

## AbstractID: 11351 Title: Dynamic TomoTherapy Treatment Delivery

### **Purpose:**

To implement the dynamic jaw and dynamic couch techniques and evaluate their throughput and clinical benefits for TomoTherapy<sup>SM</sup> treatments.

### **Method and Materials:**

The dynamic jaw technique allow jaws to move during a treatment, which leads to increased efficiency with a wider jaw width in the middle of the target and improved longitudinal dose conformity near the superior and inferior borders of tumor regions. Dynamic couch technique moves the couch as fast as possible at non-uniform speed to further reduce the beam-on time. Delivering conformal dose as fast as possible requires the combination of dynamic jaw and dynamic couch technique. The dynamic jaw with dynamic couch (DJDC) delivery is compared with the existing regular delivery of a fixed jaw width to evaluate its improvement in delivery efficiency and plan quality.

### **Results:**

Two conceptual cases and two clinical cases with different delivery techniques are calculated. The DVHs and dose distributions are compared for different delivery techniques. Compared with the existing regular delivery, DJDC can significantly improve the dose conformity near the superior and inferior borders of the targets. Significant dose reduction is achieved for critical structures longitudinally adjacent to the targets. Arbitrary one-dimensional longitudinal fluence profiles can be delivered with the DJDC technique. Compared to the regular delivery with a 2.5 cm fixed jaw width, DJDC with a 5.0 cm maximum jaw width reduces the beam-on time by 54%~64% for the calculated cases.

### **Conclusion:**

DJDC reduces the beam-on time by 40%~60% for typical cases while improving dose conformity near the longitudinal borders of the targets. DJDC enables the TomoTherapy<sup>®</sup> system to deliver a typical head and neck or prostate plan of a 2 Gy fractional dose in 2~3 minutes with a plan quality better or comparable to that delivered with the existing regular delivery of a 2.5 cm jaw width.