****Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Year 12 ATAR Human Biology Assessment Task 1**

**Endocrine System Dysfunction Marking Key**

**Extended Response:**

Part A – 1 mark per whole question

Part B – 2 marks for whole question

References – 1 mark for Harvard referencing, ½ mark for list

**Validation Test:**

1. Describe one condition treated with hormone replacement therapy and name the hormone used in its treatment. [2]

*Any of: Must have description for 1 mark*

* *Type 1 diabetes – insulin*
* *Hypothyroidism – thyroxine*
* *Dwarfism – growth hormone*
* *Menopause – oestrogen*
* *Removal of testes (testicular cancer) – testosterone*

2. Describe one source of natural hormones and give an example of a hormone produced in this way. [2]

*Any of:*

* *Animal organ (pituitary/pancreas) – growth hormone/insulin*
* *Human organ (pituitary/pancreas) – growth hormone/insulin*
* *Plants – steroid analogues/oestrogen analogues*

3. Describe one problem associated with the production or use of natural hormones. [1]

*Any of:*

* *Disease is using animal/human organs*
* *Difficulty getting enough hormone if using human/animal organs*
* *Will plant analogues work correctly in animals?*

4. Discuss what is the meant by a ‘synthetic hormone’ by:

a. Naming a synthetic hormone and describing the disease/disorder it treats. [2]

*Any of: Must have description of condition for 1 mark*

* *Insulin – Type 1 diabetes*
* *Thyroxine – hypothyroidism*
* *Corticosteroids – inflammation*
* *Oestrogen – menopause*

b. Describing one advantage using a synthetic hormone has over using a natural hormone. [1]

*Any of:*

* *Can make large amounts*
* *No risk of disease*
* *Cheaper when producing on industrial scale*

c. Describing one problem that might be seen with the production or use of synthetic hormones. [1]

*Any of:*

* *Some are analogues, not identical molecules – so may not work identically to actual hormone or have side-effects*
* *Quality control of manufacturing*
* *Misuse as readily available – performance enhancing substances*
* *Overuse as companies want to maximise profits*

5. Discuss what is meant by a ‘genetically engineered hormone’ by:

a. Naming a genetically engineered hormone and describing the disease/disorder it treats. [2]

*Any of: Must have description for 1 mark*

* *Insulin (1) Description (1)*
* *Growth hormone (1) Description (1)*

b. Describing the process(es) involved in producing this hormone [3]

*Gene is identified and restriction enzymes cut out gene (1)*

*DNA ligases used to insert gene into plasmid (1)*

*Plasmid is inserted into bacteria (1)*

*Bacteria are cultured, making the hormone when harvested (1)*

c. Describing one advantage using a genetically engineered hormone has over using a natural hormone. [1]

*Any of:*

* *Can make large quantities*
* *No risk of disease from animal/human source*

d. Describing one problem that might be seen with the production or use of genetically engineered hormones. [1]

*Any of:*

* *Quality control issues*
* *Misuse as readily available*
* *Overuse as companies want to maximise profits*
* *Ethical issues associated with changing DNA*
* *Ethical issues associated with patents and ownership of genes*
* *Antibiotic resistances, if the bacteria escape as the bacteria usually have a gene for antibiotic resistance added in order to identify the ones that have received the genetically engineered plasmid.*

6. For the treatment (gene therapy or cell replacement therapy) you researched:

*Gene therapy*

|  |  |
| --- | --- |
| a. 2 | *Involves insertion of healthy gene to replace damaged gene*  *Gene is identified & restriction enzymes cut out gene*  *DNA ligases used to insert gene into vector (usually virus) & inserted into patient* (2) |
| b. 1 | *Diseases – type I diabetes, hypothyroidism, pituitary dwarfism* (1) |
| c. 1 | *If it works individual would now have capacity to produce normal amounts of hormone (1)* |
| d. 1 | *No longer need hormone therapy as now have working copy of gene / provides permanent cure* (1) |
| e. 1 | *Have to isolate healthy gene / have to have some way of inserting gene into right part of body / issues with insertion (usually viral) causing other problems eg cancer/disease* (any 1 for 1 mark) |

*Cell replacement therapy*

|  |  |
| --- | --- |
| a. 2 | *Involves tissue culture or cloning of human cell lines for replacement cells/organs eg pancreas/thyroid, or repair eg Alzheimer’s, Parkinson’s*  *Stem cells are taken from healthy person & grown into new organ for transplant* ***or*** *stem cells are taken from patient and genetically modified before transplant*  (2) |
| b. 1 | *Diseases – type I diabetes, hypothyroidism* (1) |
| c. 1 | *If it works individual would now have a normal organ with the capacity to produce normal amounts of hormone* (1 |
| d. 1 | *No longer need hormone therapy as now have working organ / provides permanent cure* (1) |
| e. 1 | *Embryonic cells involve destruction of embryos / expense* (any 1 for 1 mark) |