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QUANTITATIVE EVALUATION OF FATTY ACID METABOLISM USING ^{123}I-BMIPP DYNAMIC SPECT: COMPARATIVE STUDY BETWEEN ISCHEMIC AND DOXORUBICIN INDUCED CARDIOMYOPATHY BY THE RUTLAND METHOD.

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Quantitative assessment of ^{123}I-BMIPP dynamic myocardial SPECT was performed to compare the mechanism of fatty acid metabolic abnormality between ischemic heart disease(IHD) and doxorubicin-induced myocardial damage(DxMD). 25 pts with IHD, 40 pts with various malignancies administered doxorubicin (38-640 mg) and 36 control subjects were examined. Soon after an injection of ^{123}I-BMIPP(111 MBq), 30-sec dynamic SPECT data were acquired successively for 15 minutes. On shortaxial mid- ventricular slices of left ventricle(LV), region of interest was set in the ischemic segment in IHD or in the whole myocardium in DxMD for output function and in LV cavity for input function. Using the time-activity curves of the output function(Mo(t)) and the input function(B(t)), the Rutland equation was calculated. $Mo(t)/B(t)=F+K \int B(t)dt/B(t)$ (F; background subtraction factor, K; uptake constant). Mo(t)/B(t) was plotted against $\int B(t)dt/B(t)$. Mo(t)/B(t) showed a good linear correlation with $\int B(t)dt/B(t)$ from 30 sec to 210 sec in normal myocardium. The duration of this linearity was shortened less than 120 sec in IHD and prolonged up to 270 sec in DxMD. The mean K was 0.059±0.032 in IHD, 0.073±0.020 in DxMD and 0.092±0.027 in the controls, respectively. There was significant difference between IHD and the controls ($p<0.01$). These findings suggested that the metabolic abnormality of fatty acid was caused by increased back diffusion in IHD but decreased metabolic rate of BMIPP in DxMD. Analysis of ^{123}I-BMIPP dynamic SPECT data by Rutland method is useful in estimating the mechanical difference of the fatty acid metabolic abnormalities among various myocardial damages.

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THE ASSESSMENT OF MYOCARDIAL AUTONOMIC NEUROPATHY IN DIABETIC PATIENTS WITH THE RUTLAND ANALYSIS OF 123I-MIBG MYOCARDIAL DYNAMIC SPECT

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Autonomic neuropathy is one of the major complications in patients with diabetes mellitus. Diabetic cardiac autonomic neuropathy often causes lethal arrhythmia and sudden cardiac death. We perfomed Rutland analysis of I-123 MIBG myocardial dynamic SPECT to evaluate diabetic cardiac autonomic neuropathy Nineteen pts with diabetes mellitus were examined. Autonomic neuropathy was observed in 14 pts. Immediately after bolus injection of ^{123}I-MIBG, 30-sec dynamic SPECT data were acquired successively for 15 minutes. On short-axial mid-ventricular slices of left ventricle (LV), regions of interest (ROI) were set in the whole myocardium for output function and in LV cavity for input function. Using the time-activity curves of the output function (Mo(t))and the input function (B(t)), the Rutland equation was calculated. $Mo(t)/B(t)= F+ K \int B(t)dt/B(t)$ (F; background subtraction factor, K; uptake constant). Mo(t)/B(t) was plotted against $\int B(t)dt/B(t)$. This curve was composed of 2 linear compartments: initial steep up-slope (K1) phase lasting from 30 sec to 150 sec and second shallow up-slope or down-slope phase (K2) starting after 150 sec. K1 tended to be higher in pts with neuropathy than those without, but there was no significant difference (106.2±61.8 vs 65.2±38.5). By contrast, K2 was significantly lower in pts with neuropathy than those without (-3.09±8.42 vs 9.42±6.03; p=0.0075). These results suggested that rapid washout of MIBG occurred 2-3 min after injection in diabetic pts with neuropathy, which might be related to increase of extra-vesicular accumulation of MIBG. The Rutland analysis of I-123 MIBG myocardial dynamic SPECT is helpful to evaluate the diabetic cardial autonomic neuropathy.

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EVALUATION OF MYOCARDIAL SYMPATHETIC NERVE FUNCTION IN PATIENTS WITH MITRAL VALVE PROLAPSE (MVP). AN I^{123} METAIODOBENZYLQUANIDINE (MIBG) CARDIAC SCINTIGRAPHIC STUDY.

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Aim: Previous studies suggest that there are autonomic nervous system abnormalities in patients with MVP. In this study we use MIBG scintigraphy to assess myocardial sympathetic nervous function in these patients.
Methods: Eleven patients (4 males, 45±15 years) with MVP and twelve controls (3 males 45±10 years) underwent planar and SPECT myocardial imaging 4 hours after the intravenous injection of 5mCi I^{123} MIBG. The heart to mediastinum (H/M) ratio was calculated in order to quantify cardiac MIBG accumulation, while the SPECT study was performed in order to investigate the regional distribution of adrenergic innervation.
Results: The H/M Ratio was less in patients than controls (1.80±0,21 vs 2,16±0,23 $p<0.001$). In SPECT Study 9/11 patients had a regional alteration in adrenergic innervation (81,8%) while only two out of twelve control subjects (16,6%). Segments with reduced uptake were observed in patients: 1 septum, 5 inferior-lateral, 3 inferior-septal, 1 anterior-apical, 2 arterior-septal, 1 anterior-lateral and 2 apical. Two out of twelve controls presented in SPECT study mild reduce uptake in apical wall.
Conclusions: Patients with MVP show localized abnormalities of myocardial adrenergic innervation. This confirms previous studies which assumed that the autonomic nervous system plays an important role in the pathophysiology of MVP

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A COMPARISON OF MYOCARDIAL PET IMAGING WITH ^{62}CU-PTSM AND THE NOVEL PET TRACER ^{62}CU-ETHYLGLYOXAL BIS(THIOSEMICARBAZONE) (^{62}CU-ETS) IN HUMANS.

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Generator produced ^{62}CuPTSM [^{62}Cu-pyruvaldehyde bis(N^4-methylthiosemicarbazone)] provides high quality PET myocardial perfusion images, however, it exhibits high liver uptake and nonlinear tracer uptake with hyperemia which may affect determination of perfusion. A related generator-produced ligand, ^{62}CuETS [(^{62}Cu-ethylglyoxal bis(thiosemicarbazone)],has been developed in an attempt to improve on imaging characteristics. We performed a comparison of ^{62}CuETS and ^{62}CuPTSM using paired rest/dipyridamole stress cardiac PET studies performed in 12 normal volunteers. Regions of interest were drawn in the LV blood pool, heart, and liver. Comparison of ^{62}Cu-ETS vs ^{62}Cu-PTSM demonstrated a higher resting heart/liver ratio (1.01±0.14 vs 0.66±0.17; $p<0.0005$) and a higher stress heart/liver ratio (1.12±0.21 vs 0.60±0.15; $p<0.0001$). The myocardial stress/rest ratio was also higher for ^{62}Cu-ETS vs ^{62}Cu-PTSM (1.56±0.16 vs 1.33±0.21; $p<0.005$). ***Conclusions:*** ^{62}Cu-ETS like ^{62}CuPTSM can be generator-produced and provides excellent myocardial image quality. The significantly lower liver uptake at rest and following dipyridamole stress along with the enhanced stress/rest myocardial uptake ratio demonstrated suggests ^{62}Cu-ETS provides improved myocardial PET imaging characteristics and may be a better PET perfusion agent than ^{62}CuPTSM.