AbstractID: 10597 Title: Beam's-eye-view dosimetrics guided inverse planning for aperture modulated arc therapy

Purpose: To utilize angular beam's-eye-view dosimetrics (BEVD) information to improve the computational efficiency and plan quality of inverse planning of aperture modulated arc therapy (AMAT). **Materials & Methods:** In BEVD-guided inverse planning, the angular space spanned by a rotational arc is represented by a large number of fixed-gantry beams with angular spacing of ~2.5^{o}. Each beam is assigned with an initial aperture shape determined by the beam's-eye-view (BEV) projection of the planning target volume (PTV) and an initial weight. Instead of setting the beam weights arbitrarily, which slows down the subsequent optimization process and may result in a sub-optimal solution, *a-priori* knowledge about the quality of the beam directions derived from a BEVD is adopted to initialize the weights. In the BEVD calculation, a higher score is assigned to directions that allow more dose to be delivered to the PTV without exceeding the dose tolerances of the organs at risk (OARs), and *vice versa*. Simulated annealing is then utilized to optimize the segment shapes and weights. The BEVD-guided inverse planning is demonstrated by using a pancreatic case and the results are compared with conventional approach without BEVD guidance.**Results**: An a-priori knowledge guided inverse planning scheme for AMAT is established. The inclusion of BEVD guidance significantly improves the convergence behavior of AMAT inverse planning and results in much better OAR sparing as compared to the conventional approach. **Conclusions**: BEVD-guidance facilitates AMAT treatment planning and provides a comprehensive tool to maximally utilize the technical capacity of the new arc therapeutic modality.