Background and Objective: Clyndrical ionization chamber is used for measurements of patient dose in radiation therapy. Therefore, determination of its effective point of measurement in finding dose distribution in tumor volume is important.

Methods: In this study a CC13 ionization chamber is used for dose measurement of 6 and 18 photon beams of Variant accelerator in different field sizes, 5*5 cm2 up to 35*35cm2. Measuremets is done in blue phantom, up to 5cm depth and data fit software is used for evaluation of experimental datas.

Results: PDD curves ara plotted seperatly for all treatment photon fields. Critical points of these curves is calculated and considered as displacement perturbation factor (Pdis)

Conclusion: The first critical point of each curve is caused by changing environment from air to water (phantom) during measuring of ionization. In fact we can consider critical point as effective point of measurement of ionization chamber. Consideration shows that any increasing in field size, decrease and increasing of energy increase the depth of this critical point.

Keywords: Effective point of measurement, clyndrical ionization chamber, Percent Depth Ddose curves

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P18: Which Body Model Is More Suitable for Dosimetry Calculations?

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Abstract

Computational phantom(three dimension computer models of human body) are essential in estimating organ doses from various occupational radiation exposures and medical procedures. Mathematical phantoms use mathematical equations to describe the organs and tissues of human body and voxel phantoms are human models based on CT or MRI obtained from high resolution continuous scans of a single individual. Voxel phantoms are exactly matches with individual so obtained results on these phantoms are accurate while mathematical phantoms are most general and covering a range of age.

In this study were investigated the effect of phantom type on neutron absorbed doses and neutron effective doses. For this aim, we compared the calculated results on ORNL adult phantom (Mathematical phantom) with VIPMAN (voxel phantom) for absorbed doses on 26 organs in monoenergetic neutron beams under six irradiation conditions: AP-PA-RLAT-LLAT-ROT and ISO. In addition, the obtained effective dose results compared with Asian voxel phantoms: TARO and HANAKO and also VIPMAN for whole body. MCNPX Monte Carlo code was used for this simulation.

The results of this study indicates that influence of phantom type (mathematical or voxel models) are not important on the absorbed dose and the effective dose values. But the size of the phantom (VIPMAN versus ORNL) significantly affected on absorbed and effective doses in all irradiation geometries. These results are important because working with mathematical phantoms is simpler and much easier than the complex voxel phantoms.

Keywords: Mathematical phantom, Voxel phantom, Monte Carlo Code, Effective dose

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P19: Reducing the Effective Dose Equivalent on 5 Year-Old ORNL Phantom by the Use of Γ-Shields on in Vivo BCA Facility

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Abstract

Body Composition analysis (BCA) by in vivo elemental measurement has proved considerable value to clinicians over the last forty years. Most of the works in this field has been performed by Prompt γ-rays in vivo neutron activation analysis (IVNAA) technique due to its "gold standard" to determine certain chemical body elements. The IVNAA facilities have produced a significant amount of knowledge in studying diseases, such as osteoporosis, obesity, AIDS, cancer, anorexia, renal disorders, and aging. To prevent receiving the dose from γ-rays produced in system by patient, an efficient strategy is to apply γ-shield. In previous publication, absorbed dose, dose equivalent and sensitivity factor were considered for cubic water phantom.The Monte Carlo simulation of BCA facility using MCNPX 2.4.0 code was performed. The results determine the optimum thickness and γ-shield composition. In this study, the γ-shield is described in three separate positions: 1) top & bottom of the patient, 2) around the 241Am-Be neutron sources and 3) latter item together with covers surrounding inner collimator walls. Then its influence on reducing effective dose equivalent is examined for 5 year old ORNL phantom. With regard to effective dose equivalent, the optimum position is 6cm thick tungsten layer on top & bottom of the patient. Gall bladder has a maximum amount of dose equivalent among all tissues in no shield state and then breasts and lungs receives maximum dose equivalent. However, when the W shield is added to free shield IVNAA facility, breasts and lungs receives maximum dose equivalent and gall bladder is in second order. However, as the importance of received dose of radiation to make the most common cancers, we are considered to the percentage of reduction of dose equivalent in lungs, gonads, bone marrow and bone surface. Decreasing dose equivalent on these organs with optimum shield is 66.47%, 65.83%, 65.57% and 65.48% rather than without it, respectively.

Finally, total effective dose equivalent in no shield state is 3.17×10-2 ± 2.14×10-4 mSv/min. This parameter decreases about 66.25% in comparison with no shield state.

Keywords: IVNAA facility, γ-Shield, Effective dose equivalent, dose equivalent, ORNL phantom

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P20: Organ and Effective Doses of Patients Arising From Some Common X-Ray Eaminations by PCXMC Software in Sabzevar County-Iran

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Abstract

The purpose of this study was to estimate organ and effective radiation dose of patients undergoing common x-ray examinations. The effective dose is one of the best parameters for describing the amount of radiation dose received by a patient undergoing any diagnostic x-ray examination. In order to determine the stochastic risk of an x-ray examination, it is necessary to know the absorbed dose in each susceptible organ together with the risk per absorbed dose associated with irradiation of that organ. The organ or tissue dose in a patient resulting from a radiological procedure depends on the amount of incident radiation, i.e. the entrance surface dose (ESD) value and the location and direction of the incident beam.

This work was carried out in eight radiology center in the Sabzevar province of Iran. Eleven x-ray units and 485 patients were included in this study. Eight typical x-ray examinations included in this work are as follows: chest PA, chest AP, lumbar spine AP, lumbar spine LAT, pelvis AP, abdomen AP, cervical AP and LAT.

Organ/tissue dose and effective dose were calculated by employing PCXMC software based on Monte Carlo method. PCXMC calculates the mean values of absorbed doses averaged over the organ volume.

Mean effective doses obtained in this work are compared with similar results reported by other workers. The