Lesson Description

In this lesson, we:

- Briefly look at egestion
- Examine, define and understand Homeostasis
- Define good human nutrition
- Look at an example of a balanced diet
- Define malnutrition
- Look at and describe types of malnutrition

Summary

Egestion

- Some substances in the food that the digestive system cannot digest.
- This undigested waste is removed from the body through the process of egestion.
- Egestion is the removal of undigested food through the anus in the form of faeces.

Homeostasis

- Homeostasis is the ability of the body to maintain a constant internal environment in response to environmental changes.
- Homeostasis maintained through the secretion of hormones.
- The nervous system processes information about the internal environment and the endocrine system controls the internal environment by secreting hormones.

Some examples of homeostatic processes are temperature, blood-glucose level and the pH of the blood and body fluids.

An example of homeostatic control – blood sugar

- The pancreas produces and secretes the hormones insulin and glucagon.
- Insulin works on cells and in the liver. In the cells it allows them to absorb glucose from the blood and in the liver it converts excess glucose into glycogen.
- The glucose levels are detected by receptors in the pancreas and high levels will cause the beta cells to release insulin and low levels will stimulate the alpha cells to release glucagon.
- Diabetes mellitus is the condition where insufficient insulin is produced or when the cells are resistant to insulin because of obesity. This means that excess glucose is not converted to glycogen and glucose is not absorbed into the cells. The concentration of blood sugar remains high.
- Glucagon converts glycogen into glucose when there is not enough glucose in the blood.
Good Human Nutrition

- Food contains energy. The energy is used for daily activities and life processes.
- The current view of nutrition follows the food pyramid below.

- The amount of energy depends on your age and how active you are.
- Every person has a basal metabolic rate (the amount of energy we need when at rest (not sleeping) for body processes).
- We use carbohydrates for energy, proteins for amino acids and fats for protecting vital internal organs as well as acting as a reserve energy source and the important minerals that we need are calcium, phosphorus, iodine and iron.
There are some alternate diets that people follow based either on personal choice or religious belief. Two examples are vegan and vegetarian:

A Vegan does not eat any animal products at all not even eggs, milk or cheese. They also don’t use products that are tested on animals or use animal products such as leather, silk or down. They will only eat grains, beans, vegetables, fruits and legumes. A vegetarian will not eat meat but may eat milk, cheese, eggs and use animal products.

Malnutrition

- Malnutrition is defined as poor nutrition. There are two main types of malnutrition, undernutrition and overnutrition.
- Undernutrition is caused by a lack of food and examples of this are kwashiorkor, marasmus and anorexia.
- Overnutrition is caused by excessive eating of energy-rich foodstuffs.

Test Yourself

**Question 1**
In which digestive organ is chyme produced?
A. Mouth  
B. Stomach  
C. Small intestine  
D. Large intestine

**Question 2**
The digestive system processes food into usable and unusable materials. The usable materials are sent to the body’s cells as food. What happens to unusable materials?
A. It goes into the pancreas to await disposal.  
B. It goes to the right ventricle to await disposal.  
C. It goes into the large intestine to await disposal.  
D. It goes into the small intestine to await disposal.

**Question 3**
Which term describes the wave of muscular contraction that moves material through the GI tract toward the anus?
A. peristalsis  
B. pendular motility  
C. segmentation  
D. haustral churning

**Question 4**
Kwashiorkor is a disease caused by a diet deficient in
A. kilojoules  
B. carbohydrates  
C. vitamins and nutrients  
D. proteins
Question 5
Malnutrition is defined as
A. excessive eating of energy-rich foodstuffs
B. a lack of food
C. binge eating and purging of meal
D. poor nutrition

Question 6
Vegans eat
A. vegetables, white meat (chicken and fish) and cheese
B. vegetables only – no animal products at all
C. vegetables, eggs, cheese and milk
D. only soya products

Question 7
The function of insulin is to
A. convert glycogen into glucose
B. facilitate the movement of proteins out of cells and glucose into cells
C. facilitate the movement of glucose from the blood stream into cells
D. convert excess glucose into lipids

Question 8
The functions of the following substances – carbohydrates, amino acids and fats – in order, are:
A. carbohydrates for energy, amino acids for bone strength and fats for protecting vital internal organs
B. carbohydrates for energy, amino acids for proteins and fats for energy
C. carbohydrates for energy, amino acids for repair and fats for energy
D. carbohydrates for energy, amino acids for proteins, fats for protecting vital internal organs

**Improve your Skills**

**Question 1**
1.1 Define the term homeostasis. (2)
1.2 The flow chart below illustrates a process of feedback control involving the endocrine system. An example of this feedback system occurs in the human body when the blood sugar content of the blood becomes low and needs to be controlled.
For each of the following, describe how blood sugar control is effected by:
1.2.1 the endocrine organ (1)
1.2.2 the messenger (1)
1.2.3 the target organ (1)
1.3 Describe the target organ’s response, and explain the effect of feedback on the endocrine organ when the human body responds to a shortage of glucose. (4)

1.4 Discuss the role of the pancreas in maintaining the glucose balance in the body. (4)

**Question 2**

2.1 The table below shows the arrival and departure times of a particular meal for certain regions of the alimentary canal of six patients, A to F. Study the table and answer the questions that follow.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Arrival time of meal in stomach</th>
<th>Departure time of meal from stomach</th>
<th>Departure time of meal from small intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6:00</td>
<td>8:19</td>
<td>11:40</td>
</tr>
<tr>
<td>B</td>
<td>6:10</td>
<td>8:05</td>
<td>10:22</td>
</tr>
<tr>
<td>C</td>
<td>6:40</td>
<td>8:52</td>
<td>11:32</td>
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<tr>
<td>D</td>
<td>6:30</td>
<td>8:27</td>
<td>11:22</td>
</tr>
<tr>
<td>E</td>
<td>6:50</td>
<td>8:57</td>
<td>11:50</td>
</tr>
<tr>
<td>F</td>
<td>6:20</td>
<td>8:20</td>
<td>11:20</td>
</tr>
</tbody>
</table>

2.1 Which Patient was the last to have a meal? (1)

2.2 How long did the meal remain in the:

2.2.1 small intestine of patient E (show all working) (3)

2.2.2 stomach of patient D (show all working) (3)

2.3 Food generally remains longer in the small intestine that in the stomach. Give a reason for this difference. (2)

2.4 Describe the absorption of glucose as it takes place in the small intestine. (3)
Question 3

(Adapted from Solutions for Life, Macmillan)

Look at the graph below and answer the questions that follow.

3.1 What happens to blood sugar level every time this person eats a meal? (1)
3.2 How many meals does this person have per day? (2)
3.3 According to the information on the graph, what happens to the excess sugar you eat? (1)
3.4 Why does the insulin level only increase after the glucose level increases? (2)
3.5 Suggest what you think the straight line on the graph represents. (2)
3.6 What negative effect do eating large meals have on a person? (2)
3.7 Describe the effect that insulin has on the glucose levels in the blood. (3)