15 (1079)

Icterus. A rapid change of hemoglobin to bile pigment in the pleural and peritoneal cavities.

By C. W. HOOPER, M.D., and G. H. WHIPPLE, M.D.

[*From the George Williams Hooper Foundation for Medical Research, University of California, San Francisco.*]

In an earlier communication we have been able to show that bile pigment could be formed from hemoglobin without the agency of the liver. Solutions of hemoglobin were introduced into the blood vessels of dogs whose livers had been excluded from any part in this reaction. There was a prompt formation of bile pigment from hemoglobin with no possible direct liver action. This transformation can take place within a space of two hours when active circulation is maintained in the head and thorax alone. It seemed probable that the endothelium might be the tissue whose activity was responsible for this change of hemoglobin to bile pigments. This work has received confirmation from experiments of McNee.

All our experiments were performed on normal dogs. Hemoglobin in crystalline form dissolved in salt solution or obtained from freshly laked red blood corpuscles was introduced into the pleural or peritoneal cavities. The fluid was withdrawn after different intervals varying from eight hours to three days. Careful tests showed at times some bile pigment formation in eight hours but always in twenty-four hours—often in sufficient amounts to be estimated quantitatively. The amount of bile pigment formation is considerable after an interval of two, three, or four days—even more than five milligrams in some cases. It is to be recalled that a dog of thirty pounds in weight may excrete normally about 25 milligrams of bile pigment in six hours.

There is very good evidence that bile pigments may be formed from hemoglobin by the agency of endothelial cells. There is conclusive evidence that bile pigments can be formed by the mesothelium of the serous cavities. It is possible that this capacity of transforming hemoglobin into bile pigments may be a general property of living protoplasm.

TABLE I.

HEMOGLOBIN CHANGED TO BILE PIGMENT IN THE PLEURAL CAVITY.

Dog No., Date.	Weight, Pounds.	Hours in Cavity.	Bile Pigment Tests.	Bile Pigments in Milligrams.	Fluid Introduced in cc.	Fluid Recovered in cc.	Bile in Urine: Before.	Bile in Urine: After.	Remarks.
15–11, March 17...	14	8	0	0	620	100	0	0	Fresh dog hemoglobin.
15–11, March 17...	14	24	+	—	620	153	0	0	Fresh dog hemoglobin.
15–34, May 12 ..	55	8	(?)+	—	1,580	1,175	0	0	Fresh dog hemoglobin.
15–39, May 10...	32	7	(?)+	—	1,160	930	0	0	Fresh dog hemoglobin.
15–40, May 10...	22	6	(?)	—	700	555	0	0	Fresh dog hemoglobin.
15–41, May 12...	36	8	(?)+	—	1,480	1,230	0	0	Fresh dog hemoglobin.
15–39, May 17...	32	17	+++	0.14	1,105	390	0	0	Fresh dog hemoglobin.
15–40, May 17 ..	21.5	18	+++	0.09	805	265	0	0	Fresh dog hemoglobin.
15–52, June 16...	41.5	24	++++	0.18	1,000	575	0	0	Crystalline dog hemoglobin.
15–54, June 16...	36.5	24	++	—	800	395	0	0	Crystalline dog hemoglobin.
15–53, June 16...	29.5	25	+	—	800	408	0	0	Crystalline dog hemoglobin.
15–56, June 16...	39	25	++	—	900	318	0	0	Crystalline dog hemoglobin.
15–41, May 20...	36.5	43	+++	0.15	805	254	0	+Faint	Fresh dog hemoglobin.
15–43, May 20...	34	44	++++	0.36	1,100	808	0	0	Crystalline dog hemoglobin.
15–40, May 25...	22	65	++++	3.60	940	430	0	+Faint	Fresh dog hemoglobin.
15–39, May 25...	32	66	++++	5.40	1,100	510	0	+Faint	Crystalline dog hemoglobin.

HEMOGLOBIN CHANGED TO BILE PIGMENT IN PERITONEAL CAVITY.

15–20, March 29...	19.5	8	(?)	—	985	300	0	(?)	Fresh dog hemoglobin.
15–34, May 20...	56	44	++++	0.25	4,000	1,360	0	?+	Crystalline dog hemoglobin—7 grams.
15–43, June 17...	33.5	28	+	—	2,800	755	0	+	Crystalline dog hemoglobin—7 grams.
15–41, June 17...	36.5	48	++++	0.18	3,000	310	0	+	Crystalline dog hemoglobin—7 grams.
15–57, June 16...	24.5	48	++++	0.32	2,500	255	0	+	Crystalline dog hemoglobin—7 grams.
15–55, June 16...	40.5	48	++++	0.27	3,000	310	0	0	Crystalline dog hemoglobin—7 grams.