Purpose: An evaluation of a commercially available 2D array for monthly and annual linear accelerator QA.

Methods: The 2D-ARRAY seven29 (PTW, Freiburg, Germany) is a two-dimensional ion chamber array, consisting of 729 (27 x 27) vented ion chambers, with separately housed evaluation electronics. The parallel-plate chambers are 5 x 5 x 5 mm in size, and have a center to center spacing of 10 mm. To increase resolution, the array can be shifted three times in increments of 5 mm, and the resulting 2916 measurement points can be summed into one image.

The array was placed under 10 cm of water-equivalent material, and irradiated to evaluate: flatness and symmetry, static MLC positioning, dynamic MLC positioning, and output. It was also irradiated without any buildup for the light field and radiation coincidence test. All deliveries were completed using a Varian 2100 C/D linear accelerator with a Millennium-80 MLC. For improved accuracy, the static and dynamic MLC fields were delivered 4 times each, and were then summed using the “merge” function in the PTW VeriSoft software.

Results: Over one month of data acquisition, output fluctuated less than 2%. For light field and radiation coincidence, reproducibility is excellent, with a maximum of 1% variation in asymmetric jaw settings. When using the “merge” function on dynamic MLC measurements, results were less than 4% for transmission and 0.5 mm for positioning errors. Measurements for flatness and symmetry and static MLC positioning also had good reproducibility.

Conclusions: The PTW 2D-Array seven29 can be used to evaluate many areas of monthly linear accelerator QA. Particularly in light of the trend for departments to go filmless, it is a viable alternative for obtaining flatness and symmetry, static and dynamic MLC positioning, light field and radiation coincidence, and for measuring output.

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