

Symposium I. Application of Radiopharmaceuticals to the Diagnosis of Renal Diseases

A Basic Study of Renoscintiphoto by Autoradiography

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Scintiphotography has been one of the widely used routine split renal function tests. Using the computer analysis on scintiphoto it is now possible that renal function is evaluated not only on unilateral kidney but also on one segment of the kidney such as upper pole, cortex etc. With such a current trend in mind, the autoradiography has been performed on the rabbit kidney and on the mice for our basic analysis of the scintiphotograph.

The steps involved in macroautoradiography of the rabbit kidney are as follows: First 100-150 μ c of ^{131}I -Hippuran, ^{131}I -Iothalamate and ^{51}Cr -EDTA are injected intravenously, then after a certain interval the kidney is removed and frozen with acetone and dry-ice. The frozen kidney cut into sections and they are dried for 1 day in deep-freezer or cold room. Then they are exposed against Fuji No. 100 or No. 200 X-ray film for 3-7 days. The film is developed and an autoradiograph results.

The microautoradiography of the rabbit kidney are performed by stripping method using Sakura NRM1 or NRM2.

Whole-body macroautoradiography of the mouse is carried out in the same way as in

the rabbit macroautoradiography.

In the macroautoradiographs, the ^{131}I -Hippuran appeared in the cortex 30-60 seconds after injection. At the same time, the microautoradiograph shows that it is in the glomerulus and proximal tubules and not in the collective tubules. In this period correspond to segment a and b of the renogram, it is considered that the Hippuran is diffused into renal vessels and is taken up to the proximal tubules. After 3 minutes, it has reached the outer medulla, especially at the lower end of the Henle's loop. It means that Hippuran excretes to the distal tubules and slowly passes through the counter current system. By 10 minutes, it has appeared at the papilla.

On the other hand, ^{51}Cr -EDTA and ^{131}I -Iothalamate is in the cortex (proximal tubules and glomeruli) 30-60 seconds after injection. Unlike the Hippuran, they are appeared to the papilla in the same period. And then 3-10 minutes after injection they are appeared in the cortex and the juxta medullary cortex repeatedly. It is considered that small amount of the injected material rapidly excreted to the pelvis, and large amount is excreted very gradually according to recirculation.