

large to correlate the nature of the response of the blood level with individual disease entities.

We could not detect tocopherol in any of 6 specimens of spinal fluid from amyotrophic lateral sclerosis and other patients.

Summary. In continuation of previous studies, the tocopherol level in the serum of patients with amyotrophic lateral sclerosis and with miscellaneous myopathies was found to

average 0.67 and 0.61 mg/100 ml respectively. The response to daily oral administration of 75 to 740 mg tocopherol runs parallel to the dosage and attains levels of more than 2.0 mg/100 ml serum. Temporary favorable effects on the clinical status are only found with doses over 200 mg tocopherol per diem. The spinal fluid does not contain tocopherol.

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Heparin and the Agglutination of Platelets *in Vitro*.

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Heparin inhibits both the coagulation of the blood and the agglutination of platelets. A much higher concentration, however, is required for the latter. Solandt and Best¹ have shown that over 300 mg per kg of body weight must be injected intravenously to prevent the intravascular clumping of platelets. The object of the present study was to determine the minimum amount of heparin that is required for the prevention of platelet agglutination *in vitro*.

Blood was drawn into a dry sterile syringe, and immediately distributed in 1 cc amounts to a series of small test tubes containing 0.1 cc of heparin solution (Roche Organon Liquaemin*) of varying concentrations as

recorded in the table. After thorough mixing, the blood was drawn to the 0.5 mark in a red blood cell pipette and the pipette filled with 0.85% sodium chloride solution. The platelet count was made in the usual manner.

A concentration of more than 0.1 mg (or 10 Toronto units) per cc of human blood is required to prevent clumping of platelets. No decrease in the platelet count by heparin as reported by Copley and Robb² was observed. Why so much more heparin is required for the prevention of platelet agglutination than for inhibiting coagulation is not clear. Nevertheless, it is well recognized that a definite relationship exists between these two processes. An additional observation in support

TABLE I.
Influence of Heparin on the Platelet Count *in vitro*.

Amt of heparin per cc of blood	Platelet count of human subjects			State of platelets
	I	II	III	
None*	337,000	312,000	278,000	No clumping
0.1 mg	360,000	320,000	286,000	Definite clumping
0.25	372,000	300,000	270,000	No clumping
0.5	320,000	208,000	264,000	" "
1.0	348,000			" "

* 0.1 cc of 3.8% sodium citrate was used.

¹ Solandt, D. Y., and Best, C. H., *Lancet*, 1940, **1**, 1042.

* The Liquaemin was kindly supplied by Edward

A. Wickham of Roche Organon, Inc., Nutley, New Jersey.

² Copley, A. L., and Robb, T. P., *Am. J. Clin. Path.*, 1942, **12**, 416.

of this may be cited. The platelets of blood obtained from animals whose prothrombin has been drastically reduced by feeding dicumarol show no tendency to agglutinate in the absence of an anticoagulant. A typical experiment was as follows: Dicumarol was given to a rabbit daily until the prothrombin time

was 7 minutes. Platelet counts were made using for one sample 3.8% sodium citrate as the diluent, and for the other 0.85% sodium chloride solution. The platelet count using saline solution was 250,000, and with sodium citrate solution was 280,000. No clumping in either was observed.

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Rate of Emptying of Biliary Tract Following Section of Vagi or of All Extrinsic Nerves.*

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Previous experiments have demonstrated that section of the specific nerves to the choledochoduodenal junction in the cat so retards emptying of the gall bladder that double the time is required to empty half its contents after a meal of egg-yolk. Subdiaphragmatic section of the left vagus has approximately the same effect but when the right vagus is cut the time is tripled. Section of all splanchnics produces little change.¹ The evidence suggests that severance of the right vagus removes not only the fibers which activate the gall bladder but those which release the sphincter of Oddi by inhibiting the local nerve net that maintains its tonus between meals.

Surprisingly, a continuation of these experiments has shown that severance of *both* vagi, or complete denervation of the biliary tract (vagi and splanchnics), has no retarding

effect on the rate of emptying, *i.e.*, gall bladder and sphincter respond to hormone-producing food at least as fast as in the controls.

Since it is known that section of one vagus does not affect the rate of emptying of the stomach² but that section of both vagi relaxes the pyloric sphincter and decreases the initial time required for passage of food into the duodenum,³ the rate of emptying of the denervated biliary tract may be explained on the basis that loss of vagus effect on the biliary musculature is compensated for by increased hormonal action resulting from faster discharge of hormone-producing food into the duodenum. Contrary to some earlier reports on section of nerves to the intestine⁴ it can be stated that severance of all extrinsic nerves to the sphincter of Oddi, although resulting in destruction of preganglionic fibers, does not

TABLE I.
Rate of Emptying of Gall Bladder After Egg-yolk.

Nervous pathway interrupted	No. of animals	Initial tonus (min)	Oil enters cystic duct (min)	½ contents gall bladder discharged (min)	¾ contents discharged (min)
Lipiodol controls (DuBois and Hunt, '32)	12	9	20	70	104
Both vagi	12	10	22	64	89
Vagi and splanchnics	11	9	26	68	87

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¹ Johnson, Frank E., and Boyden, Edward A., *Surg., Gyn., and Obst.*, 1943, **76**, 395.

² McSwiney, B. A., *Physiol. Rev.*, 1931, **11**, 478.

³ Meek, Walter J., and Herrin, Raymond C., *Am. J. Physiol.*, 1934, **109**, 231.

⁴ Evans, C. L., *Physiol. Rev.*, 1926, **6**, 358.