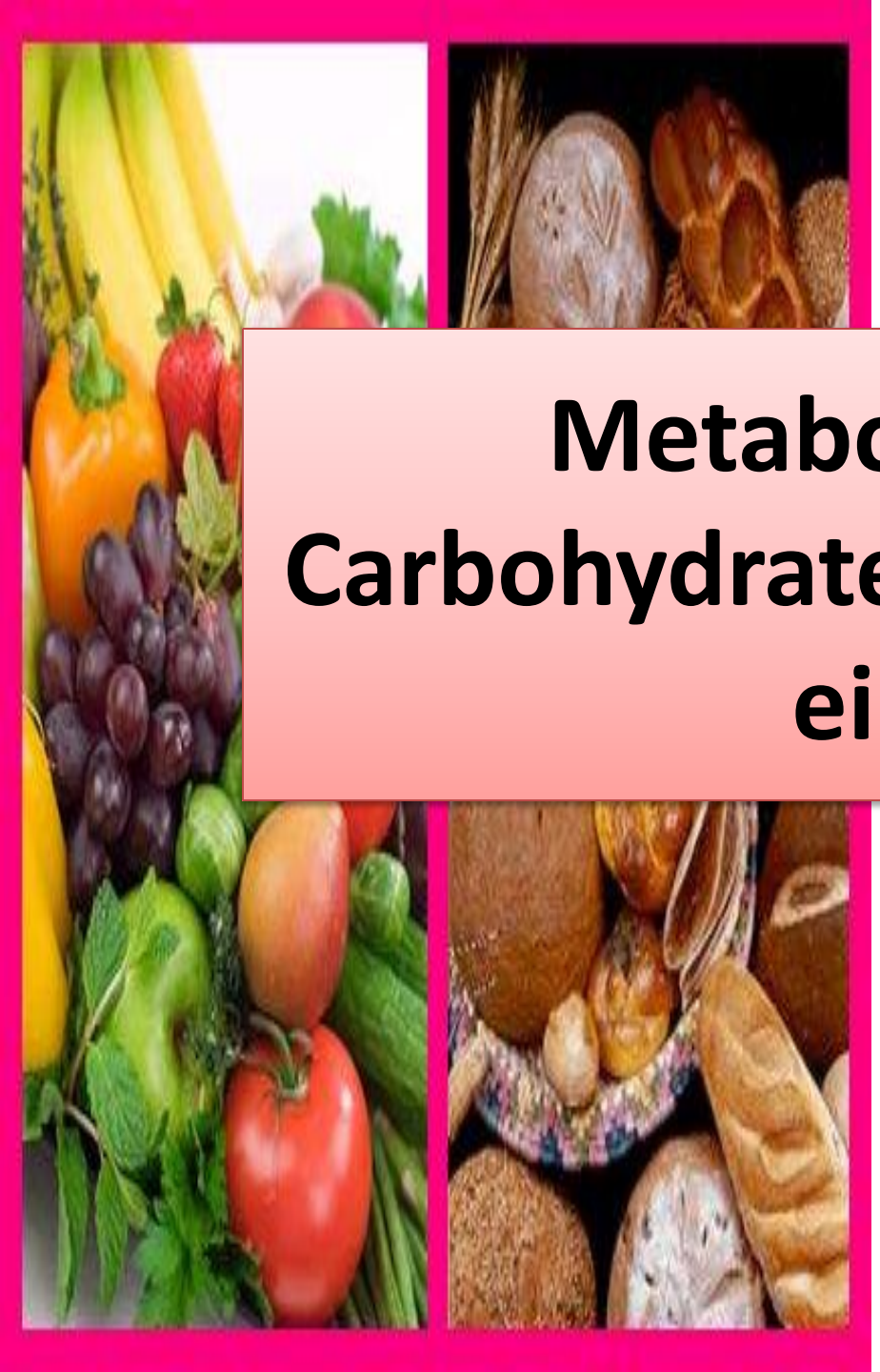
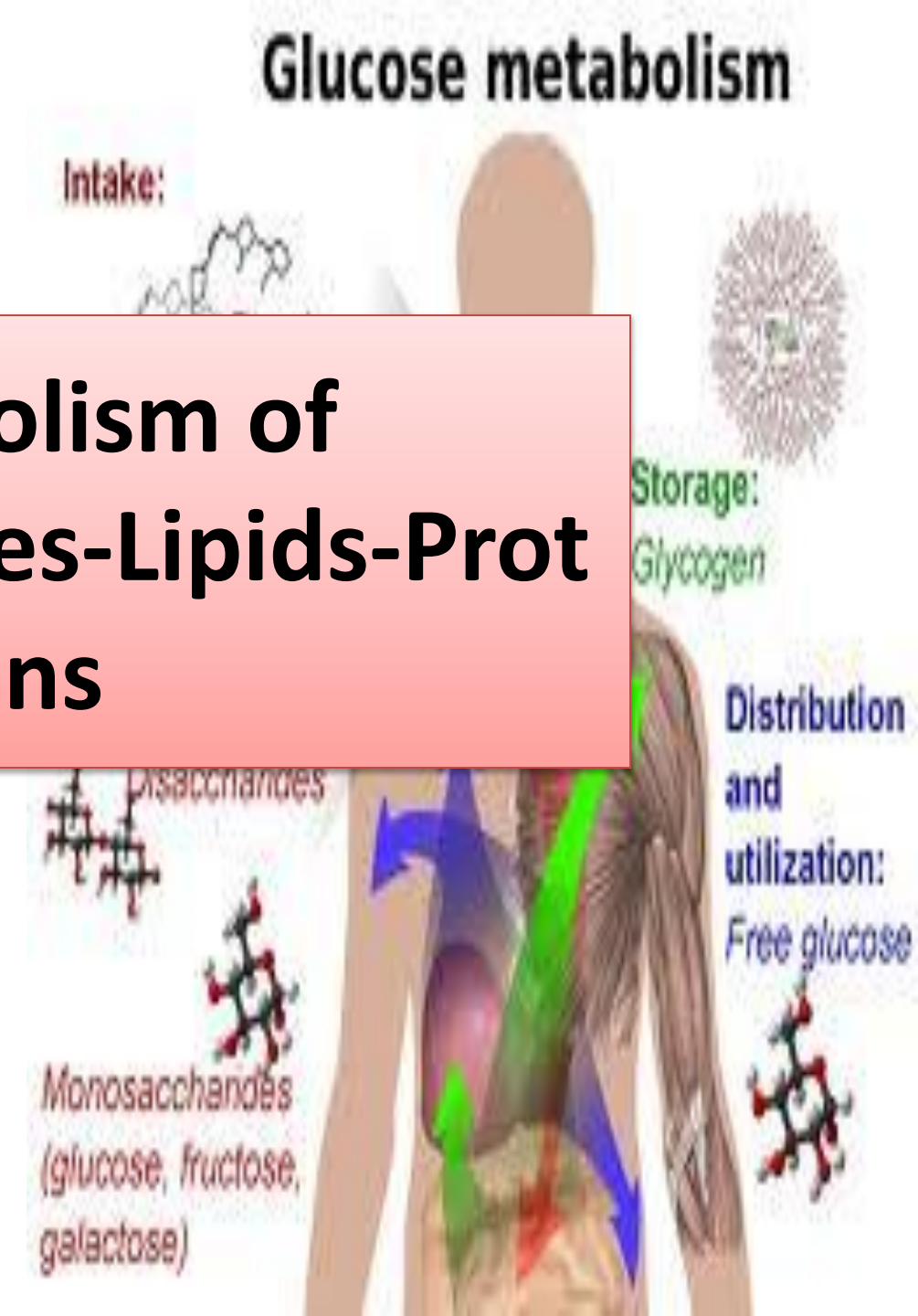
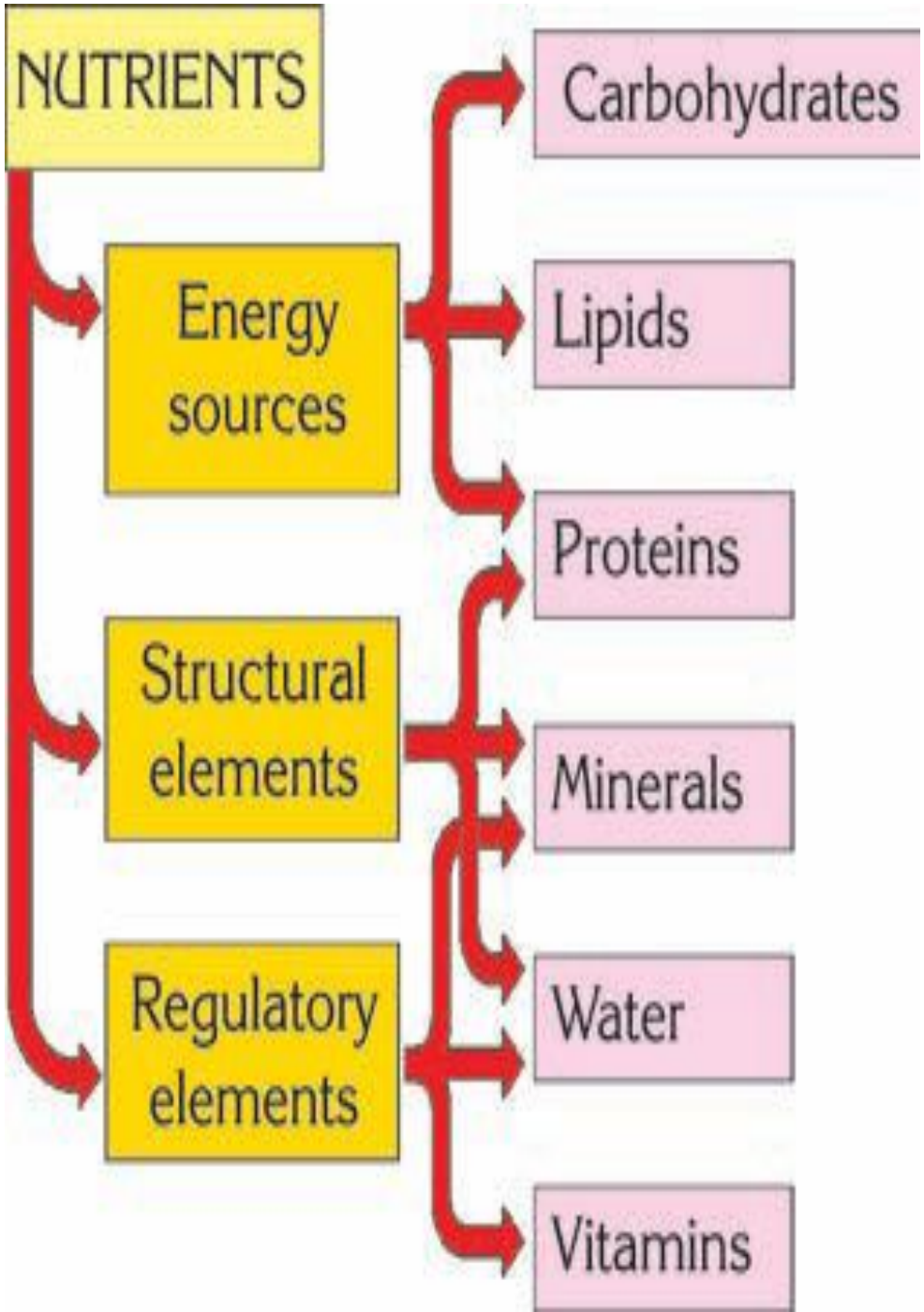




Metabolism of Carbohydrates-Lipids-Proteins

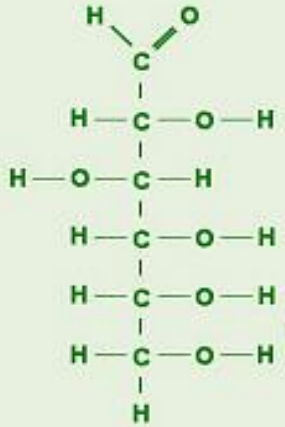
Nutrition

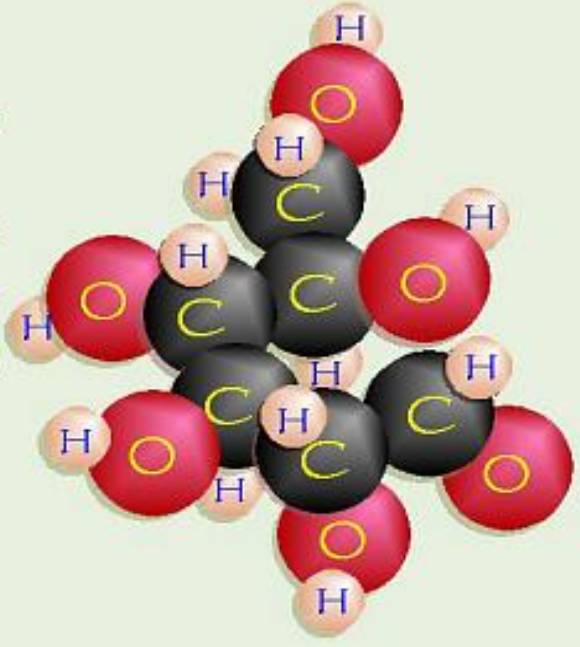
- ***Nutrition*** is the utilization of ingested substances by a healthy individual for life.
- Food can be divided into six groups:
- - carbohydrates
- - lipids
- - proteins
- - vitamins
- - minerals
- - water



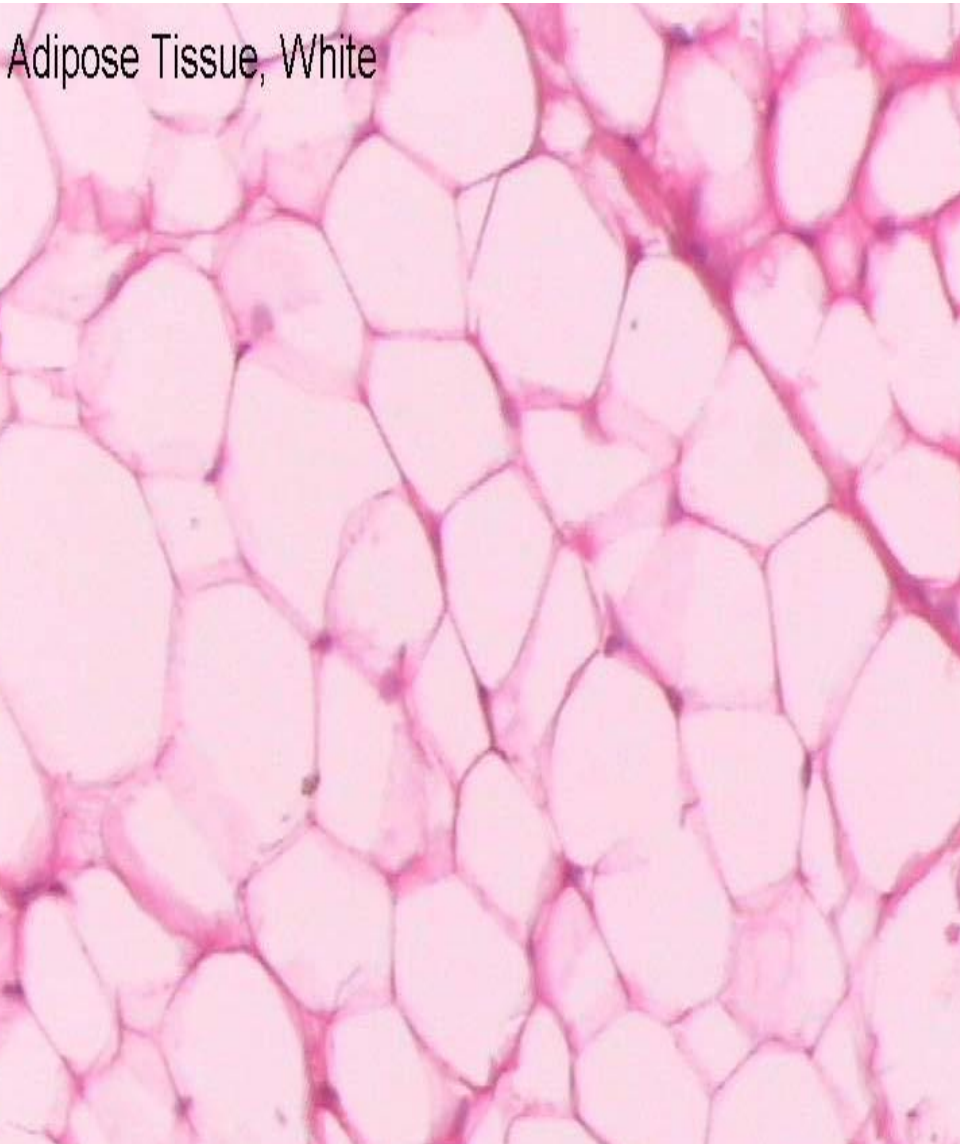
Carbohydrate

- Carbohydrates are the primary source of energy
- Carbohydrates are abundant in cereals and their products, vegetables, fruits and legumes

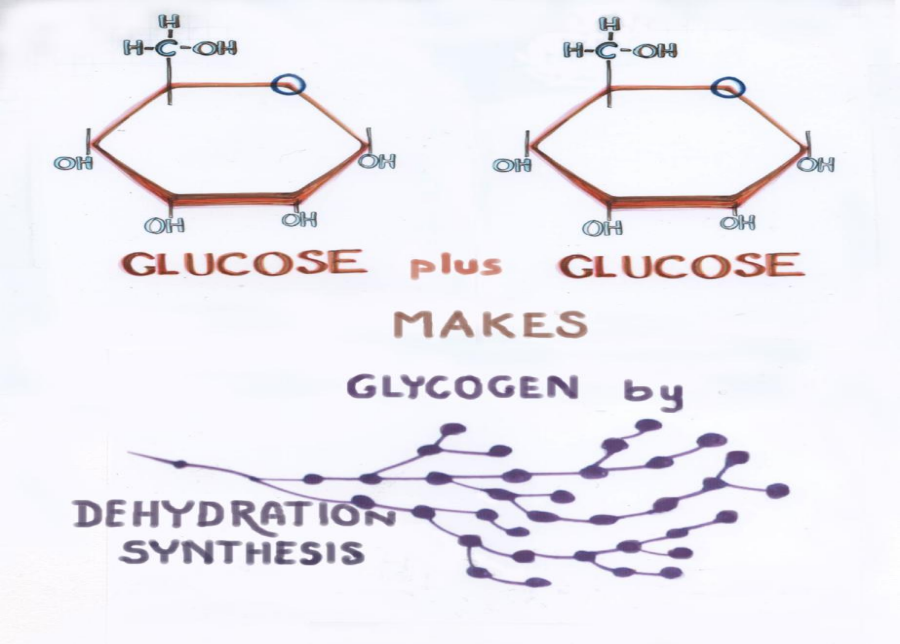


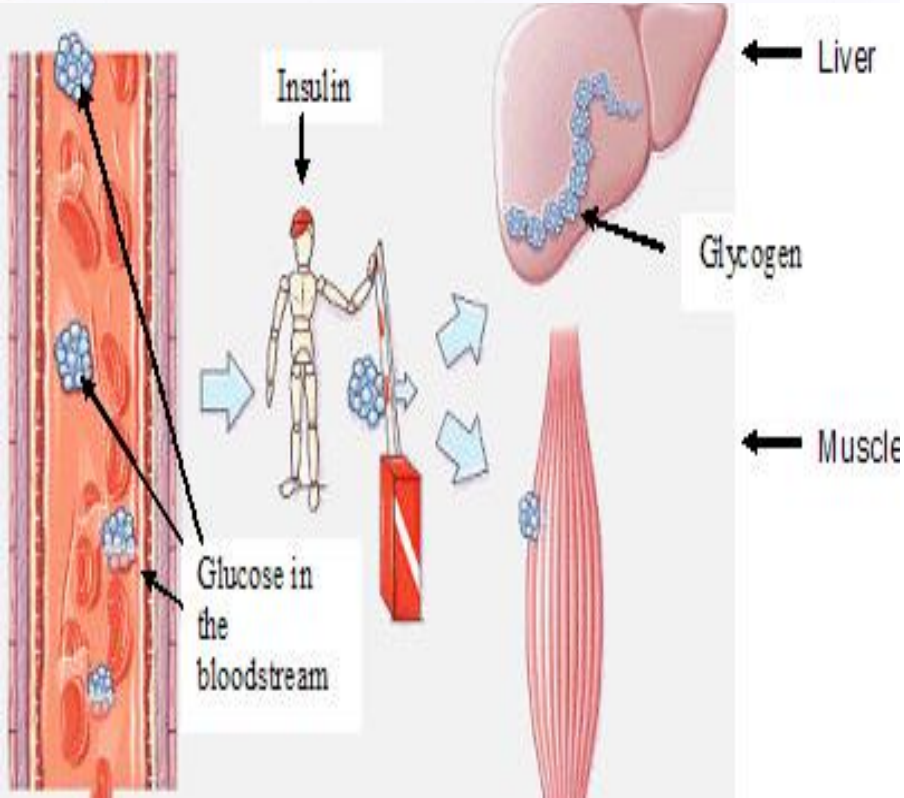


The Storage of Excess Carbohydrates in Tissues



- Excess carbohydrate in the body is converted into lipid, and is stored as adipose tissue, resulting in ***obesity***
- A diet high in soluble carbohydrates results in ***dental caries***





Carbohydrate Metabolism

- Nutrients containing <u>starch</u> and <u>sugar</u> are catabolized into <u>glucose</u> in the digestive system
- Glucose units are absorbed into the blood from the small intestine
- Excess glucose is stored in the liver and muscles in the form of ***glycogen***

Lipids

- Gives the most energy
- Excess lipid is stored in adipose tissue
- Lipid sources are olives, nuts and egg, milk, meat

Proteins

- Some hormones, enzymes, hemoglobin and antibodies are made up of proteins
- Proteins contain 20 different **amino acids**
- Some of them are ***compulsory (vital)*** amino acids that can not be synthesized in the body
- The ***qualified proteins*** contain needed amounts of vital amino acids and are easily digested
- Generally, animal proteins are qualified but plant proteins are nonqualified

Minerals

- They are required for health, continuity of metabolism and in the formation of bones and teeth
- **Essential minerals** (calcium, phosphorus, sodium, potassium)
- **Nonessential** but recommended minerals (magnesium, iron, copper, zinc and etc)

Water

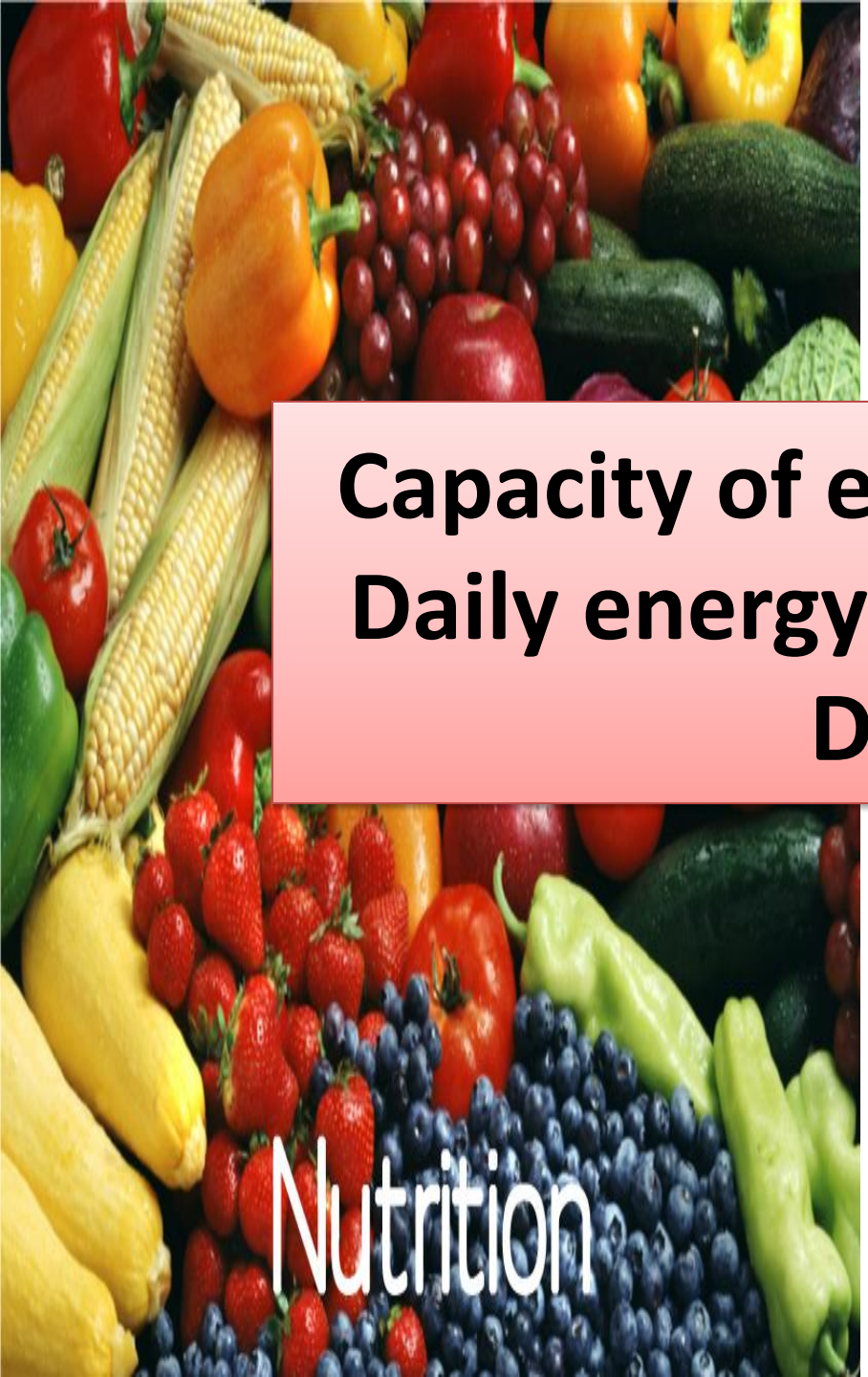
- Water constitutes 60-70% of the body of an adult
- ***Functions of water***
- --Absorption, transport and digestion of food
- --Excretion of metabolic wastes
- --Regulation of body temperature
- --In the absence of water, enzymes can not perform function

Vitamins

- Vitamins were first discovered in 1890 when the disease beriberi was found to be due to a lack of vitamin B
- A small amount of vitamins is ingested in food and play important roles in regulation of the metabolism of the body.
- The main source of vitamins is plants
- However, animal tissues, especially liver, contain a rich supply of vitamins

Vitamins

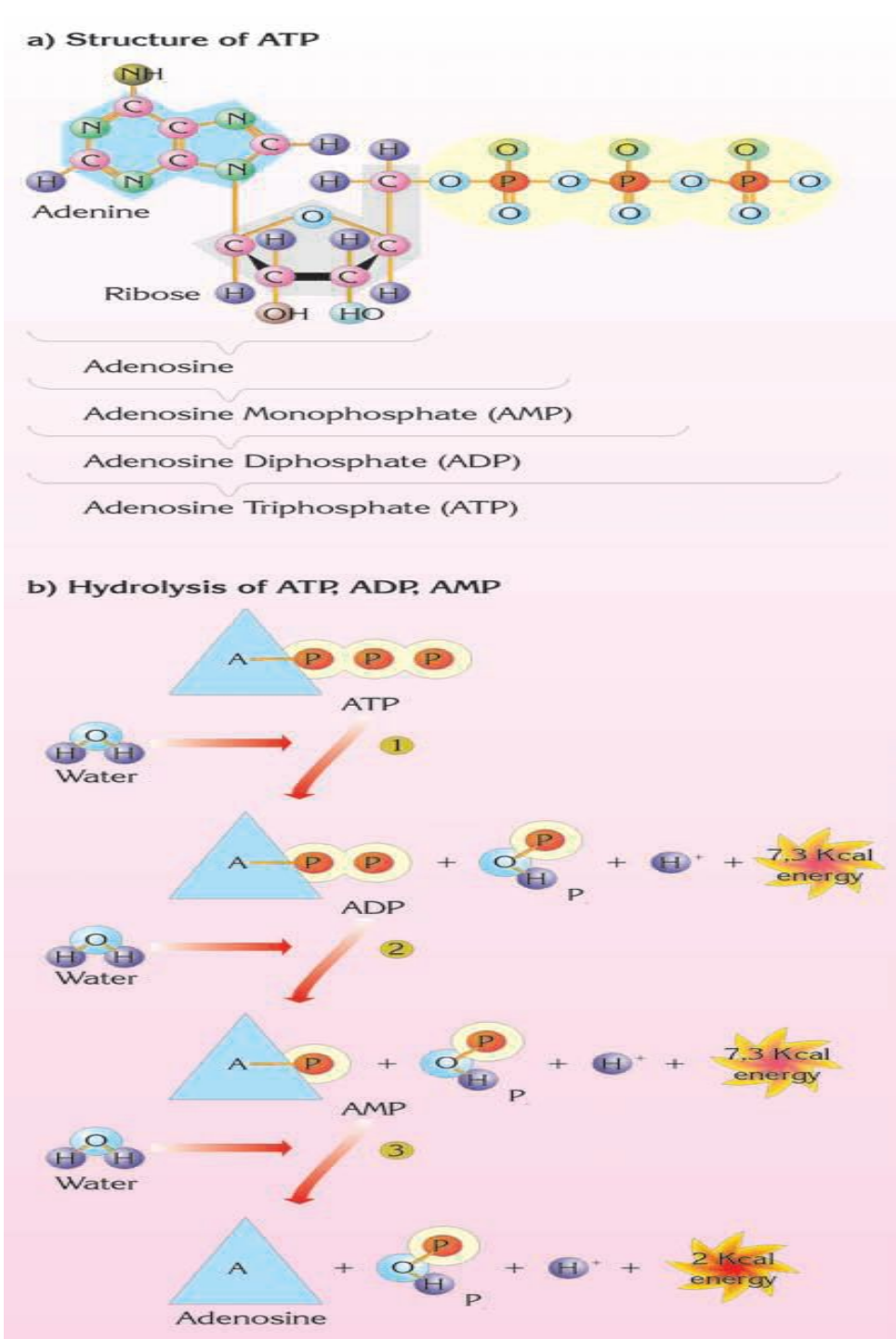
- Overheating of food, therefore, may cause destruction of vitamins
- ***Functions of vitamins***
- --to give the body resistance to infection
- --to prevent against bleeding and blood deficiency
- --to assist in formation, development and rigidity of bone tissue
- --to regulate growth, development and reproduction
- --to provide a regular program of nutrition

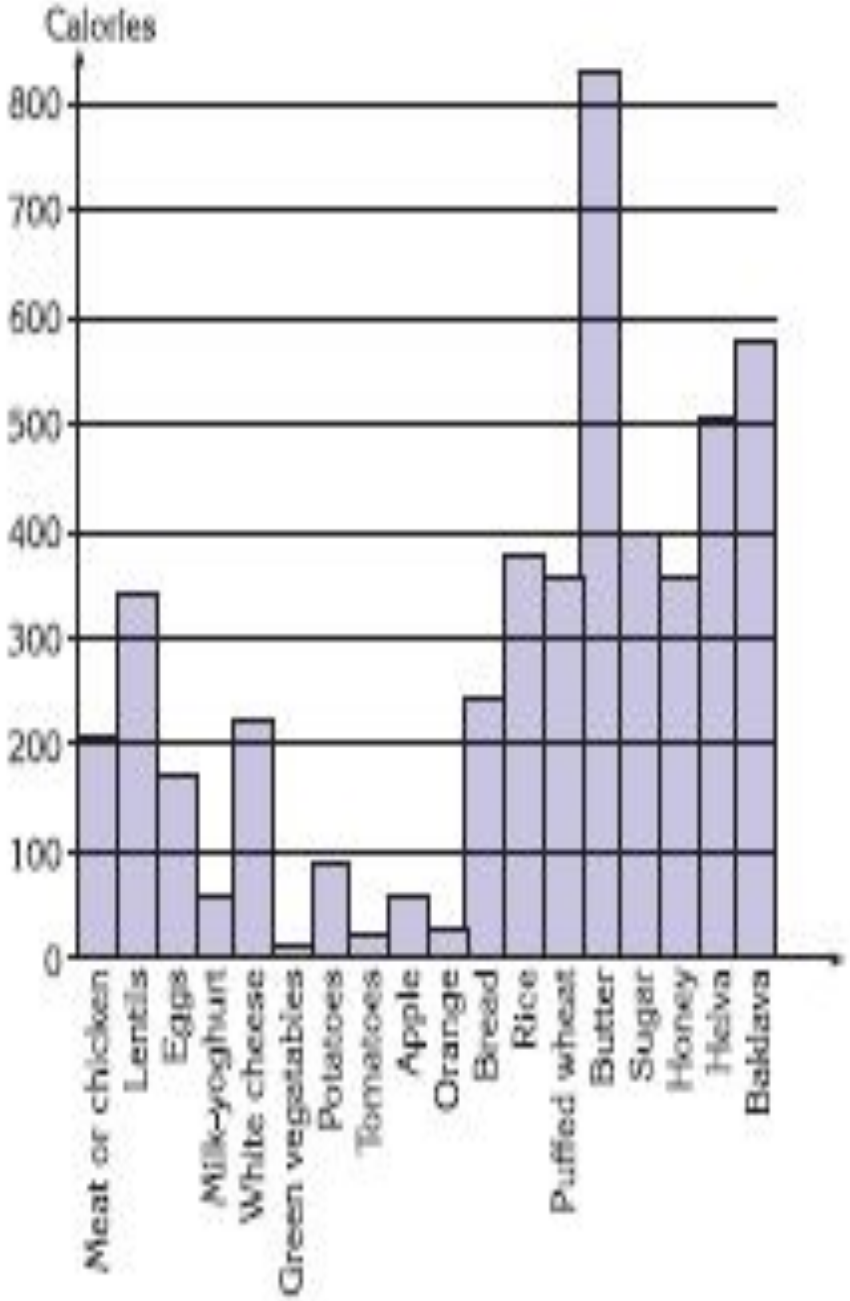


Capacity of energy in food. Daily energy requirement. Diet

ENERGY of FOOD

- Half of the chemical energy stored in food is produced by cell respiration and is consumed in the form of ATP.
- The other half is released as heat during these reactions.

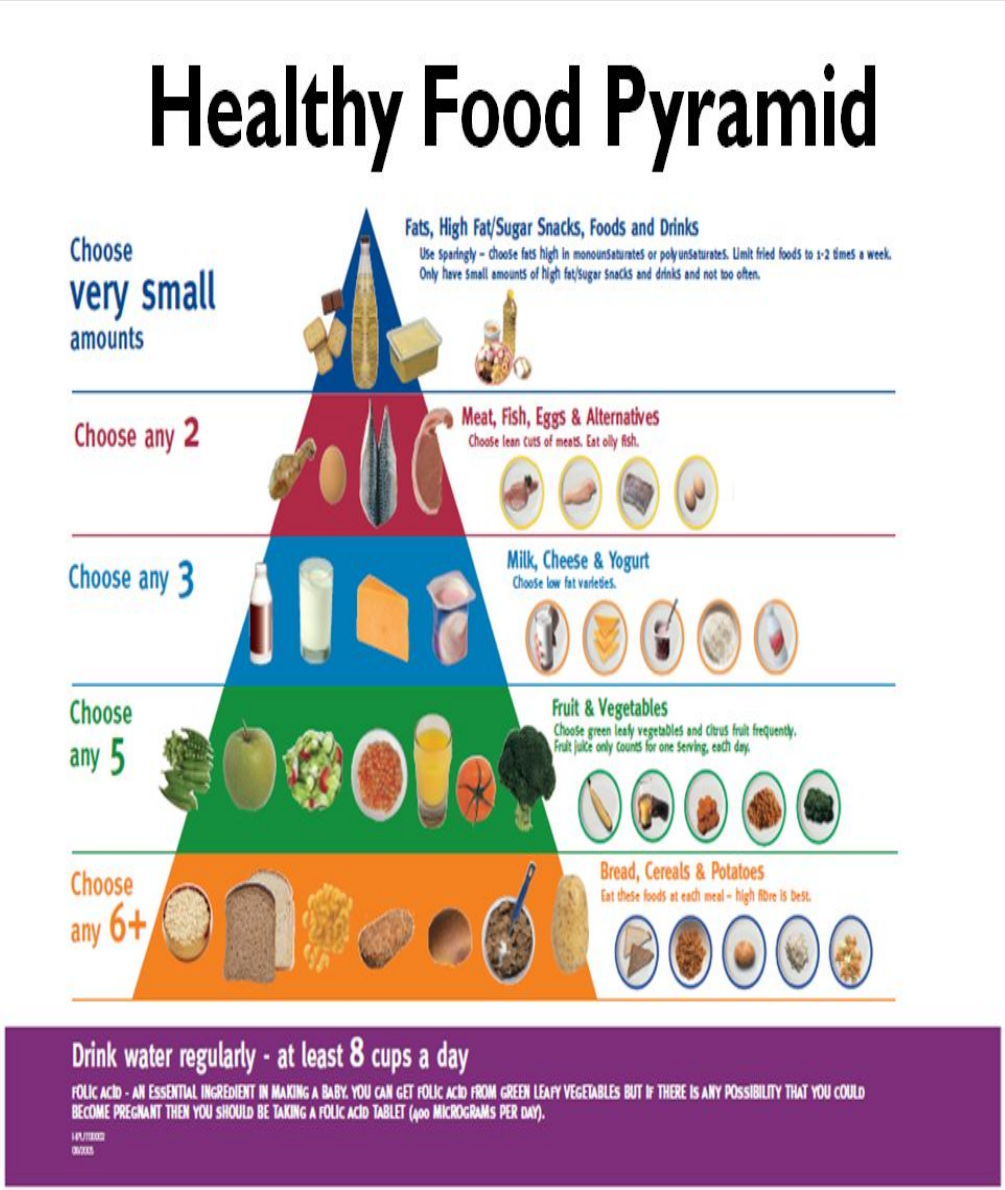




The capacity of energy in food

- 1g carbohydrate gives 17.6 kJ
- 1g lipid gives 38.9 kJ
- 1g protein gives 17.6 kJ

Daily energy requirement of an organism



- ***Basal metabolism***, the energy requirements of an individual at rest, is determined at room temperature.
- The basal metabolism is approximately 1700 kcal for males and 1600 kcal for females

Daily Food Requirements For a Balanced Diet

- The recommended daily intake is 500 g of carbohydrate, 70 g of lipid and 70 g of protein.
- The energy requirements of organisms with heavy bodies are obviously greater than organisms with light bodies.

Daily Food Requirements For a Balanced Diet

Human	Male	Female
At rest	2234 kcal	1770 kcal
Worker	3657 kcal	2876 kcal

The normal body weight can be calculated as follows

- **B.M.I (Body-Mass index)**: It is calculated as 21 for females and 22 for males, but varies according to the individual.
- The minimum is 19-20, and 24-25 is the maximum value.

$$B.M.I. = \frac{\text{Weight (kg)}}{[\text{Height (m)}]^2}$$

Example: Calculate the appropriate weight for a man and a woman who are both 1.60 m in height.

$$\text{for a man } 22 = \frac{\text{weight (x)}}{(1.60)2} = 56.32$$

$$\text{for a woman } 21 = \frac{\text{weight (x)}}{(1.60)^2} = 53.75$$