

TomoTherapy® System Repositioning Accuracy According to Treatment Localization

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Abstract : We analyzed the image-guided radiotherapy method used by the TomoTherapy® System (Accuray Corp.) for patient repositioning in clinical routine. The TomoTherapy® System computes X, Y, Z and roll displacements to match the reference CT, on which the dosimetry has been performed, with the pre-treatment MV CT. The accuracy of the repositioning method has been studied according to the treatment localization. For this, a database of 18774 treatment sessions, performed during 2 consecutive years (2016-2017 period) has been used. The database includes the X, Y, Z and roll displacements proposed by TomoTherapy® System as well as the manual correction of these proposals applied by the radiation therapist. This manual correction aims to further improve the repositioning based on the clinical situation and depends on the structures surrounding the target tumor tissue. The statistical analysis performed on the database aims to define repositioning limits to be used as security and guiding tool for the manual adjustment implemented by the radiation therapist. This tool will participate not only to notify potential repositioning errors but also to further improve patient positioning for optimal treatment.

Keywords : accuracy, IGRT MVCT, image-guided radiotherapy megavoltage computed tomography, statistical analysis, tomotherapy, localization

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