Purpose: Dosimetric comparison of beam arrangements of coplanar, non-coplanar and conformal arc for Stereotactic body radiotherapy of lung lesion.

Methods: Four spherical targets with diameters of 2, 4, 6 and 7 cm are contoured in the geometric center of the right lung of a selected SBRT CT scan. For each target, treatment plans of optimized 7, 9 and 11 coplanar, non-coplanar and conformal arc beam arrangements are generated in Pinnacle (Pinnacle Version 9.0, Philips Radiation Oncology Systems, WI). Prescription isodoses are chosen to cover at least 95% of target volumes. The volumes enclosed by the prescription and 50% of prescription isodose surfaces are computed. Conformality index (CI) and effective dose fall off gradient are computed for dosimetric comparison.

Results: All plans with optimized coplanar and conformal arc beam arrangements have similar CIs while optimized non-coplanar beam arrangements have the smallest CIs. For each target size, optimized 7 and 9 coplanar beam arrangements have the largest half prescription isodose volumes while optimized 11 coplanar beam arrangements have slightly less half prescription isodose volumes than conformal arc plans. All 3 optimized non-coplanar beam arrangements result in faster dose gradient than conformal arcs except for the smallest target cases, for a 2 cm diameter target, 9 or 11 non-coplanar beams are needed to achieve better dose gradient than their rival conformal arc plan.

Conclusions: Treatment plans using optimized 9 and 11 non-coplanar beam arrangements are superior to conformal arc plans for SBRT of lung lesions based on dosimetric comparison. To achieve a superior plan for small lesions, 11 or more optimized coplanar beams may be required.