Purpose: Accurate TomoTherapy treatment is dependent on multiple parameters, including the accuracy of couch velocity during beam delivery and gantry rotation. The recent TG-148 protocol recommends quarterly film tests to verify the constancy of couch velocity. We determined the feasibility of using TomoDose, a quality assurance device, to detect the variation in couch velocity from baseline by a deviation of one or two percent.

Methods: The TomoDose unit was rotated 90 degrees clockwise so that the long axis, consisting of 107 detectors, would translate across the TomoTherapy 'Y' jaws. The collimator field size used was the 1 cm mode and the table velocity was set to 0.5 mm/sec to establish a baseline. The velocity was then varied by 1% or 2% from nominal. The five tested velocities were 0.495, 0.490, 0.500, 0.505 and 0.510 mm/sec. The total translation time was kept at a constant 400 sec. The field was progressively painted during the scans and was shortened if table velocity was decreased, and lengthened as velocity was increased.

Results: The baseline field size was 20.03 cm (400 sec x 0.05 cm/sec). A 2% increase in velocity translated to an increase in the field size to 20.39 cm and a 2% decrease in velocity resulted in a decrease in field size to 19.64 cm. Similarly, a 1% increase in velocity increased the field to 20.18 cm, and a 1% decrease velocity decreased the field to 19.76 cm.

Conclusions: An increase or decrease in the couch velocity, for a fixed beam delivery time, resulted in an altered radiation field size. The field size results are approximately as expected for both the baseline scans as well as the modified velocity scans. This study demonstrates that, under these conditions, TomoDose can be used to determine small variations in table velocity as small as 1%.