Purpose: To systematically evaluate the dosimetric impact of grid size and angular increment, in stereotactic body radiation therapy (SBRT) using dynamic conformal arc therapy (DCAT) technique.

Methods: DCAT plans were obtained with varying grid size (2, 3, and 4 mm) and angular increment (5, 10, and 20°) for various planning target volumes (PTVs). As 95% of PTV volume is covered with the prescribed dose, dose variation from coarser grid size was compared to 2 mm grid size with assuming the latter could provide calculated dose accurate enough in practical aspect. The impact of angular increment variation on any organ at risk (OAR) was evaluated with placing the spinal cord in a set of 8 different locations (5 cm and 7 cm distance from the isocenter and 5°, 10°, and 20° of azimuthal angle with respect to the a location chosen as zero angle in axial plane).

Results: Compared to 2 mm grid size, 3 mm grid size showed increases ranging from 2 to 3%, 2%, and 1 to 2% in monitor units, the maximum dose of the PTV, and the maximum dose of the spinal cord, respectively. For 4 mm grid size, the amount of increase was larger (4 to 7%, 4 to 6%, and 4 to 6%, respectively). When compared to 5° angular increment, dose variation with 10° increment was less than 2%, but 20° increment caused significant variations reaching up to 10% and 24% for 5 cm and 7 cm distant volume.

Conclusions: Dosimetric impact of planning parameters would guide planners to use appropriate parameters with possible dose uncertainty in DCAT. With coarse grid size, planners are expected to choose lower isodose line for PTV coverage, resulting in patient overdose. Significantly inaccurate prediction of OAR dose could be made with coarse angular increment depending on location of OAR.