

AbstractID: 13576 Title: A New Treatment Plan Evaluation Index for Comparing Various SRS Treatment Technique

**Purpose:** Proper evaluation of a stereotactic radiosurgery (SRS) plan is challenging due to lack of a comprehensive evaluation index and variation of dose prescription. In this study, a new treatment plan index is proposed to evaluate the quality of an SRS treatment plan by incorporating planning parameters that describe tumor coverage, dose to surrounding normal tissues, and tumor dose uniformity.

**Method and Materials:** The proposed index contains four factors. The first factor is MDPD (ratio of the maximum dose to the prescription dose), which specifies the tumor uniformity. The second factor is V100, percent tumor volume covered by 100% prescription dose. The third factor is characteristic of dose spillage to normal tissue. The fourth factor is a piecewise function used to differentiate the deviation of the treatment plans from the requirement of RTOG protocol.

Thirty-four SRS cases fulfilling the requirement of RTOG protocol were analyzed by our proposed index and Paddick's index. Two dose prescription approaches were considered for this comparison: one is to maximize the tumor coverage and maintain plan uniformity; the other is to maximize the tumor coverage and spare the surrounding normal tissue.

**Results:** Our result indicates that the proposed index becomes negative value when the tumor coverage or PITV significantly deviates from RTOG protocol. The treatment plan index for different lesion size, irregularity and location of critical structure relative to tumor target were calculated with various techniques at two different dose prescription approaches.

**Conclusion:** Comparison of the plan index recommended by Paddick and that proposed in this study for clinical 34 SRS cases in Baystate Medical Center indicates that our plan index is reliable and sensitive to the lesion size, irregularity, and location of critical structures and is easier for the selection of the treatment techniques and dose prescription during the process of SRS.