AbstractID: 3175 Title: IMRT of Superficial Tumors

Purpose:
Due to inadequate beam modeling in the buildup region, large differences exist between planned and delivered IMRT doses for superficial targets. Our measurements show that plans underestimate doses delivered to superficial target regions by upto 40%. This results in unexpected skin reactions in patients and overdosing of critical structures. In this work, surface dose for such cases was investigated.

Method and Materials:
Using Rando phantom, IMRT plans were developed for PTVs located at: (1) skin surface (PTV0); (2) 10mm from skin (PTV10), and (3) phantom center (PTVctr). Dose distributions in Rando phantom were measured with EDR films and verified by MOSFET detectors. QA for all IMRT plans was done in a cube phantom using EDR films and ion chamber.

Results:
For PTV0, measurements in Rando phantom showed surface receiving full dose. In contrast, planned surface dose was 40% lower. In fact, superficial regions (up to 7mm) of PTV were underdosed. In distal target regions, agreement between planned and measured doses was good. For PTV10, agreement between planned and delivered surface doses was significantly better (~10%). MOSFET measurements indicated 42.5% and 8.5% surface overdose(average) for PTV0 and PTV10 respectively. For centrally located tumors, measured and planned doses were in excellent agreement. In QA phantom, dose uniformity of transferred targets depended on their location. For PTV0, the side of the tumor that was facing surface received 30% higher dose than prescription. For PTV10, dose increase was 10%.

Conclusion:
In IMRT plans, adequate target dose is delivered without bolus. Extreme care must be exercised in delineating superficial PTVs. Whenever possible, a minimum distance of 1cm between skin surface and PTV must be preserved. With smaller distances, the skin may appear to be erroneously spared. This phenomenon is not detected by commonly used IMRT QA procedures. Therefore, in-vivo measurements are recommended.