

Abnormal retention of ^{99m}Tc -TF in a hamster model of cardiomyopathy analyzed by ^{99m}Tc -TF and ^{125}I -BMIPP autoradiography

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Objective: Enhanced washout of ^{99m}Tc -tetrofosmin (TF) has been reported in patients with hypertrophic cardiomyopathy (HCM). Here, using quantitative dual-autoradiography, the relationship between TF retention abnormality and metabolism depicted by ^{125}I -BMIPP uptake was investigated quantitatively in a hamster model of cardiomyopathy. **Methods and Results:** Early and delayed TF images were obtained at 5 min (7 cardiomyopathic and 5 normal hamsters) and 60 min (8 cardiomyopathic and 5 normal hamsters) after injection, respectively. BMIPP image was obtained 5 min after injection. Five cardiomyopathic and 5 normal hamsters were evaluated histologically. Percent uptake of TF and BMIPP in the heart was measured by an auto-well counter. The left ventricular wall was divided into 12 segments, and the relative regional uptake of TF and BMIPP was measured for each segment. Heterogeneity of radioactive distribution was determined by the standard deviation (SD) of radioactive counts in the left ventricular wall on autoradiogram. The uptake of early TF, delayed TF, and BMIPP in cardiomyopathic hamsters was 8.8%, 20.3%, and 25.3% lower than that in normal hamsters, $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively. In normal hamsters, distribution of radioactivity in all images was homogeneous, and the SD values were about 13. In cardiomyopathic hamsters, heterogeneous distribution was observed on all images, and the degree of heterogeneity was marked on delayed TF and BMIPP images. The SD was 19.7 ± 1.2 for early TF image, 25.5 ± 1.4 for delayed TF image, and 31.7 ± 2.4 for BMIPP image, respectively. A weak linear correlation was observed between the relative regional uptake of the delayed TF and BMIPP in cardiomyopathic hamsters ($r = 0.57$). Electron microscopy demonstrated ultra-structural changes in mitochondria of cardiomyopathic hamsters. **Conclusion:** Degree of retention abnormality on delayed TF image corresponded to the metabolic abnormality, probably due to mitochondrial dysfunction, depicted on BMIPP imaging.

Key words: autoradiography, ^{99m}Tc -TF, ^{125}I -BMIPP, cardiomyopathy, myocardial metabolism