Title: Is one couple (T, DLS) per energy in Eclipse relevant for Varian MLC modelisation for Truebeam with IMRT SW/RapidArc techniques?

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Introduction : For Varian Medical Systems (VMS) accelerators with "Eclipse" TPS, whatever the intensity modulated technique (IMRT or RapidArc) or type of MLC (M120 or M120HD), the latter is modeled for a given energy by two parameters: the transmission (T) and the Dosimetric Leaf Gap (DLG).
This study presents the results obtained for a Novalis Truebeam STx (NTB) and Truebeam (TB) installed in 2015 at the Integrated Center for Oncology.

Methods : Two NTB and TB accelerators (6 MV) equipped with MLC M120HD and M120 respectively. (T, DLG) couples were determined in three steps: (i) Varian methodology[1] ; (ii) 1D ionometric measurements (CC13, IBA Dosimetry) in IMRT SW technique: sliding window, dynamic "chair" and "squares" with different level of doses, 10 IMRT SW and RapidArc plans ; (iii) 10 IMRT SW and RapidArc plans analysis via radiochromic films (EBT3, Ashland) and Portal Dosimetry (PDIPv11.031, VMS).

Results : For NTB, T and DLG were set to 1.3% and 0.38mm respectively. This result was determined from VMS methodology as good results were obtained in steps (ii) and (iii) (respectively <2% and gamma index >95% (3%/3mm GA)). For TB, transmission was also determined from VMS methodology. DLG determination was not that simple because for a fixed DLG while acceptable results were obtained with IMRT SW technic, unacceptable results were obtained with RapidArc plans and vice versa. A compromise was found to match the tolerances regardless the type of plan: T and DLG were set to 1.5% and 1.45mm respectively. These values are close to those found in publications[2-5].

Conclusions : Transmission and DLG were determined per energy for each accelerator. T and DLG choice is a compromise between VMS methodology and measurements when both IMRT SW and raidArc technics are implemented on the same accelerator. An extreme solution would be to set T and DLG in Eclipse per energy and technique.

References:
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