

Purpose:

To present a novel 3D CT-based treatment planning method for permanent breast seed implant (PBSI) with Palladium-103.

Methods:

On a pilot study for adjuvant partial breast irradiation between 2003 and 2005 at the BC Cancer Agency, Vancouver Island, Canada, we established a unique method for planning CT-based multi-catheter HDR interstitial brachytherapy using Varian BrachyVision. Based on our experience from that study we transferred the concept to LDR Palladium-103 PBSI. Patients are CT scanned with two radio-opaque grids placed on the medial and lateral aspect of the breast and other reference skin markers are added. The grids assist in determining the entrance and exit point of a reference needle. The implant is then guided by landmark measurements and the reference needle.

Results:

We found that the BrachyVision system, developed by Varian for planning of LDR seed implants, was unsuitable for needle-based pre-planning. When we used the afterloader planning tools, we were able to adapt its parameters to represent manual needle loadings. The total dose was converted to dose rate because of the lack of flexibility for permanent implant prescription. The BrachyVision afterloader interstitial planning tools were suitable for producing an optimal plan for PBSI with Palladium-103 in a relatively short time. Images in the oblique plane were generated in BrachyVision and exported to VariSeed planning system for validation. An image manipulation software was used to overlay images for BrachyVision and VariSeed for comparison. The dose distribution variance between the two systems was found to be within 3%.

Conclusions:

The BrachyVision afterloader planning concept can be used for PBSI planning. An optimal plan can be obtained in a relatively short time with minimal planner intervention. The skin grid guidance may achieve high accuracy of seed placements without the aid of a real time ultrasound.