**The Reflex Arc (Ch 11) and The Central Nervous System (Ch12 Part 1) Notes**

A reflex is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A reflex arc is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

All reflex arcs have 4 elements:

1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ receptor-

2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ neuron-

3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ neuron-

4.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organ-

Example of a reflex arc: Knee-jerk

1.

2.

3.

4.

There are 2 types of reflexes:

 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reflexes which regulate:

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ muscle
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ regulation
* Regulation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ system regulation

 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reflexes which regulate activation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**The Central Nervous System (Ch 12)**

The CNS develops from the embryonic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tube. The \_\_\_\_\_\_\_\_\_\_ tube becomes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The opening of the tube becomes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The cranial end of the neural tube becomes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hemispheres, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the \_\_\_\_\_\_\_\_\_\_\_\_ stem (midbrain, pons, and medulla), and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The caudal end of the neural tube becomes the spinal cord.

The brain is arranged with specific regions of grey matter and white matter.

Grey matter is- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

White matter is -\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The basic pattern arrangement in the CNS is:

* Central cavity surrounded by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter
* External surface is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter

This pattern (grey inside, white outside) is seen in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but changes with ascent into the brain stem. The brain stem has additional \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter nuclei scattered within the white matter.

The cerebral hemispheres (cerebrum) are composed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter on the outside and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter inside. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ also have scattered areas of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ matter within the white matter.

**Protection in the CNS**

The CNS has several structures in place for protection:

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (superficial)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ column
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (membranes)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ fluid
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ barrier

**The Meninges**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - double-layered; external covering; folds inward in places

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - attached to surface of skull
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer- outer covering of brain

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- middle web-like layer

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- delicate internal layer; clings to surface of brain

**Cerebrospinal Fluid**

* Similar to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ composition.
* CNS contains about \_\_\_\_\_\_\_\_\_\_ mL
* Formed by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Forms a watery cushion to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the brain
* Circulated in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ space, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of spinal cord.

**Ventricles**

 Ventricles are fluid-filled chambers continuous to one another and to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the spinal cord. They are filled with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and lined with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ventricles are large C-shaped chambers located deep in each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. They are separated by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. “transparent wall”

Each lateral ventricle is connected to the 3rd ventricle (in the diencephalon) by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The 3rd ventricle is connected to the 4th ventricle (in the hindbrain)by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (“Aqueduct of Sylvius”)

The 4th ventricle is continuous with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the spinal cord.

Path of CSF:

* Secreted by \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_ lateral ventricles
* Flows to \_\_\_\_\_\_\_ ventricle (in middle)
* Flows through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(Aqueduct of Sylvius)
* Through \_\_\_\_\_\_\_\_ ventricle which joins the spinal cord as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Passes through the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ space around the brain
* Flows back into \_\_\_\_\_\_\_\_\_blood through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ granulations (villi)

CSF is secreted by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ventricles and reabsorbed by the blood in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ space.

Blockage in the 4th ventricles causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Blood Brain Barrier**

Includes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ capillaries of the body and excludes many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances

Useless against \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_