

AbstractID: 6656 Title: Characterisation, commissioning and evaluation of DELTA4 IMRT QA system

Purpose: Characterize, commission and evaluate a dual plane diode matrix IMRT QA device.

Method and Materials: A novel device consisting of diode matrices in two orthogonal planes inserted in a cylindrical acrylic phantom of 22cm diameter is characterized, commissioned and evaluated for radiotherapy quality assurance. The system interfaces readily with a networked computer making the whole IMRT QA process very efficient in multi accelerator and multi physicist department. . It detects charge per accelerator pulse, computes and displays measured dose distribution in 3D space. The temperature dependence of the diode is corrected. The precision, stability, pulse rate dependence, dose rate dependence, angular dependence, linear response, energy response of the system and the calculation accuracy at non detector locations are evaluated in addition to comparing multiple simple and complex iso-dose distributions from TPS to measured distributions. The software readily analyses dose profiles in any orientations, %dose, DTA and gamma index of the entire 3D distributions.

Results: The precision and the day-to-day reproducibility of measured data of a single field are excellent, making additional ion chamber measurement unnecessary. The measured data indicated excellent dose linearity and pulse rate independence. Comparison of simple and complex treatment plans with delivered treatment showed good agreement considering the error bars.

Conclusions: The Delta 4 system is highly efficient, accurate and reproducible. The instantaneous and automatic data acquisition combined with the error analysis, report and database capability built into the system make it easy, convenient and efficient to use in a busy clinic.

Conflict of Interest Statement: One of the co-author is President and CEO of ScandiDos AB Company, which supplied Delta4 at no cost for evaluation.