DOISIMETRIC IMPACTS OF VARIATIONS IN ORGAN AT RISKS Delineation During Lung SABR

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Introduction: The aim is to quantify the interobserver variations in delineation of thoracic organs at risk (OARs) and to evaluate its dosimetric impacts during lung stereotactic ablative radiation therapy (SABR).

Method: This analysis included lung tumors treated with near-real-time tumor tracking using robotic SABR. Peripheral tumors were treated with 60 Gy in 3 fractions and central tumors with 50 Gy in 5 fractions. Gross tumor volume (GTV) and OAR delineations were performed by 4 experienced radiation oncologists on the end-expiration phase of the planning 4D CT scan. A 5 mm margin was added in all directions to obtain the final planning target volume. Delineations of selected treatment OARs including whole lung, trachea, proximal bronchial tree (PBT), oesophagus and heart were retrospectively compared to reference contours blindly performed by a single radiologist as per Radiation Therapy Oncology Group (RTOG) thoracic atlas. Metrics used to compare contours included Dice similarity coefficient (DSC), absolute volumetric difference (AVD) and average surface distance (ASD). Treatment doses were projected on reference OARs contours to obtain maximum point dose (mPD) differences.
**Results:** Twenty early stage lung cancer patients including 8 with central lesions were included. OARs with greatest mean (±SD) contours variations were the PBT (DSC 0.64±0.09, AVD 47.3±12.3%, ASD 2.0±1.1mm), trachea (DSC 0.72±0.09, AVD 38.9±13.4%, ASD 1.4±0.5mm) and heart (DSC 0.91±0.03, AVD 9.1±4.6%, ASD 1.8±0.8mm). Variations in contours were mainly induced by (1) discordant identification of anatomic structures, (2) differences in the application of delineation guidelines and (3) inclusion of additional structures (ex: segmental bronchi) by the radiation oncologist for OARs dose sparing. Maximum differences in mPD were observed in centrally located tumors, with 31.2 Gy for PBT, 13.0 Gy for heart and 5.4 Gy for trachea.

**Conclusion:** Interobserver variation should be considered when implementing strict SBRT OAR constraints. Although variations are typically in the order of a few millimeters, dosimetric impacts can be significant in the context of steep SABR dose gradients. The observed variations have lead us to further standardize our institutional delineation guidelines. Prospective results showing the impact of delineation standardization on contours conformity among clinicians will be updated before the meeting.