Real Sociedad Española de Física

ID de la contribución : **304** Tipo : **Oral parallel contribution**

Impact of motion compensation and partial volume correction on 18F-NaF PET/CT imaging of coronary plaque

martes, 18 de julio de 2017 18:05 (20)

Background: Recent studies suggest that 18F-NaF PET enables visualization and quantification of plaque micro-calcification in the coronary tree. However, PET imaging of plaque calcification in the coronary arteries is challenging because of the respiratory and cardiac motion as well as partial volume effects. The objective of this work is to implement an image reconstruction framework, which incorporates compensation for respiratory and/or cardiac motion (MoCo) and partial volume correction (PVC), for cardiac 18F-NaF PET imaging in PET/CT.

Materials and methods: Realistic simulations (Biograph TPTV and Biograph mCT) and phantom acquisitions (Biograph mCT) were used. Different uptake values of the plaques (spherical shape, 4 mm diameter) were evaluated in the simulated datasets, with lesion-to-background ratios (LBR) of 10, 20, 50 and 70:1. The experimental phantom included three plaque-type lesions of 18, 31 and 36 mm3 respectively, with a LBR of 70:1. After validation of the MoCo and PVC methods, they were applied to four pilot 18F-NaF PET/CT patient studies. In all cases, the MoCo-based image reconstruction was performed using the STIR software [3]. The PVC was obtained from a local projection (LP) method, previously evaluated in preclinical and clinical PET [4]. We evaluated the noise in the image (measured in a background region) and the lesion-to-background ratio (LBR) values of the plaques, using the maximum (LBRmax) voxel value within the segmented plaque.

Results: After applying MoCo and PVC, LBRmax increased by 200% to 1110% in the simulated data, by 212% to 614% in the phantom experiments and by 14% to 188% in the plaques with positive uptake observed in the patients. Similar noise values were observed in all images, in contrast to the significantly higher noise observed when using respiratory or cardiac gating.

Conclusion: A combined MoCo and PVC approach for PET/CT imaging was implemented within the STIR reconstruction framework. The simulated datasets, experimental and patient data show significant improvement in the quantification of small coronary lesions when MoCo and PVC are taken into account.

Primary author(s) : Dr. CAL-GONZALEZ, Jacobo (QIMP group, Center for Medical Physics and Biomedical Engineering, Medical University of Vienna)

Co-author(s) : Prof. HACKER, Marcus (Division of Nuclear Medicine, Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna, Austria); Sr. LASSEN, Martin (QIMP group, Center for Medical Physics and Biomedical Engineering, Medical University of Vienna, Austria); Dr. RASUL, Sazan (Division of Nuclear Medicine, Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna, Austria); Prof. BEYER, Thomas (QIMP group, Center for Medical Physics and Biomedical Engineering, Medical University of Vienna, Austria)

Presenter(s) : Dr. CAL-GONZALEZ, Jacobo (QIMP group, Center for Medical Physics and Biomedical Engineering, Medical University of Vienna)

Clasificación de la sesión : Nuclear Physics II

Clasificación de temáticas : Nuclear Physics