planning systems: Varian’s Eclipse for extracranial treatments and with Brainlab’s iplan for intracranial treatments.

**Results:** Output factors of 1000 SRS agreed with semiflex measurements for field size between 3x3 cm² and 10x10 cm². The larger deviations were observed for the 1x1 cm² field size: compared to microDiamond, deviations of 1.6%, 2.5%, 1.7% and 3.3% were observed for 6, 10 MV FF and 6, 10 MV FFF respectively. For the 2x2 cm² field size, deviations were less than 1.5% for 6 MV FF and 6 MV FFF and 2.5% for 10 MV FF and 10 MV FFF. The 1000 SRS showed large dependent dose rate response. This effect was about 1% for 6, 10 MV FF and increased to 2.5% for 6 MV FFF and 4% for 10 MV FFF.

Stereotactic treatment plans gave excellent agreement with more than 95% of pixels passing 2%/2mm gamma criteria.

Conclusions: The 4D octavius phantom with associated 1000 SRS ionization chamber array could be used for stereotactic pretreatment QA of FF and FFF beams. It is however mandatory to calibrate 1000 SRS for a field size and a dose rate close to the patient treatment plan.

**EP-1407**

**Quality Assurance on Helical Tomotherapy Treatments with small target and high modulation factor using ArcCHECK**

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**Purpose/Objective:** When ArcCHECK (Sun Nuclear Corp., Melbourne, FL) is used for Quality Assurance (QA) on helical Tomotherapy treatment plans, Tomotherapy measurement mode is applied and there is no correction on diode response for field size dependency. It is recommended to use a standard size 40x5 cm² of Tomotherapy static beam for ArcCHECK absolute dose calibration. Under such dose calibration ArcCHECK measurement does not produce good result for helical treatment plan with small target (dimension < 3 cm) and high modulation factor (>2.5), with gamma passing rate (3% dose, 3 mm distance to agreement) normally below 85% in absolute dose comparison. During such helical treatment, there are fast and frequent movement of small number of MLC leaves while the gantry is rotating. It is similar to small field irradiation at many different gantry angles. Solid state diodes on the ArcCHECK are slightly energy dependent and more sensitive to low energy component of the treatment beam. As the energy spectrum of treatment beam changes for small field size, the sensitivity of the diodes changes correspondingly. In this work the ArcCHECK measurements were done on 10 helical Tomotherapy treatment plans with small target and high modulation factor, with ArcCHECK calibrated under standard field (40x5 cm²) and small field (2x2 cm²) treatment beam respectively to demonstrate if it is necessary to do small field dose calibration on ArcCHECK for such Tomotherapy treatment QA.

**Materials and Methods:** 10 helical Tomotherapy treatment plans, with small target size (dimension < 3 cm) and high modulation factor (>2.5), were used in the study. ArcCHECK absolute dose calibration was done initially with a standard field (40x5 cm²) and 0.057 cc ionization chamber (A15L, Standard Imaging Inc, Middleton, WI). Absolute point dose measurements were also done by placing A15L ionization chamber at the centre of the ArcCHECK with PMMA insert. After ArcCHECK measurement on these 10 helical treatment plans, absolute dose comparisons between the measurement and planning calculation were carried out with gamma test (3% dose, 3 mm). The measurements were repeated with ArcCHECK calibrated under small field 2x2cm². The difference between the responses of the chamber in the standard field and small field 2x2cm² was corrected in small field calibration.

**Results:** Absolute point dose measurements for all plans showed good agreement with planning calculation as the differences were all within ± 2%. When standard field size (40x5 cm²) calibration was used, the gamma passing rate of ArcCHECK measurements were below 85% (Mean=79.5%, S.D.=3.3%) for all plans. When small field (2x2cm²) dose calibration was used instead, the gamma passing rates for all plans were over 90% (Mean=93.7%, S.D.=1.8%).

**Conclusions:** Sensitivity of the diode changes for small irradiation field. Small field (2x2cm²) dose calibration on ArcCHECK should be used instead when measuring helical Tomotherapy treatment with small target and high modulation factor in order to correct such sensitivity change.

**EP-1408**

**Stereotactic Radiation Therapy (SRS/SBRT) pre-treatment QA: two different approaches**

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**Purpose/Objective:** Stereotactic radiation therapy (SRS/SBRT) require a more comprehensive quality assurance (QA) program than 3DCRT and IMRT (or VMAT), especially because of its very high-dose gradients. The purpose of this study is to test a IBA 3D dosimetry analysis package, COMPASS 3.0 with MatriXXEvolution ion chamber array, for SRS/SBRT pre-treatment verification in terms of 3D dose, gamma analysis, Target and OAR structures DVH.

**Materials and Methods:** Nine treatment plans (SRS/SBRT) with different dose fractionations have been selected: 3 brain cases (2 cases of 21Gy x 1 and one of 15Gy x 1), 3 liver cases (15Gy x 3) and 3 lung cases (2 cases of 15 Gy x 3 and one of 8 Gy x 4). All measurements, performed with COMPASS, were compared with the reference dose