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Preliminary Estimates of Adverse Event Probability for Selected Critical Anatomical Structures in SBRT

Purpose:

To make a preliminary estimate of the probability of adverse events for various critical anatomical structures for stereotactic body radiation therapy (SBRT).

Method and Materials:

An extensive literature search has uncovered a collection of more than 500 published dose tolerance limits for various anatomical critical structures for one to five fractions of SBRT. We have not found any TD5/5 or TD50/5 adverse event probabilities for SBRT yet, and an appreciable number of the authors do not even present minimum dosimetric information for the adverse events they report. We compiled a database from the available published data and performed statistical analysis to obtain a preliminary estimate of probability of adverse events.

Results:

Sixty five of the 500 dose tolerance limits correspond to a reported adverse event. For nineteen of these cases, the authors reported the number of patients exceeding the stated dose tolerance limit. For brain tumors, details of adverse events were reported in optic chiasm and optic nerve, and for lung tumors details of adverse events were reported in bronchi, lungs, and ribs. For these critical structures we can estimate the adverse event probability, although in some cases the number of data points is quite limited.

Conclusion:

It would be quite helpful for the future if more authors would present dosimetric data corresponding to the adverse events they report. At a minimum, it would be helpful to report the maximum dose received by the involved critical structure, the doses received by a few selected volumes, and the number of patients that received these dose levels. In the meantime, this work provides preliminary estimates of adverse event probability for selected anatomical critical structures from the sparse data available.

Conflict of Interest:

None