

Effect of External Secretion of Pancreas upon Blood Lipids of Completely Depancreatized Dog Maintained with Insulin.*

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Previous reports^{1, 2} demonstrated that pancreas contains a factor capable of increasing the blood lipids of the completely depancreatized dog maintained with insulin. It was shown that, following the ingestion of raw glandular tissue, the lipid levels rose well above normal and that all constituents were involved (cholesterol, phospholipids and neutral fat). The most striking change occurred in blood cholesterol, particularly in its esterified fraction. It was also established that this factor is heat labile and therefore not identical with the heat stable factor of the pancreas, which latter, when fed to depancreatized dogs maintained with insulin, prevents the infiltration of fat in their livers.³ Furthermore, the blood lipid factor is not choline, for, although this can restore the blood lipid levels to normal, it fails to raise them appreciably above normal.⁴

The studies just described were made by adding whole pancreas to an otherwise adequate diet. It seemed important to determine whether similar results could be obtained by substituting the external secretion of the pancreas for the whole gland. The work reported here shows that the pancreatic juice does contain a factor which affects in a similar manner the blood lipid levels of the depancreatized dog maintained with insulin.

Pure pancreatic juice was collected by means of a modified Elman-McCaughan⁵ fistula from dogs that were kept in good nutritional state by the feeding of an adequate diet containing 30 to 50 g of raw pancreas daily and whose salt balance was maintained through replacement either by intravenous administration or by addition to the diet.

The depancreatized dogs were cared for as recorded elsewhere³

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¹ Chaikoff, I. L., and Kaplan, A., *J. Biol. Chem.*, 1934, **106**, 267.

² Chaikoff, I. L., and Kaplan, A., *J. Biol. Chem.*, 1935, **112**, 155.

³ Kaplan, A., and Chaikoff, I. L., *J. Biol. Chem.*, 1937, **119**, 435.

⁴ Kaplan, A., and Chaikoff, I. L., *J. Biol. Chem.*, 1937, **120**, 647.

⁵ Elman, R., and McCaughan, J. M., *J. Exp. Med.*, 1927, **45**, 561.

and were maintained on a diet consisting of raw lean meat, sucrose, bone ash and vitamin supplements. Feedings were given twice daily. Four experiments were performed on 3 animals. It already has been shown that, when raw pancreas is excluded from the diet of such animals, the blood lipid levels fall below normal. This exclusion was practiced in the 4 experiments, and as soon as the subnormal lipid levels were established, fresh pancreatic juice was added to the diet for a period of 3 weeks in amounts varying from 300 to 900 cc daily. When the pancreatic juice was mixed with other food, all the animals rapidly ingested the diet. This favorable result may be due to the fact that only dogs with a good appetite were chosen for the experiment.

All lipid constituents responded to the feeding of pancreatic juice by rising to levels above normal. The increases observed were comparable to those produced by supplementing the diet with 250 g of raw pancreas daily. The changes in the total, free and ester chol-

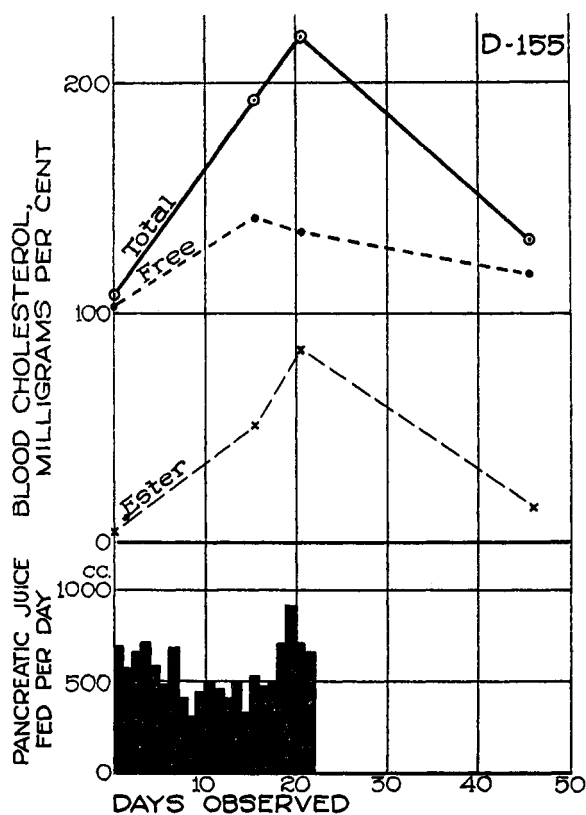


FIG. 1.

esterol in one experiment are shown in Fig. 1. The effects produced on cholesterol esters are especially striking. As shown in the chart, this lipid constituent rose from 5 to 81 mg %. Experiments to determine the nature of the substance that produces these lipid changes are in progress.

Summary. The external secretion of the pancreas contains a substance that causes a marked rise above the normal in the blood lipid levels of the depancreatized dog maintained with insulin.

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Influence of K-Strophanthosid on Elasticity of the Tortoise Ventricle.

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There has been uncertainty as to whether digitalis glucosides act to decrease the diastolic ventricular volume mainly by virtue of an increase in the efficiency of doing work¹ or by an increase in elasticity, frequently referred to as an increased tonus.² This problem has been attacked by several investigators. Cushny³ misinterpreted his own data in stating that no change in elasticity occurred with large doses of glucoside. Other observers^{4, 5} found either little or no change in elasticity with small doses of digitalis which were adequate to increase the force of contraction, and very large increases in elasticity with doses causing contracture. Working with strips of frog ventricle⁶ and cat's papillary muscle,⁷ other workers have found that great increases in work capacity occur with doses of drug which are without influence on resting elasticity.

We have performed experiments in which the diastolic and systolic elasticity and work of the tortoise ventricle were measured, and the influence of the cardiac glucoside K-Strophanthosid* upon

¹ Peters, H. C., and Visser, M. B., *Am. Heart J.*, 1936, **11**, 273.

² Cohn, E. J., and Steele, M., *J. Clin. Invest.*, 1932, **11**, 871.

³ Cushny, A. R., *The Action and Uses in Medicine of Digitalis and Its Allies*, Longmans Green & Co., London, 1925, fig. 15.

⁴ Eismayer, *Ergeb. d. Physiol.*, 1930, **30**, 126.

⁵ Sulzer, R., *Z. f. Biol.*, 1932, **74**, 571.

⁶ Ueda, S., *Acta Scholæ Med. Univ. Kioto*, 1924, **6**, 193.

⁷ Cattell, J. M., and Gold, H., *J. Pharm. and Exp. Therap.*, 1938, **62**, 116.

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