AbstractID: 6997 Title: An interactive software tool for modifying outcome models and predicting patient specific outcomes in treatment planning

Purpose

For patient-specific radiotherapy outcomes predictions (i.e., NTCP predictions), the choice of model and its parameters is of utmost importance. Our goal is to develop a software tool which will let clinicians conveniently select the model, understand the effects of the model parameter values, and thereafter predict plan specific outcomes.

Method

This module has been developed within CERR (Computational Environment for Radiotherapy Research), an open source Matlab-based software system. Two commonly used NTCP analytical models implemented are the Lyman–Kutcher–Burman (LKB) and the Critical volume (CV). The parameters of LKB model include: the exponent for calculating *EUD*, *D50,* and the slope parameter *m*; whereas the parameters of the CV model include the mean relative damaged volume, critical fraction of FSUs, and interpatient variability. Our interactive outcomes estimation module lets the user change the model and parameters and observe the change in predicted outcome simultaneously. We have also implemented a new model to predict radiation lung injury, which is a logistic regression model with two predictors - mean dose to lung (MDL) and the GTV location (GTV-superior-inferior position). We developed an interactive nomogram to let users look at the variation in outcome with respect to MDL and GTV-SI position.

Results

The interactive outcomes-prediction module within CERR was tested on sample plans. The user is presented with slider bars to change the parameter values, or the user can input their own values, and the estimated outcome is simultaneously updated. The interface is simple, user-friendly, and easily extensible to include other outcomes models.

Conclusion

This outcomes prediction module, along with other graphical visualization and analysis capabilities within CERR, may aid clinicians in understanding and using NTCP models for radiation treatment planning.

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