## ERRATUM

Article on Effect of Cortical Extract on Glucose Tolerance of Adrenalectomized and Hypophysectomized Rats, by Howard A. Ball, Leo T. Samuels and H. F. Schott, 1937, **35**, 633, the authors wish to acknowledge the financial aid of the Committee on Scientific Research of the American Medical Association.


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### SECTION MEETINGS

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| IOWA | | |
| State University of Iowa | February | 25, 1937 |
| NEW YORK | | |
| New York Academy of Medicine | March | 17, 1937 |
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| Tulane University | March | 5, 1937 |
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| Scripps Institution, La Jolla | February | 27, 1937 |

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## Effect of Cholecystectomy on Extra-Hepatic Ducts in the Rabbit and Guinea Pig.


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It is well known that removal of the gall bladder in man and dog is usually followed, in time, by dilation of the extra-hepatic ducts. In these species the output of bile by the liver is comparatively small, the ability of the gall bladder to concentrate hepatic bile is large, so that the gall bladder can accommodate the 12- to 24-hour output of

the liver in fasting (*i. e.*, the "physiologic capacity" of the gall bladder is great). Further, the sphincteric resistance is high and the ducts are not motile. In the guinea pig and rabbit the output of bile by the liver is relatively very large and the ability of the gall bladder to concentrate hepatic bile is small, so that their gall bladder can accommodate only one-fiftieth or less of the 24-hour output of hepatic bile. Further, their sphincteric resistance is relatively small and their common duct is motile, a sort of an extra-duodenal ampulla, which is contractile, being present in the guinea pig (Table I).

TABLE I.
Effect of Cholecystectomy on Dog, Man, Rabbit, and Guinea Pig.

| Species | 24-hour bile output per kilo | 24-hr. bile output per gm. of liver | Physiological capacity* of gall bladder | Sphincteric resistance in mm. N saline | Common duct measurements in mm. (dia) | |
|---|---|---|---|---|---|---|
| | | | | | Normal | After cholecystectomy |
| Dog | 17.0 | 0.51 | 12+ | 300-700 | 2.70 | 5- 7.0 |
| Man | 16.0 | 0.64 | 12+ | 300-700 | 6-7.0 | 10-15.0 |
| Rabbit | 118.7 | 4.53 | 0.6 | 35-70 | 3.02 | 4.0 |
| Guinea pig | 228.0 | 6.50 | 0.3 | 40-50 | 1.92 | 1.57 |

* Hours of hepatic secretion accommodated by gall bladder.

It was thought that the extra-hepatic ducts of the rabbit and guinea pig might not dilate after cholecystectomy, it being conceived that the factors of low sphincteric resistance and of motility of the common duct might operate to prevent or definitely reduce dilation. In fact, Burget and Brocklehurst[1] have reported that only slight dilation occurred in 2 of 7 guinea pigs from 24 to 33 days after cholecystectomy. We have repeated and extended their experiments.

A standardized method was adopted to measure accurately the diameter of the common bile duct in normal and cholecystectomized animals. A small glass cannula connected to a manometer (5 mm. bore) was inserted into the distal end of the common duct which was then filled with normal salt solution under pressure of a column of fluid 10 cm. in height. The diameter of the distended duct was then measured with a micrometer graduated to 0.01 mm.

The gall bladder and the immediately adjacent portion of the cystic duct was removed under ether anesthesia, trauma to the common duct being avoided. The animals showed no ill effects from the operation and were maintained thereafter on a stock diet.

[1] Burget and Brocklehurst, *Am. J. Physiol.*, 1928, **83**, 578.

*Results. Rabbits.* Ten rabbits were cholecystectomized, the postoperative period lasting from 9 to 200 days. The average diameter of the common duct in 5 normal rabbits (average weight 1952 grams) was 3.02 mm. as compared to 4.00 mm. in the cholecystectomized group (average weight 2011 grams). It will be noted in Table II that the diameter of the common duct was within normal limits in 4 of the 10 cholecystectomized rabbits.

*Guinea Pigs.* The diameter of the common duct averaged 1.92 mm. in 6 normal guinea pigs (average weight 543 gm.) and 1.57 mm. in 6 guinea pigs 18 to 137 days after cholecystectomy (average weight 441 gm.) (Table II).

TABLE II.
Common Duct Measurement in Normal and Cholecystectomized Rabbits and Guinea Pigs.

| Normal | | | Cholecystectomized | | | |
|---|---|---|---|---|---|---|
| No. | Wt. in gm. | Diameter common duct in mm. | No. | Wt. in gm. | Days without gall bladder | Diameter common duct in mm. |
| Rabbits | | | | | | |
| 1 | 1500 | 2.75 | 1 | 2000 | 9 | 3.05 |
| 2 | 3000 | 3.25 | 2 | 1400 | 30 | 4.00 |
| 3 | 1620 | 3.30 | 3 | 1600 | 53 | 4.10 |
| 4 | 2050 | 2.80 | 4 | 950 | 128 | 3.50 |
| 5 | 2050 | 3.00 | 5 | 1670 | 128 | 4.03 |
| | | | 6 | 1530 | 129 | 4.58 |
| | | | 7 | 2400 | 142 | 5.60 |
| | | | 8 | 2956 | 148 | 3.07 |
| | | | 9 | 3650 | 180 | 4.92 |
| | | | 10 | 1956 | 200 | 3.05 |
| Aver. | 1952 | 3.02 | Aver. | 2011 | | 4.00 |
| Body weight / Common duct diameter = ratio | | | Normal 0.001547 | | | |
| | | | Cholecystectomized 0.001988 | | | |
| Guinea pigs | | | | | | |
| 1 | 860 | 2.02 | 1 | 360 | 18 | 1.50 |
| 2 | 810 | 2.50 | 2 | 380 | 18 | 1.00 |
| 3 | 525 | 2.25 | 3 | 410 | 46 | 1.60 |
| 4 | 365 | 1.45 | 4 | 500 | 137 | 1.50 |
| 5 | 360 | 1.72 | 5 | 600 | 137 | 2.07 |
| 6 | 338 | 1.58 | 6 | 395 | 137 | 1.72 |
| Aver. | 543 | 1.92 | Aver. | 441 | | 1.57 |
| Body weight / Common duct diameter = ratio | | | Normal 0.00354 | | | |
| | | | Cholecystectomized 0.00356 | | | |

Burget and Brocklehurst did not provide measurements of the common duct after cholecystectomy in the guinea pig and stated that they doubted the significance of the slight dilation they observed. Our observations show that dilation does not occur in the guinea

pig; if so it is slight and occurs rarely. In the rabbit, however, some dilation does occur, the average percent increase in diameter of the common duct being less than 30% (body weight taken into consideration). In view of the facts that the common duct of the rabbit is relatively less motile than that of the guinea pig and that the sphincteric resistance is about the same in both, the absence of dilation in the guinea pig is best accounted for by the greater motility of its duct. Thus, in the guinea pig the gall bladder is unimportant either as a reservoir for storage of bile or as a pressure regulatory mechanism. In the rabbit it apparently serves to a slight extent as a pressure regulatory mechanism.

A study of the comparative anatomy of the gall bladder, to be reported elsewhere, shows that the gall bladder is a variable anatomic character in rodents. Some, like the mouse, have apparently retained the organ for purposes of pressure regulation and storage, as in primates and carnivours; others, like the rat, have completely lost the organ; and others, like the guinea pig, have retained the organ. In the latter, however, it can be of no real physiologic significance, since anatomic changes do not result in the extra-hepatic ducts after cholecystectomy.

*Conclusions.* Cholecystectomy in the guinea pig results in no dilation of the common bile duct. Cholecystectomy in the rabbit results in a slight but variable dilation of the common duct.

## 9128 P

## On the Relation Between Hypoglycemia and Anoxemia.

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Studies on the $O_2$ uptake by excised brain tissue and the $O_2$ consumption of the brain in man indicate that the utilization of oxygen by the brain is dependent on the sugar concentration in the blood. Brain tissue obtained from insulinized animals shows a lesser oxygen consumption than controls (Holmes[1]) and the arterio-venous oxygen difference is diminished after the administration of insulin in man (Dameshek and Myerson[2]). The anoxemia theory of in-

[1] Holmes, E. G., *Biochem. J.*, 1930, **24**, 914.

[2] Dameshek, W., and Myerson, A., *Arch. Neurol. Psychiat.*, 1935, **33**, 1.