Purpose: To determine the accuracy of TomoTherapy’s delivery verification planned adaptive (DVPA) dose reconstruction software in post-mastectomy radiation therapy (PMRT) calculations to the chest wall.

Methods: Archived treatment data for 5 patients treated at MBPCC were restored to the DVPA analysis software. This data included daily pretreatment MVCT images as well as exit detector transit dosimetry data collected during treatment. These were used to calculate the delivery verification (DV) sinogram for each treatment fraction. The DV sinogram and MVCT image for each fraction were used to reconstruct the delivered dose for that fraction using a convolution/superposition algorithm. Point doses at four TLD locations were previously acquired for 15 treatment fractions for each patient. The DVPA and TLD doses for each patient TLD for each fraction and compared to our clinically acceptable criterion of 5% agreement.

Results: The mean difference for all the data was -3.2 ± 0.28% (4.7%). Approximately 66% of the data points agreed within 5%. The largest difference between measured and calculated doses was -17.3%. While the mean difference was within 5%, the large standard deviation of the data demonstrates the potential for large differences in agreement for individual fraction data.

Conclusions: Patient motion after the MVCT can have a large effect on the calculation of radiological path-length used by the database technique, especially near the surface. This uncertainty may be responsible for the differences seen in this work. Future evaluations of the DVPA software will include anthropomorphic phantom studies. Since the motion variable is removed in the treatment of the phantom it is expected that the dose reconstruction will compare well to TLD doses.