jaundice. In all of these relatively large amounts of an olive oil splitting lipase have appeared in the blood, while the ethyl butyrate splitting esterase has not changed. The olive oil lipase is present about 6 hours after the operation and reaches its maximum in about 48 hours. However, in one animal which refused food postoperatively no such lipase appeared in the blood until the 72nd hour.

Determinations of the lipases acting on olive oil and on ethyl butyrate have been made on glycerol extracts of brain, muscle, spleen, kidney, liver, intestinal mucosa, lung and pancreas. All of these extracts were active on ethyl butyrate, liver extract being by far the most potent. Pancreas, intestinal mucosa, liver, and spleen extracts were found to contain a lipase capable of splitting olive oil, activity being in the order named. A trace of olive oil lipase was present in the kidney extract.

The appearance in the blood of dogs with pancreatic injury of a lipolytic activity which is not normally present is best interpreted, we believe, as a demonstration of the specificity of pancreatic lipase. It could also be due to the appearance in the blood of a coenzyme which activates the normal blood lipase. The lipolysis of olive oil by serum after liver injury is more difficult of interpretation. It could be due to absorption of this lipase from the injured liver into the blood. The possibility that this lipase is normally passing into the blood from the gastro-intestinal tract and that the injured liver fails to remove it while the normal liver acts as a barrier to this substance must also be considered. We consider the latter supposition the more likely; further work will be done on this question.

5427

Presence of an Olive Oil Splitting Lipase in the Blood of Patients With Multiple Sclerosis.

LATHAN A. CRANDALL, JR., AND IAN S. CHERRY. (Introduced by A. C. Ivy.)

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Recently Brickner[1] has reported that the blood of patients with multiple sclerosis causes a myelinolysis of the spinal cords of rats *in vitro;* he has also found that serum from these patients becomes less alkaline on standing than does serum from normal individuals;[2]

[1] Brickner, R. M., *Arch. Neurol. and Psychiat.*, 1930, **23**, 715.

[2] Brickner, R. M., *Bull. of the Neurol. Inst. of N. Y.*, 1931, **1**, 105.

this difference is accentuated by the presence of lecithin. These changes he ascribes to the presence of increased amounts of a lipolytic substance in the blood of patients with multiple sclerosis. He believes that this substance may be an etiological agent.

We have made studies of the serum lipases of 19 patients with multiple sclerosis, using as substrates olive oil and ethyl butyrate according to the technique previously described by us.[3] This is a titration method, employing N/20 NaOH and phenolphthalein. The error is such that we only consider values above 0.2 cc. as positive. In the cases studied we have found values of 0.3 cc. or above, using olive oil as a substrate, in 12 or 63%.

Sera from 146 dispensary patients have been used as controls. Of these sera 140 showed no trace of olive oil lipase, 6 gave values of 0.3 cc. or above. On these 6 false positives the clinical diagnoses were astigmatism, cataract, hypertension, arthritis, cerebellar medulloblastoma, and traumatic psychosis. Thus 95.9% of the controls gave negative results for olive oil lipase.

In view of the finding of an olive oil splitting lipase in the blood of animals with experimental liver or pancreatic injury a special study was made of cases with a clinical diagnosis of liver or pancreatic involvement. Eleven such cases were studied. Seven, or 63% of them, showed the presence of an olive oil splitting lipase in the blood serum. The diagnoses on the cases showing positive results were: carcinoma of the biliary tract, carcinoma of head of pancreas (2 cases), stone in common duct, and cirrhosis (3 cases). The diagnoses on cases of liver involvement with negative serum lipase were: gall stones with slight icterus, cirrhosis, catarrhal jaundice, and metastatic liver. Thus it appears that an olive oil splitting enzyme is present in most cases of diffuse involvement of the liver parenchyma.

No variation from normal values for ethyl butyrate esterase has been observed, except that in some cases of severe and long-standing liver disease with cachexia (especially cirrhosis) the esterase titre is low.

This abnormal serum lipase which appears in multiple sclerosis, in experimental hepatic and pancreatic damage, and in clinical cases of hepatic disease, may possibly be an etiologic factor as suggested by Brickner. It appears more likely, however, that it is merely an evidence of pathology in the liver or pancreas.

We wish to express our appreciation to Dr. Pollock and other

[3] Crandall, L. A., Jr., and Cherry, I. S., PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 572.

members of the Department of Neurology, Northwestern University Medical School, and to Dr. Minke of the Oak Forest Infirmary, for cooperation which made these studies possible.

5428

Staining Differences of Nuclei in Hepatic Cells.

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During a course of experiments with fixatives we observed an apparent differential staining of nuclei in liver cells. This was obtained after fixation of the tissue in a solution consisting of:

Potassium bichromate	2 gm.	Sulphuric acid (conc.)	1.75 cc.
Sodium sulphate	0.75 "	Acetic acid (conc.)	5 "
Mercuric sulphate	3.5 "	Distilled water	87 "

Liver tissue from the rabbit, cat, and dog was fixed for about 20 hours, after which it was dehydrated, imbedded in paraffin, and cut into 10μ and 5μ sections. Some sections were stained with Mallory's triple connective tissue stain while others were stained in hematoxylin and eosin.*

Observations. 1. Some nuclei of mononuclear liver cells appear blue, while others appear red. 2. Both nuclei in some binucleate liver cells appear blue, while in other cells both appear red. 3. In some binucleate liver cells one nucleus appears blue, the other red. 4. In the blue staining nuclei the nucleoli, which may be two in number, stain blue. 5. In the red staining nuclei, the nucleoli are as a rule red, but additional blue nucleoli may be present. 6. The nuclear ground-substance (enchylema) and the nuclear sponge-work stain red in the red nuclei and blue in the blue ones. 7. No apparent difference in the staining affinity of the cytoplasm of the cell body proper has been observed.

Schäfer,[1] Jordan,[2] and Bloom[3] do not describe any differences in

* Blue indicates affinity for aniline blue in Mallory's stain or hematoxylin in the hematoxylin and eosin stain; red indicates affinity for acid-fuchsin in Mallory's stain or eosin in the hematoxylin-eosin stain.

[1] Schäfer, E. A., Quain's Anatomy, 1912, **2**, 1. Longman, Green and Co., London.

[2] Jordan, E. H., A Text-book of Histology, 1930. W. B. Saunders Co., Philadelphia.

[3] Bloom, W., In Maximow and Bloom, A Text-book of Histology, 1930. W. B. Saunders Co., Philadelphia.