Nervous System

The nervous system is divided into two parts:

1. Central nervous system - the brain and spinal cord

2. Peripheral nervous system - all of the afferent and efferent nerves off of the spinal cord as well as the cranial nerves.

Functionally we have an autonomic nervous system. Its controlling centers are located in the brain and its nerve portions are divided into the sympathetic and parasympathetic nervous systems.

The functions of the nervous system are:
1. orientation of the body to its internal and external environments.
2. coordination and control of body activities.
3. assimilation of experiences requisite to memory, learning, and intelligence.
4. programming of instinctual behavior.

Brain development - The brain forms from the neural tube. By the 4th week there are three distinct areas:
1. Prosencephalon (forebrain)
    a. telencephalon - eventually becomes the hemispheres of the cerebrum.
    b. diencephalon
2. Mesencephalon (midbrain)
3. Rhombencephalon (hindbrain)
    a. metencephalon
    b. myelencephalon

Telencephalon - already talked about

Talk about the meninges here.

Meninges The meninges are made up of three layers.
1. Dura mater (tough mother) = outer layer
2. arachnoid mater - middle layer. Very thin and weblike.
3. Pia mater (tender mother) - on the surface of the brain and spinal cord.

Subarachnoid space - located between the arachnoid and the pia. It contains the CSF.

Diencephalon
1. epithalamus
2. thalamus
3. pineal gland
4. hypothalamus
5. pituitary gland

Cerebral peduncles - carry fibers from the cerebrum through the midbrain.

Metencephalon - expands to form the pons and the cerebellum

Myelencephalon - forms the medulla oblongata

In More Depth:

Diencephalon contains 4 major subdivisions:

1. thalamus - is a relay center for all sensory impulses except smell. Contains many different nuclei.
2. hypothalamus (below thalamus) is the main visceral control center of the body.
    a. Autonomic control - Heart rate, blood pressure, motility of digestive tract, respiratory rate, pupil size, etc.
    b. Emotional response and behavior
    c. Body temperature regulation
    d. Regulation of food intake
    e. Regulation of water balance and thirst
    f. Sleep/wake cycles
    g. Control of endocrine functions (Will discuss later)

3. epithalamus - is a thin roof over the third ventricle. It contains choroid plexus and the pineal gland. Hormone melatonin helps regulate sleep/wake cycles
4. pituitary gland - mainly related to the endocrine system.

Mesencephalon (midbrain) Is found located between the diencephalon and the pons. It contains the cerebral aquaduct as well as the corpora quadrigemina, cerebral peduncles, red nucleus, and substantia nigra. The corpora quadrigemina is made up of two superior colliculi (visual reflexes) and two inferior colliculi (auditory reflexes).

Metencephalon consists of the pons and the cerebellum.

1. Pons - is mostly white matter fiber tracts. It also contains many of the nuclei for cranial nerves.
2. Cerebellum - consists of two hemispheres, a vermis and two tonsils. It has outer gray matter with many folds and an inner white matter known as the arbor vitae. We should also see cerebellar peduncles. These connect the cerebellum to the pons and brain stem.
The cerebellum is mainly involved in coordination of muscle movement, however recently it has been implicated in certain forms of memory.

Medulla Is essentially a series of ascending and descending tracts of white matter. These tract cross over to the opposite side at the pyramids. It also has many nuclei for cranial nerves. Three very important areas are:

1. cardiac center - inhibitory and acceleratory
2. vasomotor center- to smooth muscles of arterial wall to elevate blood pressure.
3. respiratory center

Reticular formation- is located in the brain stem. It functions as the reticular activating center to maintain consciousness.

Go over cranial nerves now