**Review Worksheet ANSWERS: CNS Protection and Support; Comparing NS and Endocrine**

1: List 3 reasons why the brain and spinal cord require a high level of protection from damage.

(3 marks)

*They are delicate/fragile (1)*

*A small amount of damage can cause a huge loss of function, or death (1)*

*They do not heal or regenerate well (1)*

2: List the three main structures that are involved in protection of the brain and spinal cord.

(3 marks)

*Bone (1) Meninges (1) Cerebrospinal fluid (1)*

3: How does the bone protect the CNS from damage?

(2 marks)

*Provides a strong, rigid structure (1) to prevent from penetrating and blunt force injuries. (1)*

4: Give two reasons that the intervertebral discs are important in the spinal column.\*

(2 marks)

*They provide shock absorption to prevent damage to the vertebrae. (1)*

*They allow flexibility and range of motion so the spine can bend safely. (1)*

5: Describe the location and function of each of the three meningeal layers:

(9 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer** | **Structure** | **Location** | **Function** |
| Dura mater | *Fibrous outer layer (1)* | *Adheres/sticks to inside of skull and vertebral canal(1)* | *holds brain and meninges in place (1)* |
| Arachnoid mater | *Loose and mesh-like (1)* | *Between Dura mater and Pia mater (1)* | *Allows flow of CSF (1)* |
| Pia mater | *Delicate membrane layer (1)* | *Closely adheres to surface of brain and spinal cord (1)* | *Holds blood vessels in place, provides additional protection to brain surface. (1)* |

9: How does cerebrospinal fluid (CSF) form?

(2 marks)

*It forms from blood (1), via special vessel structures in the brain.(1)*

10: What is the composition of the CSF?

(3 marks)

*Clear, watery fluid (1) with few cells or large particles (1). Contains water with dissolved glucose, protein, urea and salts.(1)*

11: List and describe the three functions of the CSF:

(9 marks)

|  |  |
| --- | --- |
| **CSF Function** | **Description** |
| *Protection (1)* | *Impact shock absorption (1)*  *Tight blood-brain barrier prevents pathogen entry (1)* |
| *Support (1)* | *Cushions fragile CNS tissue from contact with skull (1)*  *Floats brain and spinal cord within the surrounding bone (1)* |
| *Transport (1)* | *Transports nutrients and wastes (1) to and from cells of brain and spinal cord (1)* |

12: What function do both the endocrine and nervous system have in common?

(1 mark)

*Send messages between areas of the body*

13: Fill in the following table comparing the differences between NS and Endocrine systems:

(12 marks)

|  |  |  |
| --- | --- | --- |
| **Characteristic** | **Nervous System** | **Endocrine System** |
| Nature of Message | *Electrical impulses and neurotransmitters* | *hormones* |
| Transport of Message | *Along membrane of neurons* | *blood stream* |
| Cells affected | *Muscle and gland cells*  *Other neurons* | *Various (in some cases all) body cells and tissues* |
| Type of response | *Local, specific (mostly)* | *general, widespread (mostly)* |
| Speed of response | *Rapid – milliseconds* | *Slower – seconds to days* |
| Duration of Response | *Very brief. Stops quickly when stimulus stops* | *Longer lasting – hormones may take time make changes in target cells, and to clear.* |



14: Draw an annotated flow diagram or write a series of steps to describe how Growth Hormone is produced and regulated, and its effects on target tissues.

(20 marks)

* *Puberty, exercise, deep sleep, and nutrition (2) are detected by the Hypothalamus (1)*
* *Hypothalamus produces Growth Hormone Releasing Factor (GHRF) (1)*
* *Hypothalamus releases GHRF into the blood vessels (1) of the infundibulum.(1)*
* *GHRF binds to receptors (1) in the anterior pituitary (1)*
* *GHRF stimulates the anterior pituitary to produce Growth Hormone (1)*
* *Anterior Pituitary releases GH into the systemic circulation (1).*
* *GH binds to target cells in liver, bone and muscle.(1)*
* *Liver stimulated to convert glycogen to glucose to provide energy for growth (1)*
* *Bone stimulated to grow and elongate (1)*
* *Muscle stimulated to grow (1)*
* *Rising levels of growth hormone and falling levels of amino acids and glucose in the blood (1) stimulate the hypothalamus (1) to secrete inhibiting hormone.(1)*
* *Inhibiting hormone acts on Anterior Pituitary (1) to prevent further GH release (1)*
* *This process is called negative feedback. (1)*