Purpose: To evaluate surface doses for beams with and without flattening filter (FF and FFF) in breast cancer treatment plans. Measurements were performed for validation.

Delivery: TrueBeam, used in this study, is a linear accelerator newly designed to deliver both flattened and flattening filter free beams. Planning: Eclipse treatment planning system (TPS) is commissioned and utilized. We used 6 MV half beams from FFF mode to plan standard tangential breast treatments due to its similar shape to wedged FF beams. We compare these plans with those from 6MV flattened beams with 30° wedges. Measurement Validation: We used a Rando phantom and InLightTM nanoDots Optically stimulated luminescence dosimetry (OSLD) system to measure surface doses from FFF beams. Medial, apex and lateral locations from central plane, as well as positions from caudal and cranial regions, were included.

Results: Planning comparison: surface doses from plans with FFF beams were 2.2%-4.7% lower than those with flattened beams with wedges, when doses at deeper depth from central axis stay close in value. Measurement validation: In the apex region of central plane, the OSLD readouts are 4.5% -6.3% higher than calculated. In the caudal, cranial and medial regions, TPS underestimated the surface dose from 7.2-8.7%. Conclusions: For standard tangential breast plans, surface doses are lower with FFF beam than with flattened beams with wedges. The surface doses from FFF beams were validated with OSLD measurements, taking into account the uncertainty of the dosimeter and its angular dependence.

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