AbstractID: 8302 Title: Validation of Collapse Cone Convolution Superposition Algorithm Using Ion Chamber and Field Measurements

Purpose: To validate the collapse cone convolution superposition (CCCS) algorithm using ion chamber and field measurements for small lung lesions subject to electronic disequilibrium. **Method and Materials:** IMRT plans for several lung patients were created using Pinnacle 8.0 planning system. The lung lesions measured less than 3 cm diameter and less than 27 cm^3 and were treated in our institution with SBRT. For each patient seven optimized plans were produced by changing the minimum segment size in the IMRT optimization parameters. The minimum segment size varied from 0.25cm^2 to 6cm^2. The optimized intensity maps for each plan were then used to calculate the dose distributions using the CCCS algorithm. For each clinical plan, a corresponding quality assurance (QA) plan was created. The intensity maps for each of the QA plans was calculated in a plexiglass phantom where there is an insert for an ion chamber (PTW 0.125 cc) and a film (Kodak EDR2). The ion chamber measurements were then converted to dose and the films were scanned using a VIDAR scanner and analyzed using the RIT software. The dose calculated from Pinnacle for the ion chamber point and the planar dose at the location of the film were then exported and compared against measurements. **Results** There was good agreement (0-5%) between the calculated values and the measurements. The agreement was independent of the segment size used during IMRT optimization. The plans with small segment sizes had more monitor units which resulted in higher doses to the lung. **Conclusion:** The CCCS can accurately predict the dose delivered to the target. Films and ion chamber measurements can be used for evaluating the delivered plan with accuracy of 5%.