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Radiation Dose to Patients and Medical Staff in Different Procedures of Nuclear Medicine

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The aim of this study is to provide information on developing technologies and clinical techniques for Hybrid SPECT/CT imaging using ionizing radiation and their associated radiation dose to patients and medical staff. A thermoluminescent dosimeters (TLD) was used in this study to analyze the historic records of the external radiation doses to staff members working in our nuclear medicine department in 7 procedures, including elution of ^{99m}Tc from $^{99m}\text{Mo}/^{99m}\text{Tc}$ generators, syringe preparation, radiopharmacy kit preparation, injection, accompanying patients, SPECT/CT scan, oral ^{131}I preparation. These dosimeters was worn by the staff members at the level of the chest on the front part of the body. A retrospective review of 110 clinical studies of various nuclear medicine procedures (^{99m}Tc -MIBI-Tetrofosmin, ^{99m}Tc -MDP bone scan, ^{99m}Tc -Tektrotyd, ^{99m}Tc -Thyroid imaging, ^{99m}Tc -Nanocoll, ^{131}I -Nal(diagnostic application 185MBq) obtained on hybrid SPECT/CT systems was performed to calculate the effective radiation dose to patients. The results from this study showed that annual effective radiation doses to nuclear medicine department staff members were within permissible levels. The contribution of total effective radiation dose from SPECT component were calculated using the activity of the injected radiopharmaceutical and dose tables published by the conversion factors listed in ICRP 53 and ICRP 80. The radiation dose for CT was calculated by Dose Length Product method. According to the results of this study the dose in each procedure depends on different factors such as the education and experience of the staff members, usage of shielding and taking the radiation protection requirements into consideration. When SPECT-CT is being performed, all measures should be taken to reduce both the radiopharmaceutical dose and the CT effective dose following the ALARA principle.

Country or International Organization

Bulgaria

Primary author: DIMCHEVA, Milena (Sofia Cancer Center, Department of Nuclear Medicine, Bulgaria)

Co-author: Dr SERGIEVA, Sonya (Sofia Cancer Center, Department of Nuclear Medicine)

Presenter: DIMCHEVA, Milena (Sofia Cancer Center, Department of Nuclear Medicine, Bulgaria)

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