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 Biomedical Seminar I
 P.E.T Scans with an Emphasis on
 Myocardial Applications

P.E.T stands for Positron Emission Tomography. It is one of the only noninvasive procedures that are being used in hospitals. The scan will produce a three dimensional picture of infected areas of a persons body.



The way the scan works is by the detection of gamma rays that will be created upon the impact of an electron and a positron (so-called beta particle). When the electron comes in contact with the positron for a brief time interval (5-20nsec) annihilation will occur. When annihilation takes place the electron and the positron will dissipate producing 2 gamma rays which are at 180 degrees apart. Annihilation will cause the gamma rays to have 511Kev of energy. Detectors with electronic circuits will pick of the gamma rays and a coincidence event will occur in the presence of a decaying atom.

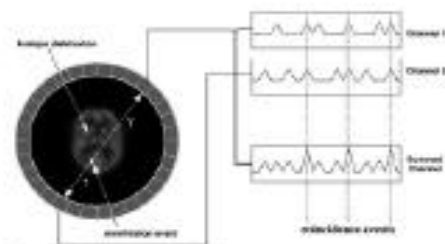
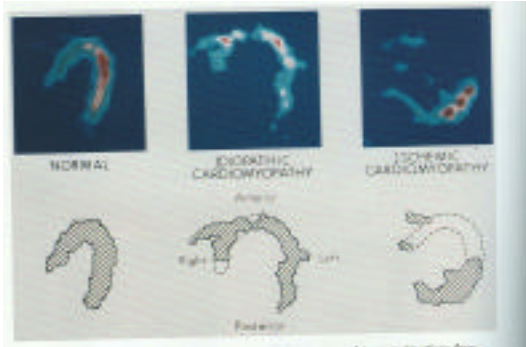


Figure 1.2. Coincidence detection in a PET scanner.

A P.E.T scanner will become quit costly due to the fact that each detector requires an electric circuit. The scanner can have thousands of detectors resulting in thousands of electronic circuits just to test for gamma rays. The average scanner will cost \$1.5M.



There are three main radiopharmaceuticals that are used for cardiovascular applications, Ammonia, Rubidium Chloride, and FDG. The risks that a person will face when he or she gets the test is no more risky then getting any other test. Even though the person is getting injected with radioactive particles the radionuclide has a very short half life. The amount of radioactive particles is standard for all diagnostic testing.

Sources:

- <http://pet.radiology.uiowa.edu>
- www.petnm.unimelb.edu.au
- <http://radiographics.rsna.org/cgi/content/full/19/4/915#SEC3>
- <http://www.radiology-info.org/nuclear-medicine-positron-emission-tomography/cardiac-pet-scan.html>
- Bergmann, Steven R, MD, PhD., and Burton E. Soble, MD. Positron Emission Tomography of the Heart. Mount Kisco, New York, 1992.