

## AbstractID: 11419 Title: Concepts for normal tissue sparing with patient-specific margins in IMRT boost treatments for cervix

**Purpose:** This concept study quantifies the potential for normal tissue sparing in IMRT boost plans for cervical cancer by employing patient-specific margins. Various PTV expansion margins are evaluated, including best-case and standard-case scenarios, which encompass internal organ motion over the intrafractional treatment period. **Method and Materials:** For 5 subjects, margins are delineated by contouring the cervix on 500 fast-spin-echo cine-MR images taken at regular intervals over a 20 minute span using in-house software (TOMAS). Organ drift is determined by magnitude of translation of contours in S-I and P-A directions with mm accuracy; research-margin CTV to PTV expansion is defined by the magnitude of organ drift. Comparison is made to IMRT plans with PTV expansions for standard-margin prostate treatment, chosen for analogous anatomical location and geometry. Dose constraints for optimization are defined by ICRU38. Plans are created in Eclipse TPS with 5 non-opposing beams, and PTV constrained to 95% isodose line over 98% volume for all plans (limiting organs constrained to best-possible distribution). Dosimetric savings for limiting organs is determined with EUD, calculated using CERR software ( $\alpha = 8.33, 2.0$  for rectum, bladder). **Results:** Customized margins varied between 0.1 and 0.7 cm (direction dependent), well below the 1.5 cm uniform expansion in the standard case. With patient-specific margins, comparisons of EUD for limiting organs suggest up to 40% reduction in bladder dose and 10% reduction in rectal dose. **Conclusion:** This study shows that application of an advanced IGRT procedure to generate patient-specific margins can lead to measurable dose reduction to normal tissues for cervical carcinoma boost treatments with IMRT. For some patients the dose reduction can be quite compelling, given specifics of anatomy, and the method proves useful for increasing normal tissue sparing in abdominal RT treatments.