4005

A New Liver Function Test.

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In a number of phenoltetrachlorphthalein liver function tests, determinations of the bilirubin content of the blood showed a rise of the icterus index following the intravenous injection of the dye. When bromosulphalein was used no rise in the index took place. At first the reason for the rise in index following the use of the phenoltetrachlorphthalein was thought to be its toxic action upon the liver. Dr. S. M. Bassett, however, suggested that, inasmuch as distilled water was used to dilute a 5% to a 1% solution in the case of phenoltetrachlorphthalein, and no dilution was made in the case of bromsulphalein, the increase in icterus index might be due to the laking of red blood cells by the distilled water. Accordingly injections of distilled water up to 100 cc. were given intravenously, and, as surmised, a rise in the icterus index was produced.

From this observation the idea arose that this use of distilled water might serve as a liver function test. The rationale was as follows: if the normal liver removes bilirubin from the blood (the source of bilirubin being the hemoglobin from destroyed red blood cells), it is reasonable to suppose that a disordered liver will remove it less efficiently. If, then, in the normal person after the injection of distilled water the icterus index rises from 2 to 4 points one half hour to an hour after injection, with an average rise of 2.5 points, and returns to its basal value in 5 hours, a greater increase in icterus index might conceivably be expected in the individual with a disordered liver, or the return to normal might be prolonged.

Adequate dosage of the water was ascertained by experiment. 25 cc. are used in the case of individuals weighing from 100 to 110 pounds, with an increase of 5 cc. for every pound of body weight up to a maximum dosage of 50 cc.

In the normal person results were obtained as stated. But contrary to expectations the injection of the water in abnormal cases occasioned either no rise in the index or a fall, according to the amount of dysfunction. The interpretation of these observations for the present lies in the realm of speculation. It seems unlikely that a disordered liver can more readily remove the bilirubin from the blood than a normal one. The results indicate that the test may

be a measure of the bilirubin-forming, rather than of the bilirubin-removing function of the liver.

Observations were made on 15 normal, healthy persons and on 122 hospital patients. The normal cases showed a rise of from 2 to 4 points in the icterus index. Of the hospital cases 28 showed either no rise or a fall. These 28 cases comprised: 5 of catarrhal jaundice, 1 of arsenical poisoning (with jaundice), 2 of carcinoma of the stomach (with liver metastases), 5 of cirrhosis of the liver, 1 of cyst of the liver (liver enlarged to umbilicus), 1 of Wilson's disease (enlarged liver and spleen), 1 of small liver, right lobe missing (splenectomy for anemia and asthenia), 3 of carcinoma of the head of the pancreas, 3 of cardiac disease with decompensation, 4 of Hodgkin's disease, 2 of Graves disease.

The remaining 94 cases showed a rise in the icterus index. In 5 of these the diagnosis of liver disease was made: 2 cases with the clinical diagnosis of cirrhosis with ascites (both with accompanying kidney lesions), 2 cases of enlarged liver in patients with syphilis, 1 case of localized carcinoma of the liver (extension from gall bladder as shown on operation). Among these some indexes rose less than 2 points.

Cases with the severest liver damage showed a fall in index, those with less damage showed no rise, and normal cases showed a rise of from 2 to 4 points. These facts make it seem possible that in some of the hospital cases showing a rise in index of less than the normal 2 points a correspondingly slight liver dysfunction may be indicated. In 4 cases of thyroid disease (1 adenoma with symptoms of intoxication and 3 of Graves disease) changes in the icterus index following the injection of distilled water corresponded to the rate of basal metabolism and the condition of the patient. The case with a basal rate of plus 31% showed a rise of 1.5 points, that with a rate of plus 40% showed a rise in index of 0.8 points, that with a plus 51% showed no rise, while the 4th case with a plus 80% showed a fall in index of 1.1 points.

Bromosulphalein tests were made to check the water test. Where findings were normal in the dye test they were likewise normal in the water test. With the bromosulphalein test in cases of jaundice there is always a 100% retention of the dye one half hour after injection irrespective of the severity of the liver involvement. With the water test the index either does not change or decreases according to the extent of damage. This test is accordingly a more delicate gauge of disturbance than the dye test, when jaundice is present.

There is a fairly common impression that the intravenous injec-

tion of distilled water may produce unpleasant consequences varying from a mild chill to death. In none of these cases were there any unpleasant reactions. On the contrary, restless patients felt quieted and all without exception experienced a feeling of well-being lasting several hours.

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Sulphur Partition of Ocular Humors and Presence of Glutathione in Lenses of the Eye.

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Gravimetric determinations of total sulphur, non-protein sulphur, total sulphates and inorganic sulphates have been made upon the humors of oxen eyes. Mean figures are based upon from 6 to 14 analyses in each instance. The total sulphur of the aqueous humor was 3.74 mg. per 100 cc., and of this 64% was found to be nonprotein sulphur. Sulphate sulphur formed 54% of the nonprotein sulphur. Ninety % of the total sulphates were present as inorganic sulphates.

In the vitreous filtrate 4.05 mg. per 100 cc. of total sulphur were found, and of this total sulphur, 54% was non-protein sulphur. Seventy-four % of the nonprotein sulphur was sulphate sulphur. The inorganic sulphates formed 83% of the total sulphates.

The sodium nitroprusside test for glutathione has been applied to normal lenses, both human and oxen, and to cataractous lenses. All of the normal lenses gave a deep magenta color. Of 64 cataractous lenses, 26 (40%) showed no color, 19 presented a trace of color about the periphery, and in 19 a color definitely lighter than in the normal lenses was obtained.