

Name of Task Group: Clinical Implementation of Data-driven Quality Control and Automated Treatment Planning

Parent Working Group: Working Group on Treatment Planning

Parent Subcommittee: Radiation Dosimetry and Treatment Planning Subcommittee

Category: Established Area

Journal to Publish: Medical Physics

Society Endorsements: AAPM

Charges to the Task Group:

It is the goal of this task group to develop guidance and recommendations for the training, validation, ongoing maintenance, and quality control of data-driven approaches to treatment planning. The following topics will be included in the report:

1. Describe general principles of patient-specific dose prediction:
 - a. Heuristic dose prediction.
 - b. Library-based dose prediction, i.e. searching databases for similar patients.
 - c. Model-based dose prediction, i.e. generating patient-specific dose predictions based on inferred quantitative relationships between anatomical features and final plan dosimetry as learned from previously treated patients.
 - d. Critical role of target and normal tissue contouring.
2. Recommendations for data requirements for knowledge-based modeling training sets and planning libraries.
3. Recommendations for analyzing knowledge-based dose prediction accuracy and quantifying model error.
4. Recommendations for quality assurance of the training sets, including quality filtering prior to modeling and validation on an independent validation set.
5. Clinically implementing patient-specific dose predictions for treatment plan quality control.
6. Recommendations for conversion of dose predictions into IMRT/VMAT optimization objectives and priorities, i.e. final automated planning routines.
7. Recommendations of pre-clinical validation of automated planning routines.
8. Recommendations for testing, validating, and assessing benefits/risks of externally sourced knowledge-based planning routines, e.g. from a published standard library.
9. Recommendations for ongoing post-clinical maintenance of knowledge-based planning systems, i.e. the incorporation of new patient plans in the service of continual improvement of knowledge-based planning routines.