

An Overview of the Digestion Process

Food, in order to be used by the body, must be digested and this process of digestion is a complicated one. It might almost be said to begin before the food is eaten, as it is greatly influenced by appetite, smell, sight, and the surroundings. These subjects will be mentioned more fully later on. Good food prepared in a skilful manner, pleasant to see, to smell, and to taste, taken in comfortable surroundings, with cheerful companions, will be digested with ease by normal individuals, while the reverse of all or any of these may cause indigestion due to the mental action upon digestion all chiefly, perhaps, on the digestive glands. Pawlow has made a most fascinating study of this subject, to which the reader is referred. *The Passage of Food Through the Alimentary Tract*. The first step in the digestion of food is mastication, which is perhaps the only purely voluntary act connected with the process. By this means the food is ground to a fine pulp and thoroughly mixed with saliva. It is necessary to have good teeth, and the importance of the care and preservation of the teeth cannot be too strongly insisted upon. Defective teeth are a menace to health, as they lead to the food being imperfectly masticated, and the constant absorption of toxic material may affect both digestion and the general health. In the process of chewing the muscles of the cheeks and lips serve to keep the food in the line of the teeth, and when the facial muscles are paralyzed mastication may be difficult. Deglutition is usually a reflex action and is generally involuntary, although it may be begun by a voluntary effort. The food passes with varied rapidity from the mouth through the pharynx and esophagus into the stomach. To be easily swallowed the food must be moist and on the tongue, and it is difficult or impossible to swallow dry food. Liquid or very soft food may pass directly into the stomach in as little as 0.1 second, but semisolid and solid food are forced down the esophagus by a sort of peristaltic movement, taking as long as six seconds to reach the stomach. There may be a delay of from four to eight seconds at the cardiac sphincter. Paralysis of the soft palate causes the food to be regurgitated through the nose when swallowing is attempted, and if the muscles of the pharynx or larynx are paralyzed the food may be aspirated into the trachea, bronchi, or lung, and so set up a bronchopneumonia. Food remains in the stomach until it has been reduced to more or less of a liquid, when it is forced through the pylorus from time to time. Our knowledge of gastric movements dates from the classic experiments made on Alexis St. Martin by Beaumont, and a great deal of research has been devoted to the subject in recent years. The fundus of the stomach acts as a reservoir for the food, while the pyloric end serves to grind and macerate it until it is forced out of the stomach into the duodenum, the pylorus apparently opening under the stimulus caused by the combination of the food being liquid in character and acid in reaction. In the duodenum the acid causes the pylorus to close. The order in which the food is digested depends somewhat on the order in which it is ingested and the amount of fluid taken with it. For example, if carbohydrates are fed first and then proteins, the carbohydrate passes almost immediately into the small intestine; if, however, the protein is fed first, the carbohydrate remains in the stomach much longer. Hedblom and Cannon have summarized the results of their investigations on the passage of food from the stomach as follows: If carbohydrate food is thinned by adding water, there is, within limits, very little change in the rate of exit from the stomach; but adding water to protein food tends to make the discharge more rapid. When hard particles are present in the food, the rate of outgo from the stomach is notably retarded. Coarse, branny food leaves the stomach slightly faster than similar foods of finer texture. The presence of gas in the stomach delays gastric discharge, an effect due to the gas preventing the walls of the stomach from exerting the normal mixing and propelling action on the food. No considerable variation from the normal rate of exit from the stomach is observed when the food is fed very hot or very cold. Food with approximately normal acidity leaves the stomach much faster than food which is hyperacid (1 per cent.), a result in harmony with other observations on the acid control of the pylorus. Feeding acid food is followed by deep and rapid peristalsis. Massage of the stomach, even when extensive, has very slight influence on the passage of food through the pylorus. Irritation of the colon (with croton oil) notably retards gastric discharge, and delays the movements of food through the small intestine. In the intestine the food is moved forward by the peristaltic movements; a wave of relaxation moves along the intestine followed by a wave of contraction and this serves to pass the contents of the bowel downward. Antiperistalsis is said not to occur under normal conditions; it may occur in injury or disease of the intestine, especially in intestinal obstruction. In addition to this general movement there are local rhythmic movements occurring at the parts of the intestine occupied by food. The mass to be digested is separated into numerous small masses by this movement, and then these are swept together and also onward by the wave of peristalsis. The length of time that a meal takes to pass from the stomach to the large bowel varies, but it is about four hours on an average, and the first part of the meal may be at the ileocecal valve by the time the last of it leaves the stomach. Various things may upset the movements of the intestines. A sudden disturbance of circulation in the bowel may cause violent movements, and dyspnea may either increase the movements or stop them altogether. The organic acids formed in the bowel as the result of the bacterial action act as stimulants to intestinal movement. The movement through the large intestine is slow, as it is there that most of the water is absorbed. The passage of the intestinal contents is delayed in the ascending colon by reverse peristaltic movements. According to the observations of Hertz the feces take two hours on an average to pass from the ileocecal valve to the hepatic flexure, and about four and a half hours to pass from there to the splenic flexure, from whence the feces are moved slowly to the sigmoid flexure. The rectum is probably empty until just before defecation, and the entrance of feces into the rectum probably excites the desire. The rectum is closed by the internal and external sphincters, the latter being partly under the control of the will. Defecation is partly a voluntary and partly an involuntary action. The digestion of food takes place through a number of chemical changes brought about in the alimentary tract by the action of certain unorganized ferments usually known as enzymes. Along with these chemical changes there are, of course, alterations in the physical properties of the food, the two combined allowing the useful part to be assimilated while the remainder passes away as refuse.

About the Author

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