A Modified Method of Planning and Delivery for IMRT Treatments

NOMOS-Corvus intensity modulated radiation treatment (IMRT) system generates treatment plans that are delivered in tomographic fashion. This technique requires precise indexing of the treatment couch. Since tomographic method uses multiple abutting fields, it may introduce multiple dose nonuniformity regions if the couch indexing is not accurate or the motion of the couch is not parallel to the multileaf collimator. Even relatively small couch positioning errors of 0.5mm to 1mm result in dose nonuniformity ~15%-30%. To reduce the dose nonuniformity, we developed and experimentally verified a modified treatment planning and delivery technique. This technique was based on examining the dependence of number and positions of treatment arcs on target dimensions. We found that the arc positioning was approximately a cyclical function of the target length (dimension in the direction of couch indexing). The period of this function was ~8mm. Within each periodic interval, every 2mm increase in target length resulted in ~1mm shift in the arc positions, and at the end of each interval, the shift was ~5mm, which was large enough to produce a clinically significant shift in abutment regions. Our technique delivers two plans on alternate days, one with the original target and the second with a slightly increased target length, resulting in a periodic ~5mm shift in abutment regions. The experimental verification of this method confirmed that the dose nonuniformity in the target region was reduced by at least half when inaccuracy in indexing was 1mm.