

THE METHOD FOR VISUALIZATION QUALITY ASSESSING FOR THE OBJECTS IN POSITRON EMISSION TOMOGRAPHY IMAGES

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Dosimetric planning of radiation treatment using positron emission tomography (PET) images is a promising area that has received special attention in recent years [1]. The PET/CT method makes it possible to improve the accuracy of determining the boundaries of the irradiation volume. However, the use of PET images for radiotherapy planning complicates the low spatial resolution (compared to CT and MRI), as well as respiratory movements, which affect the formation of contours and volumes of pathological foci of radiopharmaceutical accumulation [2]. The technological process in conditions of high throughput of the PET department does not allow performing each examination using synchronization with the respiratory gating system.

To assess the effect of respiratory movements on image characteristics, the authors developed a device consisting of a movable platform and a water-filled phantom installed on it with six spheres installed inside with diameters of 37 mm, 28, 22, 17, 13, 10 mm. The phantom and spheres were filled with ^{18}F -FDG in a ratio of 1/6 (background volume activity/volume activity in the spheres). 8 cycles of phantom scanning (4 in static, 4 in dynamic states) were performed on PET/CT DISCOVERY IQ. Each of the spheres was compared in static and dynamic positions of the phantom according to PET images. Contouring was performed using a color gradient at levels of 80%, 70%, 50% of the maximum value of volumetric activity (kBq/ml).

Calculation of contoured volumes by PET image and comparison with nominal volumes were performed. The minimum error in calculating the volume for a sphere of 10 mm was achieved with contouring at the level of 50% of the maximum value of volumetric activity. However, the volume of spheres with a diameter of more than 10 mm was overestimated both in images obtained in static and dynamic positions.

1. The use of PET/CT in radiotherapy planning: contribution of deformable registration / E. Delikgoz Soykut [et al.] // *Frontiers in Oncology*. - 2013. - Vol. 3.
2. Use of PET and PET/CT for Radiation Therapy Planning: IAEA expert report 2006–2007 / M. MacManus [et al.] // *Radiotherapy and Oncology*. - 2009. - Vol. 91, No. 1. - P. 85-94.

The speaker is a student or young scientist

No

Section

1. Nuclear technology and methods in medicine, radioecology

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