THE CHOLESTEROL CONTENT OF THE BLOOD IN VARIOUS HEPATIC CONDITIONS *

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In studying the hypercholesterinemia of cholelithiasis, a group of patients was encountered who had a continuous hypercholesterinemia.¹ Even after operation, at which all causes for an obstructive hypercholesterinemia were removed, these patients again became hypercholesterinemic with no discoverable basis for this condition.

In work previously published² we gave the evidence for believing that the liver is the regulator of the cholesterol metabolism of the body, the cholesterol being kept at a more or less constant level by excretion of cholesterol through the bile. It is of interest, therefore, to ascertain the cholesterol content of the blood of patients with various disorders of the liver usually associated with icterus.

In obstructive icterus due to cholelithiasis, we have almost invariably encountered a hypercholesterinemia of a rather severe grade. The amounts in the blood varied from 700 mg. to 250 mg. per 100 c.c. The degree of jaundice bore a definite relation to the amount of cholesterol in the blood, indicating that this cholesterinemia is due to the obstruction of the bile duct. However, we have encountered an occasional exception; a jaundiced patient with high temperature and infection will have a lower cholesterol content of the blood than a patient with the same degree of jaundice, but no active infection.

In other conditions associated with icterus, such as cirrhosis of the liver, acute yellow atrophy, pernicious vomiting of pregnancy, etc., the cholesterinemia bears no relation to the intensity of the icterus. The blood in fifteen cases of cirrhosis was examined and gave a maximum content of 0.24 per cent. and a minimum of 0.065 per cent. Only one patient of the fifteen showed a moderate hypercholesterinemia, the amount being 240 mg. per 100 c.c. The figures are as follows for each one of the fifteen patients:

* From the Department of Physiological Chemistry, Pathological Laboratory, Mt. Sinai Hospital.

1. Rothschild, M. A., and Rosenthal, N.: The Dietetic Management of Hypercholesterinemia in Cases of Cholelithiasis, *Am. J. M. Sc.* **152**:394 (Sept.) 1916.

2. Rothschild, M. A.: The Relationship of the Liver to the Cholesterol Metabolism, *Proc. New York Path. Soc.*, n. s. **14**:229 (Dec.) 1914.

Per cent.	Per cent.	Per cent.
0.24	0.15	0.125
0.185	0.147	0.105
0.182	0.137	0.1
0.162	0.134	0.075
0.15	0.129	0.065

All of these patients were jaundiced. The extent of jaundice in the cases showing only 0.105 per cent. was greater than in an obstructive cholelithiasis showing 0.64 per cent. The two cases showing the extremely low amounts, 0.075 and 0.065 per cent., were fatal cases, the patients dying three days after the blood examination.

TABLE 1.—CHOLESTEROL CONTENT OF THE BLOOD IN HEPATIC DISORDERS

Cirrhosis Per Cent.	Acute Atrophy Per Cent.	Pernicious Vomiting of Pregnancy Per Cent.	Carcinoma Per Cent.
0.24		0.177	0.4
0.185	0.116	0.164	0.36
0.182	0.1	0.127	0.25
0.162	0.087		0.185
0.15			0.166
0.15			0.162
0.147			0.146
0.137			0.142
0.134			0.125
0.129			0.124
0.125			0.094
0.105			0.09
0.1			
0.075			
0.065			

TABLE 2.—CHOLESTEROL CONTENT OF THE BLOOD IN OTHER ICTERIC STATES

Banti's Disease Per Cent.	Splenomegaly with Icterus Per Cent.	Pernicious Anemia Per Cent.	Leukemia Per Cent.	Chlorosis Per Cent.
0.108	0.1	0.16	0.125	0.103
	0.095	0.155	0.112	
		0.155		
		0.152		
		0.145		
		0.136		
		0.125		
		0.125		
		0.1		
		0.075		

The explanation of these facts is extremely difficult. However, they suggest that in severe disturbances of hepatic function, there is a selective retention of bile pigments, while the cholesterol is not retained. In one case the bile was obtained at necropsy, and showed a rather high content of cholesterol, 0.12 per cent. against a normal content of 0.08 per cent.

In other conditions associated with icterus, such as primary or secondary carcinoma of the liver, or multiple abscesses, as seen in pylephlebitis, the cholesterol content of the blood is not proportionate

to the intensity of the jaundice. In carcinoma of the liver, we have encountered figures varying from 0.4 per cent., to 0.09 per cent.

We have examined the blood of three cases of acute yellow atrophy, and all showed a low blood cholesterin with extreme grades of icterus, the figures being 0.087, 0.1, and 0.116 per cent., respectively.

In three cases of pernicious vomiting of pregnancy with icterus, the figures were 0.177, 0.164 and 0.127 per cent., respectively. All of these cases gave evidence of hepatic disorder, as shown by urinary examination, and all three patients recovered. The blood was obtained toward the end of the disease. It is interesting that these cases showed no hypercholesterinemia, as one ordinarily finds in pregnancy. In the case showing 0.164 per cent. during the disease, a blood examination made two weeks after the patient was well, gave a figure of 0.248 per cent.

Other jaundiced conditions were investigated, those corresponding to the so-called hemolytic types, as seen in Banti's disease, pernicious anemia, chlorosis, leukemias and family splenomegaly with icterus. In all these conditions a normal or decreased content of the blood in cholesterol was noted. However, here we may be dealing with icterus of nonhepatic origin.

CONCLUSIONS

1. In obstructive icterus due to stones, etc., the cholesterol content of the blood is markedly elevated, and bears a definite relationship to the intensity of icterus.

2. In conditions associated with hepatic disorders, the cholesterol content of the blood is not increased, and is usually reduced. The cholesterinemia is not proportionate to the amount of bile pigments present in the blood.

3. In the so-called hemolytic icterus, there is no increase of blood cholesterol.