

## AbstractID: 5884 Title: Development and Use of a Dose-Volume Histogram Analysis Tool

**Purpose:** To develop an automated tool providing rapid, consistent analysis of the dose-volume histograms (DVH) generated by commercial treatment planning systems (TPS). This tool has been used for comparative analysis of competing plans and is currently being used to study and mimic physician decision criteria.

**Method and Materials:** Software was developed to import DVH information stored in RTOG submission format, making it relatively independent of the TPS used to generate the plan. Analysis tools are provided to generate conformity, uniformity and radiobiological quantifiers which describe each treatment plan. These quantifiers are presented separately and as overall plan evaluation values, to include CTI, CN and COIN. Radiobiological quantifiers include NTCP, EUD and EUBED.

**Results:** The software has been used to evaluate competing techniques—(1) conventional, (2) two-field tangential inverse-planned IMRT and (3) multiple (3 or more) beam IMRT--of breast irradiation on 20 patients. Plans were adjusted to provide 90% of the prescription dose, 50.4 Gy in 28 fractions, to 90% of the PTV. The superiority of the dose distribution of the IMRT methods was clearly demonstrated as more conformal (CN 0.79 vs. 0.83,  $p < 0.001$ ) with reduced doses to the lung (mean dose 5.4 Gy vs. 4.6 Gy,  $p = 0.004$ ) and heart (mean dose 2.3 Gy vs. 1.5 Gy,  $p = 0.02$ ). The radiobiological advantages of IMRT, although better, were less dramatic (EUD, not significant, NTCP effective volumes significant, but NTCP too small to draw conclusions).

**Conclusion:** : Use of this tool enables easy, consistent interpretation of the DVH and the overall treatment scheme. Choosing between competing plans, developing and adjusting dose limits and weighting used in objective functions, and the ability to describe and mimic the physician decision making process are possible uses of the tool.

**Conflict of Interest (only if applicable):** None.