HME103-Principles of Nutrition

Components in Foods and Their Relationships with Health: Energy Requirements, and Balance

Lesson Code-Name: HME103-Principles of Nutrition

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Energy metabolism

Basic concepts

Metabolism is the name given to all the events of creating and consuming energy from nutrients in the cell in order for organs to function, to maintain body temperature, to maintain vitality, and to renew cells.

Basal metabolism; It means the energy we spend just to keep our organs working and alive while lying motionless on our back. In a state of complete rest, the necessary energy expenditure for the functioning of organs, maintaining body temperature and maintaining life is called "basal metabolism". In short, it is energy expenditure at rest.

Energy is the power to do work. Sustaining vitality is a basic condition for the body to function. Daily energy needs are met by the nutrients consumed. One gram of carbohydrate or protein provides 4 calories of energy; One gram of fat provides 9 calories of energy.

Calorie; It is the unit of heat used in energy measurement. In biology, kilocalorie (Kcal) / (C) is called physiological calorie. Kilocalorie is the heat energy that can raise the temperature of 1 liter of pure water by 1 C. Kilocalories are denoted by “kcal” or simply “cal”.

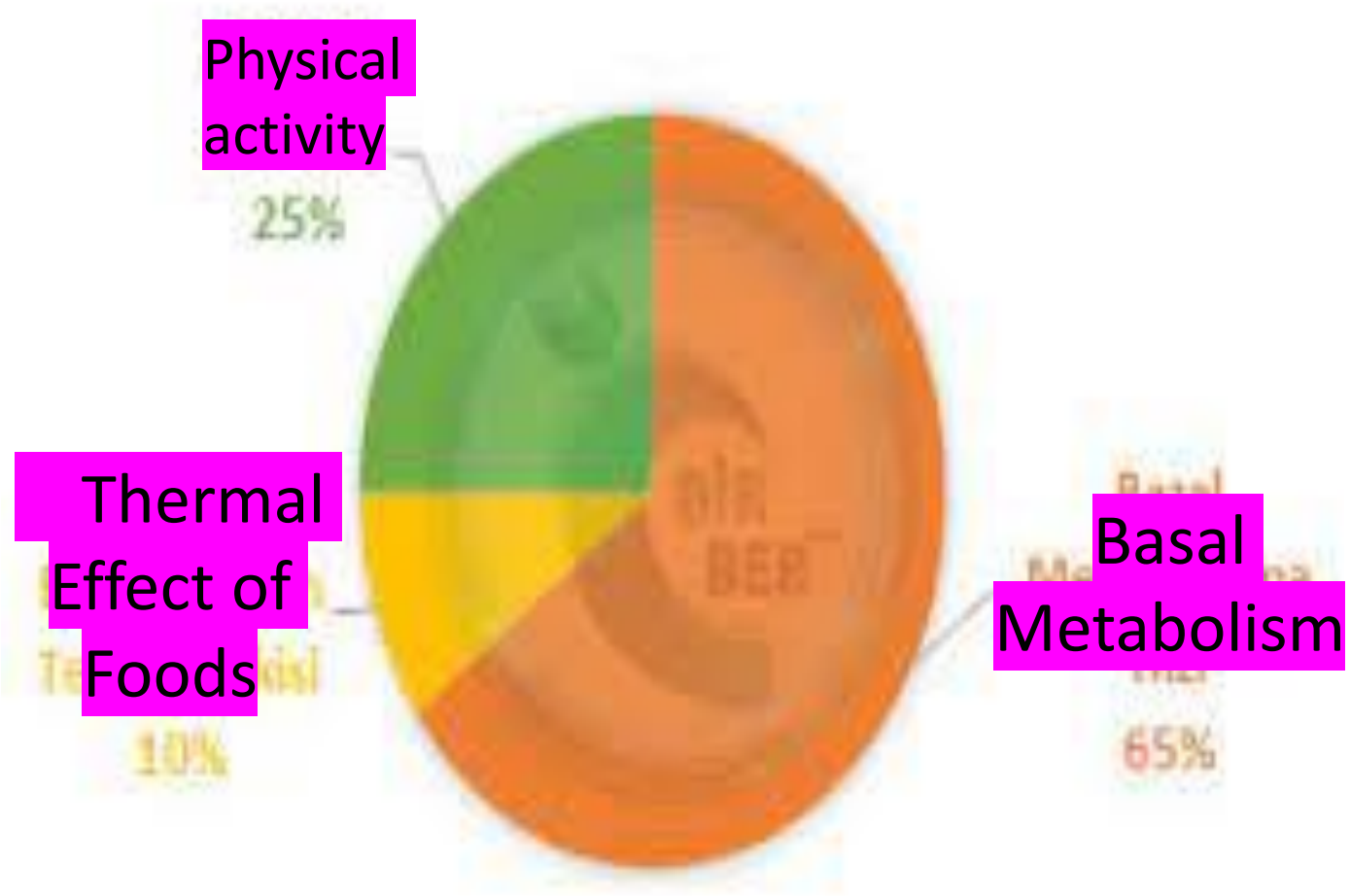
Energy metabolism

DAILY ENEGY CONSUMPTION

The energy generated in the body is used for growth, functioning of organs, excretion of harmful substances, cell construction and destruction, maintenance of body temperature and physical movements.

The use of energy in the body is examined in three groups.

1- Basal Metabolism
2- Physical Movements and Work
3- Thermal Effect of Foods (Thermal Effect)

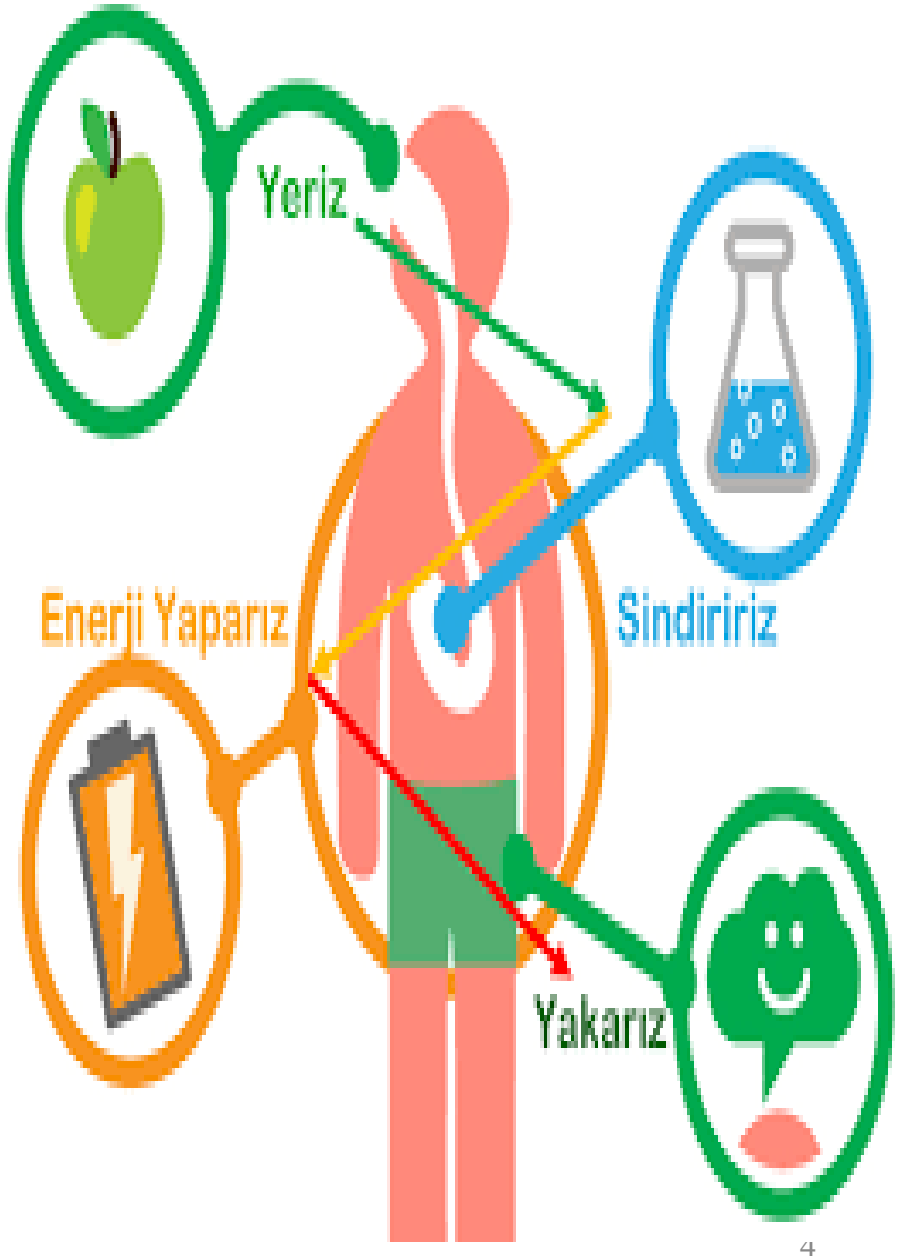


Basal Metabolic Rate (BHM): Basal metabolic rate can be measured in individuals. In order for this to be measured;

1- 12-16 hours must have passed since the last meal the individual ate.

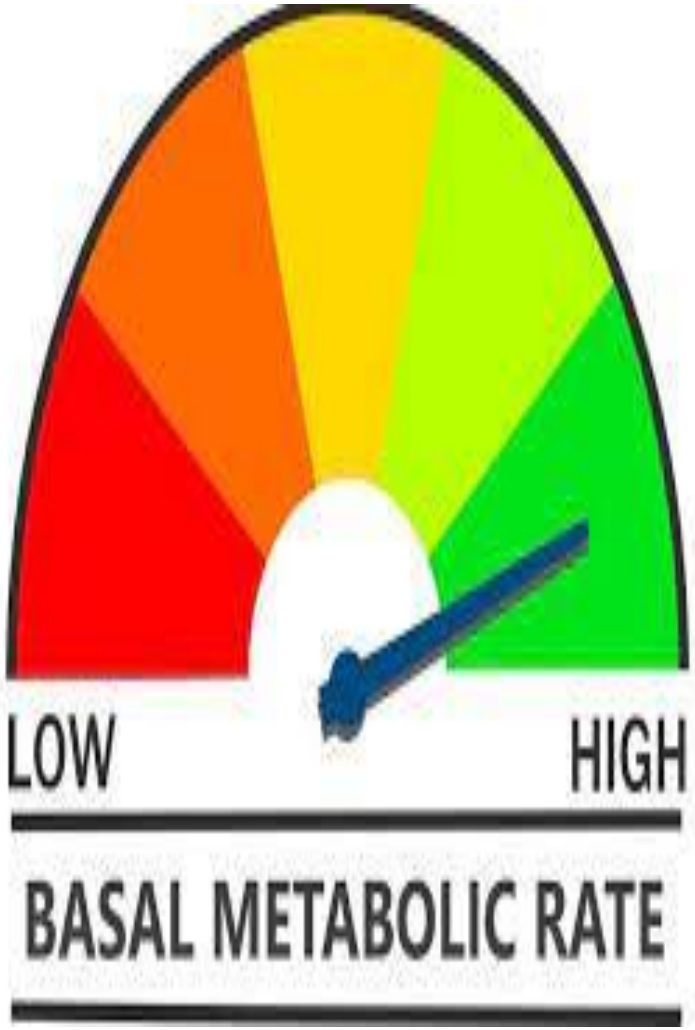
2- The individual should be in a state of complete physical and mental rest.

3- The temperature of the measurement environment should be 20-25◦C. The person whose basal metabolic rate is measured should be in a comfortable lying position.



Factors Affecting Basal Metabolic Rate

Age: Basal metabolic rate is high during infancy, when growth is fastest. Basal metabolic rate decreases with age.



Gender and body composition: As fat tissue increases in the body, the basal metabolic rate decreases, and as muscle tissue increases, the basal metabolic rate increases. Generally, women have more fat tissue than men; Therefore, women's basal metabolic rate was slightly lower than men

Hormones: The thyroxin hormone secreted from the thyroid gland affects the basal metabolic rate. In case of excessive secretion of this hormone, the basal metabolic rate increases, and as a result of under-secretion, the basal metabolic rate decreases.

Hamilelik : Hamileliğin ilk aylarında bazal metabolizma hızında artma başla ve son üç aylık dönemde bazal metabolizma hızı %20 artış gösterir. Bunun sebebi bebeğin hızlı büyümesidir. Bazı hamilelerde ise bazal metabolizma hızı değişiklik göstermemektedir.

Continuous hunger: Long-term hunger and semi-starvation reduces the basal metabolic rate. It has been found that those who eat less food for long time have a decrease of around 20% in their basal metabolic rate.

Sleep: Although there is no significant change in basal metabolic rate in the first hours of sleep, a decrease of up to 10% in basal metabolic rate is observed in the later hours of sleep.

Composition of the diet: The presence of a lot of protein in the diet increases the basal metabolic rate.

2- Physical Movements and Work:

Every movement performed for daily tasks requires energy consumption. The amount of energy spent for the movement varies depending on the type of movement, its duration, the person's skill, gender and body weight. The amount of energy consumed per kilogram per minute in performing different movements is given below.

Amounts of energy spent for different activities (kcal/kg (min))

Rest (1.0)
Sitting as if lying down (1.2)
Reading a book while sitting (1.4)
Knitting (1.5)
Ironing (1.5)
Dishwashing (1.7)

3- Thermal Effect of Foods:

After nutrients are taken into the body, there is an increase in metabolism. As a result, there is an increase in heat generation. The increase in temperature begins five minutes after eating and reaches its highest level three hours later. This heat is the response to the digestion and absorption of proteins, carbohydrates and fats taken with food and providing energy to the body. In a normal diet, the thermic effect of foods does not exceed 10% of the total energy consumed by basal metabolism and physical activity. Proteins have a higher thermal effect than carbohydrates and fats.

Energy balance and body weight

1. If the energy taken from food is lower than the energy spent through physical activity and basal metabolism, the person loses weight.

2. If the energy taken from food is more than the energy spent through physical activity and basal metabolism, the person gains weight.

3. If the energy taken from food is equal to the energy spent through physical activity and basal metabolism, body weight is stable.