

عنوان مقاله:

Impact of PET - CT motion correction in minimising the gross tumour volume in non-small cell lung cancer

محل انتشار:

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خلاصه مقاله:

AbstractObjective: To investigate the impact of respiratory motion on localization, and quantification lung lesions for the Gross Tumour Volume utilizing an in-house developed Auto3Dreg programme and dynamic NURBS-based cardiac-torso digitised phantom (NCAT). **Methods:** Respiratory motion may result in more than 30% underestimation of the SUV values of lung, liver and kidney tumour lesions. The motion correction technique adopted in this study was an image-based motion correction approach using, an in-house developed voxel-intensity-based and a multi-resolution multi-optimisation (MRMO) algorithm. All the generated frames were co-registered to a reference frame using a time efficient scheme. The NCAT phantom was used to generate CT attenuation maps and activity distribution volumes for the lung regions. Quantitative assessment including Region of Interest (ROI), image fidelity and image correlation techniques, as well as semi-quantitative line profile analysis and qualitatively overlaying non-motion and motion corrected image frames were performed. **Results:** the largest transformation was observed in the Z-direction. The greatest translation was for the frame 3, end inspiration, and the smallest for the frame 5 which was closet frame to the reference frame at 67% expiration. Visual assessment of the lesion sizes, 20-60mm at 3 different locations, apex, mid and base of lung showed noticeable improvement for all the foci and their locations. The maximum improvements for the image fidelity were from 0.395 to 0.930 within the lesion volume of interest. The greatest improvement in activity concentration underestimation, post motion correction, was 7% below the true activity for the 20 mm lesion. The discrepancies in activity underestimation were reduced with increasing the lesion sizes. Overlay activity distribution on the attenuation map showed improved localization of the PET metabolic information to the anatomical CT images. **Conclusion:** The respiratory motion correction for the lung lesions has led to an improvement in the lesion size, localisation and activity quantification with a potential application in reducing the size of the PET GTV for radiotherapy treatment planning applications and hence improving the accuracy of the regime in treatment of the lung cancer. Words count: 338

کلمات کلیدی:

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