



Contribution ID: 17

Type: Oral

Dosimetric accuracy verification of treatment plans generated during online adaptive radiotherapy

Thursday, 27 October 2022 13:55 (10 minutes)

Purpose

When performing online adaptive radiation therapy (ART), dosimetric measurements of the treatment plan of the day with the aid of a phantom before applying the dose to the patient is not possible. Typically, a dose recalculation with an independent system is done in this situation. In order to verify the accuracy of the dose distributions delivered by these online ART plans, for a series of indications and treatment techniques phantom measurements were performed retrospectively.

Methods

35 plans (10 Esophagus, 10 Lower esophagus, 10 Prostate, 5 Rectum with in total 20 IMRT and 15 VMAT plans) of 7 different patients generated during online adaptive sessions on the Ethos system were calculated and applied to the cylindrical Delta4 phantom. The measured and calculated dose distributions were compared with the gamma method using the following criteria: 3% dose difference (global), 3 mm distance to agreement, 20% dose threshold.

Results

The mean gamma passing rate over all cases was 98%. The lowest passing rate was 95.8% and was found for an IMRT plan treated in the Esophagus region. Mean passing rates for the different indications and techniques were found as follows: 96.1%, 100% for Esophagus (IMRT, VMAT), 99.9%, 100% for Lower esophagus (IMRT, VMAT), 100%, 99.9% for Prostate (IMRT, VMAT) and 100% for Rectum (IMRT).

Conclusion

For the new treatment modality, online ART at the Ethos system, we demonstrated the accuracy of the dose distributions delivered by plans generated during the online ART session, with the aid of phantom measurements for different indications and two different treatment techniques (IMRT and VMAT).

Primary authors: SCHMIDHALTER, Daniel (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.); HENZEN, Dominik (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.); HEMMATAZAD, Hossein (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.); SHELAN, Mohamed (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.); AEBERSOLD, Daniel M. (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.); FIX, Michael K. (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.); MANSER, Peter (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.)

Presenter: SCHMIDHALTER, Daniel (Division of Medical Radiation Physics and Department of Radiation Oncology, Inselspital, Bern University Hospital, and University of Bern, Bern, Switzerland.)

Session Classification: Session II: Radiobiology, Radiomics, Adaptive RT

Track Classification: Radiation Therapy