Purpose:
To establish the characteristics of flattening filter free (FFF) beams for 3D breast treatments.

Methods:

FFF beams have an approximate Gaussian shaped intensity distribution as does the breast contour. We produced 3D plans using a half-beam block technique that combined 15X, 10X, 6X flattened beams and 6X and 10X FFF beams.

One year of breast patient plans were retrospectively analyzed (48 supine, 57 prone). Of these, 12 representative shapes of typical and extreme separations were evaluated. The effects of breast separation and breast thickness- taken as an orthogonal between the nipple region and the chest wall and breast shape- approximated by the ratio of the first two parameters, were used as selection criteria. Our goals were to ensure Dmax< 110% and that the 95% isodose line covered the breast volume. Comparisons were made on the central axis between a FFF beam and a wedged beam to determine the effective wedge angle of an FFF beam.

Results:

Most supine patients met the coverage goals in the breast tissue, but there are cold areas in the superior margin and the inferior margin. In both these regions, the breast shape is approximately constant, while the FFF beam intensity continues to decrease. Prone patients produced acceptable distributions since gravity pulled the target volume away from the chest wall. The effective wedge angle for 6X and 10X beam were 30-45 and 60 degrees respectively.

Conclusions:

FFF beams can be used effectively to treat breast patients. Partial breast techniques or prone breast patients can be treated with a combination of FFF and flattened beams alone. Supine patients require additional small subfields to produce an acceptable plan.

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