

Radiotherapy Characterization of Pelletized TLD-100.

A new physical form thermoluminescent dosimeter, manufactured by pelletizing and annealing TLD-100 powder, was investigated as a disposable dosimeter for radiotherapy applications. Since these 3.6mm diameter by 0.6 mm thick pellets are intended to have greater batch uniformity than TLD chips, we studied the precision and linearity of relative pellet sensitivity. Dosimeters from the same batch were exposed to 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, and 2000 cGy 6 MV radiation and read after 18-24 hours. The average percent standard deviation was 2.5%. Superlinearity was 12 % at 1000 cGy and 6% at 500 cGy, relative to the quasi-linear 20-200 cGy region. The advantage of these pellets over powder capsules are smaller size, similar sensitivity, similar if not better relative sensitivity (precision) without dependence on powder dispensing technique. The advantage over similar-size reusable TLD chips includes similar relative sensitivity (precision) without a need to determine and use a per-chip calibration factor, and no annealing required. Thus pellets appear superior to chips and powder. We intend to use these dosimeters in parallel with powder capsules to monitor total body (TBI) and total skin (TSET) irradiation in the clinic and report this comparison.