

AbstractID: 4477 Title: The use of directional interstitial sources to reduce skin dose in breast brachytherapy

Purpose:

To investigate the feasibility of reducing the skin dose with temporary LDR multicatheter breast implants with the use of directional ^{125}I interstitial sources in comparison to conventional HDR interstitial breast brachytherapy.

Method and Materials:

The treatment plan for a patient treated with HDR interstitial brachytherapy with ^{192}Ir was compared to a directional ^{125}I treatment plan in the same dataset. Directional sources contain an internal radiation shield that greatly reduces the intensity of radiation in the shielded direction. They have a similar dose distribution to non-directional sources on the unshielded side. Several dosimetric parameters are compared including target volume coverage, dose homogeneity index, and the skin surface areas receiving 30%, 50% and 80% of the prescription dose (S30, S50 and S80, respectively). The HDR prescription dose was 34 Gy in 10 fractions.

Results:

Similar excellent target coverage was achieved by both directional LDR and HDR (99.2% and 97.5%, respectively). Moreover, for a 170-cc target volume, the dose homogeneity index was 0.82 for both LDR and HDR (V100 was 211.4 cc or 225.7 cc, and V150 was 39.1 cc or 40.4 cc, respectively). However, with directional LDR, the following reductions in skin dose may be achieved: S30 is reduced from 100.6 cm^2 to 62.6 cm^2 , S50 from 50.6 cm^2 to 16.1 cm^2 , and S80 at 2 cm^2 to null. The reduction in V50 for the whole breast is more than 100 cm^3 (386.1 cc vs. 489.2 cc).

Conclusion:

As compared to HDR, directional interstitial ^{125}I sources allow similar dose coverage to the subcutaneous target, while significantly lowering the skin dose due to a quicker fall-off beyond the target. Directional LDR sources can produce a similar dose homogeneity index, but the biological characteristics are more tolerable to the patient and can potentially reduce the risk of late skin and subcutaneous toxicity.