

We inoculated the killed whole washed cultures intravenously and the Buchner filtrates of a six day growth in blood bouillon subcutaneously. Cultures of the filtrates showed 100 colonies of the streptococcus to the cc.

One of the horses we inoculated in this way, No. 86, has been under treatment for nine months. The others for much shorter times.

The inoculations into this horse were started on January 15th, 1925, by giving the whole centrifuged 24 hour broth cultures intravenously. Two days later the Buchner filtrate of a six day blood broth culture was started subcutaneously. The doses were continued on alternate days and were gradually increased. In about 3 months the serum began to show blanching in the Schultz Charlton test. In 5 months the serum was strongly blanching, and 1 cc, neutralized 10,000 Dick skin test doses of the streptococcus toxin. At this time it showed no definite protection.

After nine months 1 cc. neutralized 40,000 skin doses of toxin and 0.05 cc. protected mice against 100 M.L.D. of very virulent living streptococci.

The clinical results with this serum have been excellent but it is impossible yet to state that they have been better than those obtained with antitoxic serum alone. Theoretically such a dual serum should not only neutralize the toxic effects of the streptococcus in scarlet fever but should reduce the number of so-called complications and sequellæ of this disease.

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The Specific Dynamic Action of Carbohydrates.

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The speed with which glucose or sucrose may be absorbed and metabolized when it is administered orally would seem to be rapid, judged from observations such as the time necessary for the recovery from insulin hypoglycemia after taking glucose by mouth. No experimental data are on record, however, in which

an investigation of this point has been carried out by the method of determining how soon the R. Q. becomes elevated from increased carbohydrate utilization or how soon the specific dynamic action becomes manifest after carbohydrate ingestion in normal animals. In the experiments of Lusk¹ on the specific dynamic actions of the common sugars, carried out on dogs in the respiration calorimeter at Cornell University Medical College, technical difficulties have prevented a determination of the effects of the carbohydrate during the first hour following its administration.

The experiments described below were conducted by making use of the open circuit type of respiration apparatus, which allowed metabolism determinations in the interval immediately following the ingestion of the different carbohydrates. The experiments were carried out on one of us (H. J. D.). The majority of these experiments were done during a period in which the subject was taking a protein-free diet and the others somewhat later during a period of low protein diet. Two basal determinations of 15 minute intervals were carried out each morning before the taking of 75 grams of the carbohydrate under investigation. After the carbohydrate was ingested a series of 11 or 12 determinations of metabolism were performed in the following period of $4\frac{3}{4}$ or $5\frac{3}{4}$ hours. Four of these were carried out during the first hour.

When sucrose or fructose was given orally an increased R. Q. was noted in the first 10 minute period thereafter, while during the second 10 minute interval the R. Q. usually reached the maximum observed during the experiment, often being greater than 1.00. A slightly slower response was obtained in the rate of elevation of the R. Q. with galactose and lactose. However, after the ingestion of glucose or maltose only a slight increase in the level of the R. Q. occurred during the first 30 to 45 minutes, and the rise which followed was usually less than in the case of sucrose, fructose or galactose. When raw starch was ingested little effect on the R. Q. became evident until the second hour, the maximum quotient of 0.90 being reached in the third hour. With cooked starch the curve of the R. Q. resembled that of glucose when the starch was given as a pudding; on the other hand, the absorption and utilization of the dried, cooked starch was mark-

¹ Lusk, G., *J. Biol. Chem.*, 1915, xx, 555.

edly delayed, as judged by the R. Q. obtained after its administration. The results obtained with glucose and fructose with regard to the R. Q. agree with the unpublished results of Wierzuchowski and Boothby.²

The specific dynamic action reached a maximum between two and two and one-half hours after the ingestion of 75 grams of the sugars studied here. The maximum heat production usually was coincident with the highest R. Q., although this was not invariably the case. At the end of 4½ hours the increased heat production had usually passed, the metabolism had fallen to the basal level, and the R. Q. had returned to the fasting level.

In the case of raw starch and dried cooked starch, although progressively increasing quotients were obtained during the first two hours, indicating an increasing utilization of carbohydrate, only slight changes of basal metabolism occurred. This indicated that the slow absorption did not result in a plethora metabolism, although sufficient glucose was absorbed to increase the R. Q. appreciably.

The amount of the specific dynamic action of lactose, which Lusk has found to be small in dogs in comparison to the other sugars, was found to be approximately equal to that of the other sugars with man.

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Ultra violet rays in the purification of cultures of *spirochaeta pallida*.

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During the past few years, we have been engaged in an effort to improve existing methods, whereby cultures of *Spirochaeta pallida* may be freed from contaminating bacteria, thus permitting more readily the isolation of the former organism. In the present investigation, it was our aim to test the selective bacteri-

² Personal communication.