Legislation & radiation safety issues in a PET/CT facility

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For the major part of the countries in Europe and the rest of the world their legislation is based on the recommendations set forth by the International Commission on Radiological Protection (ICRP). The ICRP is internationally recognized as the body responsible for recommending values of dose limits for exposure to ionising radiation. Most national legislation relating to exposure to radiation is based on the recommendations of the ICRP.

Within the European Union the procedure for national legislation regarding ionising radiation is dependent on the recommendations set by the ICRP. EURATOM uses the recommendations from the ICRP to make a directive, which the national authorities implement into national legislation.

The aim of radiation protection should be to prevent detrimental deterministic or non-stochastic effects and to limit the probability of stochastic effects to levels deemed to be acceptable. The most recent recommendation from the ICRP regarding radiation exposure already implemented on national level is the ICRP publication 60 (Radiation Protection) published in 1990 (1, 2). This gives guidelines to when radiation practices and interventions should be considered. A practice is an activity that adds to the overall radiation exposure and an intervention is an activity that subtract from exposure. The three objectives of practices are 1) justification of the practice 2) optimisation of protection and 3) dose and risk limitation.

Radiation safety for personal working in a PET/CT facility is mostly concentrated around two processes: 1) the radiation received by working personal when administering activity to the patients and 2) the radiation received when giving assistance to patients in order for them to get on and off the scanning bed. Often the patient will be left with remote monitoring in the period (one hour for FDG) between injection of activity and scanning. With the increased interest in PET/CT studies as basis for radiation therapy planning a risk of higher dose to personal is significant. With the much longer time required for the precise positioning of the patients before the scan, the personal will receive a significant increase in dose. Methods on how to minimise dose to both patients and working person have been published by the International Atomic Energy Agency (IAEA) (3).

A PET/CT facility generally is considered a supervised area where all personal should be monitored using badge or film or electronic dosimeter. The monitoring of the staff is done in order to determine the radiation exposure. The workers should not exceed three-tenth of the annual dose limit i.e. 6 mSv/year. The annual dose limit for workers in a radiation environment is according to the ICRP recommendations 20 mSv. Only in very few cases should a worker come close to this value and in a PET/CT facility should the personal be able to stay under the three-tenth limit of 6 mSv per year.

References