

عنوان مقاله:

The influence of using different reconstruction algorithms on sensitivity of quantitative 18F-FDG-PET volumetric measures to background activity variation

محل انتشار:

مجله پزشکی هسته ای ایران، دوره 26، شماره 2 (سال: 1397)

تعداد صفحات اصل مقاله: 11

نویسندگان:

Ali Ketabi - *Department of Medical Physics and Biomedical Engineering, Tehran University of Medical Sciences, Tehran, Iran*/Research Center for Molecular and Cellular Imaging, Tehran University of Medical Sciences, Tehran, Iran

Pardis Ghafarian - *Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran*/PET/CT and Cyclotron Center, Masih Daneshvari Hospital, Shahid Beheshti

Mohammad Amin Mosleh-Shirazi - *Medical Imaging Research Center and Physics Unit, Department of Radiotherapy and Oncology, Namazi Hospital, Shiraz University of Medical Sciences, Shiraz, Iran*

Seyed Rabi Mahdavi - *Department of Medical Physics, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran*

خلاصه مقاله:

Introduction: This study aims to investigate the influence of background activity variation on image quantification in differently reconstructed PET/CT images. **Methods:** Measurements were performed on a Discovery-690 PET/CT scanner using a custom-built NEMA-like phantom. A background activity level of 5.3 and 2.6 kBq/ml 18F-FDG were applied. Images were reconstructed employing four different reconstruction algorithms: HD (OSEM with no PSF or TOF), PSF only, TOF only, and TOFPSF, with Gaussian filters of 3 and 6.4 mm in FWHM. SUVmax and SUVpeak were obtained and used as cut-off thresholding; Metabolic Tumor Volume (MTV) and Total Lesion Glycolysis (TLG) were measured. The volume recovery coefficients (VRCs), the relative percent error (Δ MTV), and Dice similarity coefficient were assessed with respect to true values. **Results:** SUVmax and SUVpeak decreased and MTV increased as function of increasing the background dose. The most differences occur in smaller volumes with 3-mm filter; Non-TOF and Non-PSF reconstruction methods were more sensitive to increasing the background activity in the smaller and larger volumes, respectively. The TLG values were affected in the small lesions (decrease up to 12%). In a range of target volumes, differences between the mean Δ MTV in the high and low background dose varied from -11.8% to 7.2% using SUVmax and from 2.1% to 7.6% using SUVpeak inter reconstruction methods. **Conclusion:** The effect of the background activity variation on SUV-based quantification in small lesion was more noticeable than large lesion. The HD and TOFPSF algorithms had the lowest and the highest sensitivity to background activity, respectively

کلمات کلیدی:

18F-FDG-PET/CT, Background activity, Image reconstruction, MTV, TLG

