

dog's back. The total absence of bile on the skin appeared to do away with the dog's temptation to bite or lick the fistula, and only one dog needed a collar to prevent his biting the bag.

The achievement of such success is especially remarkable in view of the fact that neither of the authors had ever tried the method before and had had no experience whatever with these cannulas. The fact that one dog had 7 pups without interrupting the experiment is significant.

We have no hesitancy in stating that the Dragstedt cannula offers a practically fool-proof method of obtaining nearly 100% of clean specimens from bile fistula dogs, a record that we have never before been able even to approximate.

7210 P

Studies on Acholic Cachexia. II.* Is Anemia a Factor?

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The question as to whether the well known anemia accompanying acholic cachexia is a primary factor in the disease or only a manifestation of a late or terminal cachexia in general is an important one. On this feature alone are based many of the current theories as to the origin of cachexia cholipriva. One assumption often made is that prolonged loss of bile will deprive the body of the opportunity of resorption of blood-forming pigments from the gastrointestinal tract. The statement may easily be disproved by a comparative study of the rate of fall of the hemoglobin and the cells in acholic anemia. Such an assumption would surely predicate a more rapid fall of the hemoglobin than in the red count. In previously reported series as well as in our tables it can be seen at once that this is not the case.

The other theory is based on the fact that the anemia is a manifestation of lack of fat soluble vitamin, due to inability to absorb such material in the absence of bile salts from the intestinal tract. The evidence for this is admirably summed up by Takasu.¹

* Work done under a grant from the Jessie Horton Koessler Fellowship of the Institute of Medicine, Chicago.

¹ Takasu, Misao, *Deutsche Zeitschr. f. Chir.*, 1930, **224**, 240.

Studies of this character have frequently been complicated by the fact that such a surprisingly high percentage of bile fistula dogs develop ulcers of the stomach or duodenum, which are liable to massive hemorrhage. Estimates of this percentage have been given as high as 90% by some observers, although in our own experience it has been very much less. In the experiments here reported this factor was ruled out by post mortem examinations as well as daily search for blood in the stools. The figures reported are from 4 dogs with biliary fistulas who lived from $4\frac{1}{2}$ to $5\frac{1}{2}$ months.

The average loss in body weight during this period was 33%.

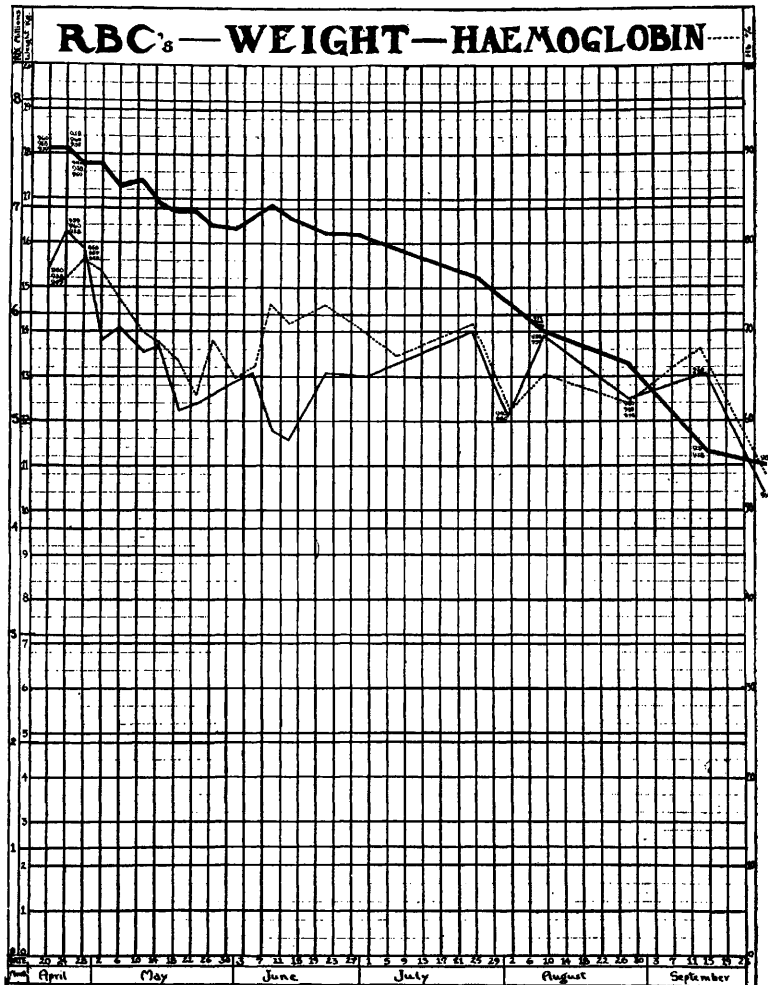


FIG. 1.

The average loss of hemoglobin was 17.4% and of red cells, 17.8%. Four of the dogs died with hemoglobin and red count within the lower limits of normal and the lowest red count was 4,200,000. These findings are certainly not indicative of the fact that anemia is at all a primary factor in the condition. Furthermore, one dog died with a red count higher than before the operation, after having lost 41% of body weight in 5 months, his appearance being in every way typical of acholic cachexia.

Red cell fragility was tested every 4 days in all these animals and in no case was there any deviation from the normal.

From the accompanying chart it is quite clear that the weight loss ran a curve definitely ahead of the anemia, and that while the cachexia and weight loss were profound, the blood findings not only were of a far lesser degree but also did not in the least parallel the progress of the cachexia.

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Studies on Acholic Cachexia. III.* The Acid-base Equilibrium.

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For many years it has been assumed that since the bile was alkaline, loss of bile would consequently produce an acidosis. The importance of this factor in acholic cachexia has been a disputed point.

Okada¹ studied fistula bile from dogs and found a pH averaging slightly over 8.00, Düttmann's² investigations showed it a trifle lower. In the prolonged studies of Drury, McMaster and Rous³ duct bile averaged pH 8.20. Neilson and Meyer⁴ found figures in the same range, but called attention to the fact that on standing, or heating, duct bile would increase its alkalinity, the pH rising to 8.40-8.60. This was presumably due to driving off of CO₂. Drury³ emphasized the point that the bile is a well-buffered solution, and that addition of considerable amounts of acid were necessary in

* Work done under a grant from the Jessie Horton Koessler Fellowship of the Institute of Medicine, Chicago.

¹ Okada, S., *J. Physiol.*, 1915, 1, 114.

² Düttmann, E., *Bruns. Beitr. z. klin. Chir.*, 1927, **139**, 720.

³ Drury, D. R., McMaster, P. D., and Rous, P., *J. Exp. Med.*, 1924, **39**, 403.

⁴ Neilson, N. M., and Meyer, K. F., *J. Inf. Dis.*, 1921, 28.