

3165

Calcium absorption.

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If a definite amount of an unabsorbable compound, such as ferric oxide, be mixed with a diet and the feces be analyzed for iron and for any food constituent, such as calcium, it is possible to determine the percentage absorption or "utilization" of the latter without an accurate separation of the feces. If the ratio of calcium to iron in the food be 10:1 and in the feces 5:1, calcium unabsorbed amounts to 50 per cent and calcium absorbed would of course also be 50 per cent.

Using this method, it has been shown that lactose in contrast with other common sugars, markedly increases the absorption of calcium. Lower fatty acids have a more favorable effect than higher fatty acids. Antirachitic substance produces the expected result.

In the same way, if animals fed an iron containing diet are killed at the height of digestion and analyses made of the intestinal contents at different levels, the percentage absorption of food products in different parts of the intestines may be estimated.

Experiments of this type on rachitic albino rats on diets with or without cod liver oil give interesting results. Using a calcium-high phosphorus-low diet rats with or without cod liver oil show considerable calcium absorption in the upper small intestine. This type of rickets is not due, therefore, to a failure of calcium absorption. Excretion of absorbed calcium into the lower bowel does, however, bring about a negative or subnormal calcium balance.

Phosphorus, on the other hand, is actually excreted into the upper intestines. Animals given cod liver oil make up for this loss by absorption from the cecum and large intestines. Rachitic animals do not and, therefore, the phosphorus balance remains negative.

On a milk diet, high in both calcium and phosphorus, both are absorbed to a considerable degree in the small intestine. It is in

the lower bowel that the balance is swung one way or the other depending primarily on the ability of the tissues to utilize these elements.

3166

Botulinum toxin in the alimentary tract.

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The great variation in the susceptibility of different animal species to oral injections of botulinum toxin may conceivably be due either (1) to the destruction or adsorption of the toxin by the intestinal contents, or (2) to the difference in permeability of the intestine to the toxin. Type A botulinum toxin was used in these experiments.

There was no evidence that botulinum toxin was adsorbed by the intestinal contents of guinea pigs *in vitro*, even where the pH was shifted with M/3000 HCl or Na₂HPO₄.

A loop of small intestine in each of six rabbits was injected with botulinum toxin and perfused with blood from the same animal for intervals varying from 30 minutes to 2 hours and 20 minutes. Very small quantities of toxin were demonstrated in the perfused blood, often only sufficient to produce symptoms of botulism in mice receiving 0.5 cc. quantities. No toxin was ever demonstrated in 0.1 cc.

In each of two hogs a loop of small intestine was perfused in a similar manner. In one case a very small amount of toxin was found in the blood, a mouse receiving 0.5 cc. of serum taken after an hour and a half of perfusion died in 4 days. In the other case toxin was not demonstrated. The toxin introduced into the ligated loop of intestine showed little if any decrease in potency during the course of the perfusion experiments.

Hogs were found to be very resistant to large oral doses of toxin; in some cases as much as ten million M. L. D.'s for mice were fed without producing any ill effects. Toxin was not demon-