

tion of acid) and do nothing for the main or final cause.

5. The efficient cause — hyperacidity — is counteracted by our dietetic prescriptions, but the results are often incomplete because this therapy also does not affect the final cause. Attention is called to the "bad timing" of the acid secretion as an essential feature

and to the appearance of prolonged acid crises. Emphasis is laid on the neurogenic theory.

6. The final causes are discussed and a possible line of treatment is suggested regarding the regulation of mental activities in such a way as to protect the local mechanism of digestion against the inroads of the central nervous system.

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## Intestinal Motility in Rats Anesthetized with Ether\*

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IT has been demonstrated through fluoroscopic observations (1) that ether and chloroform anesthetics are accompanied by a decrease in tone and arrest of movements of the entire gut. Miller (2), working with dogs having balloons in permanent fistulae of the stomach, small intestine and colon, has shown that with ether anesthesia all stages are accompanied by diminution or loss of tone and contractions except the transitory so-called "excitement," or delirium stage. During surgical anesthesia he found both complete inhibition of most of the smaller contractions and entire lack of peristalsis, as noted at all three fistulae. Sleeth and Van Liere (3) have demonstrated a marked increase in gastric emptying time of etherized animals. Following anesthesia, Miller (2) found that the colon may become hypertonic or spastic and that the small intestine shows exaggerated activity, while the stomach may remain somewhat atonic for five hours or more.

Macht's method (4) of studying intestinal motility in rats was introduced as a technique for the comparison of cathartics, but is equally well suited for studying other factors influencing intestinal motility. Like the roentgenographic methods, it measures only the effective motility of the gut, and so is perhaps more likely to yield results applicable to practical conditions in the human than are some of the other physiological techniques. In order to obtain a quantitative picture of the effect of ether on effective intestinal motility, Macht's technique was used in the following experi-

ments. No variations were made from the technique as previously employed (5).

#### EXPERIMENTAL

Ten rats, weighing approximately 200 Gm., prepared through a standard treatment, were given 2.0 c.c. of a charcoal emulsion in gum acacia solution intragastrically and were sacrificed by a blow on the head 50 minutes after administration of the charcoal. The progress of this test meal in the intestinal tract between the pylorus and anus was measured and calculated in per cent of the tract traversed. The average value for these 10 control animals is noted in Table I.

Similar groups were treated likewise: (a) 10 minutes after induction of ether anesthesia in a chamber of 18 L. total capacity, containing an initial concentration of 2.5 mM/L. of ether in oxygen; anesthesia with the same tension of ether was then resumed and continued 50 minutes, when the animals were sacrificed and examined; (b) immediately after 60 minutes of anesthesia with the same initial concentration of ether; and (c-h) at various periods after anesthetization for one hour with ether at the same initial tension, up to 48 hours. Averaged results for each group of 10 animals are collected in Table I.

As the rats were of approximately the same body weight in all groups, and the same number of rats was used in each group, the depth of anesthesia over the period of an hour may be considered very nearly the same for all groups since variations in the amount of ether absorbed by the rats would be negligible. Objectively, no difference in the depth of anesthesia of the various groups could be noticed. In all cases, the ether mixtures were made up with oxygen, and accumulation of carbon dioxide in the anesthesia chamber prevented by keeping a large gauze bag of moist soda-lime in motion during the period of

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anesthesia. The effectiveness of these measures in preventing anoxemia or excess of carbon dioxide is reflected in the results collected in Table I.

### DISCUSSION

From Table I, it may be noted that suppression of effective peristalsis in the small intestine is very

The use of 10 animals for each test by Macht's technique has been recommended, and a comparison of control values in Macht's (4) and other (5) series with the present findings indicates that excellent agreement may be obtained using this number. Tolerances noted in Table I represent one standard deviation

TABLE I

*Action of ether on the motility of small intestines, Macht's Method. Results expressed as per cent of intestinal tract between pylorus and anus traversed by a test meal in 50 minutes*

Untreated	During Anesthesia	Hours after 60 minutes anesthesia						
		1st	2nd	3rd	6th	12th	24th	48th
55 ± 2	3 ± 1	30 ± 3	48 ± 2	60 ± 2	63 ± 2	57 ± 3	57 ± 2	55 ± 3

marked during the period of anesthesia. In only one case did the test meal traverse more than 10% of the intestinal tract during anesthesia. Measurement of the passage of the test meal was difficult in animals tested during the first hour after anesthesia, since scattered small portions of the test meal, which appear as small specks through the intestinal wall, were carried along to about half the length of the intestine in a small number of rats and so increased the average figure. The value obtained for motility during the first post-anesthetic hour is therefore probably misleadingly high, due to the occurrence of weak peristaltic rushes toward the end of the test period.

Only in experiments done in the second post-anesthetic hour and thereafter is the normal appearance of a solid column of material contained in the gut obtained, denoting the resumption of normal strong peristalsis. This delay in recovery of intestinal tonus and peristalsis is not surprising, for the rats remain lightly anesthetized for as long as 20 minutes after ether administration is stopped, indicating that the tissues have become well saturated with ether during the long period of deep anesthesia.

tion of the mean. It may be noted that only the experiments done during anesthesia and the first, second and sixth post-anesthetic hours differ significantly from the controls.

### SUMMARY

Surgical anesthesia with ether inhibits the motility of the small intestine of rats for the period of its duration. Recovery is rapid after anesthetization with ether for one hour, and the gut regains approximately its normal activity by the second hour after anesthesia is terminated. Some slight hyperactivity may occur from the third to the sixth post-anesthetic hours.

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## Editorials

### NEWER METHODS OF TREATING HEMORRHAGE DUE TO ULCER

AT the 16th Scandinavian Congress for Internal Medicine held at Uppsala in 1933, Meulengracht made his first suggestion and reported his first results obtained by treating hematemesis and melena by giving the patient "something to eat." Subsequently, in 1934 and again in 1935 he reported larger series of cases with exceptionally good results in spite of his seemingly radical procedure of continuing a full and varied diet throughout the period of active hemorrhage and during the post-hemorrhage convalescence. He treated 251 ulcer cases with only 3 deaths, a truly splendid record (1.2%). The diet consisted of pureed and soft foods and the free administration of alkalis. Dinner alone included meat balls, broiled chops, omelette, fish balls, vegetable soup, stewed apricots, apple sauce, the patients eating "as much as they want."

This is a brave, very brave, frontal attack upon

hemorrhage by the manoeuvre of free and plentiful feeding, a procedure which affronts our previous orthodox concepts of enforced rest for the injured parts, physiological quiet, the free use of morphine and abstention of all food and drink by mouth. But since this is the day of radical attack upon orthodox tradition, it behooves the older members of the conservative party to pay close attention and weigh carefully the merits or demerits of such a proposal before accepting it precipitately or denouncing it without trial.

Meulengracht has quoted the mortality figures for the treatment of ulcer hemorrhage by various older authors as Bullmer 10.7%, Chiesman 25%, Tidy 19%, Hinton 20%, Lynch 12.9%. This is of course painting a very black picture, hardly consonant with all the facts.

Thus Chiesman as recently as 1932 had a mortality at St. Thomas' in London of 27% of 191 cases, but