

them. In this way, after the normal movements of the intestinal contents have been studied, the effects of various laxative and constipating substances can be readily investigated. Such drugs are mixed with the India ink and introduced into the stomach either by the "stomach tube" or by direct injection with a stout hypodermic needle into the stomach cavity. The action of powerful alkaloids, *e. g.*, pilocarpin, physostigmin, atropin, etc., can be exerted by injections into the subcutaneous or muscular tissue, while such drugs as act directly on muscle cells, *e. g.*, barium chloride, papaverin, benzyl alcohol, etc., may be applied directly to the outer intestinal walls. The use of India ink for visualizing the intestinal contents in these experiments has been suggested to the authors by the employment of India ink in mice by Loewe and Faure in another connection.¹

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Effect of Liver Extract on Basal Metabolic Rate in Pernicious Anemia.

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The following observations were made in an effort to determine whether or not the basal metabolic rate would be affected by the rapid increase in erythrocytes after the administration of liver extract.

We selected 2 female patients with uncomplicated pernicious anemia, neither of whom had had liver or liver extract. Each patient received 8 cc. of dilute hydrochloric acid daily. They were given general hospital diet for 36 days and high caloric general diet for 67 days, the total period of observation being 103 days. Liver extract was begun after a control period of 8 days.

The following determinations were made daily for 34 days, once during the sixth week and triweekly thereafter.

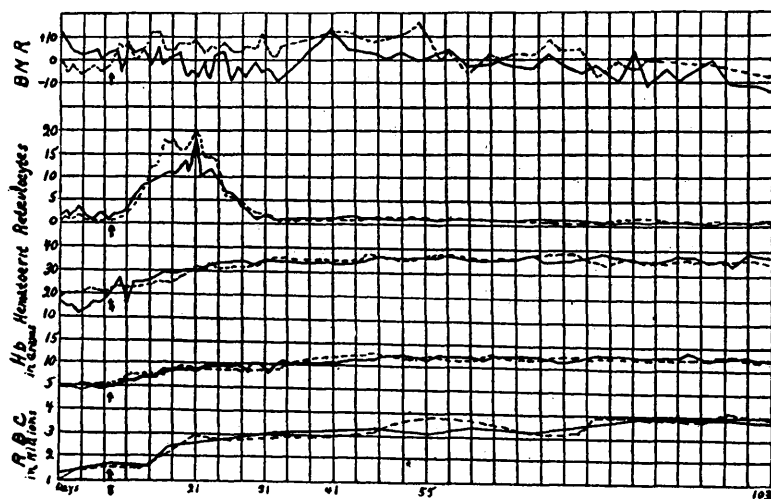
1. B.M.R.—Tissot spirometer and Haldane gas analysis. (Average of 2 analyses for each reading.)
2. Hemoglobin—Newcomer method.
3. Hematocrit—Van Allen method.
4. Reticulocyte counts—(1% brilliant cresyl blue, 500 cells being counted).

¹ Loewe, S., and Faure, G., *Arch. f. Exp. Path. u. Pharm.*, 1925, cvii, 271.

Erythrocyte counts were made about 4 times per week by different observers.

One patient received Armour's liver extract (1½ ounces daily), the other received Lilly's liver extract (3 vials daily).

The parallelism in the results was striking. The basal metabolic rate remained remarkably constant throughout the reticulocyte crises. In one patient the B.M.R. was found to be between +13 and +14% for 2 days at the beginning of the crisis, but all other readings were between +10% and -10% with no general tendency toward an elevation during the crisis.



The most marked increase in basal metabolic rate occurred on the fortieth day after a lapse of a week during which no estimations were made. One of the patients was found to have an increased basal metabolic rate again on the fifty-third day. We see no special significance in these occasional increases in metabolic rate.

A gradual fall in basal metabolism during the latter half of the period of observation was coincidental with a gain in weight. The calories per hour remained almost constant during this period.

Neither patient developed polycythemia.

Measurable serum bilirubin promptly disappeared after liver extract was begun.

The most marked increase in erythrocytes, hemoglobin, and cell volume occurred in a period of about 2 weeks after liver extract was begun. The erythrocytes increased from about 1 million to about 3 million in this period and other measurements increased accordingly.

Comments. 1. The *method used* did not reveal any significant change in the total body metabolic rate during reticulocyte crises. 2. The basal metabolic rate was practically unchanged during an increase in circulating erythrocytes from about 1,000,000 to about 4,000,000 per cu. mm.

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Experimental Hypochloremia.

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Hypochloremia is associated with a number of morbid conditions occurring spontaneously or produced experimentally. We have produced it by perfusing distilled water or other chloride free fluids through the peritoneal cavity of rabbits. Dialysis readily occurs through the peritoneal membrane.^{1, 2, 3} When distilled water is injected intraperitoneally in rabbits a high percent of chlorides is rapidly deviated from the blood stream and the blood chloride falls.⁴

In 8 experiments distilled water at body temperature was perfused through the peritoneal cavity at the rate of 500 cc. per hour. Within an hour the respiratory rate increases and localized fibrillary twitchings appear. These become more generalized, and are followed by clonic and tonic convulsions of increasing severity. Spasmodic contractions of the diaphragm occur, and the animals die after 2 to 5 hours of perfusion. The blood chloride gradually falls, and a marked hypochloremia, as low as 118 mg. per 100 cc., results. The CO₂ combining power of the plasma falls. There is a moderate rise in the N. P. N., and a slight elevation of the urea. The secretion of urine soon diminishes and finally completely ceases. Hypoglycemia does not occur during the development of the symptoms and lethal effect. The addition of 0.12% glucose to the perfusion water in 7 other experiments had no notably beneficial influence.

The perfusion of Ringer's solution with glucose by the same methods resulted in no muscular twitchings or convulsions. These animals were alive and in good condition when the experiments were

¹ Curtis, G. M., *Biochem. Z.*, 1925, clxiii, 109.

² Heusser, H., and Werder, H., *Beit. z. Klin. Chir.*, 1927, cxli, 38.

³ Engel, D., and Kerekes, A., *Zeit. f. d. ges. Exp. Med.*, 1927, lv, 574.

⁴ Curtis, G. M., *Biochem. Z.*, 1927, clxxxvi, 95.