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STUDY OF ASSESSMENT OF ¹⁸F-FDG IN APOE^{-/-} MICE ATHEROSCLEROTIC PLAQUES BY AUTORADIOGRAPHY

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Objective To investigate the possibility of application of nuclide on the ApoE^{-/-} mice plaque, we used ¹⁸F-FDG to image the plaque and elucidate the correlation between the nuclear imaging and histological imaging, estimate the feasibility of ¹⁸F-FDG on detecting vulnerable plaque.

Methods Eight-week-old male ApoE^{-/-} mice were fed with western diet (was provided by academy of military medical sciences) till 44 weeks as experimental group. After fasting for (10 to 12) h, 0.56 to 0.71mCi ¹⁸F-FDG was injected into the mice tail vein. At 30 min after injection of the radiotracer, we sacrificed the mice and removed the aortas, incised longitudinally. Aortas were weighted, and radioactivity was measured with a well-type γ -counter, the results were expressed as the SUV. Then macroautoradiographies were acquired, aorta plaque and macrophage were investigated by examination of stained sections by Red-O staining and CD68 staining. Harvestings of aortas for en face analysis were performed with oil Red-O to compare with autoradiography, and CD68 staining to compare with SUV. The control group C57BL/6N mice were fed with full diet, and the rest work were alike.

Results There was a significant difference (0.243 ± 0.054 vs 0.112 ± 0.004 , $t=4.108$, $p=0.002$) in the uptake of ¹⁸F-FDG between experimental group and control group. Control group were negative result. Macrophage (Mf) number between experimental group and control group was significant different (4.99 ± 0.51 vs 9.87 ± 0.31 , $t=2.263$, $p=0.037$), and the ¹⁸F-FDG uptake and macrophage (Mf) number in thoracic aortic segments had a strong correlation ($r=0.835$, $p=0.0002$), but the en face measurements of aortas isolated 30 min after ¹⁸F-FDG injections ($5.848 \pm 2.416:1$) demonstrated a weaker correlation between fat stainings and autoradiographies ($r=0.4697$, $p=0.001$). Macrophage (Mf) number in visualisation plaque was significantly different from the unvisualisation plaque (4.29 ± 0.42 vs 10.85 ± 1.47 , $t=10.55$, $p=0.015$).

Conclusions The uptake of ¹⁸F-FDG in aorta plaque was enhanced and had higher specificity than non-target tissue. The uptake of ¹⁸F-FDG had a strong correlation with Mf number, but the correlation between SUV and the en face of plaque is weak.