

AbstractID: 1236 Title: Non-coplanar beam angle optimization for paranasal sinus IMRT using parallelized “multi-resolution” method

The beam configurations (number and directions) in the current practice of IMRT are usually selected manually based on intuition or clinical experience. The process is cumbersome and the beam arrangements may not be optimal, especially when non-coplanar configurations are allowed. In this work, we applied a parallelized “multi-resolution” beam angle optimization approach (PMBAO) to investigate the benefits of beam angle optimization (BAO) for paranasal sinus treatments using mixed coplanar and non-coplanar beams. In the multi-resolution approach, the entire hyperspace of beam configurations is sampled exhaustively first with a small number of beams (e.g., 3) to determine the most and the least preferred directions and to reduce the size of search space. Then optimal beam configurations are selected from this reduced search space. Parallel computing was implemented to make BAO for non-coplanar beams practical for clinical situations. We found that 1) non-coplanar beam configurations have advantages for treatment targets located in the vicinity of the eyes and the optic chiasm region, 2) 5-beams plans optimized by PMBAO are at least as good, and usually better than, the 9-equally spaced beam configurations, and 3) for paranasal sinus tumor which extended inferiorly into the nasal pharynx, non-coplanar beam configuration do not improve planning quality.

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