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THE ANGULAR DEPENDENCE OF $CaSO_4$: Dy PELLETS FOR PERSONAL DOSE EQUIVALENT $H_p(d)$ MEASUREMENT*

Maria S. Nogueira and Letícia L. Campos
Instituto de Pesquisas Energéticas e Nucleares - CNEN/SP
Caixa Postal 11049 - CEP 05422 - 970 - São Paulo, SP - BRAZIL

1)Introduction - The International Commission on Radiation Units and Measurements has proposed the operational quantities of personal dose equivalent at 10 mm, $H_p(10)$, and personal dose equivalent at 0.07 mm, $H_p(0.07)$, as appropriate quantities to mesure respectively, effective dose equivalent (to become effective dose following the adoption of the recommendation in the International Commission on Radiobiological Protection (ICRP 60)) and skin dose.
2)Materials and Methods - In the present work the personal dose equivalent $H_p(d)$ was calculated for a water cube 30x30x30 cm^3 and a tissue-equivalent slab (30cmx30cm front face area, 15cm thick), both made of polymethyl methacrylate (PMMA). The dosimeters ($CaSO_4$:Dy) were irradiated in a Co-60 and a Cs-137 photon sources for a defined incidence angles of 0°, 30°, 60° and 90°.
3)Results - The obtained result to 0° radiation incidence angle shows a variation of approximattely 0.3 mSv between the water cube and tissue equivalent slab phantom respectively when exposed to a Cs-137 gamma source and for the dosimeter exposed to 2.0 mGy of air kerma. The dose response variation was determined to the 30°, 60° and 90° incidence angles.
4)Conclusion - This result shows that the $CaSO_4$:Dy pellets, when correctly calibrated, can be used to personal dose equivalent determination, including corretion factor for angular incidence.

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BUILD-UP CAPS OF HIGH DENSITY MATERIALS FOR HIGH ENERGY LINEAR ACCELERATORS

P. P. Pereira & J. F. Gonçalves
Seção de Física Médica - Instituto Nacional de Câncer/MS
Praça Cruz Vermelha, 23 - 20230-130 - Rio de Janeiro, RJ, BRAZIL

Introduction: The use of linear accelerators, linacs, for irregular field treatment requires a more sophisticated treatment plan. It is well known that for high energy machines, absorbed dose measurements in air are discouraged since the build-up cap thickness that is required alters the photon fluence in the ionization chamber, which in turn makes the measurements difficult to be interpreted.

Cundiff et al recommend that for irregular field treatment the dose at any point be divided in two components: one due to the contribution of the primary radiation, and another due to the contribution of scattered radiation, which depends, for a given energy, on parameters like depth, position of the ppoint relative to the center of the field, field borders etc. Hence, it is necessary to use the TAR concept which for high energy radiation is difficult to measure.

In this paper the authors describe a method to overcome this difficulty by using a build-up cap which is sufficiently thick to provide electronic equilibrium and thin enough in such a way that it can be used confidently for in air measurement.

The usefulness of the method is checked when comparing PSF measured for a given energy with the value tabulated in BJR Supp # 17.

Materials and Methods: A 0.6 cc Farmer type ionization chamber with its respective build-uo cap, of a given material and thickness, was used with a Keithley electrometer, and placed at a certain distance from the target of a linac, and the readings were obtained for a fixed number of monitor units, MU. Measurements have been done using different cap thickness of a given material, which has allowed to find the ideal thickness. The same procedure have been done using different material.

Results: As can be seen, for 10 MV, D_{20}/D_{10}, for a given number of MU the readings increase as the build-up cap thickness is increased to a certain value, after which it began to decrease, indicating that the buildup thickness was reached for this material. The same procedure was repeated for different materials, and energies.

Conclusion: The construction of build-up caps for high energy linacs are easily done and they are very helpfull determination beams parameters required for the treatment planning of special cases in radiation oncology.