

The Central Nervous System (CNS)

- The CNS is made up of the brain and the spinal cord and it is protected in several ways
- The brain is surrounded by a tough three-layer protective membrane called the meninges
- These act as physical protection, but also form the blood-brain barrier, regulating which chemicals reach the brain
- Cerebrospinal fluid circulates between the innermost and middle meninges of the brain and through the central canal of the spinal cord
- This fluid acts both as a shock absorber and a transport medium, carrying nutrients to the brain cells and bringing wastes from the cells to the blood

The Spinal Cord

- The spinal cord relays nerve messages between sensory neurons, motor neurons and the brain
- The majority of the spinal cord consists of myelinated white matter, but the central grey matter consists of nonmyelinated interneurons (see Fig.1, p.427)
- The spinal cord is protected by the vertebral column

The Brain

- Like even the simplest vertebrates, the human brain is made up of three distinct regions: the forebrain, the midbrain and the hindbrain (see Fig.2, p.428)
- The forebrain contains paired olfactory lobes, which receive information about smell
- The remainder of the forebrain is mostly made up of two giant hemispheres; the cerebrum
- the cerebrum act as the major co-ordinating centre from which sensory information and motor actions originate
- Higher functioning (speech, reasoning, memory, personality) are found in these two regions
- The surface of the cerebrum (called the cerebral cortex) is made of grey matter and has many folds to increase surface area (called fissures)

- Although the two sides of the cerebrum appear symmetrical, information stored in the right side is different from that stored in the left
- The right side is associated with visual patterns and spatial awareness, as well as controlling the left side of the body
- The left side is linked to verbal skills and controlling the right side of the body
- A bundle of nerves, called the corpus callosum, allows for communication between the two hemispheres

- Each hemisphere can be further divided into four lobes: the frontal lobe, the temporal lobe, the occipital lobe, and the parietal lobe (see Fig.3, p.428)
- See Table 1, p. 429, for an explanation of the different lobes and what they control

- Below the cerebrum is the thalamus, and below that is the hypothalamus
- The thalamus coordinates sensory information and sends it to the correct part of the cerebrum
- Recall that the hypothalamus is directly linked to the pituitary and unites the nervous system with the endocrine system

- The midbrain is less developed, consisting of four spheres of grey matter and acting as a relay centre for some eye and ear reflexes
- The hindbrain joins with the spinal cord and contains three major regions: the cerebellum, medulla oblongata and pons
- Frontal lobe contains motor areas which control movement of voluntary muscles and speech
- The cerebellum, is the largest section of the hindbrain and it controls limb movements, balance and muscle tone
- two In order for a nerve cell to trigger a response, there needs to be a certain amount of stimulus
- The pons is a relay station that passes information between the two regions of the cerebellum and between the cerebellum and the medulla
- The medulla oblongata is the connection between the PNS and CNS
- It controls involuntary muscle action, like breathing movements, the diameter of blood vessels and heart rate
- It also acts as a co-ordinating centre for the autonomic nervous system

Homework

p.434 # 1, 3-6