

## Use of Unithiol for Reducing Radiation Hazard of Renal Scintigraphy with Chlormerodrin $^{203}\text{Hg}$

### II. Scintigraphic Estimation

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A scintigraphic estimation was made of the reduction of renal irradiation by Unithiol (U.S.S.R.) on the basis of the authors' previous investigations.

It was found that at 7 days following Unithiol administration the intensity of radiation over both kidneys was significantly reduced in comparison with the control group of patients (without Unithiol). The authors are of the opinion that Unithiol markedly reduces renal irradiation during  $^{203}\text{Hg}$  Chlormerodrin scintigraphy.

Scintigraphy becomes at present one of the more important and widely used investigations in the diagnosis of renal diseases. Of the many agents used for this examination, the best proved to be Chlormerodrin  $^{203}\text{Hg}$  [13]. An average intravenous dose of this preparation amounts to 100–200  $\mu\text{Ci}$ , i.e. 2.0–2.5  $\mu\text{Ci}/\text{kg}$  body weight. It combines with the enzymatic system of the renal tubular cells and so it accumulates in the kidneys. This admittedly permits to obtain readable scintigraphic recordings, but at the same time exposes the kidneys to undesirable radiation of about 23–57 rads [2, 4, 5, 10, 11]. The risk of mercury poisoning by a dose administered during renal scintigraphy is very small. A solution of 200  $\mu\text{Ci}$  activity contains less than 4 mg of Chlormerodrin. According to most investigators this dose causes no clinically perceptible changes in renal function. The investigations were concerned with 24-hour diuresis, electrolyte and urea blood serum levels [12].

The best pictures are obtained when the scintigraphic recordings are made at 60–90 minutes following administration of the radionuclide. It is, however, possible to obtain rather clear scintigrams even after 7 days because of a rather long effective half-life of Chlormerodrin  $^{203}\text{Hg}$  which amounts to about 30 days [1, 5, 11].

Protection of the kidneys against needless irradiation constitutes therefore a very essential problem from the medical point of view, but its solution encounters great difficulties [6, 8].

Our previous investigations have shown that it is possible to reduce renal irradiation after scintigraphy performed with Chlormerodrin  $^{203}\text{Hg}$  by means of Unithiol (U.S.S.R.) [7, 9]. Its properties have been described in Part I of the work [7].

The scintigraphic estimation of this observation is the subject of the present study.

**Material and methods**

The investigations involved 16 patients treated at the Department of Urology of the Medical Academy in Łódź, in whom renal scintigraphy had to be performed for diagnostic purposes. Exclusively patients with full renal efficiency ascertained by biochemical tests and by urography were selected for study.

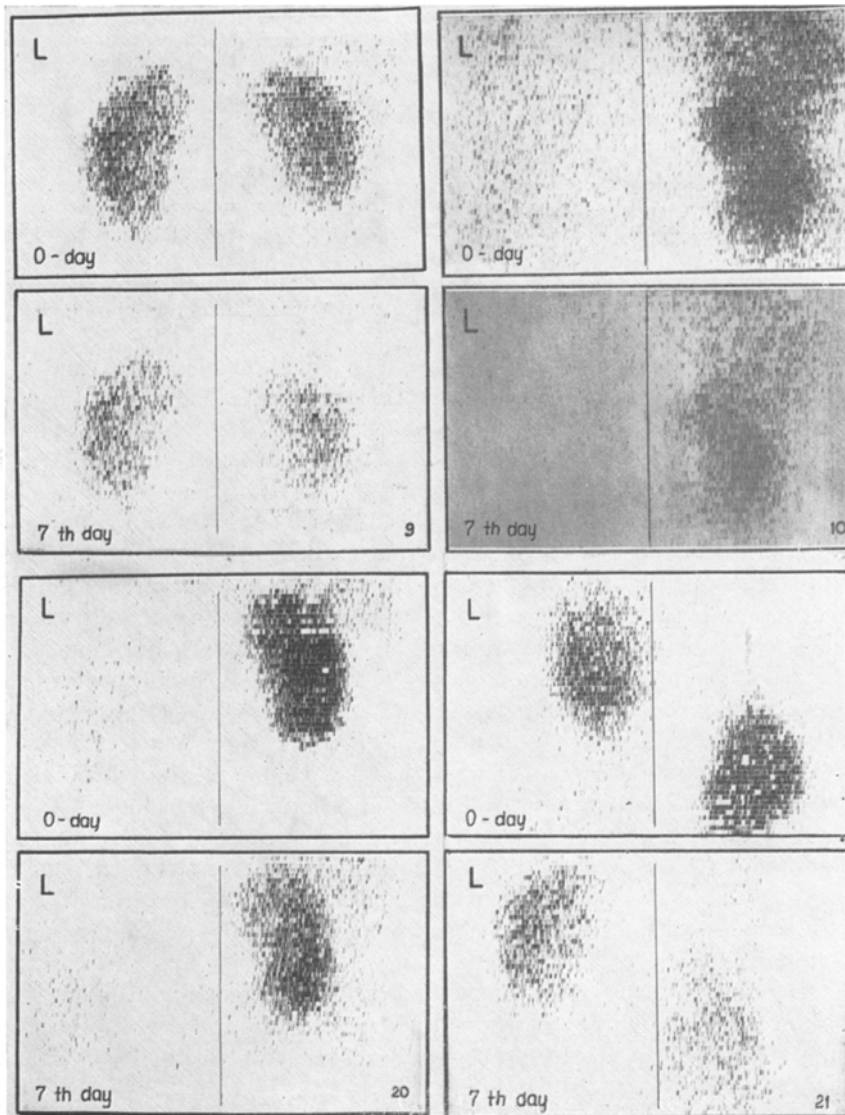
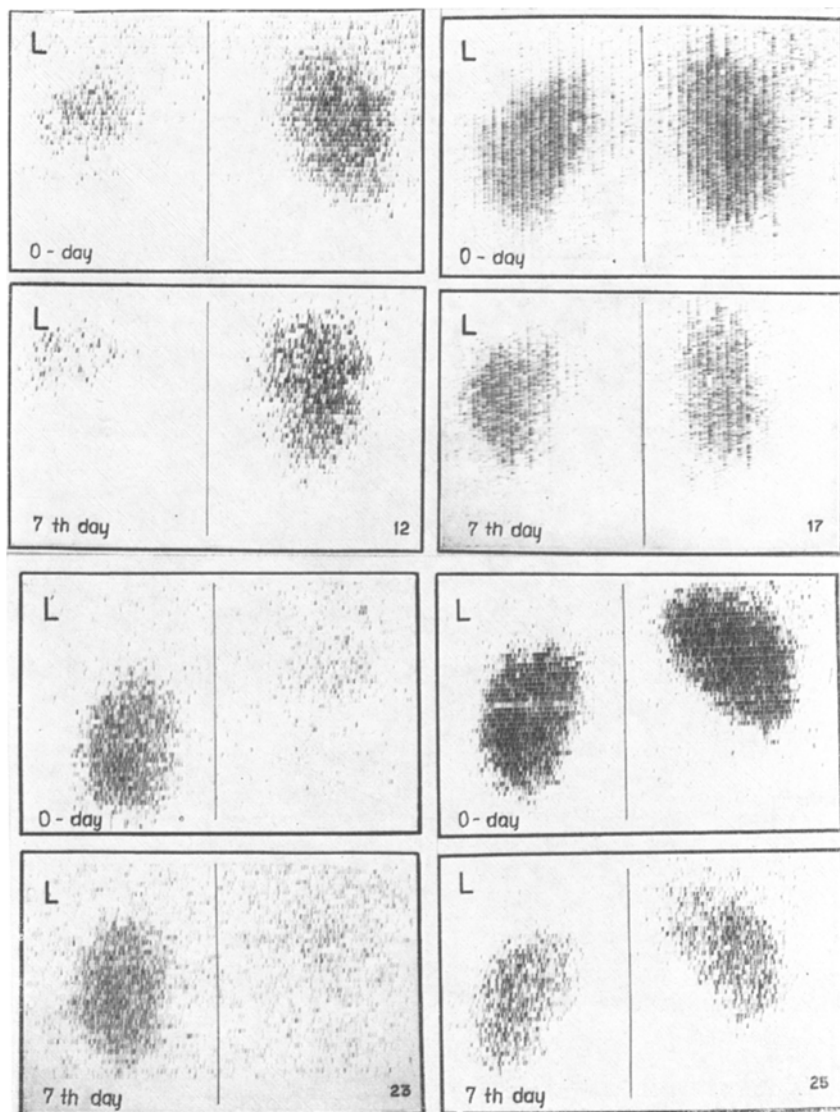


Fig. 1. Scintigrams of kidneys

The scintigrams were made by a Nuclear-Chicago, model 1735, "Pho-Dot II"-type apparatus with a 19-field focalizing collimator, with the preservation of constant parameters.

The patients were divided into 2 groups:

I. In the control group (8 patients) renal scintigraphy was performed at 60 minutes following the administration of Chlormerodrin  $^{203}\text{Hg}$  in a dose of  $150 \mu\text{Ci}$ .



of the control group

II. In the test group (8 patients) renal scintigraphy was performed at 70 minutes and on the 7th day following administration of Chlormerodrin  $^{203}\text{Hg}$  in a dose of  $150\ \mu\text{Ci}$ . After performing the first scintigraphic examination, 5 ml of Unithiol was injected intramuscularly with injections repeated every 12 hours. Each patient received a total of 6 ampoules (30 ml) of Unithiol.

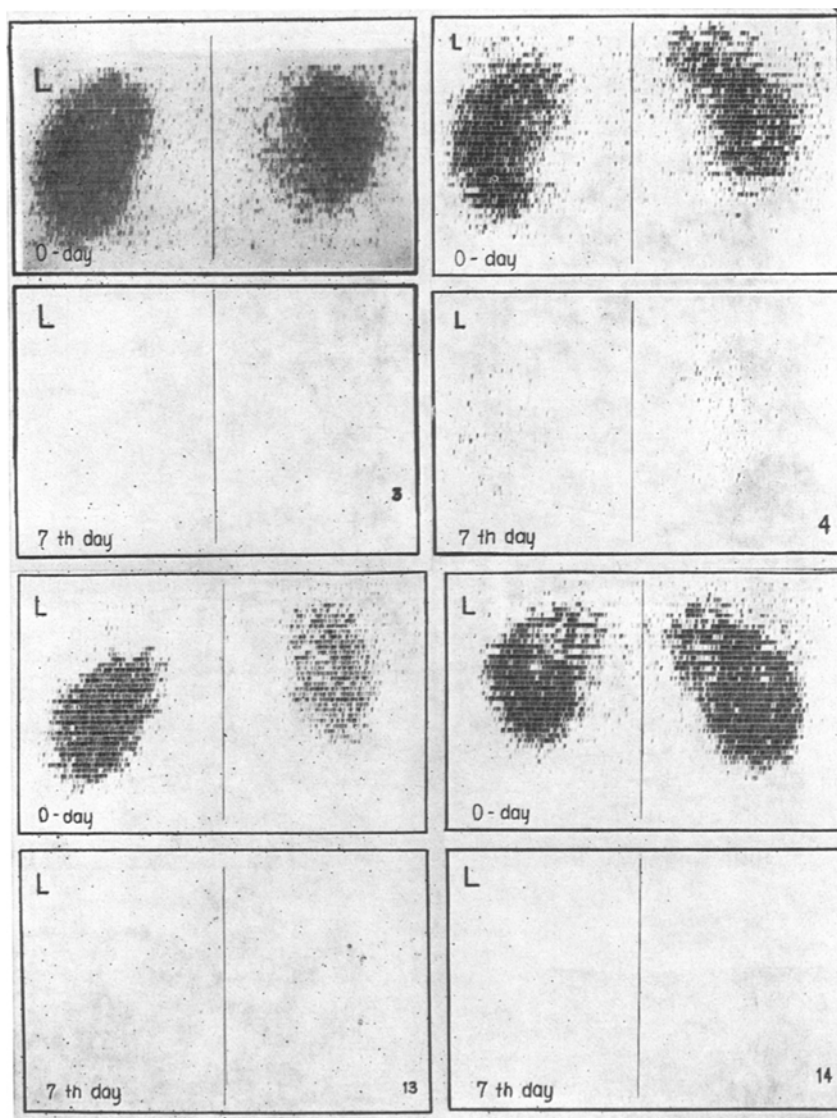
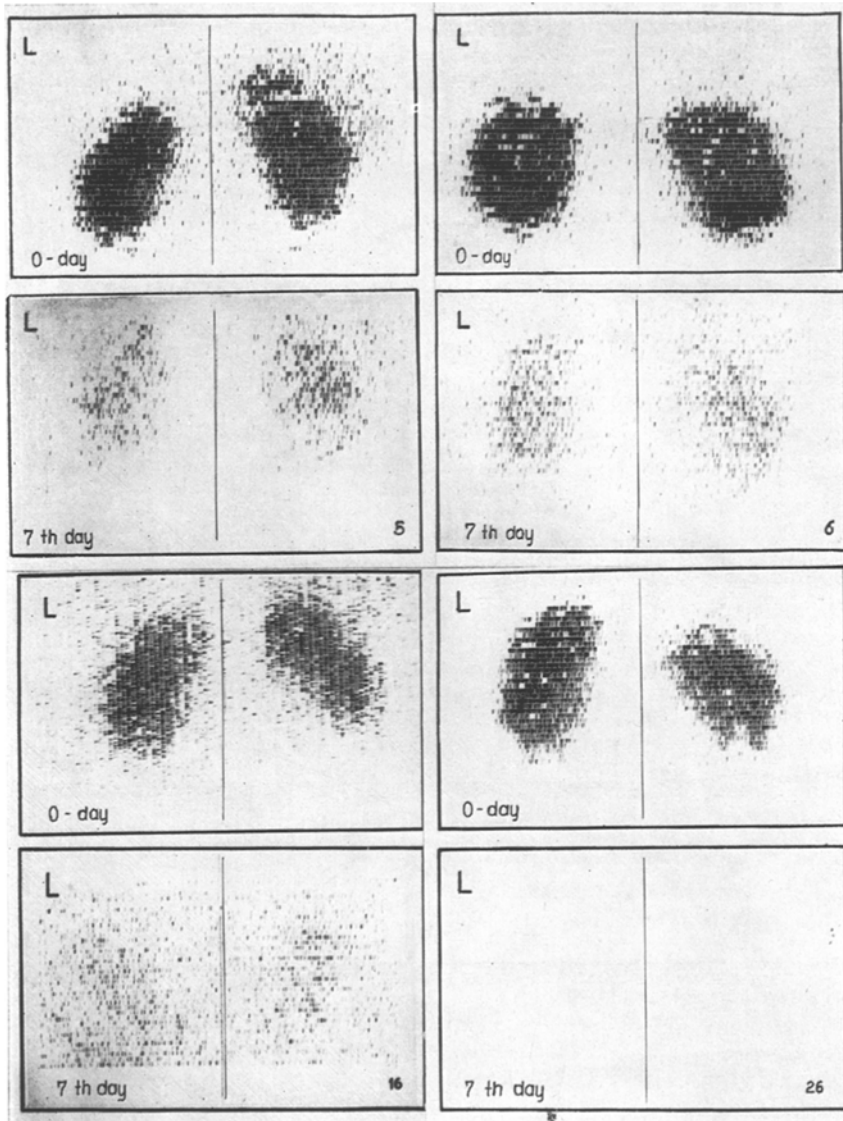


Fig. 2. Scintigrams of

### Results

The scintigrams of all the patients from the control group (without Unithiol) at 7 days revealed renal outlines of the same dimensions as the scintigrams at 70 minutes, but of weaker intensity and density (Fig. 1). In the test group in 4 persons



kidneys of the test group

on the 7th day following administration of Chlormerodrin  $^{203}\text{Hg}$  not even a vestigial recording was obtained and in the remaining 4 patients the scintigrams were obscure — of weak intensity and unfit for interpretation (Fig. 2). The results obtained indicate a marked reduction of residual radioactive mercury content in the kidneys of the patients who received Unithiol, and are a supplement to previous reports on this subject [7, 9].

It may be concluded that — in accordance with the data from the Soviet literature — Unithiol speeds up the urinary excretion of mercury. It seems that it protects the kidney against radiation damage after administration of Chlormerodrin  $^{203}\text{Hg}$ , and this is confirmed by histologic and histopathologic findings [13].

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