**YEAR 12 ATAR** **HUMAN BIOLOGY**

TASK 1 – Endocrine Dysfunction Validation task

ANSWER KEY

Research Marking Key (10 marks)

* 1 mark - The cause of the problem; including the endocrine gland and hormone involved
* 1 mark - The symptoms of the disorder
* 1 mark - Whether the disorder is caused by an under secretion or over secretion
* 2 marks - Explain the hormonal feedback system that has been impacted creating the disorder
* 1 mark - The treatment that is available for the disorder
* 1 mark - Prognosis for survival if left untreated
* 1 mark - Famous people with the condition/anything interesting about the condition
* 2 marks – correct APA bibliography (1 mark if just states the webpages)

Validation (20 marks)

QUESTION 1

Answer the following questions in relation to **the non-thyroid** endocrine dysfunction disorder you have researched.

1. Name the endocrine gland, the hormone involved, role the hormone normally plays in homeostasis of the body and whether the disorder is caused by under secretion or over secretion of that hormone.

*endocrine gland (1) must be specific anterior pituitary, or adrenal medulla (ie not just pituitary)*

*the hormone involved (1) full name*

*role the hormone normally plays in homeostasis of the body – must be specific about cell involved can’t just say ’growth’ must be cartilage/bone cell growth/proliferation (1)*

*under secretion or over secretion of that hormone (1) (4 marks)*

Androgen insensitivity syndrome - unresponsiveness of the cell to the presence of androgenic (testosterone)

Cushing’s – high cortisol

Acromegaly - excess GH in adults

Gigantism – excess GH

Addison - autoimmune destruction of adrenal cortex (cortisol aldosterone)

Dwarfism – decrease GH

Phaeochromocytoma - adrenal gland tumors that produce excess adrenaline

Diabetes Mellitus – Type 1 decrease in insulin, Type 2 no decrease but resistance

Grave’s – increase in thyroxine

Hashimoto’s – decrease in thyroxine

Polycystosis – increase in androgens

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name of disorder | Endocrine gland involved | What causes it to go wrong | One symptom of the disease | One way of treating the disease |
| Polycystosis | Ovaries | Excess levels of insulin result in excess androgen from the ovaries. Prevents ovulation and generates formation of polycystic ovaries  Ovaries may develop numerous small collections of fluid (follicles) and fail to regularly release eggs. | Hirsutism – excess hair on face  Insulin resistance  Acne  Infertility  Infrequent or prolonged menstrual periods  Amenorrhea – absence of menstruation  Obesity, hair loss,  Type 2 diabetes | Oral contraceptives  Weight control/loss  Exercise  Medication to improve insulin resistance  Metformin or clomiphrene citrate  Anti-androgenic drugs  Fertility drugs to stimulate ovulation |
| Diabetes Mellitus | Pancreas  Decrease in insulin or resistance to insulin | Type 1  Autoimmune disease  Destroys beta cells  Little or no insulin  Type 2  Lifestyle disease  Cells resistant to insulin  Gestational Diabetes  Placental hormones make cells more resistant to insulin | Increased thirst  Frequent urination  Extreme hunger  Unexplained weight loss  Presence of ketones in urine from b/down of muscle & fat  Fatigue, irritability, blurred vision, dry mouth  Frequent infections, slow-healing sores  Numbness or tingling in extremities | Type 1  Insulin injections  Monitoring of BGLs  Type 2  Medications  *Increase insulin release*  *Decrease glycogen breakdown*  *Delay breakdown of carbs/reduce absorption*  Weight loss & exercise  Improve diet |
| Hashimoto’s | Thyroid  underactive | Autoimmune disease | Fatigue, tiredness  Increased sensitivity to cold  Dry skin, constipation  Muscle aches, weakness  Irregular menstrual periods  Depression  Memory/concentration issues  Goitre  Brittle nails/hair loss | T-4 hormone replacement  T-3 hormone replacement |
| Graves | Thyroid overactive | autoimmunity (damage to TSH receptor)  thyrotropin receptor antibody (TRAb) | goitre • inc HR/BP • musc weakness • dist sleep • tremor irritability • bulging eyes • weight loss • inc appetite • fatigue • heat intol • headaches  thick, red skin | antithyroid drugs • Beta blockers to decr fx on heart • thyroidectomy • radiotherapy • (separate eye treatments) |
| Addison’s | Adrenal cortex  Cortisol  Under-secretion | Autoimmune (attacks adrenals) • infection • cancer • surgical removal | Loss appetite/weight •  Nausea/vomiting/diarrhoea •  Muscle weakness • fatigue.  Low BP • Salt cravings • Dehydration • Hypoglycaemia • Increased pigmentation of skin • menstrual probs • Mood swings • mental confusion • loss of consciousness. | hormone replacement |
| Cushing’s | Adrenal cortex [cortisol] | steroid us (asthma/lupus) • pituitary cancer • adrenal cancer • heredity | upper obesity • skin issues • weak bones • hair on face • irregular periods • decr fertility/sex drive • fatigue • weak muscles • HBP • high blood glucose • thirst/urination • headaches irrit/anx/depress • hump | cortisol-inhibiting drugs • reduction of steroid drugs • removal of tumour • radio/chemo (aldosterone injections only required if aldosterone is ALSO low) |
| Gigantism | Anterior Pituitary  Increase in growth hormone | Tumour in pituitary | Excessive growth etc • Enlarged soft tissues •  Late closure of epiphyses •  Reduced horm. prod. by testes/ovaries • muscle weakness | tumour removal • radiotherapy • Bromocriptine/GH secretion inhibitors/ |
| Phaeochromocytoma | Adrenal medulla  Adrenaline & noradrenaline  Over-secretion | Tumour in adrenal | anxiety • HBP & HR • hyperthyroidism • skin sensations • hyperactivity • sweating • pale face • weight loss •headaches • | Preoperative blocking of catecholamines  removal of tumour |
| Dwarfism | Pituitary | Turner’s syn. • other hereditary. • tumour/damage | size • facial disprop. • joint pain • hypoglycaemia in newborns • motor complications • lack of devel of 2o sex characs | HGH • |
| Acromegaly | Pituitary  Increase in growth hormone | Pituitary tumour • | [headaches are only caused by the tumour, not the GH]  HBP/other heart problems •  Diabetes • Sleep apnea  Excessive sweating •  Joint pains •Enlargement of hands and feet • Swelling of soft tissue • Carpal tunnel syndrome • Menstrual disturbances/impotence •  Goitre • Skin changes •  Coarsening of facial features | Surgery to remove the tumour • Somatostatin analogs (stops GH prod) |
| Goitre | Thyroid | Dietary iodine def • Thyroid cancer • overconsumption of certain foods • Hyper and hypothyroidism • nodules | throat lump • Swallowing problems • Breathing problems | Dietary changes • anti-thyroid drugs • HRT • surgery & radiotherapy for nodules/tumour • beta blockers • radioactive iodine |
| Myxo | Thyroid | Hypothyroidism | skin coarsening/thickening • lethargy/coma • fluid retention. | synthetic thyroid hormone |
| Androgen insensitivity syndrome | Resistant to androgens (testosterone) | Defect on X chromosome, unable to respond to testosterone | Physical traits of female• XY•  Complete AIS, Partial AIS•  infertility | Undescended testicle removed-prevent cancer•  Oestrogen replacement•  Gender assignment |

1. Explain one of the main symptoms of the disorder and relate it to the normal activities of the hormone involved.

Symptom (1), related to normal function (1)

(2 marks)

1. Outline one cause of the disorder and explain how this effects the secretion of the endocrine gland.

one cause (1) explains how it affects secretion (1)

(2 mark)

1. Give one treatment for the disorder and explain how this relates to the cause.

one treatment (1) related to cause (1) – must provide link (2 marks)

QUESTION 2

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.

1. Imagine you are Ms Jones’s doctor and are explaining how the thyroid gland works. Provide a description of the thyroid hormone feedback loop.

* Hypothalamus detects low thyroxine/BMR/temperature
* hypothalamus produces TSH RF/thyroid stimulating hormone releasing factor
* TSH RF travels into the anterior pituitary
* Via Blood vessels/portal system conducts
* Pituitary gland produces TSH
* TSH is released into the blood stream/general circulation
* TSH stimulates the thyroid gland
* Thyroid gland produces thyroid hormone/thyroxine
* Thyroid hormone/thyroxin negatively feeds back to pituitary/hypothalamus controlling output of TSH

1 mark each,, max 6 (6 marks)

1. Later that week, Ms 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’.

For either hypothyroidism or hyperthyroidism, outline **one (1)** cause, **two (2)** signs or symptoms and **one (1)** treatment.

Hypo

Causes - Lack of iodine in diet/ surgery/ cancer/ autoimmune (Hashimoto’s disease)/ radiation (1)

Signs and Symptoms - Decreases heart rate and blood pressure/ cold intolerance/ weight gain/ goitre/ poor CNS development/ slow brain function/ fatigue/ normal eye appearance/decrease TH (any 2)

Treatment - Replacement of iodine in the diet/ Thyroid hormone/ thyroxine replacement

Surgery/ surgery for goitre (1)

Hyper

*Causes* – Genetic/ immune system reaction-Graves/ cancer/adenoma secreting hormone (1)

*Signs and Symptoms* - Increases heart rate and blood pressure/ heat intolerance/ weight loss/ goitre/ normal CNS development/ hyper-excitable/ abnormal brain function/ hyperactive/ protruding eyeballs/exophthalmos/increase TH/Increase appetite/ increase sweating/fatigue (any 2)

*Treatment* - Drugs to block formation of thyroid hormone/ propothiouracil/ carbamazapine/ Surgery to remove all/ part of the gland/ Radioactive treatment/ radioactive iodine (1)

(4 marks)