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 glyceral 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 catalyze.

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 amylase 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**

<table>
<thead>
<tr>
<th>Name of Secretion</th>
<th>Saliva</th>
<th>Gastric Juice</th>
<th>Pancreatic</th>
<th>Bile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction</td>
<td>Neutral</td>
<td>Acidic</td>
<td>Alkaline</td>
<td>Neutral</td>
</tr>
<tr>
<td>Secreted by</td>
<td>Salivary glands</td>
<td>Gastric Mucus (Stomach)</td>
<td>Pancreas</td>
<td>Liver Cells</td>
</tr>
<tr>
<td>Composition (other than Enzymes)</td>
<td>Salts Gases Mucin</td>
<td>Hydrochloric Acid, Mucin Minerals</td>
<td>Sodium Carbonate, Sodium bicarbonate</td>
<td>Mucin Pigments Bile salts Cholesterol salts</td>
</tr>
<tr>
<td>Enzymes</td>
<td>Ptyalin (Salivary Amylase)</td>
<td>Pepsin Rennin Lipase</td>
<td>Trypsin or Pancreatic Protease Amylase or Pancreatic Amylase Steapsin or Pancreatic Lipase Rennin</td>
<td>Proteins</td>
</tr>
<tr>
<td>Converting Substances acted upon</td>
<td>Starch</td>
<td>Proteins, Milk, Fats</td>
<td>(As marked above)</td>
<td>Fats</td>
</tr>
<tr>
<td>Action</td>
<td>Converts starch to maltose</td>
<td>Splits proteins to proteoses &amp; peptides curdles milk. Splits fats to fatty acid and glycerol.</td>
<td>Splits proteins to proteoses, peptides, poly-peptides and amino acid. Converts starch to maltose. Splits fats to fatty acid and glycerol.</td>
<td>Emulsasifies fats</td>
</tr>
</tbody>
</table>

(To be continued)