別紙様式６

平成１９年度　博士課程学位論文要旨

学位論文題名（注：学位論文題名が欧文の場合は和訳をつけること）

An iterative reconstruction using median root prior and anatomical prior from the segmented μ-map for count-limited transmission data in PET imaging

中央値からの先験確率と領域分割したμマップからの解剖学的先験確率を用いたPETにおける計数値制限下でのトランスミッション用逐次近似画像再構成の開発

学位の種類：　博士（保健科学）
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Objective: Recently, whole-body PET examination has developed greatly. To reduce the overall examination time, the transmission scan has been increasingly shortened. Many noise-reduction processes have been developed for count-limited transmission data. Segmented attenuation correction (SAC) is one method by which the pixel values of transmission image are transformed into several groups. The median root prior-ordered subset convex (MRP-OSC) algorithm is another method that is applicable to control the noise level on the basis that the change of the pixel value is locally monotonous. This paper presents an alternative approach based on Bayesian iterative reconstruction technique incorporating a median prior and anatomical prior from the segmented μ-map for count-limited transmission data. **Methods:** The proposed method is based on the Bayesian iterative reconstruction technique. The median prior and anatomical prior are represented as two Gibbs distributions. The product of these distributions was used as a penalty function. **Results:** In the thorax simulation study, the mean square error from the true transmission image of the presented method (5.74×10^{-5}) was lower than MRP-OSC (6.72×10^{-5}) and SAC (7.08×10^{-5}). Results indicate that the noise of the image reconstructed from the proposed technique was decreased more than that of MRP-OSC without segmentation error such as that of a SAC image. In the thorax phantom study, the emission image that was corrected using the proposed technique displayed little noise and bias (27.42±0.96 kBq/ml, calculated from an ROI drawn on the liver of the phantom); it was very similar to the true value (28.0 kBq/ml). **Conclusion:** The proposed method is effective for reducing propagation of noise from transmission data to emission data without loss of the quantitative accuracy of the PET image.