HUMAN ENDOCRINE SYSTEM

Lesson Description

In this lesson we:

- Differentiate between endocrine and exocrine glands
- Define a hormone
- State the location, the hormones secreted and roles of hormones produced by the:
  - Hypothalamus (ADH)
  - Pituitary/hypophysis (GH, TSH, FSH, LH, prolactin)
  - Thyroid glands (thyrroxin)
  - Pancreas/islets of Langerhans (insulin, glucagon)
  - Adrenal glands (adrenalin, aldosterone)
  - Ovary (oestrogen, progesterone)
  - Testis (testosterone)
- State what is meant by negative feedback
- Describe the negative feedback mechanism involving:
  - TSH and thyroxin (and the result of an imbalance: thyroid disorders)
  - Insulin and glucagon
  - (and the result of an imbalance: diabetes mellitus)

Summary

Endocrine and Exocrine Glands
Negative Feedback Mechanism

- Mechanism that ensures that, in any control system, changes are reversed, and returned back to the set level.
- A process whereby the response by the effector is opposite to, and reverses the stimulus.
Interaction between Pituitary Gland and Thyroid Gland

Goitre
Hypothyroidism

Intolerance to Cold
Racing Hairline
Facial & Eyelid Edema
Dull-Blank Expression
Tachycardia
Thick Tongue - Slow Speech
Anorexia
Brittle Nails & Hair
Menstrual Disturbances
Constipation
Subnormal Temp
Bradycardia
Weight Gain
↓ LOC
Thickened Skin
Cardiac Complications

Hyperthyroidism

Intolerance to Heat
Fine, Straight Hair
Bulging Eyes
Facial Flushing
Enlarged Thyroid
Tachycardia
↑ Systolic BP
Breast Enlargement
Weight Loss
Muscle Wasting
Menstrual Changes (Amenorrhea)
Localized Edema
Control of Blood Sugar Level

**High blood glucose level detected by insulin-secreting cells of pancreas**
- Insulin-secreting cells of pancreas stimulated to release insulin into the blood.
- Most body cells take up more glucose.

**Homeostasis: Normal blood glucose level (about 90 mg/100 ml)**
- Liver takes up glucose and stores it as glycogen.
- Blood glucose level declines to a set point; stimulus for insulin release diminishes and body returns to homeostasis.

**Low blood glucose level detected by glucagon-releasing cells of pancreas**
- Glucagon-releasing cells of pancreas stimulated to release glucagon into the blood; target is the liver.
- Liver breaks down glycogen stores and releases glucose to the blood.

**Symptoms of Diabetes**
- Always tired.
- Frequent urination.
- Always hungry.
- Sudden weight loss.
- Sexual problems.
- Wounds that won’t heal.
- Vaginal infections.
- Numb or tingling hands or feet.
- Always thirsty.
- Blurry vision.
Test Yourself

Select the most correct answer from the options given. Write down only the correct letter.

Question 1
_____ are chemical messengers that are produced in one body region but affect a different body region.
A  Steroid  B  Enzyme  C  Pheromone  D  Hormone

Question 2
Which gland controls basal metabolic rate (BMR)?
A  LH  B  STH  C  Thyroxin  D  FSH

Question 3
The hormones of the pituitary gland reach their target cells through the ________.
A  Ducts  B  Neurons  C  Blood  D  Neurotransmitters
Question 4
Choose the pair of hormones that have agonistic effects on blood sugar levels:
A  ADH and Aldosterone
B  Adrenalin and glucagon
C  Adrenalin and insulin
D  ADH and aldosterone

Question 5
The target of the hormone ADH is:
A  Kidney
B  Heart
C  Pancreas
D  Liver

Question 6
Indicate whether each of the statements in COLUMN I applies to A only, B only, both A and B or none of the items in COLUMN II. Write A only, B only, both A and B or none next to the question number.

<table>
<thead>
<tr>
<th>COLUMN I</th>
<th>COLUMN II</th>
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<tbody>
<tr>
<td>1  Structures that release their secretions</td>
<td>A: Endocrine</td>
</tr>
<tr>
<td>through ducts</td>
<td>B: Exocrine</td>
</tr>
<tr>
<td>2  The conversion of glycogen to glucose</td>
<td>A: Glucagon</td>
</tr>
<tr>
<td></td>
<td>B: Adrenalin</td>
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<td>3  Hormone produced by the pituitary gland,</td>
<td>A: Prolactin</td>
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<tr>
<td>whose target tissue is the mammary gland</td>
<td>B: LH</td>
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<tr>
<td>4  Female Secondary Sex Characteristics</td>
<td>A: FSH</td>
</tr>
<tr>
<td></td>
<td>B: LH</td>
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<tr>
<td>5  A disease in which the hormonal</td>
<td>A: Diabetes mellitus</td>
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<tr>
<td>control of blood glucose is defective</td>
<td>B: Hyperthyroidism</td>
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<tr>
<td>because of a deficiency of insulin</td>
<td></td>
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</tbody>
</table>

Question 7
Tabulate the differences between the nervous system and the endocrine system.
Improve your Skills

Question 1
Study the diagrams below and answer the questions that follow.

1.1 How will the diameter of the skin capillaries of the person in Diagram I compare with those of the person in Diagram II? (2)

1.2 Choose the letter of the gland in Diagram III that can be associated with the condition of the skin capillaries in the person in Diagram I. (1)

1.3 Explain your answer in QUESTION 1.2 by referring to the changes that occur in the diameter of the skin capillaries in the person in Diagram I. (7)

1.4 Give the letter of the gland in Diagram III that will be affected first if the metabolic rate of the person in Diagram II needs to be lowered at the end of the race. (4)

1.5 Explain the role played by the gland named in QUESTION 1.4 in lowering the metabolic rate. (6)

Question 2
Answer the following questions on hormones:

2.1 Name the endocrine gland which secretes each of the following:
   
   a.) TSH
   b.) Adrenalin
   c.) Thyroxin
   d.) Growth hormone
   e.) Aldosterone

2.2 It was found that the thyroxin concentration of a healthy adult remained very low for a period of three months.
   
   a.) Will the person gain or lose weight if he continued with his normal diet during this period?
   b.) Explain your answer to QUESTION 2.2 (a).
Question 3

The nervous and endocrine systems help to protect the human body. Use suitable examples to describe how this is achieved through a reflex action and by the hormone adrenalin.

Content: (17)
Synthesis: (3)

Links


Diabetes causes, symptoms, management: https://www.youtube.com/watch?v=sTgBvJsHcCk