Carlo dose engine for Cyberknife offered by SciMoCa and to report on the clinical utility of the SciMoCa model for MLC by benchmarking it with our standard patient-specific QA procedure for 100 patients.

Material and Methods

A beam model was developed by SciMoCa based on the standard commissioning data set for the Cyberknife treatment planning system. The beam model was validated by comparing measured and calculated output factors (OFs), percentage depth dose curves (PDDs), off-centre ratios (OCRs) and a set of clinically relevant, irregular and off-axis MLC segments. For the clinical evaluation, treatment plan files of 100 consecutive patients were re-calculated using the SciMoCa dose engine. In parallel, our standard procedure for patient specific-QA was carried out by overlaying the beams on a slab phantom for SRS1000 (PTW, Germany) measurements. The measurements and SciMoCa re-calculations were analysed respectively by 2D and 3D gamma analysis. Clinical results were evaluated with 3% dose difference (DD) and 3 mm distance to agreement (DTA). For the purpose of this study the data was re-evaluated using for measurements and re-calculations 2%/1 mm gamma criteria.

Results

The agreement between measured and modelled beam data is shown in table 1 and is mostly within 2%.

Altogether, 5 QA plans that were measured with the SRS1000 failed the 90% pass rate using 3%/3mm criteria. All failures were attributed to measurement problems and inaccuracies and were clinically approved. Re-evaluation of the measurements with tighter criteria of 2%/1 mm resulted in 17 failed plans, 16 of which were attributed to measurement inaccuracies. However, one was identified to have a problem in the plan calculation. Independent of the measurements, the SciMoCa recalculations identified only 1 failed plan with the tight criteria of 2%/1 mm. Both in measurements and recalculations the same plan failed the criteria.

Table 1: Agreement between measured and modelled data, averaged over three collimators and two Cyberknife systems. The largest deviations in PDD are correlated to the smallest field sizes and are within 5%.

	OF	PDD	OCR (0.5 mm DTA)
<1%	81%	26%	84%
<2%	97%	76%	100%

Conclusion

A commercially available 3D dose re-calculation for individual Cyberknife MLC plan QA has been successfully implemented in the clinic, replacing time-consuming SRS1000 measurements, with fewer false alarms and similar sensitivity.

EP-1768 A Feasibility Study of EPID-Based In-Vivo Dosimetry System in Machine Specific Quality Assurance

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Purpose or Objective

The main purpose of this study was to evaluate performance of iViewDose (Elekta AB, Stockholm, Sweden) in machine-specific quality assurances.

Material and Methods

Measurement were carried out on Versa HD linear accelerator (Elekta AB, Stockholm, Sweden) using iViewDose Version 1.0.1 EPID-based in-vivo dosimetry tool. In this study, three sets of measurement were performed for 6 MV and 6 MV-FFF photon beams. In the first step, the output factor correction as a function of the photon beam field size were measured with iViewDose system, then results were compared with the beam commissioning data. In the second step, measured and calculated percentage depth dose differences between iViewDose and beam commissioning data at the depth of 1.5, 5, 10 and 15 cm were evaluated. In the last step, linear accelerator dose calibration was set to cause a dose differences of 2% and %4 to evaluate the sensitivity of iViewDose in detecting dose calibration errors in daily check.

Results

The measured and calculated output factor comparison between iViewDose and beam data commissioning was illustrated in Figure 1. It was found that the results were compatible with in 1% for all field sizes and photon energies. The percentage depth dose differences were generally maintained within 3% until the depth of 10 cm. However, the deviations increase up to 6% at the depth 15 cm. In the last step of measurement, the output differences for 2% and 4% was detected as 2.25% and 4.25% for 6 MV, 2.25% and 4.4% for 6 MV-FFF, respectively.

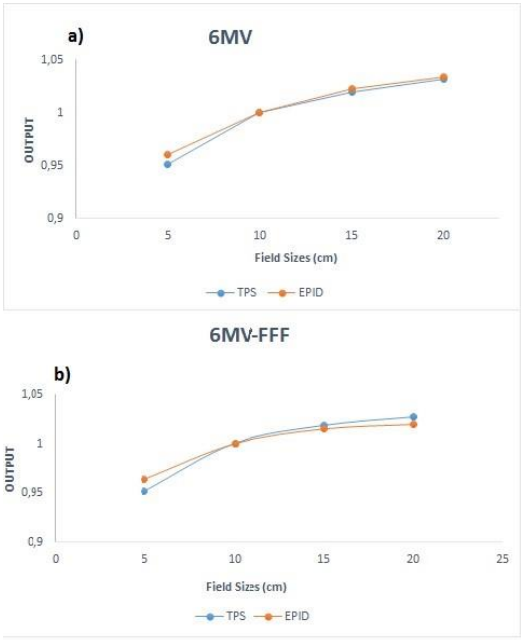

Figure1.The measured and calculated output factor comparison between iViewDose and beam data commissioning

Conclusion

The EPID-based iViewDose tool proved to be a useful in daily check of output correction factors for different field size, depth dose at reference point and dose calibration constancy of linear accelerator.

EP-1769 Pre-treatment VMAT verification with SunCHECK Fraction 0 and Varian Portal Dosimetry - a comparison

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Purpose or Objective

Varian Portal Dosimetry (PD) is routinely used for pre-treatment VMAT verification in our clinic. We are considering replacing this system with SNC SunCHECK Fraction 0 (FZ), and want to explore the difference between the two systems.

Material and Methods

36 clinical VMAT plans with a total of 70 arcs were evaluated using FZ and PD, on a Varian Clinac with the aS1000 EPID (46 arcs) and a Varian TrueBeam with the