pleural injection was omitted. The amount given intracerebrally was 0.03 cc instead of 0.05 cc. With strain 232, the intravenous route was added and the amount given by this route was 0.1 cc. The result shown in Table II, is just the same as those found in hamsters.

Inoculation by the intracerebral route with strain 232 was repeated 3 months after the first isolation. It was found that the virulence of the organism was markedly decreased.

Studies on the virulence of different strains and different types of *beta Streptococcus hemolyticus* isolated from patients with different diseases and from normal individuals will be reported later.

Conclusion. Hamsters and white mice are suitable animals for testing virulence of *Streptococcus hemolyticus* when injected by the intracerebral route. It requires only 40-400 organisms to kill the animal when given intracerebrally, whereas it requires 400,000 when given interpleurally and 4,000,000-11,500,000 when given intraäbdominally and intravenously.

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Effect of Vitamin C on Creatine and Creatinine Metabolism.

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During a study of creatine and creatinine metabolism in hypothyroidism by one of us,[1] one of the experimental subjects was utilized for studies on vitamin C[2]. It was noted that when the patient was saturated with the vitamin, there was a perceptible increase in the creatine and creatinine excretion. This is shown in Fig. I. Further, the daily fluctuation in the subsequent period seemed to be augmented. We, therefore, repeated the experiment on 4 normal children and on a case of glycogen disease in which the tolerance to creatine has been demonstrated to be much decreased.[3]

Experimental. The subjects were admitted to the metabolic ward

1 Fan, Chuan, Creatine and creatinine metabolism in hypothyroidism, in preparation.

2 Chu, F. T., and Sung, C., *Chinese Med. J.*, 1937, **52**, 791.

3 Fan, Chuan, and Woo, Theresa T., *Chinese Med. J.*, Pediatric Number, 1940.

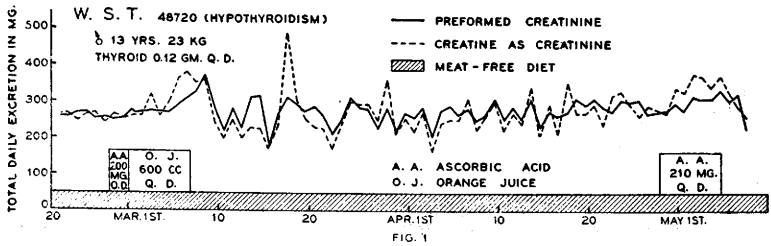

FIG. 1

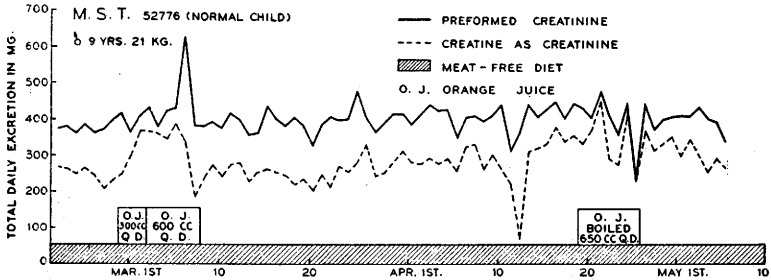

FIG. 2

where the preparation of the diet and the collection of the urine are carried out under careful supervision. They were all put on a constant diet adequate in proteins and caloric intake. Except in the case of H.E.C.T., meat was not allowed during the period of study. At the end of each daily period, the subjects were instructed to empty their bladders completely. The urine specimens were kept on ice with toluol as preservative. Analysis was done, with few exceptions, within 24 hours by the method of Folin.[4] Creatine was dehydrated by autoclaving with picric acid purified by crystallization as sodium picrate.[5] Acetone in urine does not interfere with the determination by this method.[5] We have also satisfied ourselves that ascorbic acid added to the urine specimens does not introduce any difficulty in the analysis.

Results and Discussion: The results of the study are charted in Fig. I to VI. It is evident that in the 4 normal children, no definite increase of either creatine or creatinine could be demonstrated even though the curves are suggestive. There was also a suggestive increase in the fluctuation in the daily excretion of these substances in the subsequent periods. If vitamin C did increase creatine formation in the body, such increase must be small so that the creatinuria was not significantly increased. In order to confirm this suspicion, we need a subject whose tolerance to creatine must be minimal. Such a subject we had in the case of glycogen disease.[3]

4 Folin, O., *J. Biol. Chem.*, 1914, **17**, 469.

5 Peters, J. P., and Van Slyke, D. D., *Quantitative Clinical Chemistry*, 1932, Vol. II, pp. 597 and 600.

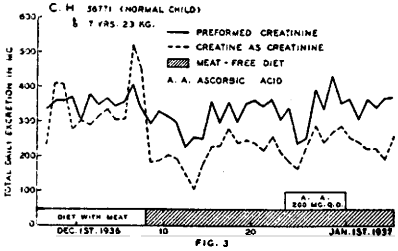

FIG. 3

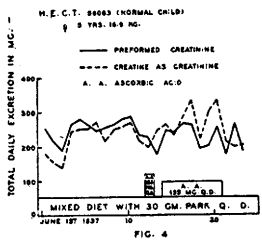

FIG. 4

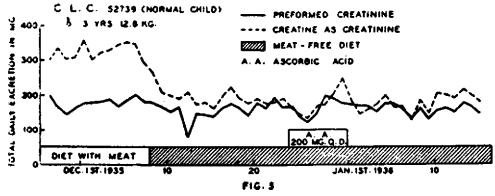

FIG. 5

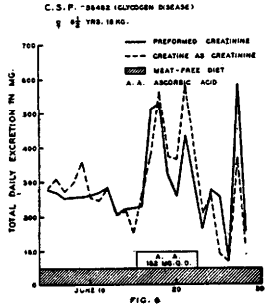

FIG. 6

Indeed when we look at Fig. VI, we see a markedly different picture. On the administration of ascorbic acid both creatine and creatinine in the urine showed remarkable increase, possibly due to an increase in creatine formation in the body. That vitamin C may have such an action is also suggested by the work of Palladin and Epelbaum[6] who reported decrease in creatine in skeletal muscles in severe scurvy. Whether this action is connected with the role of vitamin C in tissue oxidation is not known.

Summary. In a case of glycogen disease, whose tolerance to creatine is known to be minimal, saturation with vitamin C caused a marked increase in the urinary excretion of creatine and creatinine. In 4 normal children and in a child with hypothyroidism, however, no significant increase was demonstrated. This is probably due to the fact that whatever increase in creatine formation due to the ingestion of ascorbic acid is covered by the normal capacity of storage. The mechanism of the action of vitamin C on creatine metabolism is not understood.

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6 Palladin, A., and Epelbaum, S., *Biochem. Z.*, 1929, **204**, 140.