AbstractID: 9433 Title: Structure Sparing IMRT by Fluence Avoidance Method: Application To a Pelvic Case With Bilateral Hip Replacements.

Purpose: To develop a technique for planning large targets in pelvic cases with double hip replacements where the recommended physical avoidance approach is not an option. **Method and Materials:** Throughout this report, the Eclipse treatment planning system (Varian Medical System, Palo Alto, CA) was used. All calculations are performed using the Eclipse PBC Algorithm with Modified Batho heterogeneity corrections turned on. A method referred to here as fluence avoidance technique was developed. It uses an iterative approach to prevent photons from reaching the target through a prosthesis. This is because it is not possible, in the Eclipse optimizer, to apply a dose constraint only through beams that enter through a region (*entrance region beam)* and not to beams that exit through one (*exit region beam*). To circumvent this weakness of the optimizer, an iterative process was developed. First, low target dose constraints that do not compromise target coverage are set to both prostheses. The optimizer then treats both of them as any other critical structure. Once this step is complete, the fluence through each prosthesis is minimized but not zeroed .To proceed with zeroing of the fluence through each prosthesis path, a manual iterative process is used. **Results:** A drastic improvement of the dose distribution compared to physical avoidance is obtained. A comparison between the first and the final iteration needed to achieve complete fluence avoidance of the right and left prosthesis shows significantly better target dose homogeneity without increasing the dose to critical structures. **Conclusion:** The fluence avoidance method described above and applied to a bilateral hip replacement IMRT case allows for homogeneous target coverage while minimizing dose to critical structures. The principle behind the fluence avoidance method can be generalized to improve the sparing of other critical structures such as the parotids in head & neck cancer.