

Gastro-Intestinal Motility in the Albino Rat after Administration of Amphetamine Sulfate

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Reports concerning the action of amphetamine sulfate (A.S.) on gastro-intestinal motility are somewhat variable. Myerson and Ritvo¹ summarizing the results of their studies on man state that A.S. is a sympathomimetic drug which is of great value in diminishing or abolishing spasm of the G. I. tract. Ivy and Krasno,² summarizing the clinical literature state that 10-30 mg orally delays the rate of evacuation of the stomach, increases the tone of the pylorus, shows no marked constant effect on the small intestine and variable effects on the colon. Ersner,³ after treating 500 cases of obesity with the drug, reports it to cause mild constipation, in 10 mg doses.

Experimental. Our study of A.S. consisted in measurement of the action of various doses on effective peristalsis and egestion time in intact animals and its action on isolated segments of colon.

The animals were fasted for 4 hours before each determination in order that they would quickly eat their test meal which consisted of a 3 g pellet made up of the following parts by wt: bread 1, milk 4, hamburger 5, and Fe_2O_3 1. The A.S. dissolved in water was injected intraperitoneally, immediately after the food pellet was eaten.

The action on effective peristalsis⁴ was measured by comparing the rate of progress of a test meal dyed with Fe_2O_3 in treated and non-treated litter mates of the same sex, paired data being secured in all determinations; 30 min. after eating the animals were killed by decapitation, the gastro-intestinal tract quickly excised, straightened out on a warm moist plate and slit open with fine scissors; thus the distance which the dyed mass had been propelled from the stomach could be measured accurately.

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¹ Myerson, A., and Ritvo, Max, *J. A. M. A.*, 1936, **107**, 24.

² Ivy, A. C., and Krasko, I. R., *War Medicine*, 1941, **1**, 15.

³ Ersner, Jack S., *Endocrinology*, 1940, **27**, 776.

⁴ Patterson, C. A., Smith, Erma, and Hale, H. B., *PROC. SOC. EXP. BIOL. AND MED.*, 1938, **39**, 509.

TABLE I.
Effective Peristalsis.

No. of animals	Mg A.S. per kg/rat	Mean length of intestine traversed in % of total length	Range in %
45	0	70	64-96
20	5	45	0-51
20	10	33	0-46

The time required for first appearance of the Fe_2O_3 in the egesta of animals fed the test meal with and without A.S. is summarized in Table II.

TABLE II.
Egestion Time.

No. of determinations	Mg A.S./kg body wt	Egestion time in hr		% delay
		Mean	Range	
50	0	7	5-10	
10	4	11.5	10-15	64
10	5	10.5	10-16	50
30	10	12.9	10-16	84

From Tables I and II it may be seen that in all cases treatment with A. S. delayed passage of material along the gastro-intestinal tract in intact animals. Thirty min. after injecting the drug the stomach appeared atonic and the pylorus tightly constricted; casual measurement of the total length of the intestine from the pylorus to the anus in untreated rats showed the length to be about 70 cm; in treated animals it was 80 cm due to greater relaxation of the tube; 84% delay in egestion time was induced by administration of 10 mg per kg A.S.

In 100 tests using isolated segments of colon contracting in Sollman-Rademaeker's solution $16\frac{1}{3}$ to $33\frac{1}{3}$ gamma A.S. per cc added to the bath slowed or stopped the action of the strips. 35-45 gamma either stimulated or inhibited, whereas 50 gamma and above stimulated.

Conclusions. Amphetamine sulfate relaxes the stomach and small intestine, constricts the pylorus and delays the passage of material along the gastro-intestinal tract. Isolated segments of colon are stimulated by minimum effective doses; larger doses inhibit.