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**Penn Researchers Discover the Powerful Tool of Simultaneously Combining  
fMRI and PET Imaging to Study the Brain in Action**

*By Comparing These Two Functional Images, Physicians May Be Able to  
Better Diagnose and Treat Patients With Brain Disorders*

(Philadelphia, PA) - Clinical researchers from the **University of Pennsylvania Health System (UPHS)** are the first to combine fMRI and PET scanning in radiology, creating a way to compare different measurements of the brain's function concurrently. This analysis could lead to better diagnosis and treatment in patients suffering from brain disorders, like Alzheimer's disease.

"By using these two established methods, we now have an integrated way to look at the brain's functions," explained **Andrew Newberg, MD**, a radiologist in nuclear medicine at UPHS and lead author on this clinical study. "We can now get a more comprehensive view of what's happening in the brain at a particular time, than we've ever been able to do before. We can look at more diseases and more activation states."

The work combines the functional imaging of fMRI (functional magnetic resonance imaging), which captures the blood flow in the brain, and PET scanning (positron emission tomography), which looks at the glucose metabolism in the brain. "Normally, these two measures are coupled, or paired together. The more metabolism you have, the more blood flow," adds Newberg. "But there are times the two don't match up with each other like with stroke, seizure disorders, or neurodegenerative disorders. That's what led us to this new technique so that we can explore many different aspects of the brain's function."

So how does this new simultaneous imaging approach actually work? Radiologists inject a patient with radioactive material used for a PET scan **WHILE** the patient is already inside an fMRI scanner. During the time that material is being taken up in the brain, radiologists are acquiring the fMRI image. Then, when that is complete, radiologists take the patient immediately to the PET scanner, to retrieve the PET image.

"We have both machines available to us and have now put them together in a way that works," adds Newberg. "We can take the results of the simultaneous fMRI and PET scans and come up with two separate results and compare them for a new look at the brain. Using this technique, you capture the exact same moment in the brain with both scans. It will help to show us what the relationship is between metabolism and blood flow. Do those two really match up in large majority of conditions?"

Newberg said one goal of this new simultaneous fMRI-PET scan is to better understand the effect of certain medications on the brain and body. The clinical research for this study has been conducted through the PET Center at the Hospital of the University of Pennsylvania and through the Center for Functional

Neuroimaging (CFN), known for its excellence in multi-disciplinary brain imaging.

The results of this study can be found on-line at: [www.sciencedirect.com](http://www.sciencedirect.com). The study will also be published in the November 1st issue of *NeuroImage*.

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*Penn's School of Medicine is ranked #2 in the nation for receipt of NIH research funds; and ranked #4 in the nation in U.S. News & World Report's most recent ranking of top research-oriented medical schools. Supporting 1,400 fulltime faculty and 700 students, the School of Medicine is recognized worldwide for its superior education and training of the next generation of physician-scientists and leaders of academic medicine.*

*The University of Pennsylvania Health System comprises: its flagship hospital, the Hospital of the University of Pennsylvania, consistently rated one of the nation's "Honor Roll" hospitals by U.S. News & World Report; Pennsylvania Hospital, the nation's first hospital; Penn Presbyterian Medical Center; a faculty practice plan; a primary-care provider network; two multispecialty satellite facilities; and home health care and hospice.*

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