Nuclear Medicine: Lung Scan

ELE282 Biomedical Engineering Seminar I, Feb. 28, 2000

Jillyan M. Morano
Biomedical Engineering, University of Rhode Island
Kingston, RI 02881

Nuclear Medicine is unique in that it uses radioactive substances to document organ function and structure. This is in contrast to diagnostic radiology, which is based upon anatomy. Nuclear medicine uses radioactive materials (radiopharmaceuticals) in small amounts to diagnose and treat diseases. These radioactive materials are attracted to specific organs, tissues or bones and emit gamma rays. The gamma rays are then detected externally by specific cameras. These cameras, along with computers generate images that are read by a radiologist.

There are many different types of nuclear medicine exams. Every organ group can be tested with a nuclear medicine exam. One of the more regularly doctor ordered exams is a lung scan.

A Lung Scan (Lung Perfusion Scan; Lung Scantiscan) is an exam that studies the lungs and surrounding areas. The purpose of the exam is to evaluate the respiratory function of a person with minimal reserves before an operation, it assess the airflow out of the lungs, and will detect a pulmonary embolism. A Lung Scan if ordered for a patient suffering from the following symptoms: cough, lightheadedness, fainting, dizziness, chest pain and rapid breathing.

The procedure is relatively painless. A technician will inject the radioactive material intravenously where it is trapped within the small vessels in the lungs. The patient must lie still for about an hour. At this time the patient gives off gamma rays and the gamma Camera takes the pictures. From the Gamma Camera the images are then transferred to a computer where they can be read and developed.

The images are read using SPECT(single photon emission computed tomography), which provides 3-D computer-reconstructed images and function of the organ being imaged. The images are also read using PET(positron emission tomography), which likewise produces 3-D computer-reconstructed images, but this measures and determines the function in a specific organ, tumor or metabolically active site.

Today, nuclear medicine offers images that are safe, relatively pain-less, and cost-effective to gather medical information that would otherwise require surgery or expensive tests. Even though radioactive substances are injected directly into the veins, radiation from a nuclear medicine procedure is equal to a diagnostic x-ray.