

Limits of Segmental MU in sMLC Modulated IMRT

Minimum MU per segment in an IMRT port has been a controversial topic. It varies between different modalities of the machines, as well as from machine to machine. It also became a factor to determine the rejection of an IMRT plan, hence limited computerized beam optimization. In this study, different segmental MU's were tested by employing 6 MV photons at 400 MU/min with different MLC sequences. A Varian CL21EX linear accelerator with 120-leave MLC was used. The MLC sequences comprised of alternative 5 open and 5 closed 5 cm by 5 cm segments with same MU's.

The data in this study consistently indicated an overexposure in the initial segments and undervalued dose delivered in the last segment. When using a sequence with 2 MU/segment, segmental doses dose showed the greatest inconsistency between different exposures, while its total dose exceeded by 9.3% over expected value when the first segment was open, but undervalued by 4.5% when the first segment was closed. 6 or greater MU/segment decreased dose discrepancy for each segment to within $\pm 5\%$ in the sequences with a closed first segment, and to within $\pm 7\%$ in the sequences with an opened first MLC segment. It is suggested that under this test condition, 6 MU/segment shall be the lower limit, and an MLC sequence with a closed first segment will improve its delivered dosimetry accuracy.