

Nutrition for Nurses

Nutrition and Human Welfare

by

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What Happens to the Food We Eat

Digestion and metabolism

We shall now see how the food factors studied in the preceding chapters are brought into the actual nutritional service of the body. Digestion is a general form for the processing by means of which the carbohydrates, fats and proteins of the food, are brought by the body into forms fitted for absorption from its digestive tract into the various parts: blood, lymph, spinal fluid, organs and other tissues. *Metabolism* (from the Greek meaning "change") is also a general name for the changes which the products of digestion undergo from the moment of their absorption, until they have reached the end products of the nutritional process. The same terms can be applied to both food as a whole as well as to a single nutrient e.g. digestion and metabolism of carbohydrates or of fats or of proteins.

Digestion

The process of digestion has four effects on food :

1. it brings the digestible constituents of food into fluid forms ;
2. it changes the complex starches and sugars into simple sugars (mono saccharides) ;
3. it changes fats into a mixture of glycerol and fatty acids ; and
4. it changes the proteins into a mixture of amino acids.

By the above mentioned changes, absorption of nutrients is facilitated by resulting in their simplest form of "Building blocks" from which the body tissues

can reconstruct carbohydrates, fats and proteins according to their own patterns or use them as fuel.

Role of Enzymes in Digestion

The changes which the foodstuffs undergo in digestion and metabolism are greatly hastened and facilitated by the presence in the digestive juices and active cells, of substances known as enzymes. Enzymes are "catalysts" formed in the living cells. Catalysts are substances which "act by contact" and bring about chemical changes, without themselves being used up in the relation. Even in minute quantities they speed up or accelerate changes which otherwise would go on slowly. Enzymes are specific both as to the substance on which they act and with regard to the nature of the change they catalyse.

In the modern system of nomenclature of enzymes, the name is constructed from the name of the substance upon which the enzyme acts, with a suffix "ase." Thus starch is amylum and the enzyme acting on it is amylase. Enzymes are further differentiated by giving adjectives to indicate their sources. For example, salivary amylase—from saliva, pancreatic amylase from the pancreas and so on. Fats are lipids and the enzyme acting on them are Lipases—those which digest proteins are called proteases. The digestive enzymes are sometimes called "digestive ferments" and most of them are made up of proteins. The digestive enzymes effect the breaking down by hydrolysis of the carbohydrates, fats and proteins into digestion products which

are (1) more soluble and diffusible and thus more available to the body cells and (2) are simple enough to be readily used as "Building blocks" in the chemical architecture of the body substances (tissues) or to function as fuel.

Summary of the Digestive Secretions

	Name of Secretion				
	Saliva	Gastric Juice	Pancreatic	Bile	The Intestinal juice (succus entericus)
Reaction	Neutral	Acidic	Alkaline	Neutral	Alkaline
Secreted by	Salivary glands	Gastric Mucus (Stomach)	Pancreas	Liver Cells	Small Intestine Crypts of Lieberkuhn
Composition (other than Enzymes)	Salts Gases Mucin	Hydrochloric Acid, Mucin Minerals	Sodium Carbonate, Sodium bicarbonate	Mucin Pigments Bile salts Cholesterol salts	Sodium Carbonate, Sodium bicarbonate Enterokinase
Enzymes	Ptyalin (Salivary Amylase)	Pepsin Rennin Lipase	Trypsin or Pancreatic Protease Amylopsin or Pancreatic Amylase Steapsin or Pancreatic Lipase Lipase Rennin	Proteins Starches Fats Milk	Nil Peptidases (erepsin) Sucrase, Maltose, Lactose Lipase
Substances acted upon	Starch	Proteins, Milk, Fats	(As marked above)	Fats	Peptides Sucrase, Maltose, Lactose Fats
Action	Converts starch to maltose	Splits proteins to proteoses & peptones curdles milk. Splits fats to fatty acid and glycerol.	Splits proteins to proteoses, peptones, polypeptides and amino acid. Converts starch to maltose. Splits fats to fatty acid and glycerol.	Emulsifies fats	Splits peptones and peptides to amino acids. Converts sucrose to glucose & fructose. Converts maltose to glucose. Splits fats to fatty acids & glycerol.

(To be continued)