terials appear to offer a variety of possibilities for modifying the mineral components of milk, either by removal of certain ions, by substituting other ions for normal ions present, or by both operations. Unpublished work, by one of the authors, E. F. Almy, on the calcium removal from cation-exchanged skim milk, shows that removals for calcium start at 83% and drop to 39% as the exchange run progresses, whereas the adsorption for phosphorus remains constant at approximately 7–8%.

Applications of ion-exchange milk to produce smoother ice cream, to improve the quality of baked goods made with milk, and to improve various other dairy products have been suggested, but await further investigation. A local company[4] has patent applications filed covering complete demineralization of cheese whey for the production of lactose with low mineral (ash) content, and for the production of the M.I.E. milk previously mentioned. It also has filed patent applications covering the production of a powdered cream which has been rendered heat-stable by ion exchange to lower the calcium ion content before drying.

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The ΔG/ΔP Ratio after the Administration of Dextrose as an Index of Insular Function

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In the course of some investigations on the decrease in serum inorganic phosphorus produced by the administration of glucose, it was found useful to relate increase in blood sugar values to decrease in inorganic phosphate.

It is well known that deficiency in insulin production is accompanied by high blood sugar levels as determined a half hour after administration of the carbohydrate, and vice versa, that increased insulin secretion leads to low values. However, there are factors, such as rate of glycogenolysis, secretion of epinephrine, storage ability of the tissues, and different rates of intestinal absorption, that may easily alter blood sugar levels.

The decrease in serum inorganic phosphorus which follows dextrose administration (*1*, *5*, *7*) depends upon the liberation of insulin; in fact, it does not take place in the pancreatectomized animal (*2*). Epinephrine also produces a similar decrease, but only in animals with intact pancreas (*8*). Insulin and epinephrine produce the same changes in inorganic phosphorus, insulin acting by itself (*9*), and epinephrine through the discharge of insulin induced by the elevation of blood sugar. The decrease in inorganic phosphate determined by glucose is not affected by liver deficiency (*2*).

TABLE 1

The ΔG/ΔP Ratio, in Normal and Alloxan-treated Dogs

Group	Number of animals	ΔG/ΔP Ratio averages ± standard errors
Normal dogs		
Staub effect present	26	60.4 ± 18.2
Staub effect absent	17	105.9 ± 53.5
Alloxan-treated dogs	9	316.8 ± 75.2

TABLE 2

Statistical Significance of the Differences between Means*

	p Values
Normal dogs, Staub effect present, vs. Staub effect absent	0.40
Normal dogs, Staub effect present, vs. alloxan-treated dogs	< 0.01
Normal dogs, Staub effect absent, vs. alloxan-treated dogs	0.02

* Student's test (*3*).

These facts show the importance of studying systematically changes in serum inorganic phosphorus during the glucose tolerance test, in metabolic clinics, and in research laboratories. The results of such investigations are herewith reported.

The work was carried out in apparently normal dogs and in alloxan-treated dogs. Some of the normal dogs were in poor nutritional condition. A fasting sample was taken from the saphena vein, and immediately 1 ml/kg of body weight of a 50% glucose solution injected into this vessel; 30 min later a second sample was taken and the injection of dextrose repeated; 30 min later the last sample was drawn. The blood sugar determinations were carried out in duplicate, according to the Nelson method (*6*) and the serum inorganic phosphate determinations were also done in duplicate by the Fiske-Subbarow procedure (*4*). The ΔG/ΔP ratio was calculated in the following manner: the difference between the blood sugar value at 30 min and the initial value was divided by the difference between the initial serum phosphate and its value at 30 min. Results are shown in Tables 1 and 2 and Fig. 1.

From these results some conclusions can be established.

[1] With the technical assistance of Miss Jeanne Lopez, Miss Luisa Maria Andueza, and the cooperation of Dr. Alfonzo Podrizki.

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The ratio $\Delta G/\Delta P$ is a useful indicator of insular function, being less affected than the Staub effect by malnutrition and other factors that impair carbohydrate storage or utilization. While 39.5% of the apparently normal dogs did not have the Staub effect, only 16.2% of the animals had a $\Delta G/\Delta P$ ratio smaller than −100, the assumed normal limit. All of the diabetic dogs had a ratio smaller than −100.

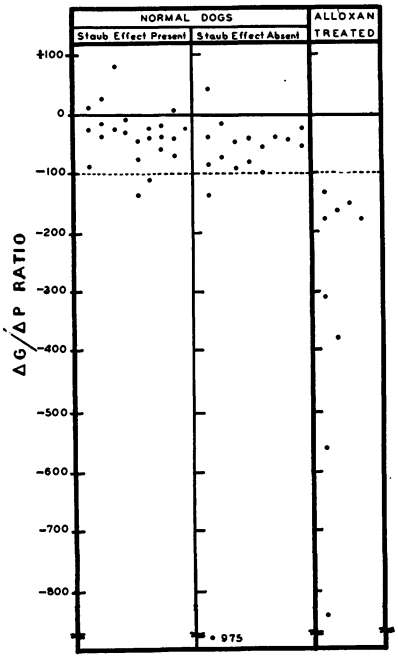

FIG. 1.

The positive values shown had a negative glucose difference, suggesting a faster rate of sugar removal from the blood. When the index is positive, because of a positive phosphorus difference, it means there is a defective production of insulin.

The results in diabetic patients and in normal human subjects will be reported elsewhere; they are in agreement with the experimental data obtained.

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Amino Acids in the Mitochondrial Fractions of Tissues as Determined by Paper Partition Chromatography

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The biochemical properties of intracellular structures identified as mitochondria have received considerable attention recently. However, little is known of the nature of the protein moiety of these important cell constituents. As a first step in the characterization of mitochondrial protein, the amino acids in acid hydrolyzates were studied by two-dimensional paper chromatography (*1*, *2*).

The method used for the isolation of the mitochondria was essentially that of Hogeboon *et al.* (*3*) with the exception that additional cycles of low and high speed centrifugation were employed to insure the attainment of maximal uniformity of the sedimented material. The isolated particles were the same size and shape as the structures identified as mitochondria in smears made from homogenates, and in free cells found in the sediment from the first low speed centrifugation. These particles possessed the same staining characteristics, with Janus green B before fixation, and with aniline-acid fuchsin after fixation with osmic acid, as do mitochondria in cells. The isolated mitochondria were hydrolyzed with 6 *N* HCl in sealed tubes for 24 hr and aliquots were subjected to chromatography. Samples were treated with H_2O_2 to enable detection of cystine as cysteic acid and methionine as methionine sulfone. Numerous chromatograms were

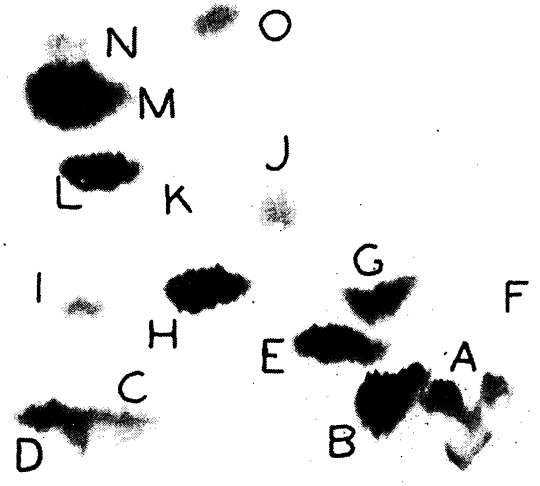

FIG. 1. Photograph of chromatogram from hydrolyzate of rat kidney mitochondria. (A) Aspartic acid, (B) glutamic acid, (C) lysine, (D) arginine, (E) glycine, (F) cystine (cysteic acid), (G) serine, (H) alanine, (I) histidine, (J) threonine, (K) methionine (methionine sulfone), (L) valine, (M) leucine and isoleucine, (N) phenylalanine, (O) tyrosine.