

Purpose:

The MatriXX Evolution 2D ionization chamber array is one of the 2D ionization chamber arrays developed by IBA dosimetry (IBA Dosimetry, Germany) for megavoltage real-time absolute 2D dosimetry, verification of intensity-modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT). We have recently shown that this 2D ionization chamber array can be used for HDR brachytherapy Ir-192 beam dose verification. The aim of this work is to investigate the use of the movie mode of the MatriXX Evolution for measurement of transit dose of the Ir-192 source of a Nucletron Micro-Selectron HDR brachytherapy unit.

Methods:

The MatriXX Evolution measurement can be performed in different measurement modes depending on the measurement situation. For megavoltage dynamic field measurement the 2D ionization chamber array is equipped with movie mode to perform measurements continuously. During this measurement each single shot is saved and can be viewed, played as a movie, or analyzed afterwards. The integration time for each sample or movie image can be varied by the user with the shortest sampling time being 20 ms. This dynamic mode measurement of the MatriXX Evolution was used to measure the entrance, exit and the inter-dwell transit dose of the HDR source.

Results:

At a fixed point of measurement, the transit dose depends on the radioactive source strength and velocity along the trajectory. The transit dose measured with MatriXX Evolution movie mode has been found to be consistent with that already presented by other dosimeters.

Conclusions:

The feasibility of using a 2D ionization chamber movie mode in determining the transit dose of HDR stepping source is explored in the present work. Results of this investigation show that 2D ionization chamber movie mode can be used to measure transit dose.