

A METHOD, USING EQUIVALENT UNIFORM DOSE, FOR THE PREDICTION OF LATE ORGAN-AT-RISK TOXICITY FOLLOWING RADIOTHERAPY OF THE PROSTATE.

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Purpose/Objective

To investigate the predictive value of Equivalent Uniform Dose (EUD) for late bladder and rectal toxicity following high dose 3D Conformal Radiation Therapy.

Materials/Methods

EUD was calculated, using the method developed by Kutcher, from the DVHs of 202 patients with localised prostate cancer treated to 74 Gy with conformal radiotherapy. Late bladder and rectal complications were recorded by means of the RTOG scale for a minimum period of 5 years. EUD was correlated against the complication probabilities of the bladder and rectum. A linear quadratic model was then fitted to the complication data for years one and three following radiotherapy.

Results

Through this work a correlation between EUD and complications to the rectum has been established. Patients who receive an EUD greater than the median (62.5 Gy) to the rectum have a higher risk of developing complications than those who receive less than the median ($p=0.0410$), see figure one. A similar correlation was not found for the bladder. Equations have then been developed which allow for calculation of individualised quantitative assessments of complication probability, for both one and three years post-RT.

Conclusions

These data have shown that EUD can be used as a singular index, incorporating all DVH data, to calculate predicted complication probabilities for individual patients. The EUD concept outlined here can be used as a complement to existing, much verified, physical predictive indicators. In particular EUD has a role in selecting treatment plans in two different situations: where it is not possible to simultaneously satisfy all physical dose constraints or to choose between two plans where all physical constraints are met but where the DVHs are very different.

