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The Modified Linear Regression Method for Bone Metabolic Parametric Image in [18F] Fluoride PET

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Purpose : We suggest new modified linear regression(LR) method for [18F] Fluoride bone metabolic parametric image. On generating parametric image, voxel by voxel time activity curve has amount of noise and takes excessive calculation time. Graphical method is able to reduce the computation time, but be more sensitive to noise and time duration. In this paper, the modified linear regression is evaluated for the estimator of fluoride bone influx rate (Ki) compared with patlak graphical method. Methods: [18F] Fluoride dynamic PET scans was acquired for 60min in a normal minipig (12 month, 28kg) after intravenous injection of 10MBq. The plasma input curve was derived using blood sampling in femoral vein. For the analysis of region of interest (ROI), the tissue time activity curve was measured by drawing ROI from iliac crest. Three compartment model with 3 parameters was used to calculate Ki. Standard error of Ki was compared between two methods by time duration. Result : The estimated Ki and standard error at ROI were 0.0059/ 0.001 in modified LR and were 0.099/0.006, 0.104/0.005, 0.107/0.007 at 20min to 60min, 25min to 60min, and 30min to 60min in patlak method. The estimated standard error of the Ki parametric image was 0.0003 ± 0.0013 at whole region in modified LR and was 0.0022 ± 0.0053 from 25 to 60min in patlak method. Conclusion : The results show that the modified linear regression is computationally practical and robust method for Ki parametric image [18F]Fluoride PET.

Keywords : Linear Regression, [18F] Fluoride PET, Fluoride Bone Influx Rate