AbstractID: 9564 Title: Analysis of Clinical Data Sets by Comparative DVH Analysis

Analysis of large clinical dosimetry data sets has been limited to evaluation of single number dosimetric quantifiers (like V_{20} or D_{90}). The quantifiers are linked with clinical outcomes and conclusions drawn based on comparative statistical tests. These quantifiers are often a matter of guesswork, at best chosen by recommendation of investigators who have performed similar analyses.

A tool for comparative analysis of the entire dose volume histogram for large data sets has been developed and is described. This tool has been used as an interface between several treatment planning systems, external beam and brachytherapy. The downloaded structure dose volume histograms and data set analysis and comparison are performed within the tool

As an example of this process, a series of ^{131}Cs implants, performed at multiple institutions, has been analyzed following import from Variseed (Varian Medical Systems). Ten patients who had RTOG Grade 2 rectal complications following the implant were compared to twenty-three patients who did not experience any rectal complications. While a similar analysis has been performed previously, this work was limited to analyzing rectal dosimetry in terms of 2 or 3 rectal dose quantifiers. While the previous effort was able to show statistical significance with R_{100}, it is apparent from the present work that the critical doses for rectal complications are much more likely associated with doses to the rectum which are much lower than the prescription dose, in the range of 40-50 Gy. This is verified by improved significance of the correlation between the two arms of the cohort at these dose levels.

The ^{131}Cs monotherapy dataset demonstrates the utility of the tool and the associated process. The tool has also been used to analyze external beam data sets to demonstrate the dosimetric improvement of inverse planning over conventional planning for external beam radiotherapy.