which also averages noise, that is transferred more efficiently than signal through the imaging chain.

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SMALL FIELDS DOSIMETRY: OUTPUT FACTORS AND CORRECTION FACTORS DETERMINATION FOR AN ELKETA AXESSE MEDICAL LINAC EQUIPPED WITH CIRCULAR CONES

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Introduction. The peculiarities of small beams (high dose gradient, source occlusion, lack of lateral electronic equilibrium) and the features of the detector (active volume dimension, components with high-Z materials) make the dosimetry very challenging.

Purpose. The aim of this work is to determine small fields output factors (OF) for several detectors and correction factors for active detectors for comparison with a passive dosimeter.

Materials and methods. Small fields beams, ranging from 5 mm to 30 mm in diameter, were defined using circular cones. OF measurements were performed with six active detectors (ionizing microchambers air-filled: Exradin A26, Exradin A16; ionizing microchamber isooctane-filled: PTW microLion; plastic scintillator: Exradin W1; diode: Razor IBA) and one passive detector (Gafchromic EBT3 films).

Results. Exradin W1 and A26 shown excellent agreement with EBT3 films (better than 2%). A significant underestimation was observed for Exradin A16, particularly for the smallest field, up to 12%. The results obtained with the PTW microLion and the IBA RAZOR indicate a dose overestimation for the smaller radiation fields, up to 4% and 7% for the 5 mm-diameter field for microLion and RAZOR respectively.

Conclusion. The present study points out that it is crucial to apply the appropriate correction factors in order to provide accurate measurements in small beam geometry. The results show that the Exradin W1 and Exradin A26 can be used for small fields dosimetry without correction factors. The correction factors should be employed for the other detectors, in particular for field diameter smaller than 10 mm.

Disclosure. Nothing to declare.

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EXPERIMENTAL AND ANALYTICAL DOSE ASSESSMENT OF PATIENT'S FAMILY MEMBERS TREATED WITH I-131

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Radiation exposure to the patient's family members is one of the major concerns during thyroid cancer radionuclide therapy. The aim of this study was to measure the total effective dose of the family members by means of thermoluminescence personal dosimeter, and compare with those calculated by analytical methods.

Eighty five adult family members of fifty one patients volunteered to participate in this research study. Considering the minimum and maximum range of dose rate from 15 μsv/h to 120 μsv/h at patient s' release time, the calculated mean and median dose values of family members were 0.45 mSv and 0.28 mSv, respectively.

Moreover, almost all the family members doses were measured to be less than the dose constraint of 5 mSv recommended by Basic Safety Standards.

Considering the influence parameters such as patient dose rate and administrated activity, the total effective dose of family members were calculated by TEDE and NRC formulas and compared with those of experimental results. The results indicated that, it is fruitful to use the quantitative calculations for releasing patients treated with I-131 and correct estimation of patient s' family doses.

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COMPARATIVE STUDY BY MONTE CARLO SIMULATION OF RPL GD-301, TLD-100 AND AL_2O_3:C DETECTORS RESPONSES

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Introduction. For the monitoring of patient dose in external radiation therapy, the luminescent dosimeters are widely used, where the physical processes of their three types (thermoluminescence (TLD), radiophotoluminescence (RPL) and optically stimulated luminescence (OSL)) are very similar.

Purpose. The purpose of this work was to compare the dosimetric proprieties of three kind of luminescent detectors, RPL glass dosimeter, commercially known as GD-301, with lithium fluoride TLD-100 (LiF:Mg,Ti) and carbon-doped aluminum oxide (Al2O3:C).

Methods and materials. In our study, a Monte Carlo simulation with MCNP5 was carried out to estimate the responses of these dosimeters in terms of absorbed dose, output factor, the angular and energy dependence.

Results. In this work we found that the difference between the output factor was less than ±4.2% for the three dosimeters. The variations in sensitivity for angles up to ±80° from the central axis of the beam were approximately 1% and 1.5% for the GD-301 and Al_2O_3:C, respectively. The energy dependence of the RPL and OSL dosimeters were found to be within 1% and 3.1% for 6 and 15 MV X-ray beam, respectively, for the TLD is stated as less than a 1.1% for the both beams.

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PYLINAC: A TOOLKIT FOR PERFORMING TG-142 QA RELATED TASKS ON LINEAR ACCELERATOR

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