

We aimed to estimate the risk of secondary cancer after radiotherapy (RT) in high-risk prostate cancer (HRPC) patients with pelvic irradiation. Computed tomography data of five biopsy-proven HRPC patients were selected for this study. Two different planning target volumes (PTV1 and PTV2) were contoured for each patient. The PTV1 included the prostate, seminal vesicles, and pelvic lymphatics, while the PTV2 included only the prostate and seminal vesicles. The prescribed dose was 54 Gy for the PTV1 with a sequential boost (24 Gy for the PTV2). Intensity-modulated RT (IMRT) and volumetric modulated arc therapy (VMAT) techniques were used to generate treatment plans with 6 and 10 MV photon energies with the flattening filter (FF) or flattening filter-free (FFF) irradiation mode. The excess absolute risks (EARs) were calculated and compared for the bladder, rectum, pelvic bone, and soft tissue based on the linear-exponential, plateau, full mechanistic, and specific mechanistic sarcoma dose-response model. According to the models, all treatment plans resulted in similar risks of secondary bladder or rectal cancer and pelvic bone or soft tissue sarcoma except for the estimated risk of the bladder according to the full mechanistic model using IMRT(6MV;FF) technique compared with VMAT techniques with FFF options. The overall estimation of EAR indicated that the radiation-induced cancer risk due to RT in HRPC was lower for bladder than the rectum. EAR values ranged from 1.47 to 5.82 for bladder and 6.36 to 7.94 for rectum, depending on the dose-response models used. The absolute risks of the