

AbstractID: 12908 Title: CT-based 3D planning using non-CT compatible Ring and Tandem brachytherapy applicator

Purpose: 3D treatment planning using non-MR/CT compatible Ring and Tandem gynecologic brachytherapy applicators requires development of a 3D reconstruction procedure. Applicator geometry is usually simulated through the acquisition of two orthogonal images with kilovoltage equipment (fluoroscopic unit or portal device) and subsequent manual digitization. In addition, the patient undergoes CT simulation to rule out bladder perforation but these data are not used for planning. This work reports on a reconstruction method for non-CT compatible applicators that allows for the use of CT-based 3D planning.

Method and Materials: The commissioning process involves imaging both ring and tandem applicators with dummy wires inserted. These images are used to ascertain the distance between the applicator tip and the middle of the last dummy source in both applicators. The middle of the last dummy source corresponds to the absolute distance from the plate of the HDR afterloader measured during the initial commissioning of the applicator. The 3D reconstruction procedure is performed on the patient CT data with inserted applicator. Once a suitable coordinate system is chosen, the catheters can be defined for both channels using the commissioning data for the last dummy' position.

Results: The developed method provides time efficient 3D treatment planning using only the CT data of the patient. It allows one to eliminate an extra step in patient imaging and digitization process, thus minimizing patient's exposure to additional radiation sources.

Conclusions: We have developed a method for 3D reconstruction of non-CT compatible HDR ring and tandem applicators using patient specific CT data. The developed method allows one to plan the dose delivery to the patient without time consuming digitization process usually employed with these types of applicators.