Cs-137 sealed QC source, Tc-99m-MIBI in a 5mL syringe, I-131 residual in a dose vial, and F-18 FDG solution in a 10mL syringe. Overlaying the 360° x 90° radiation image onto the panoramic optical image of the laboratory, made it easy to localise the precise location of the sources.



Figure 1. A Cs-137 sealed QC source was identified and imaged.



Figure 2. I-131 residual in a dose vial was identified and imaged.



Figure 3. The F-18 FDG solution in a 10mL syringe was identified and imaged.

Next, CORIS360® imaged the waiting room and identified a patient injected with Tc99m-MIBI within the area. The patient was sitting approximately 10 metres away from the device. Within two minutes, CORIS360® had localised the radioactive patient and identified the radionuclide.



Figure 4. Identified and imaged the Tc99m-MIBI administered to a patient now in the waiting room.

A patient undergoing a cardiac stress was imaged as the Tc-99m was administered. The Tc-99m was identified and localised as hotspots from the syringe and the patient on the treadmill. The device was approximately five meters from the patient.



Figure 5. Identified and imaged the Tc99m-MIBI administered to a patient undergoing a cardiac stress test.

CORIS360® was also set up within a console area behind a large, lead glass viewing window of the PET/CT imaging room. Positioned in the console area during a patient FDG PET/CT scan, CORIS360® took a 12-minute acquisition. This scan subsequently localised F-18 annihilation gamma photon emissions from the patient body that was between the PET and CT gantries, which had penetrated through the lead glass window.



The acquisition also identified a possible emission from the PET radiochemistry lab across the corridor, located behind the PET/CT imaging room. In the acquisition, low energy X-ray radiation from the low dose CT was also captured at two time points, reflecting that a scout CT scan and a low-dose CT scan had both been performed at the start of the PET/CT study.

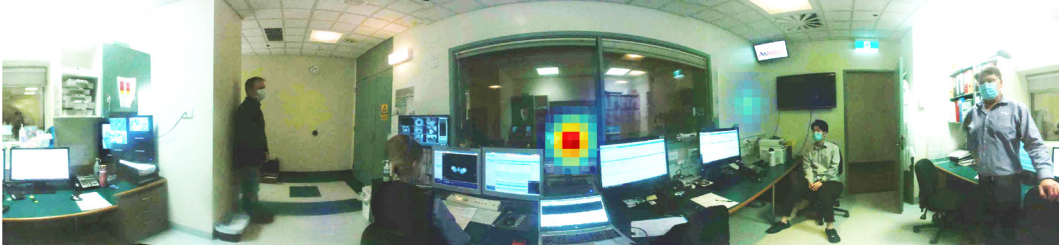


Figure 6. The annihilation photon emissions from the PET/CT imaging room and PET radiochemistry lab were detected and imaged.

CORIS360[®] Benefits

- 360° × 90° gamma ray imaging allows for a quick accurate assessment of unknown radiological environments
- Identification and imaging of multiple isotopes from a single data acquisition
- Remote operation
- Easy to use interface
- Operates in low and high dose environments, 0.5 μ Sv/h - 40 mSv/h for ¹³⁷Cs
- Images full energy range, 40 keV to >3 MeV
- Verification that the radiation source has been removed

CORIS360[®] delivers value. Better data improves decision making for anyone working in radioactive environments.

Contact us

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CORIS360[®] is a product of ANSTO, the Australian Nuclear Science and Technology Organisation, with over 60 years of experience in meeting the nuclear needs of industry.

