

P-1. Updated colorectal radiation therapy (RT) dosimetry for the Childhood Cancer Survivor Study (CCSS) cohort

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Background:

Late effects studies often use prescribed radiation therapy (RT) dose as a surrogate for organ-specific doses but for a large heterogeneous organ like the colon/rectum (CR) the accuracy of prescribed dose is not known. We aimed to compare our method for calculating organ-specific CR doses and to assess its relationship with prescribed dose among Childhood Cancer Survivor Study (CCSS) participants treated with abdomen or pelvic RT.

Methods:

Mean CR-specific doses were estimated for 5,517 CCSS survivors treated with abdomen or pelvic RT and compared with prescribed dose. CR-specific doses were calculated on an age-scalable computational phantom with a colorectal organ model that we recently developed and validated for late effects RT dosimetry. Absolute differences (AD) and Pearson correlation coefficients (PCC) were calculated to quantify the magnitude of the differences and assess linear correlations. Mean AD and PCC were determined across all survivors and stratified by primary cancer diagnosis.

Results:

The mean CR-specific and (mean prescribed) doses in Gray were 9.2 ± 6.9 (28.6 ± 12.7) across all survivors and for survivors of leukemia 5.1 ± 4.7 (17.2 ± 7.1), central nervous system tumors 5.4 ± 3.1 (33.8 ± 8.7), Hodgkin's lymphoma 10.2 ± 6.5 (32.0 ± 9.0), non-Hodgkin's lymphoma 11.8 ± 9.6 (25.2 ± 11.1), renal tumors 10.7 ± 6.4 (19.2 ± 9.1), neuroblastoma 8.9 ± 5.9 (21.7 ± 9.4), soft tissue sarcomas 15.0 ± 9.5 (44.4 ± 11.8), and bone sarcomas 11.8 ± 8.9 (48.3 ± 11.6). Prescribed doses overestimated mean CR-specific doses with mean AD of 19.4 ± 11.9 across survivors and a range of 12.2 ± 5.9 to 36.5 ± 11.1 by primary cancer. There was only a weak positive correlation ($p < 0.001$) between prescribed and mean CR doses with $PCC = 0.39$ across all primary cancers with a range of 0.33 to 0.65 by primary cancer.