

Purpose: To compare the doses and toxicities in patients treated with radiation therapy for rectal cancer using 3-dimensional conformal radiotherapy (3DCRT) verses intensity-modulated radiation therapy (IMRT).

Materials: Thirty six patients treated for Stage II-IV rectal cancer were retrospectively reviewed: 19 using 3DCRT and 17 using IMRT. A median dose of 5040cGy was delivered. The dose volume histogram statistics for the initial 45Gy delivered for small bowel, large bowel, bladder, femoral heads, and iliac crest were compared between the two treatment groups. Toxicities such as pain, proctitis, urinary urgency, dehydration, fatigue, and anorexia were graded according to the CTCAE version 3.0 and compared between the two groups. Student t-tests were used to determine the statistical significance of the data.

Results: The patients treated with IMRT showed larger volumes receiving low doses and smaller volumes receiving higher doses in normal structures than 3DCRT. To list a few, Large bowel >30Gy (3D=112cc, IMRT=60cc); Large bowel >40Gy (3D=93, IMRT=39); Femoral Heads >40Gy (3D=18%, IMRT=2%); Bladder >45Gy (3D=47%, IMRT=19%); Iliac Crest >45Gy (3D=22%, IMRT=4%). The patients treated with 3DCRT showed more Grade 2+ toxicities than the patients treated with IMRT – total percent of patients with toxicity greater than Grade 1: Pain (3D=42%, IMRT=0%); Proctitis(3D=53%, IMRT=12%); Urinary Frequency/Urgency (3D=26%, IMRT=0%); Dehydration (3D=32%, IMRT=0%); Fatigue (3D=21%, IMRT=6%); Anorexia (3D=16%, IMRT=0%). However, due to the relatively low number of patients, correspondence between the DVH data and the individual toxicity data did not prove to be strongly statistically significant.

Conclusions: The data shows that IMRT has the potential to greatly reduce high grade acute toxicities when compared with 3DCRT. A stronger correlation between dose levels and toxicities is anticipated with more patient data. Specifically, we expect that further research would produce insight into correlating which dose factors contribute to which toxicities.