Prescription isodose line definitions and not set up uncertainty limit the normal tissue irradiation in SBRT of lung patients

In this study, planning CT and pre-treatment CBCT images have been used to calculate the delivered dose. The maximum, mean, minimum GTV delivered dose and the Rx dose is shown for ten lung SBRT patients in Figure 1. The GTV does not exhibit the unpredictable excursions from the planning CT location that is implied by the relatively large PTV margins. In trying to reduce the volume of irradiated normal tissue and still meeting the prescribed dose volume constraint (95% of Rx dose irradiating at least 95% of PTV volume), we found that the sum of the block margin and the PTV margin stayed constant to within 0.7mm. This resulted in a very small variation in volume of Rx isodose line, as shown in Figure 2.

By prescribing to a lower isodose line (as % maximum dose), a reduction in volume of irradiated normal tissue is seen, as shown in Figure 3. Planning techniques used: Full stereotactic radiosurgery (FSRS) – 60%, Moderated SRS (MSRS) – 70%, Aggressive conventional (AC) – 80%, and Full conventional (FC) – 90% of the global maximum dose. However, the volume of tissue that received a certain percentage of Rx dose is higher with stereotactic prescription technique than with conventional technique. This is shown in Figure 4 (for the same tumor as in Figure 3) which highlights the fact that stereotactic prescription technique achieves target coverage by increasing monitor units that contribute to additional dose to the normal tissue.

**Conclusion:** Our imaging, contouring, immobilization, planning and daily set-up techniques result in a high degree of geometric and dosimetric accuracy. Stereotactic-like planning technique could help reduce dose to normal tissue, especially in small tumor with small margins.