Unit 3:

Maintaining Dynamic Equilibrium II

Chapter 9:

Human Nervous and Endocrine Systems

TB Ch. 35, p. 891

The human body is a well-organized machine.

It's basic building block is a cell.
ex: nerve cell, skin cell...

Cells with similar structure and function combine to form tissues.
ex: connective tissue, muscle tissue

Many tissues can work together to complete a single function make up organs.
ex: kidneys, lungs, eyes...

Organs that perform similar functions make up organ systems.
ex: digestive system, nervous system...

All of the body's organ system work around the clock to maintain a stable environment - one in which the factors are controlled, and change as little as possible.

This is *homeostasis*.

The Nervous System (TB p. 897)

The nervous system acts as the body's communication system.

It controls all functions in the body in response to stimuli (changes in the environment - both internal and external).

The ability to respond to stimuli is one of the defining factors of life.
ex: shivering when cold
pupils dilate in the dark

Neurons

The nervous system "communicates" by sending electrical impulses via neurons (nerve cells).

There are 3 types:

1) Sensory neurons: Carry impulses from the senses to the brain

2) Motor neurons: Send impulses from the brain to the body.

3) Interneurons: Connect sensory and motor neurons.

Most neurons share similar features:

Cell body: Contains the cell's nucleus and performs most the cell's required processes.

Dendrites: Receive electrical impulses send to cell body.

Axon: Long fiber that carries impulses away from cell body.

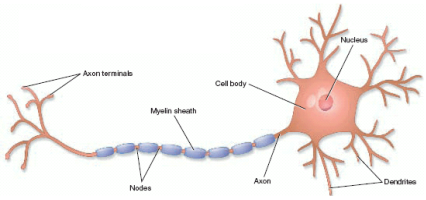


Figure 35 - 5,p. 897

Nerve Impulses

Nerve cells actively pump K^+ into and Na^+ out of their cell bodies in order to become charged (K^+ leaks through the cell membrane more easily than Na^+)

As a result, a nerve cell at rest has an overall negative charge, while the environment around it has a positive charge.

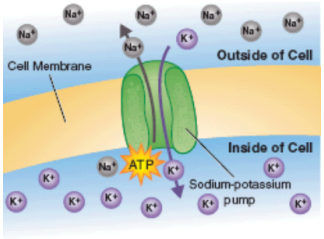


Figure 35 - 6, p. 898

The difference in charges is known as the *resting potential*.

Once it receives an impulse, ions move across the cell membrane as a response.

As the impulse moves through the cell, protein pumps allow in more Na^+ ions, creating a temporarily more positive environment inside the cell.

This is the *action potential*.

At the end of the impulse, K^+ pumps allow these ions out, restoring the resting potential of the cell.

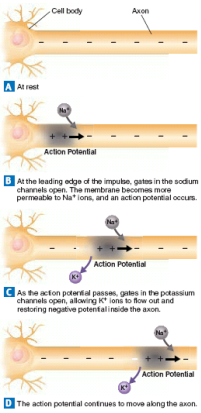


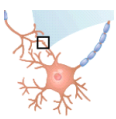
Figure 35 - 7, p. 899

This process allows an impulse to drive itself forward.

Once an impulse crosses the length of the cell, it must be passed onto another cell.

The gap between cell across which the impulse must travel is known as the *synapse*.

Neurotransmitters are used to send packets of chemicals across the synapse to initiate the impulse in the next cell.



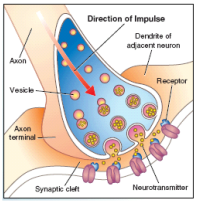


Figure 35 - 8, p. 900.