

ADAPTIVE RADIATION THERAPY METHOD USING CONE BEAM COMPUTED TOMOGRAPHY

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There are situations at prolonged treatment when patient loses weight, tumor changes its size or new lesions appear. In this case adaptive radiation therapy (ART) is necessary. This concept takes into account the changes of patients' parameters and involves the recalculation of the treatment plans using new set of images. In this phantom study the ART method with using cone-beam computed tomography (CBCT) was developed.

CBCT doses for head and neck, chest and pelvis sites were calculated for small and big size of the heterogenic phantoms [1]. Deviation between the calculated CBCT doses and the reference doses was determined. The long-term stability of the ratio between Hounsfield Units and Relative Electron Density (HU-RED) for CBCT was investigated [2].

The deviation of the average dose in the target, for the plans on the CBCT with HU-RED for corresponding size and protocol, from the reference dose was less than 0.5 % and 1.5 % for pelvis and head and neck, respectively. For lung the deviation of the average dose in the target is 2 % from the reference dose only using the methods of the HU-RED correction.

HU-RED curves for XVI Elekta Synergy have good long-term stability.

The ART method using the CBCT was developed using X-Ray Volume Imaging (XVI) Elekta Synergy. This method allows to estimate consequences of pediatric patients' anatomy changes and to recalculate new radiotherapy plans without additional scanning on the computed tomography (CT).

1. Dunlop A., McQuaid D., Nill S. et al. Comparison of CT number calibration techniques for CBCT-based dose calculation. // *Strahlentherapie und Onkologie*. 2015. V. 191. P. 970-978.
2. Rong Y., Smilowitz J., Tewatia D. et al. Dose calculation on kv cone beam CT images: An investigation of the HU-Density conversion stability and dose accuracy using the site-specific calibration. // *Medical Dosimetry*. 2010. V. 35. I. 3. P. 195-207.

The speaker is a student or young scientist

No

Section

1. Nuclear technology and methods in medicine, radioecology

Primary author: Dr LISOVSKAYA, A.

Presenter: Dr LISOVSKAYA, A.

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