New design of the Valencia applicators to reduce radiation leakage

The Valencia applicators are designed to treat skin lesions with the microSelectron-HDR afterloader. Although the radiation is highly directed to the treatment area, radiation might leak through the backside of the applicator.

The complete geometry of the new applicators has been introduced in the Monte Carlo code GEANT4. The materials, dimensions of the applicators and Monte Carlo methodology (cut-off energy, physics processes used) have been the same as the study of Granero et al [1] for the Valencia applicators. Dose rate distributions have been scored in a 3D fashion using a grid of 200×200×200 cubic cells with 0.5 mm in side. In the simulations, Kerma in air and kerma in water have been scored in order to speed up the simulations. The linear track length kerma estimator has been used to obtain kerma.

Kerma in the water phantom and kerma in air outside the phantom have been evaluated to estimate the radiation leakage of the new designed Valencia applicators.

The complete geometry of the new applicators has been introduced in the Monte Carlo code GEANT4. The materials, dimensions of the applicators and Monte Carlo methodology (cut-off energy, physics processes used) have been the same as the study of Granero et al [1] for the Valencia applicators. Dose rate distributions have been scored in a 3D fashion using a grid of 200×200×200 cubic cells with 0.5 mm in side. In the simulations, Kerma in air and kerma in water have been scored in order to speed up the simulations. The linear track length kerma estimator has been used to obtain kerma.

Kerma in the water phantom and kerma in air outside the phantom have been evaluated to estimate the radiation leakage of the new designed Valencia applicators.