**SOUTHERN RIVER COLLEGE**

**Human Biology**

**Unit 3**

**TASK 1**

**Endocrine Dysfunction – (5%)**

**TYPE:** Extended Response

**CONTENT:** Homeostasis

**TASK 1:** Extended response

Many homeostatic mechanisms keep the internal environment within certain limits (or set points). When the cells in your body do not work correctly, homeostatic balance is disrupted. Homeostatic imbalance may lead to a state of disease.

**YOUR TASK:**

(a) Research how the following disorders affect the maintenance of homeostasis:

* Hypothyroidism / Hyperthyroidism
* Diabetes

You should include the following in your research:

* Causes
* Symptoms
* Treatments
* All hormones involved in maintaining homeostasis of blood sugar and metabolism

(b) References (2 marks)

* Include your references in APA 6th edition. Hand this in with your notes on a separate of paper.

**Time allowed for completion of the task:**

* Two classes, plus research at home
* 55 mins - in class extended response (no notes)

**Task weighting**

5% of the school mark for this pair of units

**Due Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**To Submit:**

References 2 marks

In-class extended response 40 marks

**TOTAL 42 MARKS**

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**Human Biology**

**Unit 3**

**TASK 1**

**Endocrine Dysfunction – (5%)**

**TYPE:** Extended Response

**CONTENT:** Homeostasis

**TASK 1:** Extended response

**YOUR TASK:**

**Answer ALL parts of the following question:**

1. Mrs Jones had been feeling unwell for some months and was not able to cope with everyday activities. She had noticed that her neck was getting thicker, preventing her from buttoning her shirts. She visited her doctor, who after a physical examination and blood tests, diagnosed low thyroid activity, or hypothyroidism.
2. Imagine you are Mrs Jones’s doctor and are explaining how the thyroid gland works. Provide a description of the thyroid hormone feedback loop.

(8 marks)

1. Later that week, Mrs Jones is talking with her friends about her medical experience. A friend mentions that one of her family members has a thyroid disease. The doctor called it ‘hyperthyroidism, or Graves’ disease’.  Compare and contrast Mrs Jones’s hypothyroidism with hyperthyroidism (Graves’ disease). For each condition outline **two (2)** causes, **two (2)** signs or symptoms and **one (1)** treatment.
2. marks)
3. Glucose is required in the body cells for the production of energy during cellular respiration. To maintain glucose levels in a cell, negative feedback mechanisms are necessary for more glucose to be released into the bloodstream and to enter the cell. Identify, name the source and describe the role of **three (3)** hormones in increasing glucose levels in the bloodstream.

(12 marks)

1. Mr Smith has found out from his doctor that he has to have daily insulin injections to counteract an inbalance to homeostasis.

Name and describe the disorder Mr Smith has. Include in your response an explanation of **one** **(1)** possible cause of this disorder, describe **three (3)** symptoms he may have experienced and **one (1)** alternative treatment he could undertake.

(10 marks)

**Time allowed for completion of the task:**

55 mins /40

**Task weighting**

5% of the school mark for this pair of units

**Endocrine Dysfunction Marking Key – (5%)**

1. Mrs Jones had been feeling unwell for some months and was not able to cope with everyday activities. She had noticed that her neck was getting thicker, preventing her from buttoning her shirts. She visited her doctor, who after a physical examination and blood tests, diagnosed low thyroid activity, or hypothyroidism.
2. Imagine you are Mrs Jones’s doctor and are explaining how the thyroid gland works. Provide a description of the thyroid hormone feedback loop.

|  |  |
| --- | --- |
| May use a fully annotated diagram.  Any 8 of the following. | |
| * Hypothalamus produces TSHrf * TSHrf travels to the anterior pituitary * Blood vessels / portal system conducts / transmits TSHrf * Pituitary gland produces TSH * TSH is released into the blood stream / general circulation * TSH stimulates the thyroid gland * TSH produces thyroid hormone / thyroxin * Thyroxin is released by the gland back into the blood stream/general circulation (talk of how it travels) * Thyroxin negatively feeds back to pituitary/hypothalamus controlling output of TSH | 1-8 |

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|  |  |  |
| --- | --- | --- |
| Hypothyroidism | Hyperthyroidism |  |
| Any 2 points for both conditions for 1 mark each. | | |
| Causes   * lack of iodine in the diet * surgery * cancer * autoimmune disease (Hashimoto’s disease) * radiation | Causes   * genetic * immune system reaction * cancer * adenoma secreting hormones * taking excessive iodine (medication etc) * Inflammation – thyroiditis * Toxic nodular goitre | 1-4 |
| Any 2 points for both conditions for 1 mark each. | | |
| Signs & symptoms   * decreased HR and BP * cold intolerance * weight gain * goiter/swelling of the neck * poor CNS development * slow brain function * fatigue * normal eye appearance * decreased TH * elevated blood cholesterol levels | Signs & symptoms   * increased HR and BP * heat intolerance * weight loss * goiter * normal CNS development * hyperexcitable/hyperactive * abnormal brain function * protruding eyeballs / exophthalmos * increased TH * increased appetite * increased sweating * fatigue * hair loss | 1-4 |
| Any 1 point for both conditions for 1 mark each. | | |
| Treatment   * replacement of iodine in the diet * thyroid hormone * thyroxine replacement: levothyroxine * surgery | Treatment   * drugs to block formation of TH (propothiouracil or carbamazepine) * surgery to remove all/part of the gland * radioactive treatment/radioactive iodine * antithyroid drugs | 1-2 |

1. Glucose is required in the body cells for the production of energy during cellular respiration. To maintain glucose levels in a cell, negative feedback mechanisms are necessary for more glucose to be released into the bloodstream and to enter the cell. Identify, name the source and describe the role of **three (3)** hormones in increasing glucose levels in the bloodstream.

|  |  |
| --- | --- |
| The three following hormones for 4 marks each.  Name 1 mark. Where produced 1 mark. Description 2 marks. | |
| **Glucagon** | 1 |
| * Produced by alpha cells/islets of Langerhans/pancreas | 1 |
| * Enters the liver * Promotes gluconeogenesis/breakdown of lipids/amino acids * Into glucose which enters the bloodstream * Gluconeogenesis – glycogen to glucose | 2 |
| **Cortisol/Glucocorticoids** | 1 |
| * Produced by adrenal cortex (must state cortex) | 1 |
| * Glycogenolysis/breakdown of glycogen to glucose * Glucose enters bloodstream * Removal of amino acids from muscle cells * Amino acids to liver for gluconeogenesis * Amino acids to glucose | 2 |
| **Adrenaline/noradrenaline** | 1 |
| * Produced by adrenal medulla (must state medulla) | 1 |
| * Glycogenolysis/breakdown of glycogen to glucose * Glucose enters bloodstream * Glycogen in muscles is acted upon * Lactic acid is produced * Lactic acid is converted to glucose in the liver * Increased insulin receptor numbers on surface of cell * Increased sensitivity of insulin receptors * Gluconeogenesis | 2 |
| **Growth Hormone** | 1 |
| * Produced by the anterior pituitary | 1 |
| * Suitable description |  |

1. Mr Smith has found out from his doctor that he has to have daily insulin injections to counteract an inbalance to homeostasis.

Name and describe the disorder Mr Smith has. Include in your response an explanation of **one** **(1)** possible cause of this disorder, describe **three (3)** symptoms he may have experienced and **one (1)** alternative treatment he could undertake.

|  |  |
| --- | --- |
| Type 1 Diabetes | 1 |
| Describe the disorder:   * Autoimmune condition where the immune system destroys the beta cells of the islets of Langerhans. * As a result no insulin is being produced. * Therefore the body is unable to convert glucose to fat (to be stored). * And body is unable to regulate blood glucose levels. | 3 |
| Explain one (1) cause:   * Genetic/family link * Because of this it cannot be prevented | 2 |
| Describe any three (3) symptoms:   * Being excessively thirsty * Passing more urine * Always feeling hungry * Always feeling tired/lethargic * Headaches * Dizzyness * Havign cuts heal slowly * Itching/skin infections * Blurred vision * Weight loss (only) | 3 |
| One (1) alternative treatment:   * Cell replacement therapy to generate insulin producing beta cells. | 1 |