

Dose Verification of Traditional (2.5-D) and 3-D Treatment Planning Systems Through in-vivo Dosimetry of Tangential Breast Irradiation: A Satellite Study

Abstract

Several authors have reported that 2-D treatment planning systems tend to overestimate the dose in radiotherapy to the breast by 2-3%. A recent phantom study by Davis et al suggests that certain 2-D systems may over-calculate dose by 10%. In the same study, the 3-D treatment planning systems calculated the dose to within +/-3% of the measured dose. The present study is based on the in vivo dosimetry (diode) of 114 women for whom the treatment plan was devised using either a 2.5-D (traditional) or 3-D treatment planning system. Each diode reading was compared with the dose as computed by one of two 2.5-D treatment planning systems or a 3-D treatment planning system. The ratios obtained by dividing the measured dose by the calculated dose from each of the planning systems formed distributions for each planning system. The ratios of measured to calculated dose obtained through the use of the 2.5-D treatment planning systems were combined to form a new, separate, distribution. This new distribution was then statistically compared with that obtained through the use of a 3-D treatment planning system. Intra-comparison of the distributions from the 2.5-D systems revealed no statistical difference between the two systems. Inter-comparison of the 2.5-D distribution with the distribution from the 3-D treatment planning system did not show statistically significant differences.

Keywords: in vivo dosimetry, treatment planning, radiotherapy quality assurance, breast cancer