AbstractID: 13433 Title: Patient-specific QA tool for motion management in hypofractionated lung radiotherapy

Purpose: As radiotherapy approaches become more complex and individualized, it must be considered to extend patient-specific QA beyond IMRT. We report on a tool and procedure developed to conduct patient-specific QA for hypofractionated stereotactic lung treatments accounting for tumor motion. **Method and Materials:** Patients are immobilised in a BodyFix system and treated based on 4DCT/PET planning. The Varian RPM system is used during planning 4DCT acquisition and/or patient mock-up to acquire a patient-specific breathing pattern and used during treatment only to monitor breathing. A Modus Quasar phantom is used to mimic the patient breathing pattern with a customised motor, and a moving cylinder that accommodates ion chambers and radiochromic film. The patients treatment plan is transferred onto the average 4DCT of the moving phantom and point doses per beam and isodose distributions are extracted. The plan is then delivered to the stationary phantom as well as the phantom moving with the patient-specific breathing pattern, and film (EBT2) and ion chamber (CC13) measurements are conducted. Film is scanned using a flatbed scanner and qualitatively evaluated in Excel against the planned isodose distributions. Three patient plans have been evaluated to date. **Results:** The agreements between planned and measured stationary doses ranged from 0.2% to 2.0% (3.0% tolerance), and from 0.9% to 2.4% for dynamic doses (5.0% tolerance). Qualitative film analysis found no discernible discrepancies from planned isodose distributions. The QA session demonstrates that the treatment can be delivered as planned and rectifies initial problems that arise during implementation. **Conclusion:** We have developed a QA tool and procedure that goes beyond conventional patient-specific QA that accounts for breathing patterns during dosimetry and treatment for hypofractionated stereotactic lung radiotherapy. This procedure is integral in verifying the accuracy of both the planning and delivery of techniques involving high doses in small-fields and complex beam arrangements.