

# POSITRON EMISSION TOMOGRAPHY

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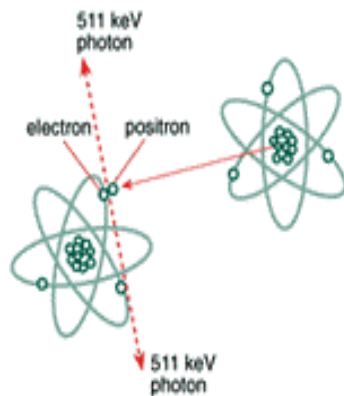
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Cardiology, oncology, and neurology are all growing areas of study. Much advancement in technology has been made in order to better diagnosis and treat patients with cancer, neural diseases, and heart disease. One of the most significant of these is that of the development of positron emission tomography (PET). Interest in the PET started around the 1940's but it wasn't until about 25 years ago that it was introduced by Dr. Michael E. Phelps. It first started as a research tool but hopefully it will soon be used in clinical practices.

Tomography, as we all know, is the internal imaging of the body. PET is a very advanced type of tomography. It is molecular medical imaging technique that uses the tissue's metabolism of glucose to detect abnormalities, such as tumors, heart disease, Alzheimer's, Hodgkin's and many more. Unlike MRIs and CTs, which are more commonly used in viewing just the organ anatomy, PET is the study and visualization of the chemical changes in the organs, which measures metabolic, biochemical and functions of living tissue. Most often PET is used in brain imaging.

## HOW DOES PET WORK?

A small amount of radioactivity is injected in to the blood stream and a photon scanner reads the photon emissions. This radioactive substance has two parts called a carrier (glucose), which concentrates in parts of the body with increased metabolic activity, and the radionuclide, which emits a positron that interacts with electrons in the body. This reaction creates two photons 180 degrees apart that are in coincidence. A PET scanner records the



coincidence events and constructs and image on the computer. This image helps the viewer locate areas of increased metabolic activity. These areas show locate abnormalities in the organs.

## THE ADVANTAGES OF PET

This technique of imaging has many advantages. For example, PET has proven to more accurate and costs less than most process. It is the first noninvasive imaging technique that views the functioning of the organs. Also, because PET is a biochemical-based process, it is possible to detect diseases and abnormalities before they appear in CT and MRI scans. This important advancement allows for patients to be aware their condition earlier and, if possible, be treated before the condition might worsen. It can determine whether or not the affected tissue might benefit from a specific surgery. Another plus is that most insurance carriers cover this procedure.

## THE FUTURE OF PET

Breast cancer has been the biggest interest of the medical authorities. PET has been commended for reducing the number of recurrences in breast cancer patients. FDA approval for more radiopharmaceuticals is looking positive. Once more radioactive substances are found, the type of tumor and exact location can be predicted from the test. Researchers are also looking to combine the PET with the CT scan in order to produce both the anatomy and physiology scan on one reconstructed image.