

Purpose: IMRT planning of head and neck (H&N) cancers routinely employs artefact contouring in the oral cavity due to dental restorations (DR). The differentiation between teeth and soft tissue in the region immediately surrounding these DR however is uncertain. A study was carried out on patients with varying number of DR/artefacts to determine the impact on optimization.

Methods: Five H&N patients who had been planned using IMRT were selected with varying PTV locations, degrees of DR and artefacts. These patients were originally planned with the artefacts surrounding the DR contoured and the density of these converted to water/soft tissue (HU=0). The DR were given a maximum CT number assigned for our CT scanner (HU~2700). These patients were then re-optimized (using identical constraints as in the original plan) without any compensation for artefacts. Optimizations were carried out in both scenarios using the Eclipse™ planning system Pencil Beam (PBC)8.6.15 and then carried out using the AAA algorithm with/without artefacts contouring as well.

Results: In the cases where the PTV didn't overlap the teeth/DR, DVH as well as axial slice comparisons showed insignificant differences between contouring the artefacts or not. In those cases where the PTV did overlap the DR, a difference was seen between the two optimizations; with and without artefacts converted to water/soft tissue. For large PTV volumes, this may not translate into a significant effect based on DVH comparisons since the volume of DR artefact is relatively small compared to the PTV volume. However, for smaller PTV volumes, the impact could be quite significant. This effect was seen using both algorithms: PBC and AAA.

Conclusion: For H&N cancers with PTVs within the oral cavity, artefact contouring does have an impact on the optimization of IMRT plans and the proper contouring of DR artefacts can minimize the impact.