

# Evaluation of Radiation Dose to Medical Personnel and Environment in PET and SPECT

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## Abstract

Positron emission tomography (PET) has become the trend in the current field of nuclear medicine. More and more patients receive PET for tumor diagnosis extras a self-paid service and the population is still growing. The working staff of PET laboratories also receive increasing radiation from the imaging agent, therefore, measures to protect personnel from radiation are even more important. Among the instruments of nuclear medicine, PET and single photon emission computed tomography (SPECT) are two of the major diagnosing tools. This study measures and compares the radiation doses of these two examinations in order to provide information for personnel protection.

This study uses thermoluminescent dosimeters TLD-100 and TLD-100H to measure the radiation doses received by working staff of PET and SPECT laboratories in a medical center. The deployment of dosimeters includes three parts. First is the space surrounding PET examination room, including lavatories, injection room and passage. Second is the place inside the scanning room, including the examination bed and the points 1 to 4 meters away. The final is the body parts of working staff, thyroid, genital glands, lungs and kidneys.

The results reveal that the average effective dose of medical personnel is about 12.5 $\mu$ Sv per year and it is lower when comparing with those in other countries. This may be because the radiology technicians in other countries have to conduct injections and orientation to the patients in addition to photography and therefore have longer contact to patients carrying radioactive agents. The absorbed radiation of staff in charge of injections is the highest among all the staff, so it is necessary to increase lead shield protection for the injection operator in order to reduce their absorbed doses.

**Key word:** thermoluminescent dosimeter, positron emission tomography (PET), effective dose, single photon emission computed tomography (SPECT)