

Reduction of Small Bowel, Bladder and Rectal Doses using IMRT in Patients Receiving Whole Pelvic Radiation Therapy

The purpose of this study was to demonstrate that IMRT could reduce the volume of small bowel, bladder and rectum irradiated in patients receiving whole pelvic radiotherapy (WPRT). Ten cervical cancer patients undergoing WPRT were selected for this analysis. A treatment planning CT scan of each patient was obtained using oral, intravenous, and rectal contrast. The common iliac, right and left internal and external iliac lymph node regions, bladder, rectum, vagina and small bowel were contoured on axial slices. The target volume consisted of all contoured lymph node regions, upper vagina, and parametrial tissues. Two plans were created. The first was a standard "4-field box" with apertures shaped to the target in each beam's eye view. The second was a 9-field, coplanar, IMRT plan designed to conform to the target while minimizing the volume of normal tissues irradiated. Both plans were normalized to deliver 45 Gy to the target volume. DVH analysis indicated that the volume of small bowel irradiated in the IMRT plans was on average 20% and 60% lower than the conventional plans at 20 and 40 Gy, respectively. Additionally, there was significant reduction of the bladder and rectal volumes irradiated at doses greater than 40 Gy, relative to the standard plans. These results demonstrate that normal tissue sparing can be achieved using IMRT in patients receiving WPRT, and offers the potential of higher dose delivery to pelvic lymph nodes.