AbstractID: 3837 Title: Evaluation of the lung dose calculation accuracy for an IMRT planning system

Purpose: Image guided treatment of lung provides the ability to deliver dose precisely to the target, however, lung dose calculation is often difficult and might be the weakest link now in the chain of lung IGRT. The purpose in this work is to find out the accuracy of a common TPS system in lung dose calculation.

Method and Materials: So far lung dose measurements have been done only in slab geometry and for a single beam. In this work, we used a realistic lung phantom and delivered all fields of realistic IMRT plans. The phantom is supplied with cylindrical inserts, made of lung, bone, and tissue, which were used to load the dosimetry equipments. The dose to the phantom was calculated, for 10 IMRT treatment plans, with the Corvus system. Validation of the calculated dose was performed with LiF thermoluminescent dosimeters (TLDs) measurement, Ionization chamber measurement, and Monte Carlo simulation. For each treatment plan, the dose was verified at points located in lung, bone, and tissue.

Results: The comparison of the collected data shows that the dose to the lung calculated with Corvus was overestimated by 10% relative to the Monte Carlo results, and by 7% relative to the chamber measurements. The TLDs dose results show better agreement to the Monte Carlo results than to the Corvus results. In bone the Monte Carlo agreed well with both TLDs and chamber measurements (within 3.5%) while Corvus dose was 6.5% different. The dose to the tissue shows good agreement (within 2%) between all the dosimetry tools.

Conclusion: The dose calculation accuracy in lung has been estimated for IMRT planning system. It indicates some better dose algorithms might be needed in order to have an accuracy of a few percent.