antihemolysin titer was not paralleled by a corresponding improvement in the patients' clinical condition.

8732 P

Ascorbic Acid Metabolism in Tuberculosis.

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The literature relating to experimental animals indicates decreased resistance to tuberculous infection in animals on vitamin C deficient diets.[1-5] Conversely, animals with chronic disease are more easily precipitated into acute scurvy.[4] Clinical reports[1, 6, 7, 8] have appeared to the effect that scurvy renders a patient increasingly susceptible to tuberculosis, while the addition of vitamin C to the diet improves the prognosis in these cases. With the development of knowledge concerning subclinical vitamin deficiencies[9, 10] and of a method of judging the state of ascorbic acid nutrition in the human,[10] the study of this substance in its relation to tuberculosis was indicated.

Schroeder[11] has reported an increased requirement of vitamin C in tuberculosis. Three cases were studied: 2 for a period of 5 days during which they were fed 300 mg. of ascorbic acid daily. The report of Bullowa, *et al.*,[12] shows in one tuberculous patient a reduced excretion of vitamin C but with prolonged dosage of ascorbic acid a high peak was reached which fell rapidly on discontinuing the treatment.

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The present study includes 44 cases with minimal, moderately advanced and far advanced tuberculosis; with every stage of activity under each type as shown by X-ray, symptomatology, and sedimentation rates.

A consideration of the daily excretion of vitamin C of patients with no complications, on the sanatorium diet, permits a rough classification into 4 groups: those excreting from 0 to 5 mg. of ascorbic acid daily; those from 5 to 8 mg.; those from 8 to 14 mg., and a fourth group comprising those excreting over 14 mg. daily. The method developed by Tillmans, *et al.*,[13] and Harris and Ray[14] for the estimation of vitamin C excretion in urine by titration against phenolindophenol was used throughout. Twenty-four-hour samples were collected, using glacial acetic acid as a preservative. In the group from 0 to 5 mg. daily excretion, there are 6 cases, 5 of which have active tuberculosis and one with questionable activity. This group consists of moderately and far advanced cases. The second group, 5 to 8 mg. daily excretion, has 14 cases, 5 of which are inactive and 9, or 70%, active. The group from 8 to 14 mg. comprises 21 cases with 7 active and 14, or 66%, inactive. The group 14 mg. or above contains 13 cases, one of which is active and 12, or 93%, inactive. This shows a rough parallelism between activity in uncomplicated tuberculosis and the daily excretion of ascorbic acid on a controlled diet. The factor of complications of the disease must be emphasized as it is realized that such conditions as acute sinusitis, etc., might render the determination valueless as an indication of the activity of the tuberculous process.

The second method of classification, namely, the response to a 4 oz. orange juice supplement to the diet (4 oz. of orange juice containing 55 mg. of ascorbic acid as determined by titration with phenolindophenol) offers a more accurate division according to activity. Two groups are here considered, one giving a positive response, the other a negative. A positive response is considered as an increase in excretion of ascorbic acid above 16 mg. daily within 2 weeks after the daily dose of 4 oz. of orange juice is instituted. The negative group here comprises 10 cases of which 80% are active. The positive group comprises 14 cases of which 100% are inactive. Again, it is to be emphasized that this report deals with uncomplicated disease.

The amount of ascorbic acid required daily by a normal healthy individual is from 15 to 20 mg. daily, whereas from our tests it

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would seem that between 55 and 138 mg. of ascorbic acid daily are required to bring a tuberculous patient into equilibrium as regards vitamin C nutrition. In one case dosages above 200 mg. daily did not cause a positive reaction.

The investigation is being extended to demonstrate the requirements of vitamin C in tuberculosis and the possible prognostic value of determinations of the daily excretion of ascorbic acid. The present indications are that an increased requirement of ascorbic acid is manifested in tuberculosis and that the determination of the daily excretion seems to parallel determinations of activity made roentgenologically.

8733 P

Electric Potentials in Normal, Castrate, and Theelin Treated Rats.*

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The development of the Burr-Lane vacuum tube microvoltmeter has opened up a new field in endocrine research. With the use of this machine a study of the electrical changes taking place during the reproductive cycle has been undertaken[1] since it has already been found that the instant of ovulation in the rabbit may be determined by the microvoltmeter.[2, 3] The following is a report of experiments with rats designed to record the electrical changes that take place during the normal oestrous cycle, and the effects of ovariectomy and of hormonal injections upon these changes.

In normal rats the difference in electrical potential between the vagina and the symphysis pubis changes greatly during the oestrous cycle. Daily readings taken while the animals were anesthetized with sodium amytal† have been completed on 35 female rats, from 2 to 8 months old, over periods varying from 10 to 30 days. In all cases vaginal smears were taken immediately before making the electrical readings in order to insure a close time correlation between the

* Aided in part by a grant from the Fluid Research Funds of Yale, administered by Professor Edgar Allen.

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3 Hill, R. T., Allen, E., and Kramer, T. C., *Anat. Rec.*, 1935, **63**, 239.

† Supplied by the Eli Lilly Company.