AbstractID: 1441 Title: Study of inter-patient variation of the optimized beam angles for 15 prostate IMRT cases

IMRT is becoming an important modality for cancer treatment. In practice, however, the beam orientations used for the treatments are still selected empirically without any guideline. In this work we investigate inter-patient variation of the optimal beam configurations by studying 15 previously treated prostate cases. For each patient, we generated optimized beam orientations using a multi-objective optimisation method for a pre-selected number of beams (N=5, 6, 7, 8 and 9). The angular distributions of the incident beams of the fifteen patients were then analyzed for each number of incident beams. For a fixed number of incident beams, we found that each beam varies within a well-defined angular range, indicating that inter-patient variances are small, and it seems adequate to use a customized beam orientation class-solution as a surrogate to replace the individually optimized beam configuration for a patient. For example, in the case of five incident beams, beam configuration with gantry angles of 35º, 110º, 180º, 250º and 325º or an equi-spaced beam configuration starting from 20º~40º seems to serve as a good surrogate of the individually optimized beams. In the situation of six to nine incident beams, similar trend was observed. While patient specific beam orientation tools are highly desirable in the future, the study conducted here is useful to systematically understand the role of beam configuration in IMRT treatment and may simplify the current trial-and-error selection of the beam orientations.