

AbstractID: 2769 Title: The DAVID system – a device for in-vivo verification of IMRT and conformal irradiation techniques

Purpose: While dosimetric plan verification ensures consistency between planned and measured dose distributions in the pretreatment phase, a daily *in-vivo* verification of the beam profiles by a radiation detector positioned at the entrance side of the patient has not been clinically available so far.

In this work we present the DAVID system which is able to perform a daily *in-vivo* verification of IMRT beams in front of the patient during the treatment.

Method and Materials: The DAVID system is a flat, translucent multi-wire ionization chamber. It is placed in the accessory holder of the linear accelerator. Each detection wire of the chamber is positioned exactly in the projection line of two opposing leaves of the MLC. The measurement signal of each detection wire is directly proportional to the opening of the leaf pair. Therefore the number of measurement channels equals the number of leaf pairs. After a successful dosimetric verification of an IMRT plan, the values measured by the DAVID system are stored as reference values. During daily treatment the signals are re-measured and compared to the reference values. In case of a deviation beyond a threshold a warning occurs.

Results: The error detection capability for a 1 cm x 1 cm field is a leaf position error of less than 0.5 mm. The inherent limit due to electronic noise of the chamber is 1mm for a 20 cm x 20 cm field (all values related to the isocenter).

Conclusion: Clinical examples demonstrate that the DAVID system is a relevant tool to improve the reliability of IMRT treatments. Because the DAVID system operates as an ionization chamber, disadvantages which might be observed in other devices, such as aging, are not to be expected.

Conflict of Interest: This work was performed in collaboration with PTW-Freiburg Dr. Pychlau GmbH, Freiburg, Germany.