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CHOENGCHAI ORKONGKIAT : RADIATION LEAKAGE FROM
ACRYLIC ELECTRON CONES FOR AN INTRAOPERATIVE THERAPY
LINEAR ACCELERATOR. THESIS ADVISORS : CHIRAPHA TANNANONTA,
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In an intraoperative radiation treatment (IORT), normal tissues may be adjacent to the outer wall of the treatment cone. It is very important to determine the leakage radiation outside the cone wall in addition to the beam data since a large single dose is delivered to the tumor.

In this study, radiographic films were wrapped around the cone wall to locate the area of the high radiation leakage according to the optical density of the films. Then the leakage doses at the cone wall with high optical density starting from the distance of 0-8 cm from the cone end and the dose at the depth of the maximum dose (d_{max}) were measured by using thermoluminescent dosimeters (TLDs). The measurements were made for 4.5, 6.4, 8.3, and 9.5 cm diameter cones (both flat and bevel ends), each with 6, 12, and 20 MeV electron beams. The leakage dose as the percentage of the maximum dose in phantom tended to increase with the energy and cone size except the 8.3 cm cone which showed more leakage than the 9.5 cm cone. For the same cone size and energy, all bevel end cones showed higher leakage dose than the flat ones with the maximum value of 3.95% of the tumor dose for 4.5 cm cone of 20 MeV. The maximum leakage dose for the distance of 4 cm from the cone end was 20.94% of the dose at the depth of maximum dose (d_{max}) with the 8.3 cm bevel end cone for 20 MeV. Normally, the normal tissue adjacent to the cone wall do not extend to more than 4 cm from the end of the cone. So, for the IORT applying system of Ramathibodi Hospital, the normal tissues should not receive more than 23.10% of the tumor dose if the treatment depth of 90% depth dose is used. The tolerance dose for the normal tissue involved in each treatment should be considered together with the maximum radiation leakage for the cone size and energy used in the treatment.