

# Abstracts of Current Literature



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## PHYSIOLOGY OF GASTROINTESTINAL FUNCTION

*The regulation of appetite and of gastric hunger contractions has been a controversial topic. Is the important factor the volume of food, its caloric value, its carbohydrate or protein content, or change in body fluids caused by absorption of digestive products? According to Mayer, the availability of glucose as a source of energy with certain hypothalamic centers of the central nervous system represents the primary controlling factor in this relationship.*

**Relation of Metabolic Events to Gastric Contractions in the Rat.** S. Sudsaneh and J. Mayer. *Am. J. Physiol.*, 197: 269, 1959.

A water-filled balloon system was used to study gastric hunger contractions in normal rats. Fasted rats have active hunger contractions alternating with periods of quiescence. The contractions occur at a rate of one or two per minute for ten to fifteen minutes followed by a quiescent period of five to ten minutes. Exposure to cold (5°C.) and heat (32° and 40°C.) inhibited gastric hunger contractions in fasted rats. The intravenous administration of 75 µg. glucagon or the intravenous injection of 50 µg. epinephrine and norepinephrine also inhibited gastric hunger contractions. Cessation of the gastric motility also occurred when 100 µg. glucagon or 50 µg. epinephrine were given to fed animals pretreated with 2 units of insulin. It was found that changes in carbohydrate utilization induced by glucagon preceded the gastric phenomena. **AUTHORS**

**Mechanism of Hypothalamic Control of Gastric Contractions in the Rat.** J. Mayer and S. Sudsaneh. *Am. J. Physiol.*, 197: 274, 1959.

Gastric hunger contractions in hypothalamic hyperphagic and aphagic rats are similar to those of normal

rats. Heat, cold and epinephrine inhibited hunger contractions in both types of hypothalamic animals. The gastric hunger contractions of aphagic rats are inhibited normally by glucagon. However, doses of glucagon which inhibit hunger contractions in normal rats fail to do so in hyperphagic hypothalamic animals whether obese or reduced to normal weight, despite the fact that responses are similar to those seen in normal animals. This ventromedial "glucoreceptive" hypothalamic area thus seems to exert a considerable measure of control upon gastric hunger contractions while the lateral area does not. A scheme integrating hypothalamic, metabolic and gastric factors in hunger is proposed. **AUTHORS**

**Effects of Some Physiologic Substances on Gastrointestinal Propulsion in the Rat.** P. M. Lish, B. B. Clark and S. I. Robbins. *Am. J. Physiol.*, 197: 22, 1959.

The influence of some physiologic substances on the distribution of a dye following oral administration in the rat has been studied by a very sensitive and discriminative technic. Under certain conditions an agent may influence the rate of movement through one portion of the gastrointestinal tract while not affecting the transit through an adjacent segment. Propulsive motility was slowed following subcutaneous administration of *l*-epinephrine, *l*-norepinephrine, glucagon, 5-hydroxytryptamine, or 5-hydroxytryptophan. The characteristics of the inhibition produced by each agent were not the same. Insulin inhibited the motility of the gastrointestinal tract fifteen minutes following subcutaneous administration, but forty-five minutes after administration there was intense stimulation of propulsion. Ganglionic blockade eliminated the stimulating effect of insulin on the intestine but only partially reduced the stimulation of the stomach. **AUTHORS**

*The inhibitory effect of a high fat meal upon gastric motility has been recognized for many years. This has been part of the treatment for peptic ulceration using a milk and cream diet which, in intractable cases, has proved superior to protein-supplemented milk formulas.*

**The Effect of an Ordinary and of an Excessively Fatty Breakfast on Human Gastric Antral Motility.** A. W. M. Smith and C. F. Code. *Gastroenterology*, 35: 398, 1958.

The gastric antral motility of twelve healthy human subjects was recorded for three-hour periods by a balloon-photokymographic technic during fasting and after the ingestion of a breakfast containing 16 gm. of fat. Similar studies were made of five of the twelve subjects after ingestion of a breakfast containing 100 gm. of fat. Immediately after the breakfast containing 16 gm. of fat, type II waves were reduced significantly as compared to the fasting records, and rhythmic type I activity increased. Total activity was significantly increased during the second hour. After the breakfast containing 100 gm. of fat, type II waves were abolished within fifteen minutes and remained depressed. Type I activity was immediately increased and became more rhythmic.

The mean amplitude of the pressure produced in the balloon by type II waves was 14.3 cm. of water during fasting, 10.3 cm. after the ordinary meal, and 7.8 cm. after the fatty meal. This indicated a significant decrease in the amplitude of the type II waves after both types of meals.

The present study confirms the previously described transient immediate decrease in parastaltic activity occurring when food enters the stomach followed by a gradual increase in parastaltic activity. It also documents the inhibitory effect, on gastric motility, of a meal high in fat previously demonstrated radiologically.

J. B. HAMMOND

**The Effect of Bland Fluids and Anticholinergic Drugs on the pH of Gastric Contents in Duodenal Ulceration.** T. J. Thomson. *Clin. Sc.*, 17: 701, 1958.

The use of a bland diet in the treatment of peptic ulcer is traditional and indeed is symptomatically very effective. However, it has been shown that the rate of healing and the relapse rate are unaffected by such a diet. The investigation reported here was designed to assess the effect of frequent bland fluid feeds, atropine sulphate, sodium penthienate and continuous intragastric milk drip in twelve men and three women with active duodenal ulceration.

The pH of the gastric contents was measured hourly during treatment in samples obtained by an indwelling Ryles tube. It proved impossible by the means used to raise the pH above 4 and it is concluded that any benefit due to bland diets is unlikely to be related to their effect on gastric acidity.

F. E. HVTEN

*Thiamine-deficiency neuritis affects not only the peripheral nervous system but also the autonomic system.*

*This is evidenced not only by changes in motility but also by a reduction of reflexly induced gastric acid secretion.*

**Effect of Thiamine Deficiency on Canine Gastric Secretion of Acid.** M. K. Lavers, P. A. Stefanik and C. F. Code. *Am. J. Physiol.*, 197: 253, 1959.

A study was undertaken to determine the effect of thiamine deficiency on the hydrochloric acid output of vagally denervated gastric pouches (Heidenhain-type) and vagally innervated gastric pouches (Pavlov-type) in dogs. Responses of both types of pouches to injection of 0.05 mg. of histamine/kg. of body weight and the maximal secretory capacity of both types after histamine therapy were unaltered during the deficiency state. A degree of thiamine deficiency sufficient to produce anorexia and neuritis was without effect on the secretory response of canine gastric mucosa to the administration of histamine. The hydrochloric acid output of vagally innervated pouches during nervous stimulation caused by insulin-induced hypoglycemia was drastically reduced as soon as thiamine deficiency developed, while the response to bethanechol chloride was little, if at all, affected. It is concluded that the vagal secretory mechanism participates in the general neural failure of thiamine deficiency and that this failure most likely is in the neurons of the vagal nuclei.

AUTHORS

**Inhibiting Effect of Norepinephrine on Gastric Secretion in Human Subjects.** A. J. Leonsins and W. R. Waddell. *J. Appl. Physiol.*, 12: 334, 1958.

The action of norepinephrine in relation to gastric secretion was studied on human subject material. The route of administration was by intravenous infusion. When patients were in the basal state norepinephrine inhibited gastric secretion. Norepinephrine was also inhibitory after stimulation of gastric secretion by peptone broth, histamine and hypoglycemia following insulin. In each case it was observed that the volume of gastric juice was reduced. The acidity and chlorides might or might not be reduced and sometimes were increased even when the volume of secretion was less.

M. J. OPPENHEIMER

*Adrenal steroids affect gastric activity by increasing acid and pepsin activity. Amphenone may affect these gastric functions through its depressant effect upon adrenocortical activity. In addition, amphenone is a toxic substance which may influence the function of tissues other than the adrenal directly.*

**Effect of Amphenone on Gastric Secretory Activity.** J. Manrique, R. Paredes, J. Arabehty and S. J. Gray. *Am. J. Physiol.*, 195: 221, 1958.

A single subcutaneous injection of amphenone to pyloric ligated rats produced a significant decrease in gastric secretory volume, free acid and potassium content, with an increase in pH, gastric juice sodium and pepsin concentration. Cortisone, corticosterone, DCA or ACTH administered with amphenone did not alter



the amphenone effect. Aldosterone alone produced a reduction in gastric juice sodium. When amphenone was injected with aldosterone, the amphenone effects, including an increased sodium, were again observed. When amphenone was administered with histamine, the amphenone effects relating to pH and free acid concentration were not observed. Adrenalectomy produced a decrease in gastric secretory volume, acidity and pepsin secretion, and an increase in sodium and pH. In previously adrenalectomized rats the amphenone inhibitory effects on gastric secretion were absent. An increase in adrenal gland weight was observed four hours after the administration of amphenone, but was not seen when cortisone, corticosterone, DCA, aldosterone or histamine were administered with amphenone. ACTH, administered alone or with amphenone, produced an increase in adrenal weight. Amphenone caused a considerable increase in thymus weight, which could be prevented by the simultaneous injection of corticosterone, aldosterone or histamine, but not by DCA or adrenalectomy. ACTH or cortisone, administered alone or in combination with amphenone, decreased thymus weight.

AUTHORS

**Secretory Function of the Stomach After Denervating Operations.** W. R. Waddell. *J. Appl. Physiol.*, 12: 468, 1958.

This study deals with acid secretory function in patients with ulcer during control periods and after several types of surgical procedures. In one group of postoperative patients the parasympathetic nerve supply was interrupted. It was observed that the volume of gastric secretion was only slightly increased in these patients after the injection of histamine. On the other hand, insulin hypoglycemia actually decreased the volume of secretion in these patients. However, chloride concentration was increased after both histamine and insulin therapy. The author expresses the opinion that histamine acts principally on gastric blood vessels. Parasympathetic denervation might, in this case, interrupt reflex arcs mediating vasodilation.

The work of Uvnas and others who observed the interrelationship of nervous and humoral control on gastric secretion, while not mentioned in this work, ought to be considered in relation to this report.

M. J. OPPENHEIMER

*Attention is called to the recognition of a new congenital defect in the function of the small bowel involving the failure to hydrolyze lactose, possibly due to the absence of lactase*

**Defective Lactose Absorption Causing Malnutrition in Infancy.** A. Holzel, V. Schwarz and K. W. Sutcliffe. *Lancet*, 1: 1126, 1959.

Failure of infants to gain weight with apparently

adequate breast feeding is most often due to an abnormality of milk composition, usually a low fat content. This paper describes two children, a brother and sister, who failed to gain weight on a large intake of breast milk and who had frequent stools and excessive flatus. They made excellent progress on artificial feeds containing no lactose, and tests showed that they were unable to hydrolyze lactose, possibly due to lack of, or inhibition of, the enzyme lactase. Their intestinal symptoms were presumably due to bacterial fermentation of the sugar. This congenital abnormality has not been previously described.

F. E. HYTTEN

**Intestinal Absorption of Methionine and Histidine by the Chicken.** C. M. Paine, H. J. Newman and M. W. Taylor. *Am. J. Physiol.*, 197: 9, 1959.

Intestinal absorption of methionine and histidine was studied in adult chickens having permanent Thiry-Vella fistulas. The L isomers of both amino acids were absorbed from the fistulas more rapidly than were the D isomers. At a concentration of  $10^{-3}$  M, 2,4-dinitrophenol retarded absorption of L-methionine but not of the D form. The absorption of L-histidine was impaired in the presence of equimolar concentrations of either L- or D-methionine. Racemization of D-methionine during absorption could not be demonstrated. The L isomers of both methionine and histidine appear to be absorbed from the chicken intestine by a common specific transport mechanism, with D-methionine being able to participate in at least one stage of this mechanism.

AUTHORS

## ITEMS OF GENERAL INTEREST

**Progress of the Columbia University Institute of Nutrition Services.** AMA Council on Foods and Nutrition. *J. A. M. A.*, 170: 1928, 1959.

This brief report discusses the organization and program of the Columbia University Institute of Nutrition Sciences, Dr. W. H. Sebrell, Jr., Director. It is clear that establishment of this Institute marks an important step in the promotion of nutrition as both a clinical and experimental science.

S. O. WAIFE

**The Effect of Radiation Sterilization on the Nutritive Value of Foods. V. On the Amino Acid Composition of Milk and Beef.** W. S. Tsien and B. C. Johnson. *J. Nutrition*, 69: 45, 1959.

Evaporated milk and beef round steak were used in these experiments. The foods were exposed to radiation at three dosage levels, the highest being 9.3 million rad. The amino acids most seriously reduced were glutamic acid, aspartic acid, serine, and glycine—fortunately all are nonessential.

FRANK E. RICE

