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Evaluation and validation of the Fast Superposition, Superposition and FFT Convolution algorithms for IMRT of low density treatment sites on CMS XiO Treatment Planning System.

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Dose calculating algorithms play an important role in patient treatment planning in radiotherapy. Morden complex treatment techniques for example intensity modulated radiotherapy (IMRT) require accurate and fast dose calculating algorithm to enhance delivery of quality in the treatment of low density sites.

The study evaluated three algorithms used in IMRT and these include Superposition, Fast Fourier Transform (FFT) Convolution and fast Superposition. These algorithms were evaluated when applied to low density treatment sites, which include larynx, stomach and lung. An inhouse phantom with low density material was designed and constructed for use in both point dose and planar dose distribution measurements using ionisation chamber and MapCHECK 2 respectively. The evaluation involved a comparison and quantification of deviation between the TPS predicted dose and that experimentally measured, for each algorithm and treatment site.

The percentage deviation of the ionometric measurements was between ±2.09% and ±6.03%, while the gamma index method had > 80% points satisfying the acceptance criteria of (3%/ 3mm).

Therefore the outcome of the IMRT treatment is affected by the choice of the algorithm per each treatment site. An affordable inhouse phantom can be used for algorithm evaluation.

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