

The mechanism of the serum colloidal gold reaction in liver disease is not known. Positive reactions do not depend primarily upon a quantitative increase in globulin, lowering of albumin or inversion of the albumin-globulin ratio. Positive colloidal gold reactions were present in 29 of the 32 cases with normal plasma globulin determinations and in 21 of the 23 cases with normal albumin-globulin ratios. Conversely in the control series the colloidal gold reaction was negative in 13 of the 15 cases with elevated plasma globulin values and in each of the 15 cases with low or inverted albumin-globulin ratios. It is suggested that since the euglobulin is believed to play an important rôle in colloidal gold precipitation and is thought to be specifically increased in liver disease, it may be responsible for the positive reactions obtained.

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The Relationship of the P-P Factor to Gastrointestinal Motility.

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In a previous preliminary report we have outlined our observations on the effect of whole vitamin B complex¹ and of some of its components on functional digestive disturbances. We have studied 65 cases in which the diagnosis of functional digestive tract disorder was made after every attempt to reveal any existing pathology by X-ray examination and appropriate laboratory tests. The principal complaints of these patients have been distress, flatulence (bloating, passage of flatus, borborygmi), and constipation which might alternate with loose stools. Less constant symptoms are anorexia, weakness and fatigue, and nervousness. A group of 45 have been treated over periods of 2 months to 2 years with whole vitamin B complex; 70% of these have shown a satisfactory response to this therapy. The presence of a vitamin B deficiency in this group of individuals was indicated by determinations of urinary thiamin output, which was below normal in 17 of 22 patients. (That is, below 10 I.U. per day.)

¹ Crandall, L. A., Jr., and Chesley, F. F., *Proc. Inst. of Med., Chicago*, 1939, **12**, 359.

In parallel determinations on a group of 16 normal individuals the average excretion was 20.5 I.U. per day.

Groups of patients were treated separately with thiamin, riboflavin, and nicotinic acid to determine whether any of these fractions of the vitamin B complex could be shown to be responsible for its effectiveness. Negative results were obtained with thiamin and riboflavin. However, in 40 cases treated with nicotinic acid in dosages ranging from 75 to 200 mg per day, the beneficial effects obtained were comparable to those resulting from treatment with whole complex (satisfactory in 60%). It is our impression that the therapeutic effect of nicotinic acid in functional bowel disturbance is not the complete equivalent of that given by the whole B complex, but further study may be necessary to establish this point.

A marked intestinal hypermotility was noted in several of our patients on roentgen ray examination. This observation, together with the digestive disturbances that are known to occur in human pellagra and canine black tongue, led us to examine the intestinal motility of dogs on a black tongue-producing diet. Six animals have been thus studied. The dogs were placed on a complete diet plus additional amounts of yeast extract for 2 weeks prior to starting the black-tongue diet. Roentgen ray observations were made by giving the animals 30 g of barium in 150 cc of water, noting the gastric emptying time fluoroscopically, and following the progress of the barium through the small and large intestines by films taken at the end of the second hour and every hour thereafter for 5 hours. The experimental diet consisted of corn meal 80, washed casein 10, peanut oil 5, cod liver oil 2, and $\text{Ca}_3(\text{PO}_4)_2$, CaCO_3 , and NaCl 1 each. Evident disturbances of motility occurred in all of the 6 animals studied. Hypermotility was the most common abnormality, and tended to occur within 3 to 5 weeks after the dogs had been started on the black-tongue diet. At about the same time changes in the small intestine pattern, consisting of areas of apparently atonic small bowel in which barium collected and which were separated by presumably spastic regions, appeared. These changes were comparable to the "puddling" which has been noted in human small bowel patterns as the result of deficiency diseases. Accumulations of small bowel gas, which is rarely noted in normal animals, were observed in 3 of the 6 dogs; this was accompanied by increased amounts of gas in the large intestine. In the 3 animals showing the greatest intestinal hypermotility, barium reached the rectum in 2 hours. In 2 instances this extremely rapid propulsion of the barium meal appeared just prior to the development of black-tongue; in the third animal it occurred 3 weeks after an attack of black-tongue

which had been treated by a single injection of nicotinic acid (50 mg intravenously) while the animal remained on the experimental diet.

The periods of hypermotility were interrupted in 3 of our 6 animals by other periods of hypomotility. Whether hyper- or hypomotility was present, however, the entire gastrointestinal tract was involved so that gastric emptying time, small bowel passage time, and propulsion in the large intestine were all affected. The large bowel appeared the least susceptible to the effects of the deficiency.

It is our impression that the P-P factor (nicotinic acid, nicotinamide, or any carboxypyridine derivative capable of replacing these in the diet) is essential to the maintenance of normal gastrointestinal motility, and that absence of this factor leads to motor dysfunction of the intestinal tract prior to the appearance of the usually accepted deficiency symptoms. We base this opinion on the response of many cases of functional digestive disturbance in the human, some of which have shown hypermotility, to nicotinic acid; and on the abnormal intestinal motility appearing in dogs on a black-tongue-producing diet long before mouth lesions were evident. Although we have not been able to demonstrate any effectiveness of thiamin or riboflavin in functional digestive disturbances, it is entirely possible that other factors in the vitamin B complex may be concerned with gastrointestinal function.

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Persistence of Medullary Tissue in Homotransplanted Adrenals.

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Observations by the senior author¹ indicated that the anterior chamber of the eye was a favorable site for the incorporation and persistence of adrenal cortices in the rat. Out of 243 grafts persisting subsequent to insertion of whole glands, medullary tissue was observed in only one instance. Since it was possible to increase the incidence of medullary persistence by removal of the surrounding cortex previous to insertion into the eyes, it was postulated that the survival of medullary tissue was conditioned by the rapidity of vascularization or by the accessibility of nutritional substances. In

¹ Turner, C. Donnell, *Anat. Rec.*, 1939, **73**, 145.