Verification in the water phantom of the irradiation time calculation done by the algorithm used in intraoperative radiotherapy

Maria Słyk, Marcin Litoborski

A B S T R A C T

Aim: The investigation of the irradiation time calculation accuracy of the GGPB algorithm used for IORT.

Background: Conventionally, breast conserving therapy consists of breast conserving surgery followed by postoperative whole breast irradiation and boost. The use of intraoperative radiotherapy (IORT) enables the boost to be delivered already during the surgery. In this case, the treatment dose for IORT can be calculated by use of General Gaussian Pencil Beam (GGPB) algorithm, which is implemented in TPS Eclipse.

Materials and methods: PDDs and OFs for electron beams from Mobetron and all available applicators were measured in order to configure the GGPB algorithm. Afterwards, the irradiation times for the prescribed dose of 3Gy were calculated by means of it. The results of calculations were verified in the water phantom using the Marcus ionization chamber.

Results: The results differed between energies. For 6MeV the irradiation times calculated by the GGPB algorithm were correct, for the energy of 9MeV they were too small and for the energy of 4MeV they were too large for applicators with smaller diameters, while acceptable for the remaining ones.

Conclusion: The GGPB algorithm can be used in intraoperative radiotherapy for energy and applicator sets for which no significant difference between the measured and the prescribed dose was obtained. For the rest of energy-applicator sets the configuration should be verified and possibly repeated.

Keywords: GGPB algorithm, Algorithm configuration, Algorithm verification, IORT