

Clinical evaluation of the effect of attenuation correction technique on ^{18}F -fluoride PET images

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Objective: The purpose of this study is to evaluate effect of attenuation correction technique on ^{18}F -fluoride positron emission tomography (PET). **Methods:** We performed PET scans after the injection of 185 MBq ^{18}F -fluoride on 32 patients from October 20th, 2004 to April 13th, 2005. We calculated bone-to-muscle ratios for the images with and without attenuation correction. We placed regions of interest (ROIs) on normal bone accumulation in 22 patients. The exclusion criteria were bone metastasis, Paget's disease, and rheumatoid arthritis. Several regions were chosen for ROI placement: skull, cervical vertebra, mandible, scapula, thoracic vertebra, rib, humerus, lumbar vertebra, radius, ulna, pelvis, femoral head, femoral shaft, tibia, and fibula. The count ratios of normal bones to gluteus muscle were calculated as bone-to-muscle ratios. The count ratios of abnormal skeletal lesions to gluteus muscles were calculated as bone-to-muscle ratios, while the count ratios of abnormal skeletal lesions to normal bones were calculated as bone-to-bone ratios. **Results:** PET images without attenuation correction showed significantly higher mean bone-to-muscle ratios than those with attenuation correction ($p < 0.05$) for all normal bones except the femoral head and lumbar vertebrae. For abnormal bones, bone-to-muscle ratios without attenuation correction were significantly higher than those with attenuation correction ($p < 0.005$). The same statistical significance was found for bone-to-bone ratios ($p < 0.005$). **Conclusions:** The attenuation correction technique is not necessary to conduct the visual interpretation of ^{18}F -fluoride PET images. The bone-to-muscle ratio analysis without attenuation correction may be of use to differentiate malignant from benign disease processes.

Key words: ^{18}F -fluoride, PET, attenuation correction, bone-to-muscle ratio