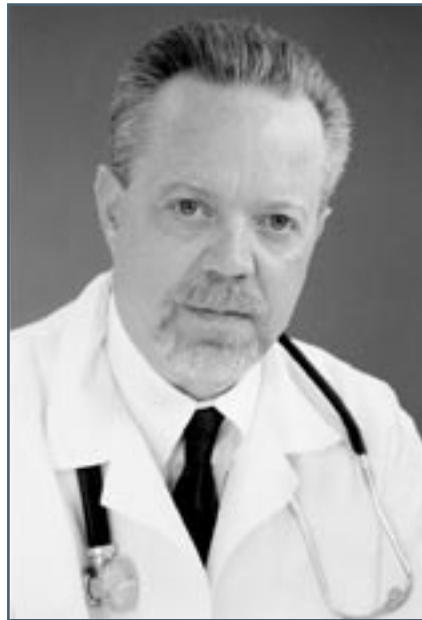


Your Patients, Our Priority



Dr. Jere Sandefur

OAI offers Positron Emission Tomography (PET), a safe diagnostic imaging tool that detects the earliest stages of cancer, when it is most treatable. Physicians and other healthcare providers count on the radiologists at Oregon Advanced Imaging to provide a comprehensive interpretation of the scan results. Radiation Oncologist Dr. Jere Sandefur (left) is one of our partners who relies on our services to help him make accurate diagnoses and select the optimum treatment plans for his patients.

At OAI, we make prompt communication with physicians and other healthcare providers among our top priorities. We are committed to providing our referring physicians with the best service in the area. This means providing speedy access to radiology images and reports. We are available for any questions or concerns you may have. Please call us at 608-0350. Our goal is to provide the best imaging services for you and your patients. ■

OAI 1631



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Operated jointly by Rogue Valley Medical Center, Providence Medford Medical Center, & Medford Radiology Group

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Alzheimer's and PET

By William R. Nemzek, MD

Replacing the car keys and forgetting what's needed at the grocery store are mild memory lapses associated with getting older. The average person loses about 50,000 brain cells per day after age 20. By 75 years of age, the normal brain has decreased by 10% in weight. When does this normal aging process become pathological?

By weight, the brain uses more energy than any other organ in the body. Brain cells need glucose for fuel. Positron emission tomography (PET) scans use [18F] fluoro-2-deoxyglucose (FDG), a glucose analog. Like glucose, FDG enters the cell, but then FDG become trapped and is not further metabolized. Brain PET scans make a metabolic snapshot of neuronal firing and restoration of ionic gradients.

Alzheimer's disease is the most common progressive neurodegenerative disease, and accounts for about two thirds of cases of dementia. Beginning with memory loss, there is a progressive inexorable decline of other cognitive functions. Language, orientation, perceptual and motor skills deteriorate. Behavior and mood alteration leads to deterioration of social skills. In advanced stages there is unresponsiveness and eventually death.

The accuracy of the clinical diagnosis of Alzheimer's disease is very good. The need for accurate, early diagnosis is important now that medications for the treatment of mild to moderate Alzheimer's disease are available. Early therapeutic intervention delays cognitive deterioration, postpones nursing home care, and gives the patient and family time to plan for the future.

The signature of Alzheimer's disease on PET imaging is decreased metabolism in the posterior cingulate, inferior parietal and superior temporal cortex. The basal ganglia, thalamus, visual and sensorimotor cortex are spared. Abnormal brain glucose metabolism is present with mild cognitive abnormalities, before there is dementia. PET scans can detect early changes of Alzheimer's disease before there are any anatomic abnormalities on CT or MR scans. FDG Brain PET can help in the differential diagnosis of other causes of dementia, such as frontotemporal dementia, Lewy body disease, and Huntington's disease.

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Oregon Advanced Imaging

is a local community partnership between Rogue Valley Medical Center, Providence Medford Medical Center, and Medford Radiology Group. This partnership provides MRI and PET scan services to patients, physicians, and healthcare providers throughout southern Oregon. We provide uncompromising standards of customer service, integrity, reliability, and accuracy. The entire team at Oregon Advanced Imaging is committed to providing the highest quality imaging services.

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PET/CT: Exquisite Detail

By Robert C. Sinnott, MD

As recently as 6 years ago, tumor staging and follow-up was done with anatomy alone, plus a few tumor markers, and little if any physiology. Although the resolution has significantly improved, a large arena of neoplastic assessment was not available. PET scanning dramatically changed that situation. However, like all nuclear medicine procedures, there is inherent lack of resolution of anatomy.

PET/CT is about to change that drawback.

PET scanning works like offering candy to a child. Cancer, like children, has little self-control when given access to sugar. In fact, cancer cells absorb 3.5 to 15 times the amount of a normal cell population. PET scanning uses a non-metabolizable sugar, (2[deoxy-D-glucose]), a glucose derivative, to which is bound the radioactive molecule, Fluorine 18. The isotope Fluorine 18 produces a positron (ANTI-MATTER) as it decays, which when it comes in contact with a normal electron (REAL MATTER) annihilates, resulting in the formation of 2 high energy Gamma rays that leave the site at 180 degrees to each other. By injecting FDG into a person, tumor cells will ingest more sugar and the PET scanner can see the areas of increase activity and localize them.

PET/CT combines superb anatomic detail plus tumor physiologic information provided by PET. In order to make its images, PET requires information about where and how thick the patient is. Although this previously was acquired with a radioactive source, it took time and lacked highly-accurate density information. The CT scan does this, plus it does it 1/50th of the time. An additional benefit is the ability to fuse the PET information to this exquisite information provided by the CT images.



Biograph PET/CT: Scan times are almost cut in half, reducing patient motion and discomfort.

WHAT THIS MEANS TO PATIENT CARE:

1. Scan times are almost cut in half, reducing patient motion and discomfort.
2. New imaging crystal technology has doubled the resolution of the new PET scanner.
3. Vascular spaces can now be identified, instead of assumed.
4. Much smaller lesions can be delineated, and biopsied, if necessary to confirm tumor.
5. Areas of tumor re-growth can be better defined for therapy.
6. FDG now begins to take on the role of a contrast agent.
7. There is no need to search out scans to compare; in the past this has been a logistical nightmare.

Just as the gasoline powered engine and the glider became something new when combined together by the Wright brothers, the PET/CT machines are something quite different from either machine separately. We are now able to see clearly abnormal areas of physiology within an anatomic setting. A new world of cancer imaging is opening before us. ■

continued from cover...

It is difficult to predict the clinical course of patients with mild cognitive problems. PET scans can distinguish early Alzheimer's disease patients from normal adults with mild memory loss due to aging. PET scans may be used as a prognostic tool to determine the likelihood of progressive mental deterioration. A study of 167 patients with only mild cognitive dysfunction (mean Mini-Mental State Examination 24 of 30 possible points), were followed for up to ten years. PET scans were rated as positive or negative for a progressive neurodegenerative process. In the patient group predicted by clinical criteria to have a progressive dementia, 94% with positive PET scans suffered a progressive decline, while only 25% with negative scans deteriorated. Conversely, in patients with a working clinical diagnosis of a nonprogressive cause for their cognitive complaints, if the PET scan was positive, 74% of those suffered progressive deterioration, compared to 4% of those with a negative PET scan. Therefore, a positive PET scan conferred an 18 fold greater likelihood of progressive cognitive decline.¹

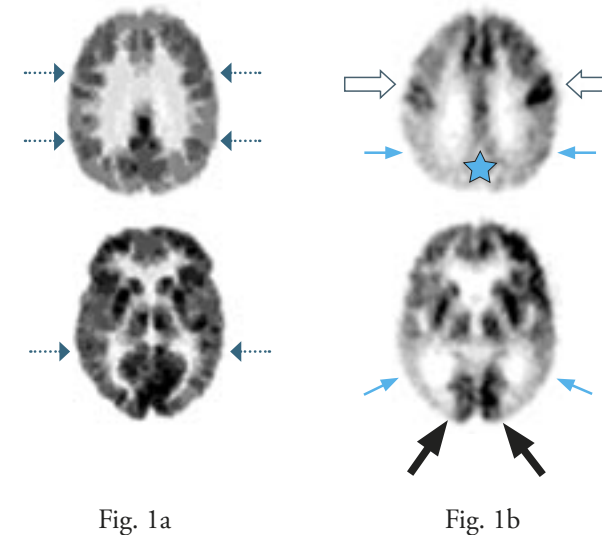


Fig 1.
1a. Normal brain PET scan. Note dark outer ring of activity (--->), which represents cortex, is very metabolically active. White matter uses much less glucose. The darkness of each pixel is proportional to the amount of radioactive sugar used by the brain.
1b. Alzheimer's disease. Note decreased metabolic activity (—>) in the parietal and temporal cortex, which is important in processing language and memory. The posterior cingulate cortex (★) is also hypometabolic. The occipital (—>) and sensorimotor cortex (--->) is relatively spared. (images courtesy of Dr. Daniel H. Silverman)

NeuroQ: A computer-aided detection program

The early metabolic changes of neurodegenerative disease may be subtle. Dr. Daniel Silverman from UCLA, has developed an automated software platform that generates quantified analysis of regional cerebral metabolism. This computer-aided detection program is called NeuroQ. This program evaluates about 240 different areas of the brain. The patient's PET brain scan is compared with the asymptomatic control subjects in the database. Abnormal areas of metabolism are identified. The magnitude and statistical significance of the abnormality is estimated, giving a probability of developing progressive dementia. We will be using NeuroQ to assist in the evaluation of our scans.

Appropriate use of PET imaging can add valuable information to the clinical workup of dementia patients with early symptoms of cognitive decline. Early recognition and intervention facilitates optimal care can slow or delay the symptoms associated with this progressive illness.² ■

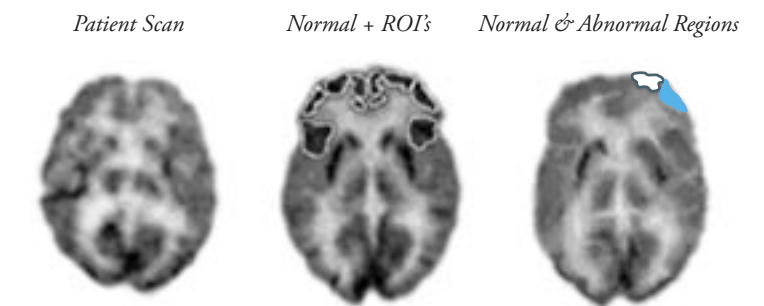


Fig. 2. NeuroQ. Areas of equivocal (white) and significant (light blue) hypometabolism are color coded and displayed in each axial slice. (images courtesy of Dr. Daniel H. Silverman)

1. Silverman DHS et. al., Prognostic value of regional cerebral metabolism in patients undergoing dementia evaluation: comparison to a quantifying parameter of subsequent cognitive performance and to prognostic assessment without PET. *Molecular Genetics and Metabolism*, 2003; 80:350-355.
2. Silverman DHS, Brain 18FDG PET in the diagnosis of neurodegenerative dementias: comparison with perfusion SPECT and the clinical evaluations lacking nuclear imaging. *Journal of Nuclear Medicine* 2004; 45:594-607

Patient Surveys: Oregon Advanced Imaging Scores Well on Care, Comfort, and Convenience.

In our ongoing customer satisfaction surveys over the last year, your patients rated us highly on friendly, professional, and compassionate service. Our average score is 4.85 on a 1 to 5 scale. Other highlights from patient surveys include a high level of satisfaction with ease of scheduling their appointment time, the comfort of OAI's facility, and the clarity of pre-exam instructions.

Patient comments: "Best care I've ever received," "Friendly and welcoming," "Entire staff outstanding, caring, compassionate."