Occupational exposures in PET Procedures with 18F-FDG

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The diagnosis with positron emission tomography (PET) is an increasingly used procedure in cerebral, cardiac and especially oncology diseases. It is performed in nuclear medicine clinics mainly using 18F-FDG, which has one of the longest half-lives among positron emitters (β^+). They will further annihilate in two high energy photons (511 keV). The gamma rays, produced in the annihilations, require a strict radiation control, in order to guarantee the safety of the occupationally exposed individuals working in PET exam facilities. To evaluate the occupational exposures, in this study, the MCNPX2.7.0 radiation transport code [1], which is based on the Monte Carlo Method, was used. The professionals were represented by the adult virtual anthropomorphic phantoms FASH3 (female) and MASH3 (male), which have anthropometric characteristics similar to those of real individuals. Four exposure scenarios were modeled: radiopharmaceutical preparation, administration to the patient, patient follow-up, and patient placement in PET equipment. The results are presented in terms of conversion coefficients for equivalent and effective dose. Using the set of conversion coefficients presented in this study, it is possible to calculate the absolute values of equivalent and effective doses, of nuclear medicine professionals, who deal with the source of radiation or in contact with the patient. This study may be used as a dose reference for professionals responsible for radiological protection.

Keywords: Monte Carlo simulation, 18F-FDG, PET Dosimetry.

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References

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