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Morphological Changes Induced in the Liver by Acute Passive Congestion.

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This is a continuation of the experimental work on the liver of the dog begun by Doctor Simonds and Doctor Brandes.[1, 2, 3, 4, 5]

The morphological changes induced in the liver by acute passive congestion lasting from 10 to 30 minutes, are being studied. The slides are taken from the same animals used in the above experiments with some additional ones from dogs in which a detailed study of blood and lymph changes was not made.

The method of producing acute passive congestion has been described in the preceding papers. Briefly, it consists in producing mechanical constriction of the hepatic veins between the liver and the diaphragm by clamping with an intestinal clamp or by placing rubber tubing about these veins, anterior to and excluding the inferior vena cava. With the veins constricted, the liver can be seen to enlarge and darken, and the veins in the mesentery can be seen to dilate while the intestine assumes a bluish color.

After 10 to 30 minutes, the constriction is released, and the laparotomy wound is closed. All the work is done aseptically under ether anesthesia.

The dogs are then killed at intervals of 12 to 72 hours with ether. Some of the last dogs have been allowed to live 1 week. After autopsy, sections from several lobes of the liver are prepared routinely.

In studying these slides, an attempt is being made to estimate the amount of damage done. This is being done by comparing the area of the tissue which seems little if at all damaged, with the total area of the portion of the section examined microscopically. From 15 to 20 low power fields—measuring 1.3 mm. in diameter, or 1.327,326 sq. mm.—are studied per slide. The area of the normal tissue is computed arithmetically from measurements with a micrometer which fits in the eyepiece. The portions of the fields to be measured are

1 Simonds, J. P., *J. Immunol.*, 1927, **13**, 11.

2 Simonds, J. P., and Brandes, W. W., *Am. J. Physiol.*, 1925, **75**, 201.

3 Simonds, J. P., and Brandes, W. W., *Am. J. Physiol.*, 1925, **75**, 320.

4 Simonds, J. P., and Brandes, W. W., *J. Immunol.*, 1927, **13**, 1.

5 Simonds, J. P., and Brandes, W. W., *Am. J. Physiol.*, 1928, **86**, 623.

split into geometric figures whose areas can be obtained by multiplication of their heights and widths according to the rules of arithmetic.

Results. The morphological changes induced may be summarized as follows: 1. Dilatation of the central veins and neighboring capillaries. 2. Engorgement of the central veins and neighboring capillaries with r.b.c. and granular eosinophilic debris. 3. Formation of conglutination thrombi in the central veins. 4. Areas of focal necrosis about the thrombosed central veins. 5. In some cases, a generalized, but slight, infiltration of the tissue with polymorphs. 6. Degenerative changes in the cells about the central veins, a. narrowing of cells; b. loss of characteristic cord-like structures, piling up of cells with ill-defined borders and fragmentation of cells; c. loss of staining affinity, both by nucleus and by cytoplasm; d. increased and coarse granular appearance of cytoplasm; e. vacuolization of cytoplasm; f. hemosiderm pigmentation; g. decrease in number of nuclei; h. degenerative changes in nuclei, pyknosis, karolysis. 7. Hyperplasia of portal canals. 8. Edema of portal canals. 9. Slight degenerative changes in cells surrounding the portal canals. 10. In those slides studied for quantitative changes, as much as 90% to 94% of the tissue has been damaged.

The production of areas of focal necrosis is particularly interesting, for this apparently bears out Mallory's[6] hypothesis as to the origin of focal necrosis in the liver in typhoid. That focal necrosis is caused by the plugging of capillaries by enlarged Von Küpfer cells, or the proliferation of endothelium, has been doubted by later workers.

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Cinchophen Poisoning.*

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Cinchophen is usually given in therapeutic doses of 7½ grains 3 times a day. Considering 150 pounds as the normal or average weight, this is a dose of 22 mg. per kilo.

In order to produce cinchophen poisoning quickly 3 dogs were

[6] Mallory, F. B., *J. Exp. Med.*, 1898, **3**, 611.

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