The rôle of infection seems to be an important one, first as shown by the first experiment described (Dog I) in which the infected gallbladder bile contained a very high content of cholesterol. In Dog Y, in which acute inflammatory changes were noted in the section of gallbladder wall, the greatest amount of the cholesterol was found in the gallbladder bile. Sufficient study of this factor, however, has not been made, although there is other evidence to be mentioned later which suggests also that infection may increase the output of cholesterol by the walls of the biliary tract.

Some of these dogs were fed large amounts of fat-containing food, but the effect of a high cholesterol diet is difficult to judge from these few experiments. There is, in general, much conflict of opinion as well as of evidence on this point.

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Cholesterol Content of "White Bile" from Various Sources, Including Contents of "Hydrops" of Gallbladder.

ROBERT ELMAN AND J. B. TAUSSIG. (Introduced by E. A. Graham.)

From the Department of Surgery, Washington University Medical School.

During experiments on the biliary tract of dogs a number of instances of so-called white bile were observed, one from the gallbladder and the others from the ducts. Several human cases were also encountered in which hydrops of the gallbladder was found at operation. These specimens were all analyzed for their cholesterol content.

The significance of these observations concerns the question of the function of the gallbladder and bile ducts as regards the cholesterol of the bile. Is cholesterol absorbed or is it secreted by the bile duct and gallbladder epithelium? Or is it indifferent to the activities of these cells? Study of "white bile" furnishes one way of getting suggestive information as to these questions since it is well known that this secretion is a product not of the liver but of the duct mucosa. The colorless fluid found in hydrops of the gallbladder must similarly be a product of its wall since in these cases the cystic duct is occluded.

In 4 cases of hydrops in the human 2 gave 0.19, 0.45 mg. per cc. of cholesterol, and 2 cases gave macroscopic cholesterol crystals. Stepp and Nathan[1] found 0.64 mg./cc. of cholesterol in the contents

of an "acute hydrops" of the gallbladder. Winternitz,[2] however, in another case finds "cholesterol absent". The method he used is not mentioned. Naunyn[3] states that cholesterol is present in such fluid, but always in small amounts. Fowweather and Collinson[4] found up to 0.92 mg./cc. in 9 cases. In one of our cases (G. C. C.) no evidence of inflammation was made out on section of the wall, but since the lesion had been present for some months with no acute symptoms it is probable that it had subsided, leaving no trace. The other 3 cases all showed evidence of inflammation.

The findings in dogs include 5 instances in which the colorless secretion of the common duct, isolated by ligature, was collected and analyzed. They all contained cholesterol in concentrations varying between 0.047 and 0.085 mg./cc. values somewhat less than that present in normal (hepatic) bile in dogs as found in many isolated determinations by us. Rous and McMaster[5] report that "cholesterol is practically absent as shown by the Lieberman-Burchard test which is occasionally negative and at most weakly positive" in similar specimens of "white bile." The only one of our specimens which was infected contained much more cholesterol, 0.2 mg./cc., or over twice that of the highest value of the other 4 specimens. That infection tends to increase the output of cholesterol is also shown by the high values in the other 2 specimens, one from the infected dilated hepatic ducts following a total biliary obstruction and the other from an infected gallbladder fistula (cystic duct tied). These contained 0.22 and 0.50 mg./cc. of cholesterol respectively. That the finding of cholesterol is not due to its general presence in all body fluids is shown by control analyses of various samples of saliva, and ganglion cyst fluid, in which measurable amounts could not be detected.

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[1] Stepp, W., and Nathan, M., *Med. Klin.*, 1919, **15**, 40.

[2] Winternitz, H., *Z. f. Physiol. Chem.*, 1896, **21**, 386.

[3] Naunyn, B., *Klinik der Cholelithiasis*, Jena, 1892, 106.

[4] Fowweather, F. S., and Collinson, G. A., *Brit. J. Surg.*, 1926, **14**, 583.

[5] Rous, P., and McMaster, P. E., *J. E. I.*, 1921, **34**, 75.