AbstractID: 14114 Title: In-silico verification of RapidArc using Swiss Monte Carlo Plan

Purpose: Nowadays, patient specific quality assurance (QA) for RapidArc treatments is performed by pre-treatment verification based on measured dose distribution within phantoms. This procedure is well-established in clinical practice for IMRT and IMAT verification. However, the procedure is in principle a mixture of machine and patient specific QA and lacks of the fact that linac treatment time is needed. We believe that instead of performing the patient specific QA on the machine the QA could be realized using computers, which is referred to as in-silico verification of RapidArd treatments. The aim of this work is to use the Monte Carlo (MC) method as an in-silico verification of RapidARc treatments. **Method and Materials:** We extended and modified our in-house developed Swiss Monte Carlo Plan (SMCP) such that dose distributions for RapidArc treatments on the Novalis TX can be calculated. Several methods were developed in order to calculate dose distributions within reasonable computing time. The validation of this approach is performed by comparing MC calculated dose distributions with measured dose distributions for open as well as RapidArc treatment fields. The usefulness of this verification approach is shown by comparing MC calculated dose distributions within the patient with corresponding dose distributions using Eclipse (Varian Medical Systems). **Results:** The measured and SMCP calculated dose distributions are in good agreement for open as well as for RapidArc treatment fields. In general, the agreement between SMCP and AAA calculated dose distributions is also good. However, due to the presence of inhomogeneities in the patient anatomy, the AAA typically overestimates the mean PTV dose and underestimates the dose for organs-at-risk. **Conclusion:** In this work, SMCP was used for in-silico verification of clinical RApidArc treatment fields. The results demonstrate the usefulness and the efficiency of this approach. **Conflict of Interest:** This work was supported by Varian Medical Systems.