

3936124 RAMP/M : MAJOR : MEDICAL PHYSICS ; M.Sc. (Medical Physics)

KEY WORD : OUTPUT FACTOR / ELECTRON BEAM DOSIMETRY /
SHAPED ELECTRON BEAM / CUTOUT OF ELECTRON
BEAM

TASANEE LAYANGKUL : OUTPUT FACTORS FOR SHAPED ELECTRON
BEAM OF RAMATHIBODI LINEAR ACCELERATOR. THESIS ADVISOR:
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PIRABUL M.Sc. 59 p. ISBN 974-661-525-4

An electron beam from a linear accelerator is limited by a standard cone that is usually made in the square shape. If the treatment area is different from the standard cone, individual shielding (cutout) is needed to protect non-treatment areas that would otherwise be exposed to the beam's standard cone. A side effect of using a cutout, however, is that the various exposure parameters (beam data) will be different than for a standard cone. An experiment was performed to study if the beam data of two standard cones could be used for their cutouts in patient treatment. Low melting point alloy was used to make a variety of square and rectangular cutouts; 18 cutouts for the 10x10 cm cone and 19 cutouts for the 15x15 cm cone. The central axis depth dose and output with all cutouts were measured for 9 MeV and 12 MeV electron beams. The comparison of the measured cutout beam data with the open cone data showed that : (a) for the cutouts of the 10x10 cm cone, the treatment depths shifted toward the surface with the maximum values of 0.15 cm for 9 MeV with 6x4 cm and 7.4x4.2 cm cutouts and 0.3 cm for 12 MeV with 6x4 cm cutout. For the cutouts of the 15x15 cm cone, the shifting distance was not significant (≤ 0.05 cm) for either energy, (b) the output with all cutouts used in the experiment for both energies varied within $\pm 2\%$ from the open cones' value, (c) if the beam data of the open cones were used for their cutouts, the error of the treatment dose would be less than $\pm 2\%$ for all cutouts of the 15x15cm cone, and, with the cutouts of the 10x10 cm cone, would have treatment depths errors less than 0.15 cm and 0.3 cm for 9 MeV and 12 MeV respectively. For the 10x10 cm cone and 9 MeV beam, the 7.4x4.2 cm, the 7x4.5 cm and the 6x4 cm cutouts would create lower treatment dose than that of the standard cone by 4.96%, 5.44% and 8.6% respectively. For the 10x10 cm cone and 12 MeV beam with 6x4 cm cutout, the treatment dose would be 12% lower than that of the standard cone.