Researchers merge PET and SPECT biomedical imaging techniques and increase resolution

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The new device, the VECTor (Versatile Emission Computed Tomography), is designed for use in fundamental research into the functioning of cells and organs. It can show functional details smaller than half a millimeter. Credit: Image courtesy of MI Labs

Dutch researchers have succeeded in combining two forms of medical imaging techniques into one piece of equipment. These techniques are particularly useful for cancer research. The two techniques are known as microPET and microSPECT. SPECT and PET can be performed simultaneously and they give a higher resolution than traditional microSPECT and microPET. The new device is known as the VECTor (Versatile Emission Computed Tomography) and is designed for use in fundamental research into the functioning of cells and organs. It can

show functional details smaller than half a millimetre.

Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) are used in cancer research and diagnosis, among other things. PET and SPECT are also commonly used to carry out fundamental research into living cells and disease mechanisms or to develop better methods of diagnosis and treatment. The equipment that has now been developed at TU Delft and MI Labs is designed for fundamental research using experimental animal models. The combined PET/SPECT apparatus offers extremely high resolution, reduces use of laboratory animals and also offers financial savings when carrying out research in this area. Previously, both types of equipment would have had to be bought separately and less information could be gained from each individual animal.

Prof. Freek Beekman, professor at TU Delft and CEO/CSO of MI Labs, previously was in charge of developing the U-SPECT, one of the two elements in the new combined apparatus. This U-SPECT (Ultra-high resolution Single Photon Emission Computed Tomographer) is much more precise than the normal SPECT apparatus or other scanning techniques.

'These scanners allow us to see how cells and organs function in unprecedented detail. There are already more than ten U-SPECTs around the globe, which can test new tracers and pharmaceuticals for cancer, cardiac problems and brain diseases,' says Beekman.

The U-SPECT, and later the combined U-SPECT/PET scanner, is currently being used for research using mice. 'The challenge is now to build a U-SPECT that can be used on people, so that tumours can be detected and classified early, for example, and the right treatment can be started immediately,' says Beekman.

The further development of U-SPECT is part of the worldwide quest for more efficient medical imaging technology, radiotherapy and tumour seekers. These efforts are slowly but surely leading to ever better cancer treatments, according to Beekman. We still have much to gain by improving technology for detecting and treating cancer. Beekman emphasises that it is important for hospitals and technicians to work together very closely.

TU Delft and MILabs are taking action in this area by participating in Medical Delta. They are cooperating with Erasmus University, the University of Leiden and their two affiliated academic hospitals.

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