Purpose: Adoption of slow scan CT (SSCT) for contouring targets affected by respiratory motion artifacts is an accepted practice. The goal of this study was to propose a CT technique which would yield a target shape that would most closely reproduce that of the ideal excursion volume traced by a moving target sphere.

Methods: A single-slice, large-bore Marconi scanner was used to acquire axial and spiral scans of a moving plastic sphere. 1 cm movement in the superior-inferior and anterior-posterior directions was considered separately to isolate directional issues. Scan techniques such as 1 sec fast scan, 4 sec slow scan, over-scanning and pitch variations were used to produce target volumes of different shapes due to the interplay between the movement of the target and the x-ray tube. Shapes were compared to the true excursion volume by scoring them with the Paddick conformity index (CI) as well as by visual inspection.

Results: For anterioposterior movement, the average CI was 0.777 (STDEV=0.05) and the largest CI occurred for the axial slow scan, yet visual interpretation showed best agreement with Axial SSCT with overscan. For inferior-superior movement, the average CI was 0.83 (STDEV=0.05) and the largest CI of 0.872, occurred for the spiral scan with pitch 0.5, which did agree with visual inspection.

Conclusions: Optimal scanning technique, depended on the direction of movement and the interpretation method. Furthermore, it required either a pitch of 0.5 or an axial overscan technique in order to reduce respiratory motion induced target artifacts.