

N) Kidney and Urinary Tracts

Studies on Radiopharmaceuticals

—Synthesis of New Renal Scanning Agents and Their Evaluation— (Second Report)

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A new renal scanning agent, labeled 4-IPCM ((abbreviation of 1-(4-iodophenyl)-3-[3-(chlor-mercuri)-2-methoxypropyl]-urea)), its synthesis, renal affinity, distribution and excretion were presented in a previous paper, "The First Report" (Jap. J. Nucl. Med. 8: 318, 1971).

In the present report, two isomers—3-IPCM and 2-IPRM—have been studied.

Since 4-IPCM suggested the possibility as a renal scanning agent, 3-IPCM or 2-IPCM labeled with ^{203}Hg was given to rabbits intravenously (30–40 μCi , specific activity 3.6 $\mu\text{Ci}/\text{mg}$) for screening their renal concentration with a scintillation camera.

^{203}Hg -3-IPCM and ^{203}Hg -2-IPCM were synthesized by the usual method described in the

first report. The former gave better renal scintigrams than the latter, so that renal scintiphotography with ^{131}I -3-IPCM was performed simultaneously. However, the renal image with ^{131}I -3-IPCM was contrary to our expectations. It may suggest that 3-IPCM, unlike 4-IPCM, was decomposed *in vivo*.

In this serial studies, mercury-labeled IPRM showed a good renal image, but it was disadvantageous in radiation dose and cost.

Among iodine-labeled IPCM isomers, 4-IPCM proved the best renal scanning agent.

Some problems related to clinical application of new renal scanning agents were discussed, with emphasis on metabolic differences of IPCM isomers and the possible use of ^{123}I in the future.

Renal Scanning by $^{99\text{m}}\text{Tc}$ -Penicillamine Acetazolamide Complex (TPAC)

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At present ^{203}Hg -Chlormerodrin and ^{131}I -Hippuran have chiefly been used in renal scintigram, but reports are presented in the literature where $^{99\text{m}}\text{Tc}$ -TPAC and $^{99\text{m}}\text{Tc}$ -iron ascorbic acid complex are used as $^{99\text{m}}\text{Tc}$ labeled com-

pound. However, these have various problems as renal scanning agents. Recently, $^{99\text{m}}\text{Tc}$ -TPAC has attracted much attention as a new scanning agent. Through the courtesy of Dynaport Research Laboratory $^{99\text{m}}\text{Tc}$ -TPAC was provided us. The

results thus obtained with this agent with be presented.

Method

Renal function tests are performed on patients with renal diseases admitted to Urology Department of this hospital and renogram using ^{131}I Hippuran and renal scintigram using ^{203}Hg -Chlormerodrin are also obtained. A comparative review is made between scintigram using $^{99\text{m}}\text{Tc}$ -TPAC and that using ^{203}Hg -Chlormerodrin on

the severity of renal function disorder.

Results and Conclusion

$^{99\text{m}}\text{Tc}$ -TPAC is superior to ^{203}Hg -Chlormerodrin, especially in the scanning of severe renal disturbance. Further, $^{99\text{m}}\text{Tc}$ -TPAC can be prepared by a simple procedure and the renal exposure dose is lower than by ^{203}Hg -Chlormerodrin. Therefore, it is expected that this would be widely used in the future as a renal scanning agent.

Clinical Experience with the Tomocamera

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Gamma-camera is now one of the useful tool diagnosing various renal diseases. Recently Anger et al. improved this camera for tomographic use, and it has resulted in modest gains in depth resolution. Since last year we have used Pho/Gamma III tomocamera system (Nuclear Chicago) and studied on the patients who had renal diseases.

Before clinical study, tomoscan on the phantom which included the small balls sized 1–3 cm in diameter was performed.

On the tomoscan especially two planes near

the Geometric Focal Plane the defects were more sharply outline than on the non-tomoscan.

Of 4 kidney patients studied. In a patient with polycystic kidneys the tomoscans resolved the small cysts which were not detected by non-tomoscans. But in 3 patients with simple cysts and renal calculi which were localised whole layer of the renal tissue the same results as non-tomoscans. Therefore the tomographic scanner provided useful information especially in localization of small defect such as one of the small cyst in polycystic kidneys.