

AbstractID: 3179 Title: Evaluation of a commercial diode array (Tomodose) for Tomotherapy beam profile measurements

Purpose:

Tomodose, a commercial diode array (Sun Nuclear Corporation, Melbourne, FL) is used to measure the radiation field in a Tomotherapy Hi* Art linear accelerator. The performance of Tomodose is evaluated by comparing the diode measurements with (i) ion chamber based water tank measurements and (ii) data from an on-board ion chamber array mounted opposite the linac.

Method and Materials:

Tomodose has an active area that is rectangular (530 mm by 96 mm) to cover to the maximum field size (50 mm by 400 mm) of the tomotherapy beam. A total of 223 diodes allow a measure of the lateral and longitudinal beam profiles on the central axis and longitudinal profiles 50, 100, and 150 mm off-axis. Both central axis profiles were compared with ion chamber data obtained in a water tank during an annual quality assurance test. Over a period of about seven weeks, the central axis lateral profile was monitored and compared with profile measurements obtained using the treatment machine's on-board detector system.

Results:

Tomodose measurements agreed well with the ion chamber data. A repeated measurement of the lateral profile revealed subtle changes in this profile. Identical trends in profile change were independently measured using an on-board detector array system. These changes were used for diagnosis of the system's components and can be used to provide early signs of component wear and tear.

Conclusion:

Tomodose is accurate and can be used for regular, e.g. monthly, monitoring of the beam profiles. It is sensitive to subtle changes in the profile that may be used to provide early warning signs of developing problems.

Conflict of Interest:

Two of the co-authors are employees of Tomotherapy, Inc. .