

## AbstractID: 8820 Title: Combined Biological Effective Dose Based Treatment Planning for Low Dose Rate Prostate Brachytherapy and IMRT

**Purpose:** Brachytherapy with seed implants followed by intensity-modulated radiotherapy provides an effective treatment for prostate cancer. However, it is difficult to quantify the effectiveness of the combined treatment because of the different dose rates of brachy and IMRT. We developed a simple pc-based system using the  $\alpha/\beta$  model for the biological effective dose (BED) as an additional quality index to evaluate treatment plans.

**Methods:** Dose grids and organ contours from a commercial brachy planning system (Variseed) and external beams systems (Eclipse and Brainscan) were exported to our in-house system where physics doses were converted to BED. Iso-BED derived from the brachy, IMRT, and the combined treatment of brachy + IMRT were displayed using our software. The in-house system was implemented by using Interactive Data Language (IDL). The IDL provides the capability of importing treatment plans and the graphical interface for navigating the combined results.

**Result:** Contours and isodose curves generated from the commercial software were unchanged after being transferred to the in-house planning system. Iso-BED curves were verified with hand calculation method. Our system allows users to customize the  $\alpha/\beta$  values and iso-BED curves, zoom in and out on each available plane, view BED-volume histograms, and display 2D/3D at any angle to detail the target and normal tissues doses. Because BED is more appropriate to correlate with tissue injury, knowing the BED of the prior treatment, we can design dose-mapping plans to compensate for under- or over-dose regions in the previous treatments.

**Conclusion:** This combined BED based treatment planning system will allow for clinicians to make more informed judgments regarding the therapeutic ratio of any given give treatment plan which uses two different modalities of radiotherapy delivery.