

AbstractID: 1608 Title: Comparison of characteristics of photon beams generated by Siemens/Primus and Varian linear accelerators

The purpose of this study was to compare the photon beam data for Siemens and Varian accelerators in six categories: (1) beam quality, (2) phantom scatter factor, (3) output factor in air, (4) primary off axis ratio, (5) electron disequilibrium factor and (6) selective benchmark of dose per MU. We compared beam quality using three quantities: PDD10, TMR20/TMR10 and narrow beam attenuation and beam hardening coefficients (μ , η). PDD and TMR agreed within 1% and the attenuation coefficients agreed within 3% for the same energy. For the same nominal energy, the phantom scatter factor (S_p) measured at 10cm depth agreed within 0.5% regardless of the accelerators. The output factor in air is almost energy independent but was machine dependent. The head scatter off axis agreed among the same machine type. The benchmark agreed to within 4% for the 6MV beam and within 8% for the 15MV beam, respectively. The profiles were different between Siemens and Varian accelerators. For the same machine type, the data varied by 5% and 3% for 6 and 15MV, respectively. The electron disequilibrium factor was found to vary about 9% among different accelerators of the same type. We concluded that accelerators from the same manufacturer, with the same nominal energy, can be treated as "identical" for conventional treatment. However, caution must be taken to treat accelerators as identical for IMRT treatment, given the potential large differences in OAR and small field dosimetry.