

AbstractID: 12011 Title: Performance-based QA for Radiotherapy: TG-135 - QA for Robotic Radiosurgery

History: TG-135 was approved by AAPM at the 2006 Annual Meeting. The intent of this TG was to fill the gap between TG-40, which does not cover certain QA aspects of newer radiation delivery devices, and TG-100, which will revise our current QA paradigm. **General Outline of Report:** The report consists of three major sections: (1) QA for individual system components, (2) QA for the integrated systems, (3) a summary with QA checklists. At the time of publication there is only one FDA-approved robotic radiosurgery system (Cyberknife, Accuray Inc, Sunnyvale, CA) on the market, therefore the report is often vendor-specific. Technologies which became available in the clinic after the report was submitted for review (e.g. IRIS collimator, XSight lung tracking) were not included.

Major Highlights: Each individual Cyberknife component will be discussed, with reference to applicable AAPM reports and additional QA recommendations if necessary. We also highlight areas in which a good QA approach has not yet been developed. Those include the QA of the imager systems, but also periodic QA of individual beam pointing accuracy. The second section, QA for integrated systems, explains how the various subsystems interact, and how to design a QA program for the feedback loops. Similar to the individual component QA, there are areas in the integrated systems QA where more work needs to be done. This includes e.g. QA of the interaction between image quality and tracking algorithm accuracy, and individual beam pointing QA for non-isocentric plans. The Task Group's recommendations on patient-like and individual patient QA are also included. The report summarizes daily, monthly, annual and special considerations (software and hardware upgrades, earthquakes, etc).

Report as it relates to TG-100: This report is intended to give QA recommendations based on the philosophy of TG-40. The QM approach to robotic radiosurgery will have to be adapted to the TG-100 philosophy after its publication, which includes the data collection for a FMEA analysis for this relatively new technology.

Implementation Plan: The recommendations of TG-135 should be critically evaluated by the site physicist after the report is published. Changes to the existing QA program should be made at the next scheduled incidence (i.e. changes for the annual QA at the next annual QA). Robotic radiosurgery is a fast-evolving field, therefore keeping informed through reading peer-reviewed literature and attending CE programs on QA is essential.

Timeline for Report Release: At the time of abstract submission, TG-135 was undergoing the second revision within its subcommittee, with the goal of being submitted to the TPC for review and a publication in summer/fall of 2009.

Learning Objectives:

1. Be aware of the estimated publication date for the report, report structure, and implementation plan.
2. Understand the difference between individual component QA and integrated systems QA.
3. Know which areas of robotic radiosurgery QA are still under development.
4. Anticipate the future change of QA philosophy for robotic radiosurgery with TG-100.