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Importance of the Spleen as a Reservoir for Red Blood Cells.

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The fact that different authors vary in their opinion concerning the rôle of the spleen as a reservoir for red blood cells (Radosaljevic and Sekulic, Feldberg and Lewin, and others[1]) has induced us to study this problem.

In the first group of experiments, we studied the effect of intravenous injection of adrenalin on the peripheral blood picture of normal anesthetized dogs. Chloralose was the narcotic chosen because of its dilating effect on the spleen. In 16 dogs the curve of hematocrit determinations (femoral vein) showed an average maximal increase of 13.4%. In a second series of experiments we compared the curves of the hematocrit values of the splenic vein, portal vein and vena cava (or vena femoralis) of dogs after the injection of adrenalin. It was found that a marked but brief increase of the hematocrit numbers takes place in the splenic vein incident to the rapid contraction of the organ. On the other hand, the co-incidental hematocrit values of the portal vein or of the vena cava increase gradually. The curves in Fig. 1 demonstrate clearly the fallacy of single determinations.

In a third group of dogs the tests were repeated under similar conditions but following splenectomy. No or only a slight increase in the hematocrit numbers was found after the injection of adrenalin. In a fourth series of experiments the liver of dogs was completely excluded from the portal circulation by means of a reversed

[1]Radosaljevic and Sekulic, *Wien Arch. f. inn. Med.*, 1930, **20**, 81. Feldberg and Lewin, *Arch. f. d. ges. Physiol.*, 1928, **219**, 246.

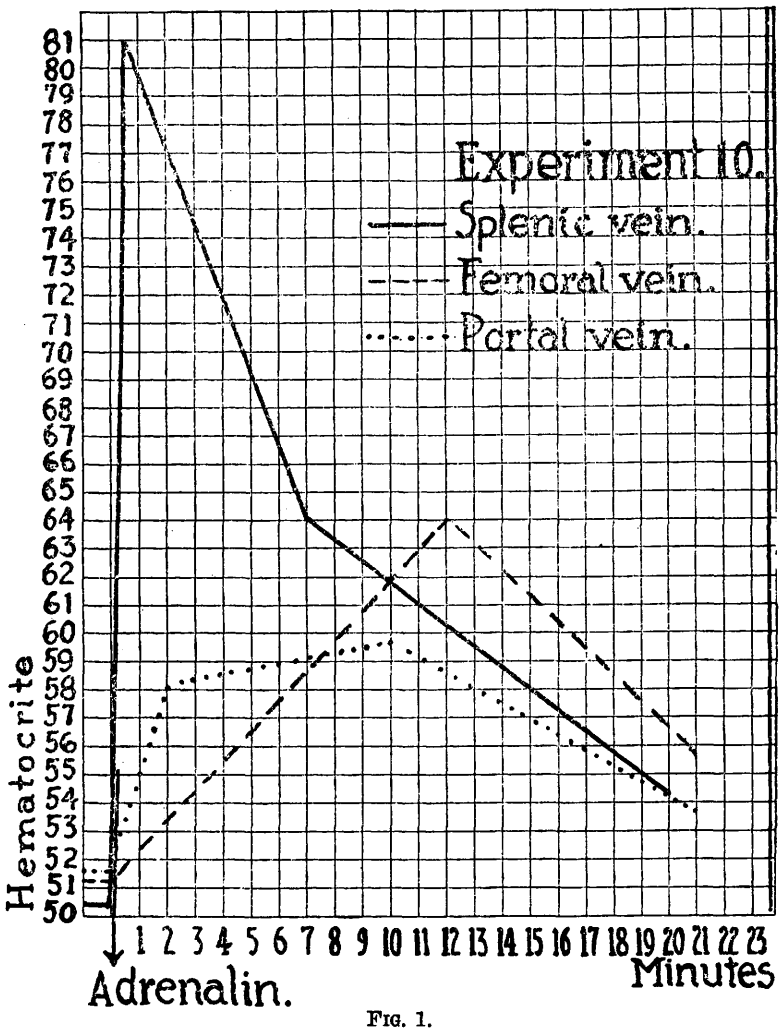

FIG. 1.

Eck fistula. No differences were noted in the curves of the hematocrit values as compared with normal dogs. In a fifth group of dogs fully dilated spleens were extirpated with minimum loss of blood and their blood content determined. It was found that the dog spleen, because of its ability to express stored red blood cells could furnish about 80% of the total increase in the adrenalin erythrocytosis.

Analogous investigations on other animals were made. Twenty rats were killed by means of ether (spleens retain approximately normal size), 10 were given lethal doses of chloralose (producing dilatation of the spleen) and 10 animals were forced to exhaust

themselves completely through swimming (resulting in contracted spleens). The total hemoglobin of the animals of the relaxed and contracted spleens were determined after having placed the extirpated organs into a measured volume of dilute adrenalin solution. Thus a quantitative designation of the function of the spleen as a reservoir for red blood cells was permitted. Our results are listed in Table I.

TABLE I.

Animal group	No. of animals	Hemoglobin in spleen in % of total hgb.	Hgb. of blood expelled from the extirpated spleen by adrenalin:	
			in % of total hgb.	in % of spleen hgb.
A. Chloralose poisoning	10	8.1	3.3	40.3
B. Ether narcosis	20	3.4	0.56	16.6
C. Exhaustion	10	1.7	0.2	11.5

Conclusions. 1. The spleen, though not alone in this function, is the most important blood reservoir in the dog. 2. Chloralose effects storage of red blood cells also in the spleen of the albino rat, while exhaustion leads to ejection of erythrocytes from this organ. The ability of the rat spleen to form a depot of red blood cells is very slight. 3. No generalizations concerning the function of the spleen as a reservoir of red blood cells can be permitted because of the great variability of its function in different animals.

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Influence of the Adrenal Glands on the Contractility of the Spleen.

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The purpose of the experiments was to determine the regulatory mechanism responsible for splenic contraction and dilatation. Tournade and Chabrol[1] believe in a combined nervous and hormonal control of the splenic contractions and Izquierdo and Cannon[2] observed no erythrocytosis after exposure to low oxygen tension in an

[1] Tournade and Chabrol, *Compt. rend. Soc. d. Biol.*, 1924, **90**, 835.

[2] Izquierdo and Cannon, *Am. J. Physiol.*, 1928, **86**, 545.