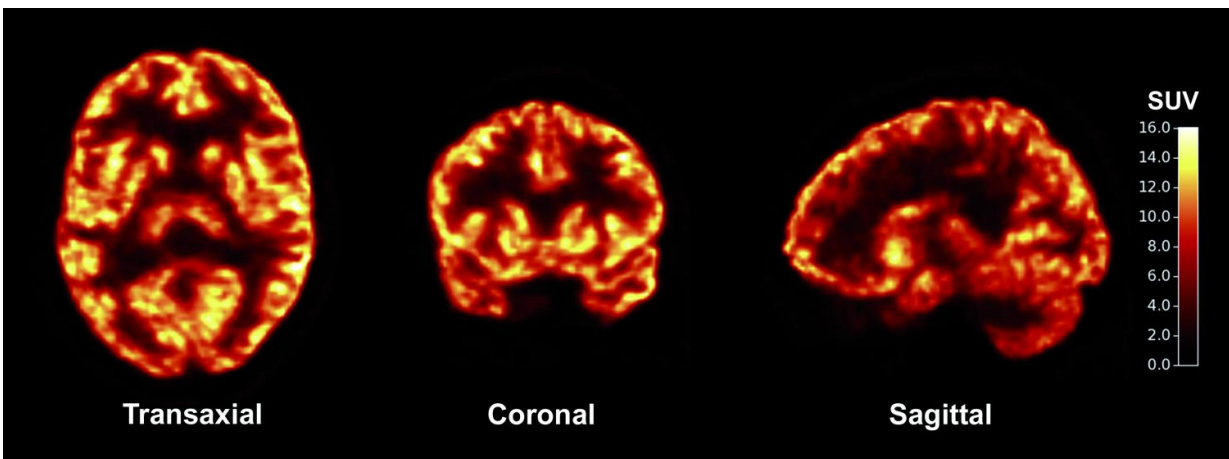


Scientists apply new imaging tool to common brain disorders

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PET imaging evaluation of the SV2A-specific tracer [11C]UCB-J in a healthy human subject. Credit: Finnema et al., *Science Translational Medicine* (2016)

A Yale-led team of researchers developed a new approach to scanning the brain for changes in synapses that are associated with common brain disorders. The technique may provide insights into the diagnosis and treatment of a broad range of disorders, including epilepsy and Alzheimer's disease.

The study was published July 20 in *Science Translational Medicine*.

Certain changes in synapses—the junctions between nerve cells in the

brain—have been linked with [brain disorders](#). But researchers have only been able to evaluate synaptic changes during autopsies. For their study, the research team set out to develop a method for measuring the number of synapses, or synaptic density, in the living brain.

To quantify synapses throughout the brain, professor of radiology and biomedical imaging Richard Carson and his coauthors combined PET scanning technology with biochemistry. They developed a [radioactive tracer](#) that, when injected into the body, binds with a key protein that is present in all synapses across the brain. They observed the tracer through PET imaging and then applied mathematical tools to quantify synaptic density.

The researchers used the imaging technique in both baboons and humans. They confirmed that the new method did serve as a marker for synaptic density. It also revealed synaptic loss in three patients with epilepsy compared to healthy individuals.

"This is the first time we have synaptic density measurement in live human beings," said Carson, who is senior author on the study. "Up to now any measurement of synaptic density was postmortem."

The finding has several potential applications. With this noninvasive method, researchers may be able to follow the progression of many brain disorders, including epilepsy and Alzheimer's disease, by measuring changes in synaptic density over time. Another application may be in assessing how pharmaceuticals slow the loss of neurons. "This opens the door to follow the natural evolution of synaptic density with normal aging and follow how drugs can alter synapses or synapse formation."

Carson and his colleagues plan future studies involving PET imaging of [synapses](#) to research epilepsy and other brain disorders, including Alzheimer's disease, schizophrenia, depression, and Parkinson's disease.

"There are many diseases where neuro-degeneration comes into play," he noted.

More information: "Imaging synaptic density in the living human brain," *Science Translational Medicine*, [stm.sciencemag.org/lookup/doi/... scitranslmed.aaf6667](https://stm.sciencemag.org/lookup/doi/10.1126/scitranslmed.aaf6667)

Provided by Yale University

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