

The purpose of this study was to quantitate the dose delivered during clinically-set electron treatments to prevent errors in treatment delivery. Prior to clinical use, the diodes were calibrated against a standard ionization-chamber in a reference configuration and their relative response was measured for parameters such as electron beam energy, %DD, cone-size and insert, and beam directional dependence. Dose measurements were made in phantoms before initiating patient dosimetry. A total of 449 in-vivo dose measurements were performed on 185 patients treated on our Clinac-2100C/D (6-20 MeV electrons). Upon patient initial dosimetry, the ratio of measured to prescribed dose was calculated. Deviations larger than $\pm 6\%$ were investigated and corrective measures were taken, if necessary.

The in-phantom measurements resulted in dose accuracy within $\pm 2\%$. Patient dosimetry resulted in the following dose deviations from the prescribed doses: $\pm 2.7\%$ for 104 breast patients (241 measurements), $\pm 3.6\%$ for 40 head and neck patients (112 measurements), and $\pm 2.9\%$ for various other sites patients (96 measurements). The standard deviations were 2.1%, 2.9%, and 2.1% respectively. Twenty-two patients (11%) and 30 measurements (6.7%) fell out of dosimetry tolerance. In all cases, the diode positioning was found to be the primary reason for dose discrepancy. Treatment sites with rapidly changing contours and sloping-surfaces posed the greatest diode positioning challenges for the therapists.

Quantitative validation of clinically-set electron treatments is important to avoid human errors in treatment delivery and diodes provide a convenient way of real-time patient dose verification and are easy to use by the therapists.