PET/CT Imaging System

ELE 282 Spring 2003
Shyla Booker

The PET/CT scanner is a tumor detecting imaging system that combines the technology of two existing systems- the PET and the CT-to provide doctors with a more complete picture of the internal workings of the body.

The PET/CT scanner combines an image from PET (positron emissions tomography) and CT (computed tomography) to produce one comprehensive image that detects cancerous tissue better than either technique acting alone.

The PET uses radiopharmaceuticals (tracers) to trace abnormalities in the body's metabolism. The most common tracer is FDG (flourodeoxyglucose). FDG is a sugar with a small amount of a radioactive material attached. After the tracer is injected into the patient, it travels through the body emitting signals. All metabolically active organs or tumors use sugar. Cancer cells metabolize sugar faster than non-cancerous cells, so the signal is the strongest where the organ is abnormal. The PET records the signals and transforms them into images. The tumor cells light up on the image. By detecting increased glucose use, the PET/CT identifies cancerous cells at an earlier stage than the CT working alone.

The CT-Computed Tomography- uses a computer and a rotating x-ray device to create detailed, cross-sectional images of organs and body parts. The CT image allows doctors to see what an organ or tissue looks like so abnormalities can be identified. The CT provides structural information whereas the PET provides biochemical information.

Using the two imaging systems separately does not provide as complete a picture. By combining the two techniques into one device, both the anatomical and biochemical information can be obtained in one scanning session. The PET/CT takes the CT image and the PET image, then the computer combines the two images.

The PET/CT was developed by Dr. Townsend at the University of Pittsburgh. The first prototype was set up in 1999. In December of 2002, researchers reported that the PET/CT was able to distinguish cancerous cells from non-cancerous cells 100 percent of the time. The PET alone was only accurate 50 percent of the time.

This technology will allow for earlier detection of disease. In addition, it will allow physicians to monitor the effects of treatment and adjust treatment accordingly. The PET/CT also has applications in cardiology and neurology. Physicians will be able to better understand the workings of heart disease and neurological disorders such as epilepsy and Parkinson's disease.

Researchers caution however that the studies on the PET/CT have been limited to a small number of patients and further study is necessary to determine the value of combined PET/CT over PET alone and over CT.