

## Food facts file: The Healing Arts

### Food and Digestion ... The Long and Winding Road ...



#### **Food ingestion** begins at the **mouth**.

The teeth, tongue and salivary glands underneath are digestive organs that masticate the food. Saliva contains the enzymes amylase and lipase which are responsible for chemically increasing the rate of breakdown of carbohydrates and fats. Also produced are hormones that stimulate production of T cells, the essence of our immune system.

Swallowing food is a voluntary process where food passes from the mouth to the pharynx (throat), into the **esophagus** whilst closing the epiglottis, a flap that covers the larynx or voice box. The esophagus is a tube that runs from the mouth to the stomach. Bolus, (balls) of food move through this tube by an action called peristalsis, which are involuntary muscular contractions. At the end of this tube is a flap called the esophageal sphincter which is the doorway to the **stomach**. The action of peristalsis relaxes this muscle to allow food to pass through into the stomach.



When food arrives in the stomach the production of the hormone gastrin stimulates the production of gastric juices and the mechanical action of churning the food and stretching the stomach. The gastric juices are enzymes, hydrochloric acid, hormones and intrinsic factor. Specific enzymes work with specific food groups to break them down into smaller particles, amylase – carbohydrates, lipase – fats and protease – proteins. Hydrochloric acid is produced by the parietal cells in the stomach, as is the intrinsic factor, and functions to break down proteins, kill bad bacteria and activate the enzyme pepsin which begins protein digestion. Pepsin is produced from the stomach hormone pepsinogen. Once food is broken down sufficiently into chyme, a mixture of hydrochloric acid, enzymes, food and water with a consistency of pea soup, it passes to the **small intestine** by way of the pyloric sphincter. This is where it is completely digested and absorbed by the body into the bloodstream through the intestinal walls by villi and microvilli which produce digestive enzymes, absorb nutrients and prevent any harmful substances passing through. The small intestine has three parts – first the duodenum, second, jejunum and third the ileum. Different nutrients are absorbed at different stages of the small intestine. At the duodenum stage, the pancreatic substance cholecystinin is secreted which stimulates the pancreas to secrete bicarbonate alkaline fluid which neutralizes the chyme, partially digested food, to

ensure a correct pH level for this section of the intestine. The pancreas, close to the duodenum, also secretes specific enzymes to breakdown the macro nutrients, pancreatic amylase, lipase, and trypsin, chymotrypsin, carboxypeptidase and elastase for proteins in the ducts and empties the juices back into the duodenum. The jejunum absorbs carbohydrates and proteins. The ileum absorbs vitamin B12 and bile salts. The pancreas also products the hormones insulin, glucagon and polypeptide.



When all useful nutrients have been absorbed by the body, water, bad bacteria and fiber pass through the ileocecal valve into the **large intestine** to form a stool. The ileocecal valve separates the small and large intestine. There are three parts to the large intestine, the cecum, colon and rectum. The function of the colon is to change chyme into feces for disposal. Sodium, chloride and water are absorbed into blood and lymph. Bicarbonate and potassium are secreted by the colon. The good bacteria in the large intestine, bifidobacteria ferments fiber into fatty acids – butyric, propionic, acetic and valerate. From the large intestine involuntary mechanical muscular actions, segmentation and peristalsis, pass it to the rectum. When there are enough stools ready for elimination, the external sphincter relaxes and voluntary action urges defecation via the anus, known as **food egestion**.

The *liver* receives nutrient rich and poor blood from the digestive tract before it travels around the body. It takes simple sugars and converts them into glycogen that the body can store for energy later. It detoxifies harmful substances and converts amino acids and waste into urea. The liver also produces bile, which is produced upon eating and sent to the duodenum. It is made up of bile salts, mucus, pigments, fats, inorganic salts and cholesterol. It helps breakdown or emulsify fats in the duodenum and is stored in the gallbladder. It has a yellow, brown color and this is what gives stools their color.

Wishing you happy, healthy days! *Jacqui*



