

AbstractID: 7269 Title: Dosimetric effects of metallic hip implants on image guided radiation therapy

Purpose: Image guided radiation therapy allows us to track the prostate location daily, and to compensate for prostate movement by shifting the treatment isocenter. For patients with metallic hip prostheses, this may result in dosimetric errors due to the presence of high Z materials in the fields. The purpose of this work is to determine whether shifting the isocenter to compensate for prostate motion delivers the proper dose in patients with hip prostheses.

Method and Materials: A retrospective study was performed using IMRT plans for five prostate cancer patients with hip prostheses. For each patient, six copies of the contours defining the prostate were created, and shifted 1.5 cm (representing the worst case scenario) in the anterior-posterior, superior-inferior, or lateral direction to simulate prostate movement. The dose to the shifted prostate was calculated using the original treatment plan with an isocenter shift corresponding to the change in the prostate position.

Results: Without compensating for prostate movement, a 1.5 cm displacement in prostate position has significant dosimetric effects, resulting in an average decrease in the dose delivered to 95% of the prostate (D95%) by 33%. We found that for patients without hip prostheses, shifting the isocenter to track prostate motion reduces the change in D95% to under 1%. The presence of hip prostheses did not have a significant effect, except in a case using lateral beams in a patient with bilateral prostheses. In that particular case, D95% decreased 5% even when an isocenter shift was used to compensate for prostate motion.

Conclusion: In IMRT treatment of prostate cancer, it is possible to compensate for prostate motion by simply shifting the isocenter without creating a new treatment plan, even in patients with hip prostheses. The effect of hip prostheses can be minimized by avoiding beam angles that pass through the prostheses.