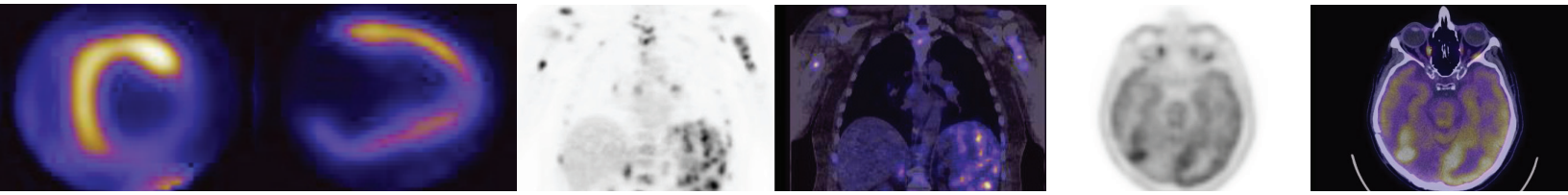
PET PROS

PET Professional Resources and Outreach Source



PET Scans: Get the Facts

What are molecular imaging technologies?

Molecular imaging procedures are highly effective, safe and painless diagnostic imaging and treatment tools that present physicians with a detailed view of what's going on inside an individual's body at the cellular level. Most nuclear medicine procedures are molecular imaging procedures using radioactive substances.

The most commonly used molecular imaging procedure for diagnosing or guiding treatment of a variety of conditions is Positron Emission Tomography (PET) scanning, which is often used in conjunction with Computed Tomography (CT) scanning. The National Oncologic PET Registry (NOPR)—a nationwide database documenting the use of PET and PET/CT in managing cancer—shows that in more than one out of three cases, PET/CT scan results prompt changes in a patient's treatment. The results, published in The Journal of Clinical Oncology, demonstrate the vital role that PET/CT can play to properly diagnose or verify the suspected recurrence. [For more information on PET/CT scanning, please read SNM's fact sheet "PET/CT Scans: Get the Facts" on SNM's Web site at http://interactive.snm.org/index.cfm?PageID=7988.] In addition, the National Comprehensive Cancer Network (NCCN) has incorporated FDG PET/CT in the practice guidelines and management algorithm of most malignancies [1, 2].

What are PET scans?

Positron emission topography (PET)—also called PET imaging or a PET scan—is a noninvasive, painless molecular imaging technology that allows physicians to determine how organs and tissues inside the body are functioning on a molecular and cellular level. PET is a powerful diagnostic tool that is advancing our understanding of the underlying causes of disease and improving the way in which many diseases are detected and treated. PET scans are one of the most effective types of nuclear medicine procedures for detecting cancer, brain disorders, heart conditions and other diseases. PET scans have advanced greatly since it was introduced in the 1970s, and PET scans are more and more widely used. In 2005, an estimated 1,129,900 clinical PET patient studies were performed at 1,725 sites around the country.

What are the advantages of PET scans?

PET scans are one of the most effective types of nuclear medicine procedures for detecting cancer, brain disorders, heart conditions and other diseases.

Cancer—PET is a powerful tool for diagnosing and determining the stages of many types of cancer, including lung, head and neck, colorectal, esophageal, lymphoma, melanoma, breast, thyroid, cervical, pancreatic and brain cancers.

The National Oncologic PET Registry (NOPR)—a nationwide database documenting cases in which PET has been used by physicians to more successfully manage disease in patients—shows that in more than one out of three cases, the use of PET prompts changes to the management of patient care. The results, published in The Journal of Clinical Oncology, demonstrate the vital role that PET can play to properly diagnose or verify the suspected recurrence of disease.

PET scans can eliminate the need for surgical biopsy because PET can detect whether lesions are benign or malignant. PET is currently the most effective way to check for cancer recurrence. It can also be used to determine whether chemotherapy or other treatments are working as intended, as well as help individuals avoid unnecessary or unproductive surgery or treatment.

Brain disorders—PET scans can detect the onset of neurological disorders such as Alzheimer's disease and other memory disorders. Early detection can give patients access to therapies that are more effective in the beginning stages of the disease. For epilepsy patients, PET is one of the most accurate methods available to pinpoint areas of the brain causing epileptic seizures and for determining whether surgery is an option for treatment.

Heart problems—In addition, PET scans can detect cardiovascular diseases such as coronary artery disease and heart damage following a heart attack. PET scans can pinpoint areas of decreased blood flow, such as

those with blockages, and differentiate living muscle from damaged muscle. This information is particularly important for patients considering procedures such as angioplasty or coronary artery bypass surgery following a heart attack.

How is the procedure performed?

When disease strikes, the biochemistry of an individual's tissues and cells changes. In cancer, for example, cells multiply at a much faster rate than normal cells, feeding on sugars like glucose.

If an individual has cancer or cancer is suspected, a nuclear medicine or molecular imaging specialist performs a PET scan to see exactly what is going on inside that person's body. During a PET scan, a patient is injected with a very small amount of a radiotracer such as fluorodeoxyglucose (FDG), which contains both sugar and a radioactive element. The radiotracer travels through the body and is absorbed by the tissues or the organ being studied. The patient then lies down on an examining table and is moved to the center of a PET scanner. The scanner contains an array of detectors that receive signals emitted by the radiotracer. Using these signals, the PET scanner measures metabolic activity while a computer reassembles the signals into images.

PET/CT Scanning

How can PET/CT scanning help cancer patients?

Specifically, PET/CT scanning is a powerful tool for many types of cancer for:

- Establishing how advanced the cancer is and whether it has spread to other parts of the body;
- Helping physicians and patients decide on courses of treatment that are tailored to patients' individual conditions and needs;
- Determining early on whether chemotherapy or other treatments are working as intended; and
- Detecting whether the disease is recurring after treatments are completed and assisting physicians in determining a site that is appropriate for biopsy, if necessary.

How does PET/CT scanning work?

PET scanning is a molecular imaging procedure that allows physicians to obtain three-dimensional images of what is happening in a patient's body at the molecular and cellular level. For a PET scan, a patient is injected with a very small amount of a radiotracer such as fluorodeoxyglucose (FDG), which contains both a sugar and a radioactive element. The radiotracer travels through the body and is absorbed by tumors or cancer cells. The patient then lies down on an examining table and is moved to the center of a PET/CT scanner. The PET/CT scanner contains a PET scanner and a CT scanner next to each other. The CT scan and the PET scan are obtained one after the other. The PET scanner is composed of an array of detectors that receive signals emitted by the radiotracer. Using these signals, the PET scanner detects the amount of metabolic activity while a computer reassembles the signals into images. [For more information on PET/CT scans and how they work, visit PET/CT Scanning: Get the Facts.]

How can PET/CT scanning help in the long-term management of cancer?

PET/CT scanning can help physicians gain a clear understanding of where the disease is occurring and how aggressive it is. Armed with this knowledge, physicians and patients can decide together on the best courses of treatment. PET/CT scanning can help determine how effective treatments are as soon as one cycle of treatment is completed. It may also eliminate the need for unnecessary surgeries after treatments are finished because PET/CT can determine whether any suspicious tissue masses are active tumors or residual masses.

How many PET/CT scans will patients require?

Depending on the course of treatment selected by physicians and patients, patients may require several PET/CT scans during the course of their disease to make an accurate diagnosis and determine whether courses of chemotherapy or radiation are working as intended and ensure that patients are cancer-free after treatments have ended.

How long does it take to get PET/CT scan results?

A trained radiologist or nuclear medicine physician will interpret the results and write a report for the physician who ordered the tests. A verbal report is available the day of the PET/CT scan and the written report is usually delivered to the physician within two or three days.

Will insurance reimburse for PET/CT scans?

Insurance companies will cover the cost of most PET/CT scans. Because of the mounting evidence of the effectiveness of PET/CT scanning for the diagnosis and treatment of a wide range of cancers, coverage levels continue to expand. For the most updated figures, check with your insurance carrier or physician as the levels at which Medicare reimburses for PET/CT are under review with the Centers for Medicare and Medicaid Services CMS and subject to change.

Where can I get more information about PET scans and molecular imaging?

To learn more about PET scans, visit www.snm.org/facts. To learn more about PET/CT scanning or other nuclear medicine procedures, visit the SNM Molecular Imaging Center of Excellence.

(Endnotes)

1 Podoloff DA, Advani RH, Allred C, Benson AB, Brown E, Burstein HJ, Carlson RW, Coleman RE, Czuczman MS, Delbeke D, Edge SB, Ettinger DS, Grannis FW, Hillner BE, Hoffman JM, Keil K, Komaki R, Larson SM, Mankoff DA, Rozenzweig KE, Skibber JM, Yahalom J, Yu JM, Zelenetz AD. NCCN Task Force Report: Positron Emission Tomography (PET/Computed tomography (CT) scanning in cancer. J Natl Compr Canc Netw 2007;May;5 Suppl 1: S1-S22.

2 http://www.nccn.org/professionals/physician_gls/f_guidelines.asp