Fat Deposits in the Kidney in Chronic Intoxication of the Dog by Hexachlorocyclohexane

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We have found that chronic intoxication of dogs by the γ isomer of hexachlorocyclohexane (HCH) results in abnormal intracellular deposits of fat in most tissues and organs. This intoxication was obtained by repeated intramuscular injections of 10–30 mg of γ HCH in 10% oily solution per 1000 g of body weight, to a total dose of 130–475 mg/kg. The dogs died or were killed 7–44 days after the first injection.

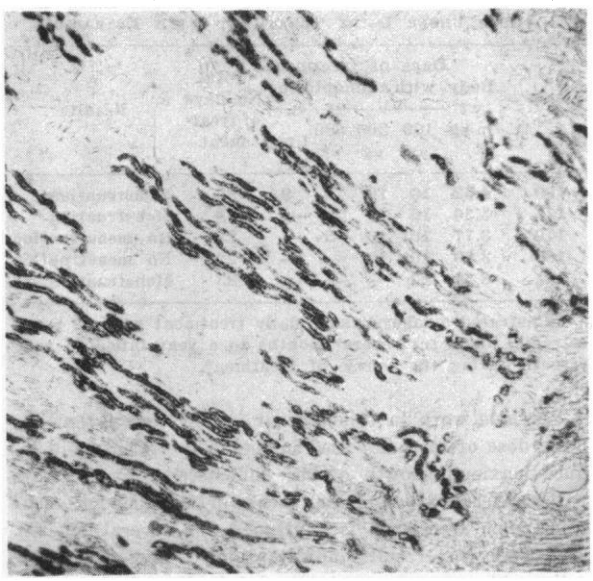

FIG. 1. Intracellular fat deposits in terminal parts of proximal convoluted tubules of the kidney, in a γ HCH-treated dog. Stained with Sudan black; magnification 22 ×.

The fat deposits are most marked in liver, striated muscle, nerve cells, and kidneys. They appear quite clearly in frozen sections of formaldehyde-fixed material, stained with general fat stains such as Sudan black or scharlach red.

Intracellular fat deposits in the kidney are limited to the proximal convoluted tubules (Fig. 1), the other tubules being practically free of fat droplets. Even in the proximal tubules, there is a precise distribution of the deposits, which may be formed by very big droplets. Whereas the glomeruli have a normal appearance and the initial parts of the tubules show only scattered and rare droplets, the terminal straight parts of the proximal tubules, or medullary segments of these tubules, contain numerous intracellular droplets. Some extracellular fat droplets are also to be seen in the lumen of these tubules. There is no cell destruction or any alteration in nuclear structure, even in those parts of the tubules that are filled up with fat. The outer zone of the medulla shows no fat deposits. When the deposits in the proximal convoluted tubules are very rich, the lumen of the terminal parts of the collecting tubules and of the papillary ducts of Bellini may contain some fat and also some hyaline globules and cylinders. In the same animals, the epithelium of the calyces and the kidney pelvis may contain intracellular droplets.

Ureter, urinary bladder, urethra, and Littre's glands are free of fat deposits. In the male, one may sometimes see fat droplets in the epithelial cells of the prostatic portion of the urethra. This seems to be correlated with the abnormal amount of fat granules in the prostatic and Cowper's glands.

Treatment by the δ isomer of HCH produces the same distribution of fat deposits in the kidney, but they are in smaller amount. We have noticed no fat droplets in the kidney following intramuscular injections of big amounts of oil and DDT.

Our experiments allow us to conclude that this specific intracellular fat deposit in the kidney is bound to the still unelucidated biochemical lesion induced by hexachlorocyclohexane.

A Simple Apparatus for Multiple Uniform Intravenous Injections[1]

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In the course of carrying out a study of total body water[2] on a large series of subjects, a simple method for the intravenous administration of precisely 50 ml of fluid was devised.

The apparatus consists of single unit (unit I, Fig. 1) calibrated to contain 50 ml. This unit is filled from a Baxter infusion bottle through the inlet (A). The inlet side-arm empties completely, thus eliminating any error from trapped air bubbles.

A two-way stopcock is provided for the outlet, allowing any excess of fluid (over the calibration mark) to be eliminated via the waste outlet (C).

The injection fluid is then delivered through the tubing (B). The reservoir of injection fluid (antipyrine solution, 1 g in 50 ml) was analyzed only once for each 20 subjects, as compared with 20 separate analyses when 50-ml syringes and separate 50-ml solution bottles were used for each subject.

A separate piece of tubing, with a glass adapter and needle attached, is autoclaved as a unit (II), and changed for each subject. In this manner, the hazards from injecting refluxed blood to successive subjects are eliminated.

[1] The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

[2] Using the "antipyrine technique" of Messinger & Steele.