

ture resembles qualitatively, though obviously not quantitatively, that noted by Greep in his male and female parabionts, both under the stimulation of one pituitary. Parabiotic studies can thus not be regarded as evidence concerning the number of gonadotrophins secreted by the pituitary. Such evidence can be obtained only from the isolation of the pure hormones from the blood as it has been done from the pituitary.

Summary. A mixture of purified FSH and ICSH was shown to produce predominantly follicle-stimulating effects in female and interstitial cell-stimulating effects in male hypophysectomized rats. These differences in the response of the two sexes were secured by the simultaneous administration of both hormones and it would consequently not seem valid to interpret such phenomena as evidence for the existence of a single pituitary gonadotrophin.

13440 P

Nitrogen Balance in Experimental Tryptophane Deficiency in Man.*

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The observations here reported comprise a part of a more comprehensive study undertaken jointly by the Departments of Medicine and Pediatrics of the Johns Hopkins University on experimental amino acid deficiencies in man. The purpose of this study was two-fold. It was felt desirable to determine human amino acid requirements by direct observations on man, rather than by inferences based on animal experiments, since it is now known that even closely related animal species differ in their amino acid requirements. A second purpose was to discover whether deficiencies of particular amino acids produced characteristic pathological changes which could be recognized by clinical or laboratory technics. It seemed probable that, in certain parts of the world at least, specific amino acid deficiencies might be present, and that a familiarity with the picture,

* The expenses of this study were defrayed by grants from the Rockefeller Foundation, Merck and Company, Mead Johnson and Company, Eli Lilly and Company, and E. R. Squibb and Sons.

such as could be obtained in an experimental study, would be of aid in recognizing and treating them.

The present report deals with the nitrogen balance of 4 normal adult males, who ingested a diet deficient in tryptophane for periods of 2 to 5 weeks. The experimental diet consisted of fats, starch, sugar and certain fruits and vegetables selected for their low protein content (tomatoes, mushrooms, carrots, asparagus, apples, oranges, etc.). Of the total nitrogen ingested only 10% was in the form of food proteins, the remaining 90% being supplied as a mixture of amino acids devoid of tryptophane (an acid hydrolysate of casein to which 1% cystine was added). The total nitrogen intake was maintained throughout the experiment at 0.1 g per kilo per day. The intake of non-nitrogenous food was identical for all subjects, providing approximately 800 calories of fat and 1500 calories of carbohydrate per day. The total caloric intake varied in the different subjects between 2400 and 2700 calories per day. A daily vitamin supplement of one-fourth of a Merck's No. 1 TRN6P tablet was given to each individual.

For a week preceding the experimental period and for a week following it the subjects were placed on a diet identical with that of the experimental period except that it contained tryptophane. The fore-period served to adapt the subject to a diet somewhat different from his customary one which as a rule had contained more nitrogenous food. The post-period served as a control. The amino acid mixture of the control diet in subjects Br. and Bi. was identical with that used in the experimental period except that it was supplemented with 1.5% of tryptophane. The total nitrogen intake remained the same. In the case of the other 2 subjects the amino acid mixture in the control period consisted of an enzymatic casein hydrolysate in which the original tryptophane had not been destroyed. This, too, was enriched with 1% of cystine.

Throughout the experimental period the subjects retained a good appetite. They lived essentially normal lives and slept well. They were studied at intervals by a variety of clinical and laboratory techniques with results which are being reported elsewhere.¹ The food and excreta were analyzed for nitrogen throughout the experiment, and balances were calculated for each two-day period. The course of the nitrogen balance for each subject is shown in Fig. 1.

It is apparent that each of the subjects went into negative nitrogen balance a few days after the tryptophane deficient diet was insti-

¹ Holt, L. E., Jr., Wintrobe, M. M., Albanese, A. A., Guild, S. R., Loch, Walter, Buschke, W., Fleischmann, W., and Lyddane, Anne, to be published.

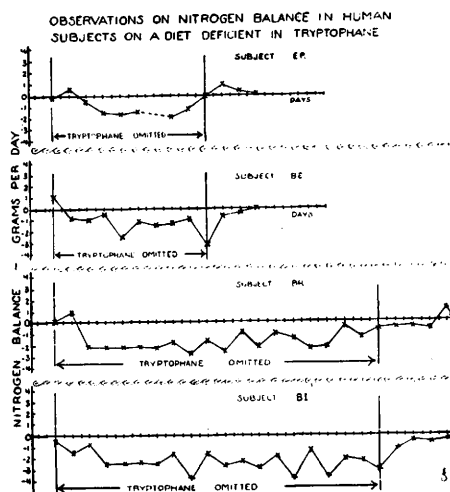


FIG. 1.

tuted, and that within a week after the restoration of tryptophane to the diet, nitrogen equilibrium was restored.

It appears, therefore, that nitrogen equilibrium cannot be maintained unless tryptophane is supplied in the diet, and that tryptophane must therefore be regarded as a dietary essential for the human species.[†]

13441 P

Nitrogen Balance in Experimental Lysine Deficiency in Man.*

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As part of a general study designed to determine the amino acids essential for man, the nitrogen balance was studied in 5 human vol-

[†] We have been unable to find in the literature observations dealing with tryptophane deficiency in man, but we have recently had the privilege of examining the data from a single unpublished experiment performed by Dr. Warren M. Cox, Jr., in which a tryptophane deficient diet, continued for 4 days, induced a negative nitrogen balance. (Cox, W. M., Jr., Mueller, A. J., and Fickas, D., to be published.)

* The expenses of this study were defrayed by grants from the Rockefeller Foundation, Merck and Company, Eli Lilly and Company, and E. R. Squibb and Sons.