

Opti-SPECT/PET/CT: Five different imaging systems now combined

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Taking their pick, biomedical researchers can now conduct five different imaging studies in one scan with a state-of-the-art preclinical molecular imaging system that scientists unveiled during the Society of Nuclear Medicine and Molecular Imaging's 2014 Annual Meeting.

The imaging device allows single photon emission tomography (SPECT), [positron emission tomography](#) (PET), X-ray computed tomography, fluorescence and bioluminescence imaging—powerful imaging techniques that provide different information about anatomy and physiological processes happening within the body. With the Opti-SPECT/PET/CT system, SPECT or PET information details drug distribution and improves interpretation of optical data, while bioluminescence and fluorescence characterize additional tumor properties. The tracers that are developed with the system will be used as a surgical guide for clinicians.

"We need to know as much as possible from our enemy: the tumor," Frederik Beekman, PhD, explained. Beekman is head of radiation technology and medical imaging and a professor at Delft University of Technology in Delft, The Netherlands. "This research proves that we can now obtain comprehensive data from five medical imaging systems in a single scan. It is minimally invasive and requires only a single dose of anesthesia."

Opti-SPECT/PET/CT is built on a small scale for preclinical studies and allows scientists to use a gamut of imaging methods including high

resolution [nuclear medicine](#) (SPECT and PET), radiological (CT) and optical imaging (fluorescence and bioluminescence). This means that information about organ function, structure and real-time physiological signals revealed within the light spectrum are all available in a synergistic fusion of advanced [medical imaging](#). The hybrid system includes high-performance cameras and an on-board dark room. The [molecular imaging](#) platform could be used for new drug discovery, especially for imaging agents that could be used intraoperatively for patients undergoing cancer surgery.

To test the device, researchers imaged models and then mice in multiple studies using a fluorescent dye optical agent and a [nuclear medicine imaging](#) agent that combines a radioactive particle with a chemical drug compound. The agent is injected and then imaged as it homes in on and interacts with specific bodily functions. In this case, that function is angiogenesis, or the development of new blood vessels, which often proliferate as a tumor grows. Results of the study confirmed the imaging system's functionality and proved that it was comparable to other add-on imaging platforms for [preclinical studies](#).

More information: Scientific Paper 484: Matthias van Oosterom, Rob Kreuger, Wendy Mahn, Frederik Beekman; RDM, Delft University of Technology, Delft, Netherlands; Tessa Buckle, Anton Bunschoten, Fijs Van Leeuwen, IMI, Leiden University Medical Center, Leiden, Netherlands; Lee Josephson, Massachusetts General Hospital and Harvard Medical School, Boston, MA, "Opti-SPECT: Preclinical module for integrated bioluminescence, fluorescence and radionuclide imaging," SNMMI's 61th Annual Meeting, June 7, 2014, St. Louis, Missouri.

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