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Absorption of Carbon Particles from Gastro-Intestinal Tract.

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From the literature,[1-5] it is clear that if carbon particles (India ink) in relatively large quantities are placed directly into a "fasting" loop of the intestine of a guinea pig, rabbit or dog, some absorption of the particles results. The literature is not clear in regard to whether carbon particles are absorbed when mixed with food. This work was undertaken to answer that question for dogs.

Adult dogs of average size were chosen. They were fed the regular stock diet of the laboratory which consisted of ground meat and bread. Fifty grams of "fine" lamp black were mixed daily with the ration. The animals relished the mixture regardless of its color. Five dogs were used; they were chloroformed at various stages—dog 1 at 16 days, dog 2 at 30 days, dog 3 at 2 months, dog 4 at 4 months, and dog 5 at 7 months after the feeding was begun. The mesenteric lymph glands, spleen and liver were sectioned and examined for carbon particles.

Black pigment was observed readily in the mesenteric lymph glands in 3 of the 5 dogs, dogs number 2, 3, and 4, it being more marked in dogs 2 and 4. On histologic examination the glands of all 5 dogs were found to be pigmented, those of dog 1 being the least pigmented. Dog 5 which received the carbon for 7 months contained only a little more pigment than dog 1; however, in this dog some black pigment was found in the spleen and the Kupfer cells of the liver. The pigment particles in the mesenteric lymph glands were located in both the cortex and medulla of the gland.

From these experiments it is apparent that, under the conditions stated, carbon particles are absorbed from the gastro-intestinal tract of the adult dog. It must be remembered, however, that a very large amount of lamp black was fed daily, so that there was a more

1 Aufrecht, *Die Lungenentzundungen in Nothaagels spec. Path. und Ter. Bd.*, XIV.

2 Kuss and Lobstein, *Bull. Med. Par.*, 1907, **21**, 83; *Compt. Rend. de la Soc. Biol.*, 1907.

3 Ravenna, *Gazz. d. osp. Milano*, 1907, **28**, 177.

4 Chinaglia, *Atti d. r. Ist. Veneto di sc., lett. ed arti* (pt. 2, disp. 4), 1928-29, **88**, 337.

5 Tychowski, *Compt. Rend. de la Soc. Biol.*, 1930, **104**, 538.

or less constant inundation of the intestine with carbon particles. Further, the animals were kept on the described regime from 16 days to 7 months, a much longer time than that reported by other workers.

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Formation of Carbohydrates from Non-Glycerol Fraction of Lipoids in the Rat.

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Although the study of the metabolic disturbance in the depancreatized dog has contributed in a large measure to our present knowledge of metabolism, there is still no universal agreement as to the exact nature of this disturbance. Two main schools of thought exist on this question. The theory which gained early acceptance in this country postulates an inability of the diabetic tissue to utilize carbohydrate. The opposing theory, more widely accepted in Europe, and gaining more credence in this country, states that the diabetic organism can utilize carbohydrate but that the essential disturbance is an overproduction of sugar from non-carbohydrate sources. A necessary corollary to this latter theory is a formation of carbohydrate from the non-glycerol fraction of lipoids.

We have previously reported that carbohydrate is utilized by the completely depancreatized dog not receiving insulin,[1] and many older and more recent reports may be drawn in support of this thesis.[2, 3, 4] The existing evidence for the conversion of fat to carbohydrate in the higher animal species is largely based on the D:N ratio and Respiratory Quotient, and is disputed on theoretical grounds,[5] although it is conceded that this conversion occurs in plants and probably also in insects. The present preliminary report offers direct proof, of a crucial nature, that carbohydrate can be derived from the non-glycerol fraction of lipoids in the rat.

1 Soskin, S., *J. Nutrition*, 1930, **3**, 99.

2 Houssay, B. A., *Endocrinology*, 1931, **15**, 511.

3 Mann, F. C., *Archives Int. Med.*, 1923, **31**, 797.

4 Hedon, L., *Arch. Internat. de Physiol.*, 1926, **26**, 329; 1926, **27**, 254; 1927, **29**, 175.

5 Soskin, S., *Biochem. J.*, 1929, **23**, 1385.