

AbstractID: 4798 Title: Investigation of effects of magnetron replacement on a helical tomotherapy unit

**Purpose:** To quantitatively evaluate the physical effects of magnetron replacement on a Helical TomoTherapy system (TomoTherapy Inc., Madison, WI, USA)

**Methods and Materials:** A Helical TomoTherapy (HT) (TomoTherapy Inc., Madison, WI, USA) is in clinical use at our institutions. Due to various design, engineering and manufacture issues, the magnetron (e2v Technologies, Essex, UK) used on HT system needs to be replaced some times during unit maintenance or repairing. The magnetron provides microwave power to LINAC accelerator and thus its output has direct effect on the LINAC beam quality and subsequent dosimetry characters. In this work, the effect of replacing a magnetron on HT system is investigated. A Tomo water tank, 8 channel Tomo-Electrometer and X1S1 ion chambers (Standard Imaging Inc., Middleton, WI, USA) are used to measure beam output, beam PDD curves and profiles before and after the magnetron replacement.

**Results:** The central axis output of the machine is found to be about 2% lower compared to measurement before magnetron replacement. Both transverse and longitudinal beam profiles at various depths are found to be in a very good agreement before and after magnetron replacement, as was the central axis percentage depth (PDD) curves for various available jaw sizes (5 cm, 2.5 cm and 1 cm).

**Conclusions:** Magnetron is a major part of a LINAC system and its replacement should be checked carefully. In this study, a series of measurements are performed to compare the machine beam properties before and after magnetron change. It is shown that the central axis output changes about 2%, and no significant change is found on beam profiles and PDDs before and after magnetron replacement.