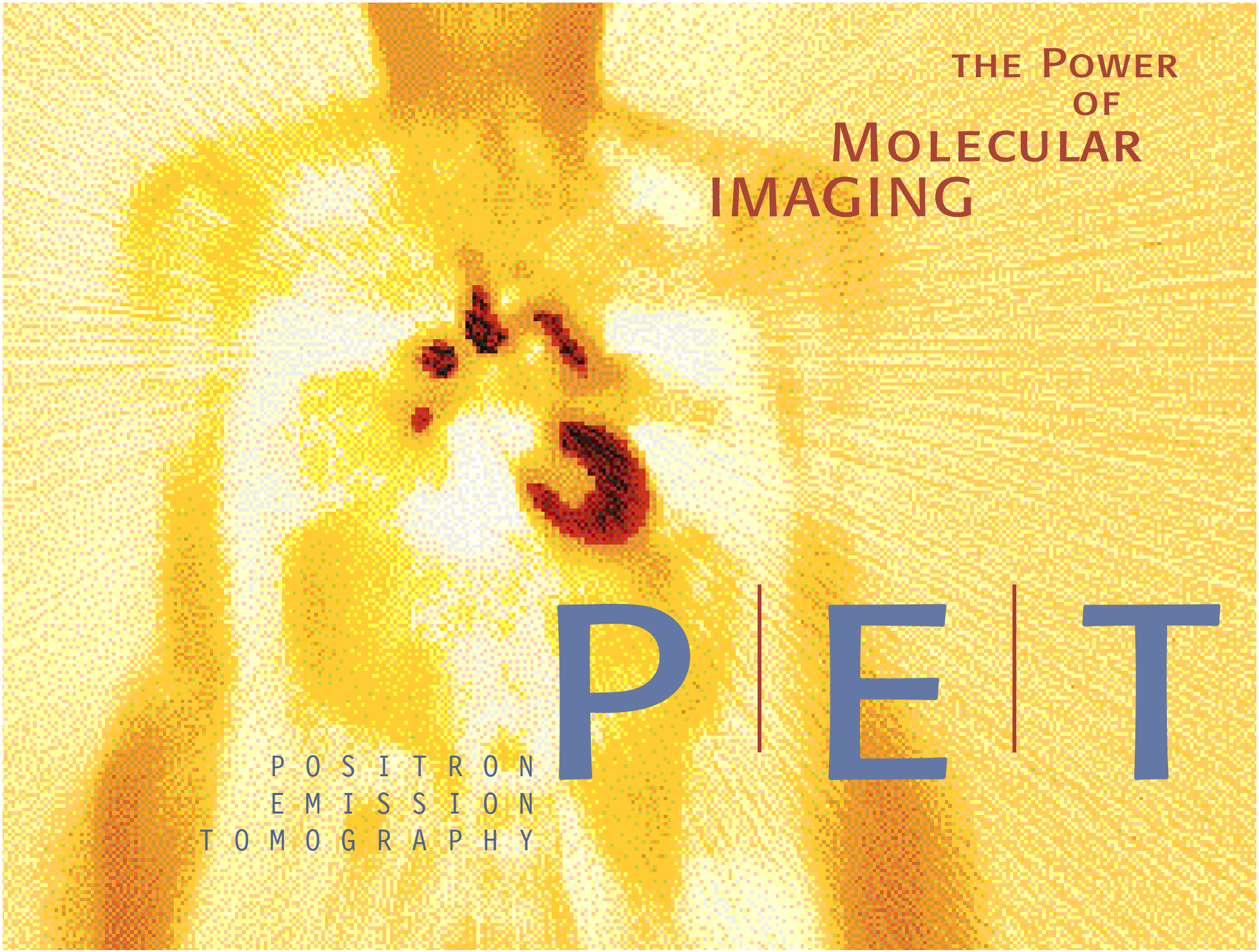

THE POWER OF MOLECULAR IMAGING
P | E | T
POSITRON EMISSION TOMOGRAPHY

Case in Point

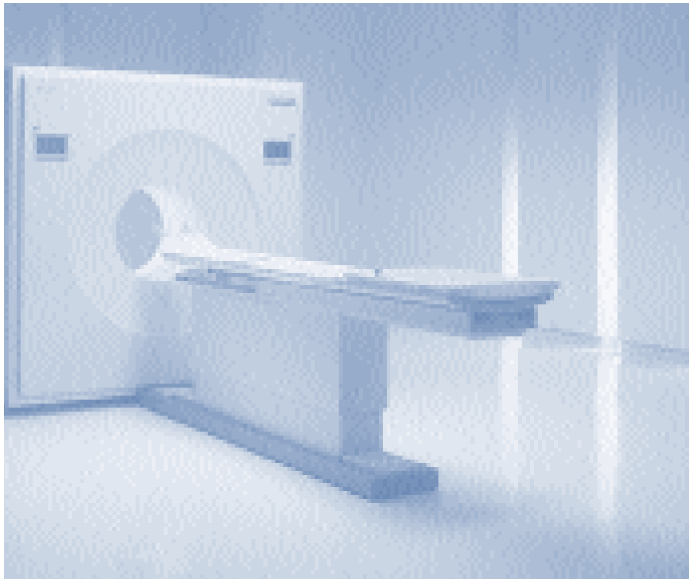
This 34-year old woman had recovered from ovarian cancer and felt fine. Then, her quarterly blood results showed a slight increase in her tumor marker levels. Her doctor recommended an imaging procedure called Positron Emission Tomography, or PET. The PET scan revealed that the cancer had recurred in her chest, and therapy was immediately resumed.

Cancer is one of the major causes of death worldwide.

P|E|T reveals metastatic disease other imaging techniques simply can't detect.

P|E|T helps to diagnose cancer and guides physicians to the most beneficial therapies.

WHAT IS PET?



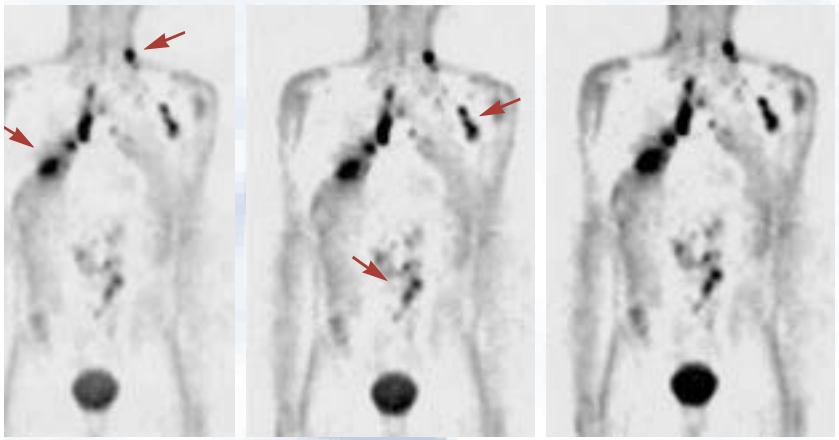
PET is a camera that produces powerful images of the human body's biological functions and reveals the mysteries of health and disease.

1 Compounds like simple sugars (glucose, for example) are labeled with signal-emitting tracers and are injected into the patient.

2 A scanner records the signals these tracers emit as they journey through the human body and collect in the various organs targeted for examination.

3 A computer reassembles the signals into actual images – the first pictures ever to show biological causes of normal organ function and failure of organ systems in disease.

WHAT CAN PET TELL ME ABOUT CANCER?



The PET scan shows a chain of lymph node tumors in the neck, chest and abdomen. Why are these tumors so visible?

WHERE IS THE TUMOR?

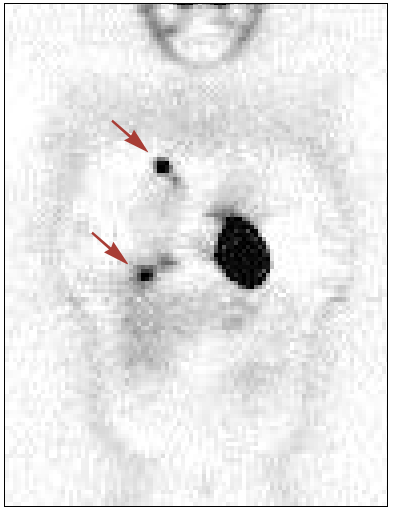
The patient is injected with a glucose tracer. Although glucose is used by all cells, more glucose is used by cells with increased metabolism. Because cancer cells are highly metabolic and use more glucose than neighboring cells, they are easily seen on the PET scan.

IS THE TUMOR BENIGN OR MALIGNANT?

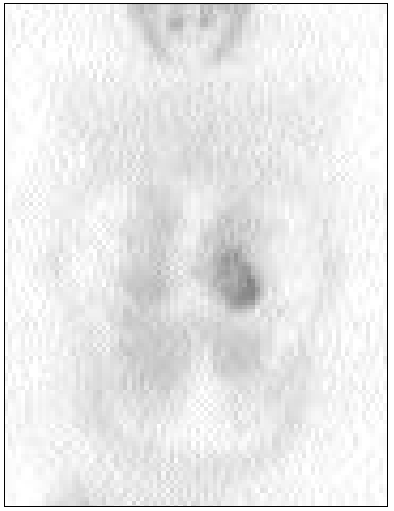
The high glucose metabolism of these Hodgkin's Lymphoma lesions indicates that they are malignant. Armed with this knowledge, the physician is able to determine the best method for treatment.

IS MY TREATMENT WORKING?

After chemotherapy, a PET scan proves that the cancer treatment has been effective.



Pre-chemotherapy, March 1995



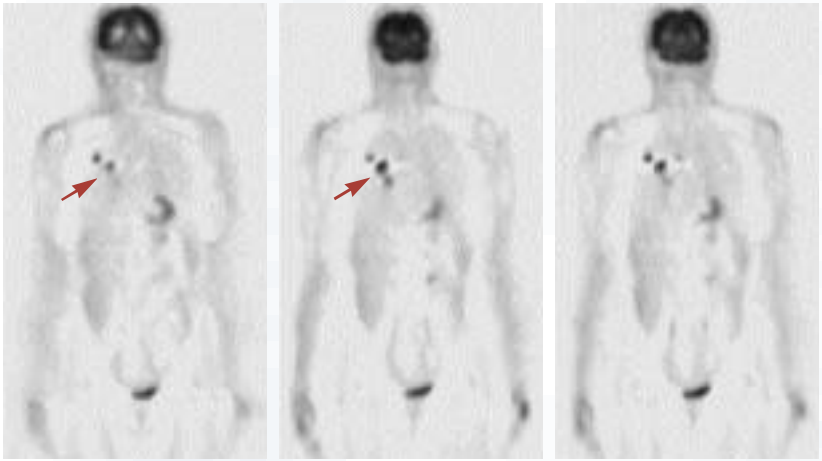
Post-chemotherapy, Jan. 1996

Lung Cancer

Colorectal Cancer

Breast Cancer

Prostate Cancer



Has the cancer spread?

A lesion is found on a chest x-ray, and a PET scan is performed to see if it is benign or malignant. The PET scan reveals that the lesion is malignant and also shows that metastases have spread to the right lung. PET can follow the course of the cancer through the body and accurately show the extent of the disease.

Cancer Facts & PET

7.4 million Americans have a history of cancer, and 1.3 million new cancer cases will be diagnosed this year. Peer-reviewed literature supports and clinical data demonstrates that PET is effective in the diagnosing and staging of most of these cancers.

Cancer Deaths By Site

SITE	DEATHS
Lung	160,400
Colorectal	54,900
Breast	43,900
Prostate	41,800
Pancreatic	27,600
Female Reproductive	26,500
Malignant Melanoma	13,800
Hodgkin's	7,500

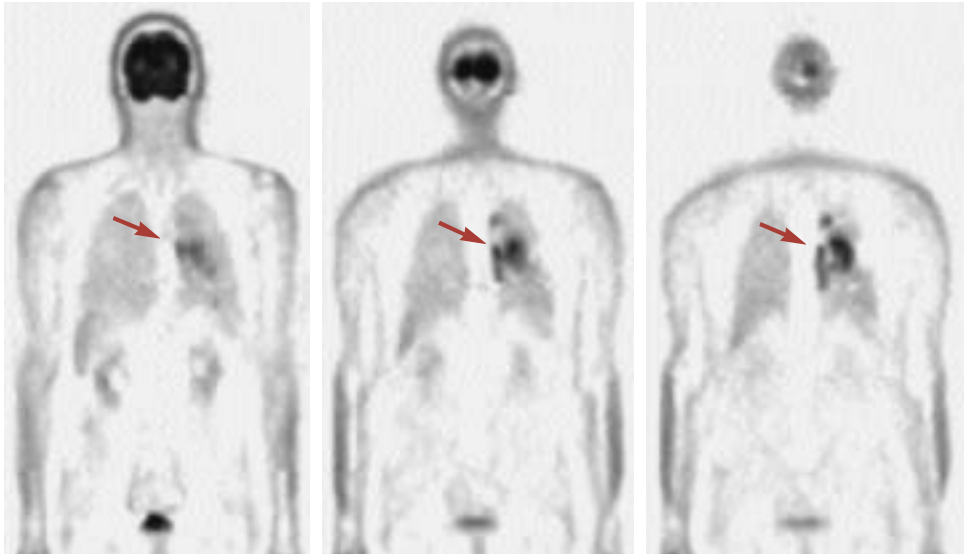
Lung Cancer

New Cases 178,100/yr
Deaths 160,400/yr

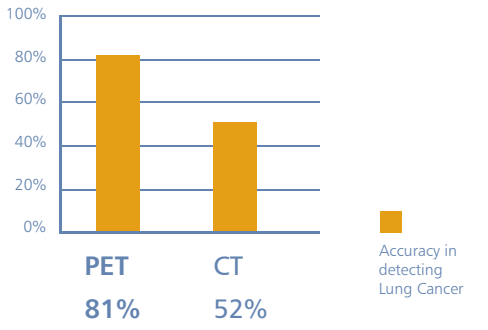
My 56-year old husband had a shadow on his chest x-ray, and his doctor can't tell if it's a benign or malignant lesion.

Prior to PET: Your husband would have undergone a needle biopsy or have had a portion of his lung removed to determine if the lesion was benign or malignant. If the lesion was malignant, he would have had CT scans and possibly more surgery.

With PET: One PET scan will show if the lesion is benign or malignant. If benign, your husband can be followed with regular chest x-rays to detect changes over time. If malignant, the same scan will show the extent of primary and metastatic disease without another test. The scan will also show if he should undergo surgery or if some other therapy is indicated.



How Does PET Compare?



(Wahl et al, 1994) Representative of multiple literature references

Colon Cancer

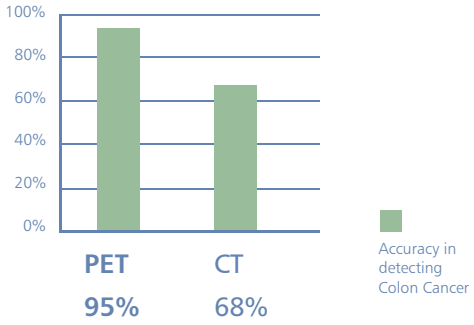
New Cases 131,200/yr
Deaths 54,900/yr

My 82-year old mother has a history of colon cancer. Lately, her serum CEA levels have increased. Her doctor ordered a CT scan, but it was negative. Does my mother have a recurrence of the disease?

Prior to PET: CT scans would have continued periodically until the tumors were large enough to be detected, or a diagnostic laparotomy would have been performed to determine the source of the rising CEA levels.

With PET: With a rise in CEA tumor marker levels or if your mother is symptomatic, a PET scan should be the first diagnostic study to be performed. If the PET scan is positive, the same scan will also show the extent of the recurrent disease, indicating which surgical, radiation or medical treatment would benefit your mother most.

How Does PET Compare?



(Scheipers, 1995) Representative of multiple literature references.

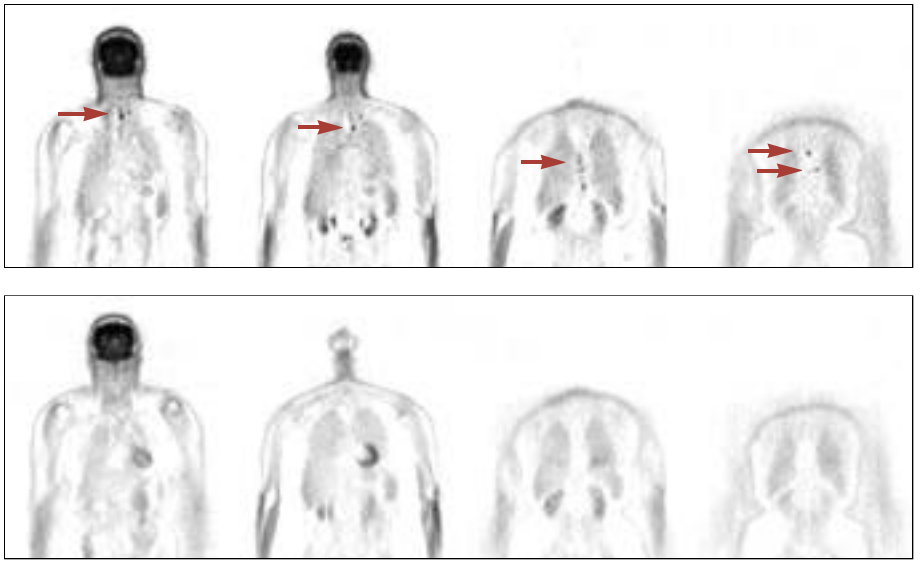
Breast Cancer

New Cases 180,200/yr
Deaths 43,900/yr

My 36-year old wife has breast cancer. She had a mastectomy one year ago. Recently, she developed symptoms that concern us.

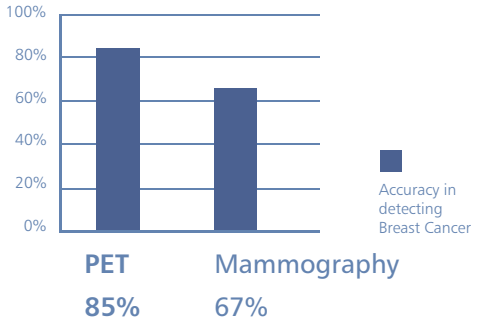
Prior to PET: Her doctor would have ordered a CT scan of the chest, abdomen, and pelvis, and perhaps a bone scan to search for possible recurrent disease. However, many anatomic imaging tests may not show recurrent disease at this stage.

With PET: Your wife will have a single PET scan of the entire body that will reveal the presence or absence of highly metabolic activity indicative of tumor recurrence.



Update: The PET scan did indeed reveal that your wife had metastatic disease in the bones, lung and liver (see arrows). Fortunately, the accurate diagnosis led to immediate chemotherapy treatment, and the follow-up scan showed resolution of the metastatic disease.

How Does PET Compare?



(Hoh, 1993) Representative of multiple literature references.

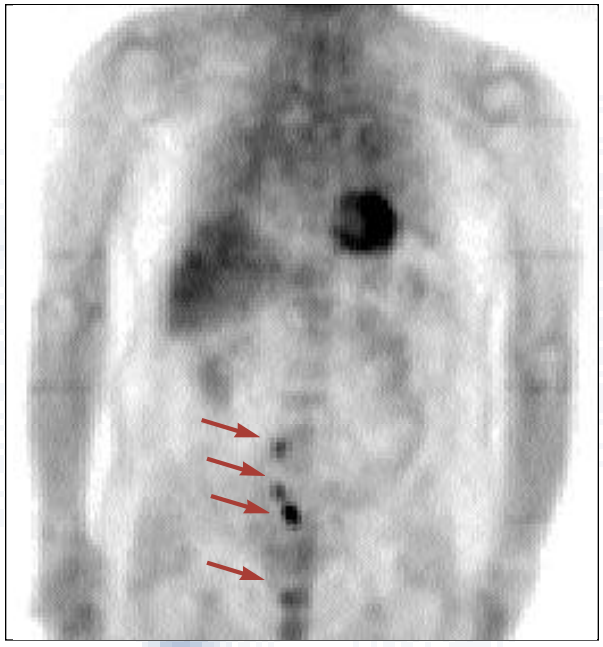
Prostate Cancer

New Cases 334,500/yr
Deaths 41,800/yr

My 72-year old father has prostate cancer. Four years ago he had a radical prostatectomy, but recently his PSA level has been rising.

Prior to PET: Your father would have undergone a bone scan, a CT scan and a monoclonal antibody scan which may have shown no evidence of metastasis.

With PET: If the cancer has recurred, the PET image will demonstrate intense glucose metabolism in the site of pelvic lymph node metastases. The PET findings will also show the presence of metastases in any other areas, such as bone or lung.



Update:
Although your father was considering radiation therapy for presumed local recurrence, the PET scan showed the cancer had spread. His physician was able to counsel him that he would not benefit from radiation therapy, and treatment for systemic disease was initiated.

Cancer and PET

The most dangerous aspect of cancer is how it spreads throughout the organ systems of the body.

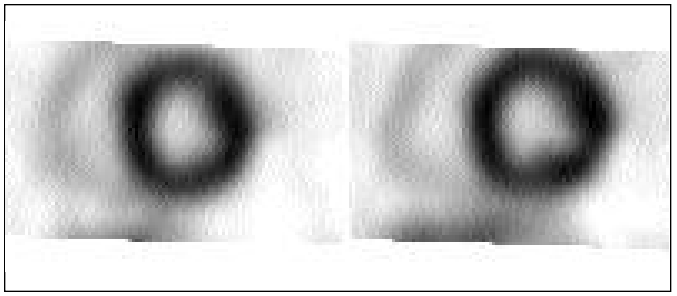
PET is a medical imaging modality that inspects all organ systems of the body to search for cancer in a single examination.

WHAT CAN PET TELL ME ABOUT HEART DISEASE?

DO I HAVE CORONARY ARTERY DISEASE?

PET is the most accurate test to reveal coronary artery disease or rule out its presence. The PET images show inadequate blood flow to the heart during stress undetected by other non-invasive cardiac tests.

REST



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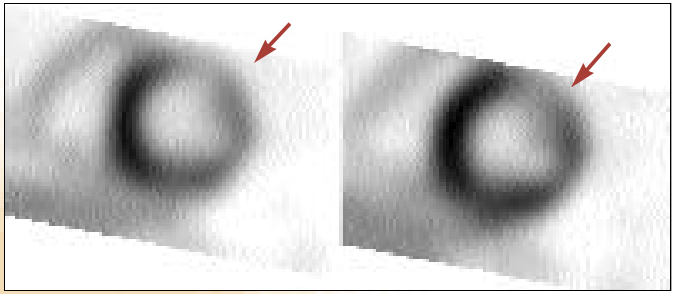


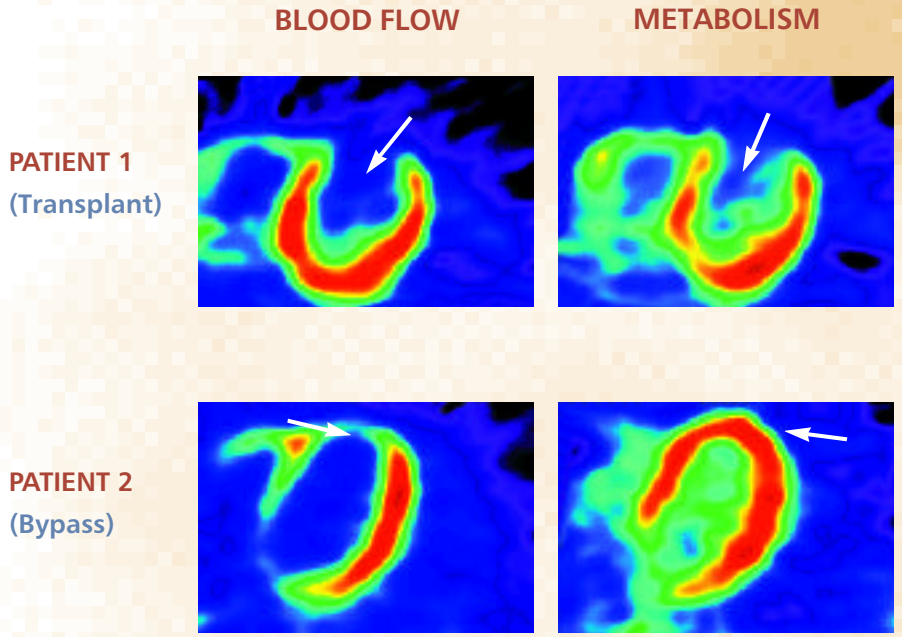
45-year old patient with occasional chest discomfort. The PET scans show significant coronary artery disease.

PET is the gold standard to determine the viability

I have heart failure symptoms! Should I be treated by either transplant or bypass surgery?

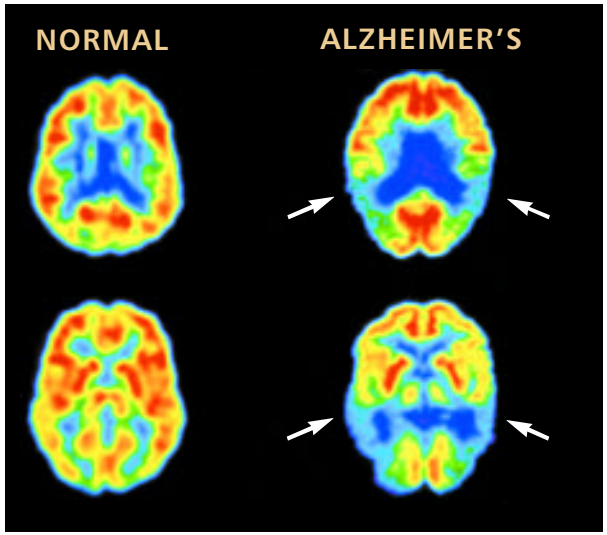
PATIENT 1: These PET scans reveal that both blood flow and metabolism are absent in a large area of the heart. The absence of metabolism indicates that the tissue is dead, so a cardiac transplantation would be the treatment of choice.

PATIENT 2: These PET scans reveal that blood flow is markedly reduced in a large area of the heart, but metabolism is maintained. Because metabolism indicates that the tissue is still alive, cardiac transplantation is not necessary for this patient. However, bypass surgery would improve the function of the heart.



of heart tissue for revascularization.

WHAT CAN PET TELL ME ABOUT BRAIN DISORDERS?

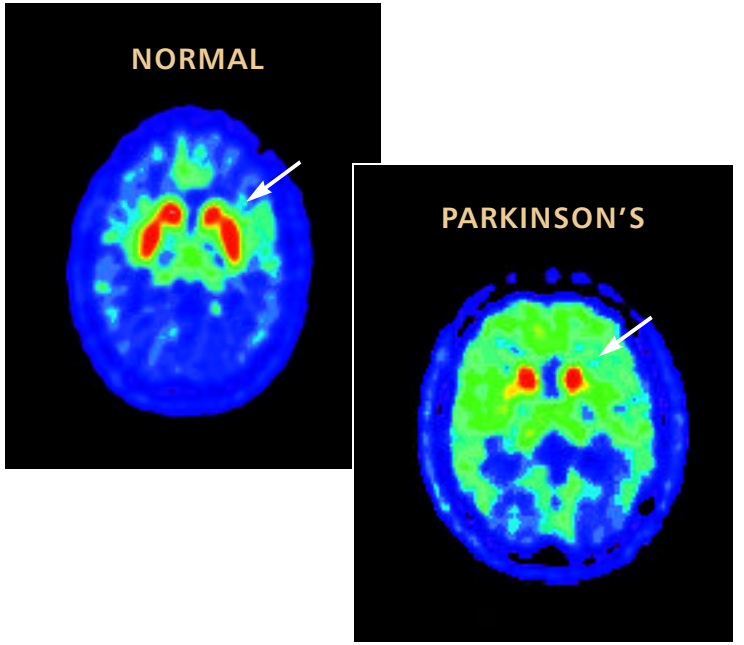


My doctor suspects my husband may have Alzheimer's Disease. What can PET tell us?

PET scans show a very consistent diagnostic pattern for Alzheimer's disease, where certain regions of the brain have decreased metabolism early in the disease (see arrows). In fact, this pattern often can be recognized several years before a physician is able to confirm the diagnosis and is also used to differentiate Alzheimer's from other confounding types of dementia or depression.

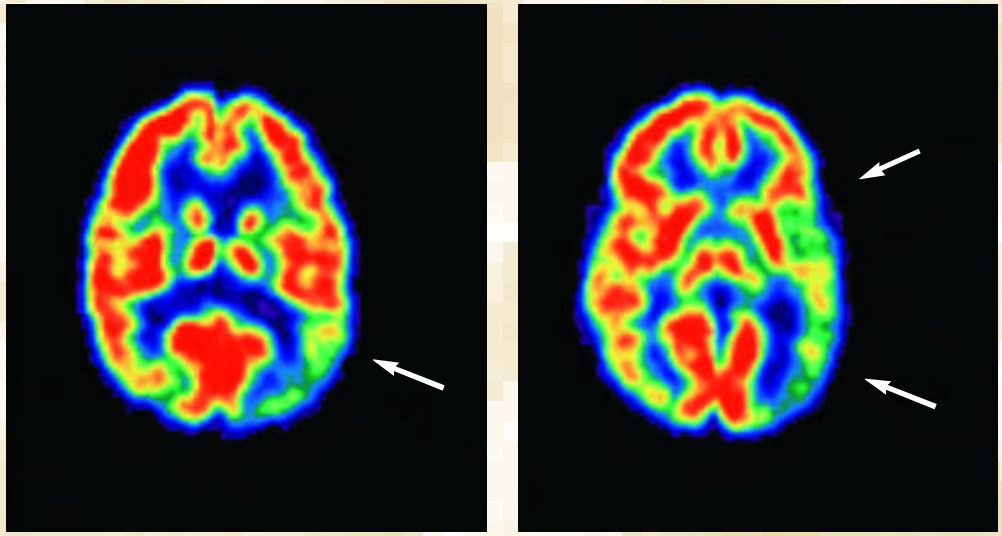
If I have a feeling of tremor in my muscles, do I have Parkinson's Disease?

PET images of the brain will show if you have Parkinson's disease. A labeled amino acid called F-DOPA is used with PET to see if your brain has a deficiency in dopamine synthesis. If it doesn't, then you do not suffer from Parkinson's, and your tremor will be treated differently.



If my child has seizures, and if medical therapy doesn't work, can PET help?

PET images of the brain identify regions of reduced glucose metabolism, pinpointing the epileptogenic tissue. Surgical techniques are now available to successfully remove the tissue, leading to a definitive cure of the seizure disorder in 80% of these children.



The PET scan showed abnormal glucose metabolism in the back of the right hemisphere (see arrows). Following surgical removal of the dysfunctional brain area, the child was seizure-free.

PET Facts

In a world of limited resources, PET saves time, saves money, and, most importantly, saves lives.

People expect quality medical care at a reasonable cost and up-to-date diagnosis and treatment. Medical costs are most expensive when doctors are pursuing the origin of disease. As long as the disease is unknown, more tests will be done and more costs will result.

PET can effectively pinpoint the source of many of the most common cancers, heart and neurological diseases, eliminating the need for redundant tests and diagnostic surgical procedures. **PET** is a powerful, proven diagnostic imaging modality that displays the biological basis of function in the organ systems of the human body unobtainable through any other means.

PET is safe.

PET replaces multiple medical testing procedures with a single exam.

PET shows all the organ systems of the body with one image.

PET diagnoses disease often before it shows up on other tests.

PET shows the progress of disease and how the body responds to treatment.

PET reduces or eliminates ineffective or unnecessary surgical or medical treatments and hospitalization.

PET significantly reduces multiple medical costs and avoids needless pain to the patient.

Case in Point

This child had a brain tumor that was surgically removed. Radiation therapy followed. Subsequently, an MRI scan revealed a change in the structure of his brain near the surgical site, but could not reveal if the structural change was the result of scar tissue or tumor re-growth.

P|E|T proved the structural change was scar tissue and not a tumor.

P|E|T is the only metabolic tool powerful enough to accurately image and measure the metabolic function of cancer.

P|E|T saved this child from unnecessary surgery, and his family was spared the emotional trauma of further diagnostic evaluation.

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