

AbstractID: 9178 Title: Applying imaging detector data for daily monitoring of dose output in helical tomotherapy

Background and Purpose : In Tomotherapy dose is dependant on the output and shape of the beam ('cone'). Variations in these can have huge influences on IMRT-treatments and daily monitoring is required, but time consuming using conventional methods.

Material and Methods : A software package was developed to run independently on the system and retrieve the integrated CT-detector and dose-chamber data. The ability to monitor daily output changes was tested by using static fields and ionization chamber(IC). To validate the link between output, cone and daily patient QA a dedicated IMRT-plan containing disjunctive targets was used and a regression model was built to check the effect variations of cone and output have on this.

Results : Results show that the in-house tool can be used to monitor output and cone shape on tomotherapy in a fast and reliable way. Furthermore, the system has the ability of separating effects of output and cone in one single measurement. The static beam measurements using IC show a correspondence within 2% after elimination of the cone effect. Using a 6D-linear regression the software can predict IMRT-ionization chamber measurements within 0.7%. Early results show that the model's instabilities model could predict problems such as target failure prematurely

Conclusion : The in-house developed software tool based on direct detector and dose-chamber monitoring can be used to monitor output- and cone-variation in 1 procedure. By using a regression the tool can also replace IMRT-QA measurements. Combined, this allows for daily QA-time reduction from 50 to 5 minutes.