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Functional Radionuclide Imaging Algorithm Based on the Appended Curve Deconvolution Technique and its Use in the Diagnosis of Renovascular Hypertension

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Abstract: In this study, a new method called the pixel basis functional radionuclide imaging (PBFRI) algorithm based on the appended curve deconvolution technique, in order to be able to increase the medical diagnostic capability of a conventional gamma camera, is presented together with the clinical results. In the PBFRI method, retention function of each pixel is obtained from the renograms and cardiac curves generated by processing the filtered segments of the kidney and heart, using a special deconvolution method. The deconvolution operation is done by using the Fourier transform technique. High frequency artifacts presented by the Fourier transform are removed by using a novel method which is based on the use of the appended curves of raised cosine functions. The mean transit time (MTT) and the glomerular filtration rate (GFR) parameters are obtained from retention functions. Finally, the functional images related to MTT and GFR parameters are generated by pseudo coloring of different quantisation values in the range. Diagnosis of renal artery stenosis (RAS) is chosen as a clinical application of the proposed PBFRI method. It is shown that the PBFRI technique can be used as an alternative to existing digital subtraction angiography (DSA) in the diagnosis of RAS.

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