MRI/PET scanner combo

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Two kinds of body imaging -- positron emission tomography (PET) and magnetic resonance imaging (MRI) -- have been combined for the first time in a single scanner.

MRI scans provide exquisite structural detail but little functional information, while PET scans -- which follow a radioactive tracer in the body -- can show body processes but not structures, said Simon Cherry, professor and chair of biomedical engineering at UC Davis. Cherry's lab built the scanner for studies with laboratory mice, for example in cancer research.

"We can correlate the structure of a tumor by MRI with the functional information from PET, and understand what's happening inside a tumor," Cherry said.

Combining the two types of scan in a single machine is difficult because the two systems interfere with each other. MRI scanners rely on very strong, very smooth magnetic fields that can easily be disturbed by metallic objects inside the scanner. At the same time, those magnetic fields can seriously affect the detectors and electronics needed for PET scanning. There is also a limited amount of space within the scanner in which to fit everything together, Cherry noted.

Scanners that combine computer-assisted tomography (CAT) and PET scans are already available, but CAT scans provide less structural detail than MRI scans, especially of soft tissue, Cherry said. They also give the patient a dose of radiation from X-rays.

The photomultiplier tubes used in conventional PET machines are very sensitive to magnetic fields. So the researchers used a new technology -- the silicon avalanche photodiode detector -- in their machine. They were able to show that the scanner could acquire accurate PET and MRI images at the same time from test objects and mice.

Source: University of California - Davis