



Western

Biomedical Imaging
Research Centre

SEMINAR
SERIES
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Wednesday, May 23rd 2018 4:00–5:00 pm
(Pizza served at 3:45 pm)

Richard E. Carson, PhD

Professor of Radiology and Biomedical Imaging and of Biomedical Engineering; Director, Yale PET Center; Director of Graduate Studies, Yale Biomedical Engineering, Yale University



Title: Imaging of Synaptic Density in the Human Brain

**Auditorium B
3rd Floor
(Room B3-246)
University Hospital
London, Ontario**

The BIRC Seminar Series is jointly sponsored by BIRC and the London Chapter of the IEEE Engineering in Medicine and Biology Society



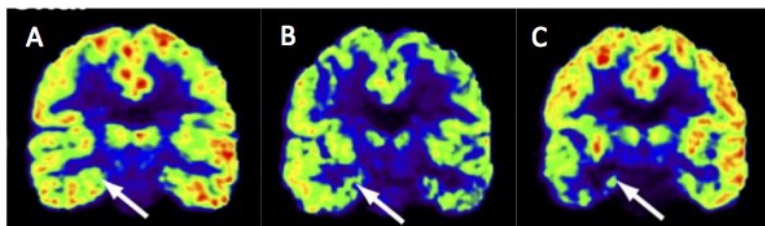
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Abstract

A wide variety of neuropsychiatric diseases involve the loss of neurons and synapses. To date, there are many brain imaging methods that can quantify surrogates for brain synaptic density. These include various MR measures of gray matter density, and FDG, which assesses glucose metabolism and neuronal activation. Recently, we developed a new PET radiopharmaceutical, [C-11]UCB-J, which binds selectively to a synaptic vesicle protein, SV2A. This target is ubiquitously expressed in the brain, and thus provides an imaging paradigm to measure synaptic density in humans. The presentation will include the development of this ligand, the *in vivo* and *ex vivo* validation studies in nonhuman primates, healthy human studies including test/retest scans, kinetic modeling, and blocking studies to identify reference regions. Initial patient results are shown in temporal lobe epilepsy, where UCB-J shows much larger ipsilateral/contralateral asymmetries than FDG, and in Alzheimer's disease, which showed a large (~40%) reduction in hippocampus and entorhinal cortex.

Biography

Richard E. Carson's research focus includes development of mathematical models for novel PET radiopharmaceuticals and applications of PET tracers in clinical populations and preclinical models of disease, with specific focus on neuropsychiatric disorders. Dr. Carson has published over 275 papers, given over 125 invited lectures and has received numerous awards including the Kuhl-Lassen award and the Edward J. Hoffman Award from the Society of Nuclear Medicine, the Distinguished Investigator Award from the Academy of Radiology Research, and the Edward J. Hoffman Award for Medical Imaging from the IEEE.



Parametric SV2A PET V_T mapping of a healthy control (A) and a PIB-positive MCI patient (B) and an AD patient (C) using [^{11}C]UCB-J. There is a discernable reduction of SV2A binding in the hippocampus of the MCI and AD patients (denoted by the arrows).

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