

# PTW OCTAVIUS Detector 1600 SRS: Fast and user-friendly CyberKnife® QA

Regularly performed quality assurance (QA) is fundamental to ensure safe radiotherapy patient treatments. Especially CyberKnife® stereotactic treatments with small target volumes and high doses require extreme accuracy of dose delivery. The OCTAVIUS Detector 1600 SRS array is well suited for CyberKnife® QA!

The CyberKnife® system is a high precision robotic radiosurgery device that is used for those kinds of patient treatments. Quality assurance measures recommended for CyberKnife® comprise multiple measurements that have to be performed regularly, such as patient-specific QA, Iris QA, or the Laser and Radiation Coincidence Check. To ensure a fast and user-friendly workflow in clinical routine, it is crucial to use appropriate measurement equipment. The OCTAVIUS Detector 1600 SRS is

a liquid-filled ionisation chamber array with a detector spacing of 2.5 mm and a maximum field size of 15 x 15 cm<sup>2</sup>. Because of its high resolution, large field size and negligible angular dependence, this detector array is well suited for CyberKnife® QA (Figure 1).

## Negligible angular dependence

The angular dependence of the OCTAVIUS Detector 1600 SRS was evaluated for two common CyberKnife® paths, the Head Path and the Body Path. The measurement results show that the angular dependence is quite small. Only for 90°, where the incident beam vector is perpendicular to the detector normal, is there a larger deviation.



Figure 1. Fast and simple workflow: CyberKnife® QA with OCTAVIUS Detector 1600 SRS.

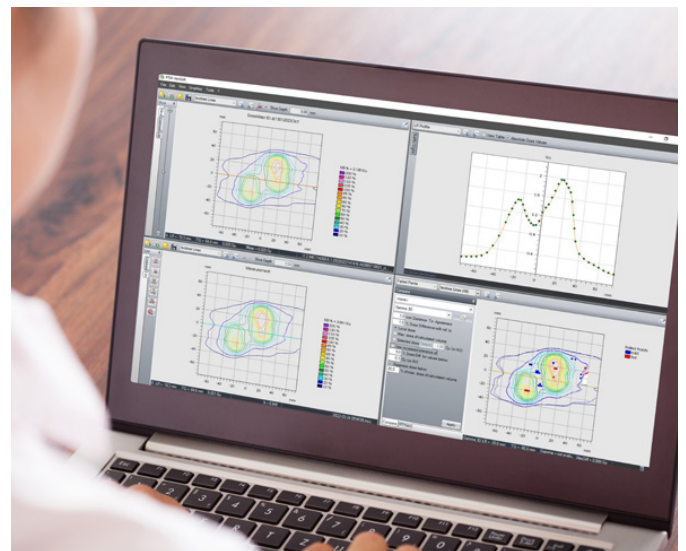


Figure 2. Evaluation of measurement results in VeriSoft® using the Gamma Index analysis with appropriate gamma criteria.

This deviation is negligible for normal treatment plans with many different radiation angles because the measured dose distribution will be the sum of all irradiated nodes. The low angular dependence of the detector array

allows the user to accurately perform patient-specific QA measurements at the CyberKnife® system.

### Patient-specific quality assurance

To perform patient-specific QA, PTW offers a CyberKnife® marker plate with integrated fiducials. This makes the measurement setup feasible for the automatic alignment of the CyberKnife® imaging system. The setup for patient-specific QA measurements is fast and simple, requiring only a few RW3 plates for backscattering and the OCTAVIUS Detector 1600 SRS along with the CyberKnife® marker plate.

After creating a CT scan of the measurement setup and calculating the plan to be measured on this CT, the reference dose distribution can be exported and the patient QA plan can be stored as a deliverable plan. After cross-calibration, the patient plan can be irradiated and then analyzed in the VeriSoft® software using the gamma criterion (Figure 2).

### Iris QA

The OCTAVIUS Detector 1600 SRS is also a useful tool to test the different field sizes of the CyberKnife® iris collimator. The same measurement setup as for patient-specific QA can be used. To carry out the test, QA plans with one beam perpendicular to the OCTAVIUS Detector 1600 SRS have to be created for all selectable field sizes of the collimator system. The CyberKnife® will be automatically aligned using the fiducial information of the CyberKnife® marker plate, and the QA plans can then be irradiated. For the evaluation of the measurement, the included BeamAdjust software can be used to analyze the field size on the main axes and the diagonals. Additionally, it is possible to compare the isodose distribution of reference data with the actual measurement using VeriSoft®.

### Laser and Radiation Coincidence Check

Another regularly performed QA task is to check the coincidence of the collimator laser and the collimator beam axis. To perform this check, the OCTAVIUS Detector 1600 SRS will be irradiated from two different heights and the central axis deviation can be evaluated using BeamAdjust.

With its fast and easy measurement setup, the OCTAVIUS Detector 1600 SRS is well suited for machine QA, particularly for Iris QA and the Laser and Radiation Coincidence Check. The negligible angular dependence of the array makes it an ideal device for CyberKnife® patient-specific QA. To learn more about the CyberKnife® QA workflows using the OCTAVIUS Detector 1600 SRS, read our brochure. Further information about the OCTAVIUS Detector 1600 SRS can be found on our website.

### References:

- [1] <https://www.ptwdosimetry.com/en/products/octavius-detector-1600-srs/?type=3451&downloadfile=1947&cHash=4853a34d5c606224a7621ce9872dd11b>, last access 26/11/2022 10:48 CET
- [2] <https://www.ptwdosimetry.com/en/products/octavius-detector-1600-srs/>, last access 26/11/2022 10:48 CET



**Nicole Brand** is a medical physicist and product manager at PTW Freiburg. Before joining PTW, she worked as a clinical physicist at Schwarzwald-Baar Klinikum Villingen-Schwenningen where she was, among other things, responsible for quality assurance of the CyberKnife® System.



**Christian Albrecht** brings extensive experience in clinical medical physics. Since 2014, he has been working as a medical physicist at the CyberKnife® Zentrum Süd of the Schwarzwald-Baar Klinikum Villingen-Schwenningen, where he is responsible for the quality assurance programme of the CyberKnife® System.



**Britta Loutfi-Krauß** has been employed as a medical physicist at CyberKnife® Center Süd of Schwarzwald-Baar Klinikum Villingen-Schwenningen since 2018. She has extensive prior experience in clinical physics gained at Goethe University Frankfurt am Main and Saphir Radiosurgery Center Frankfurt am Main.