HUMAN ANATOMY for CNA's & HHA's

INTRODUCTION

Anatomy is the study of the structure of the organs and tissues of the human body. Our bodies are made up of tiny, microscopic building blocks called cells. The cells, in turn, are organized into tissues and organs, and each one of these has a unique structure and a specific, unique function. Certified Nursing Assistants (CNAs) and Home Health Aides (HHAs) must have a good basic knowledge and understanding of anatomy for these two reasons:

- One of your primary duties as a CNA or HHA is monitoring and assessing the basic wellness of your clients and patients. In order to do that, you need to know how the human body functions normally so that you can detect abnormal changes in body functioning, changes that may indicate that there is a serious alteration in someone’s health.

- Many of the patients and clients you will be working with will have a chronic medical problem such as diabetes, heart disease, etc. And as a CNA or HHA you will be expected to understand these disease processes, to understand how they affect health, and to know when these medical conditions have worsened. For that, you need to understand anatomy.

OBJECTIVES

When the student has finished this module, he/she will be able to:

1. Identify one reason why CNAs need to understand anatomy.
2. Identify a definition of anatomy.
3. Identify the basic functions of the nervous system.
4. Identify the three components of the circulatory system.
5. Identify what the circulatory system does.
6. Identify two basic functions of the respiratory system.
7. Identify two basic functions of the digestive system.
8. Identify the basic function of the renal system.
9. Identify the basic function of the endocrine system.
10. Identify three basic components of the female reproductive system.

ANATOMY

The medical dictionary defines anatomy as “the science of the structure of the body and the relation of its parts.” Anatomy can be very complicated or very easy, but for most health care professionals, learning anatomy does not have to be difficult. Much of the learning of this science is basic memorization, and the simplest way to do this is to divide
the body into systems. Each system – and the organ, or organs that make up that particular system – is then categorized by what it does and the task of learning becomes manageable.

**Skeletal System, Muscles, and Skin**

The **skeletal system** is comprised of **bones, ligaments, tendons, cartilage, and bone marrow**. The bones are connected to each other at the joints by strong bands of fibrous tissues – the ligaments – and the muscles are attached to the bones by other fibrous tissues – the tendons. Cartilage is found at the ends of bones where they meet, e.g., where the bones of the upper leg meet the bones of the lower leg. The cartilage acts like a shock absorber and also provides a smooth surface so that the ends of the bones that reconnected do not wear away and become damaged.

The **bone marrow** produces red blood cells and white blood cells. The red blood cells carry oxygen in the blood, and the white blood cells fight infection and provide immunity against disease.

There are more than 700 muscles in the human body. **The muscles allow for voluntary and involuntary movement.** The movements of a muscle are called contraction (the muscle gets shorter) and relaxation (the muscle relaxes and returns to its original length). Muscles are considered to be one of three types. **Skeletal muscles**, such as the biceps in your upper arm, are muscles that we can consciously control. **Smooth muscles** are muscles that we cannot consciously control. For example, we have muscles in the small bowel of the digestive tract. These muscles contract and relax to allow for passage and absorption of food and liquid. We also have muscles in some of the blood vessels, and these help with the circulation of the blood. In both of these instances, the smooth muscle contraction and/or relaxation cannot be consciously started or controlled.

**Cardiac muscle** is the muscle found in the heart. It is somewhat like smooth muscle in that it is not under conscious control. However, it has two unique properties: Cardiac muscle has the ability to automatically and rhythmically contract and relax, and it does so continuously, *and it does this mostly without external control*. Smooth muscle can also do this, but it contracts and relaxes *intermittently* in response to internal and external stimuli. The heart beat – the contraction and relaxation of the cardiac muscle – occurs constantly and in regular fashion, and does not usually rely on external stimuli.

The **skin** acts as a barrier and covers the entire surface of the body. There are three layers of skin: the epidermis is on the outside, underneath that is the dermis, and underneath the dermis is a layer of fat called the subcutaneous. The skin is where many of the blood vessels, nerve receptors, temperature receptors, sweat glands, and oil glands are located. The skin also has the pigment cells that give the tissues their distinctive color.

**A quick summary:** The skeletal system is made up of bones, ligaments, tendons, cartilage, and bone marrow. There are three types of muscle, skeletal (under conscious control), smooth (not under conscious control), and cardiac (which automatically and rhythmically contracts). The skin covers the entire surface of the body, has three layers, and many blood vessels, different types of receptors, and glands.
The bones function to give the body form and support. The muscles function is to allow for voluntary and involuntary movement. The skin’s main function is to act as a barrier to protect the body from heat, cold, and contamination from infectious agents such as bacteria and viruses. It is also the place where many blood vessels, glands, and receptors are located.

**Nervous System**

The nervous system is both extremely complex and relatively simple, but for the purposes of his module it can be easily divided into three parts: the **brain**, the **spinal cord** and the **peripheral nerves**.

The **brain** is divided into various regions that control basic body functions (breathing, heart rate, digestion, pain, sight, smell, taste, etc.) and regions that control higher functions (speech, memory, complex thinking, etc). The **spinal cord** is a long body of nervous tissue that inside the spine (also known as the backbone). It is attached to the base of the brain and ends at the bottom of the spine near the beginning of the buttocks. All along the length of the spinal cord, the **peripheral nerves** – long, thin strands of nervous tissue like wires – leave the spinal cord and travel to the organs (heart, lungs, liver, kidneys, glands, etc) and to every part of the body. There are literally millions of peripheral nerves and there are no organs and very few parts of the body that are not supplied with peripheral nerves. The peripheral nerves pick up information from the environment and from the body and send it back to the brain. In turn, the brain sends out signals and information to the organs and tissues by way of the peripheral nerves.

*A quick summary: The nervous system: The nervous system is comprised of the brain, the spinal cord, and the peripheral nerves. The nervous system controls all of our behavior and body functions, both conscious and unconscious.*

**Circulatory System**

The circulatory system is comprised of the **heart**, the **blood vessels** and the **blood**. As the name implies, the function of the circulatory system is to circulate the blood. The heart is a muscular organ that is located on the left side of the chest between the waist and the shoulder. The heart first pumps blood out to lungs where it picks up oxygen. The oxygenated blood is then pumped to the body through a system of blood vessels: first through the **arteries** and then at the outer parts of the body through the **capillaries**. Almost every part of the body is supplied with blood vessels.

The blood delivers oxygen to the organs and the tissues, and it then carries the waste products of metabolism and body functions back to the lungs through the **veins**. (Note: The arteries and capillaries can’t be seen. The blood vessels that we can see that are close to the surface are the veins). The waste products are eliminated when we breathe and the process begins again.

*A quick summary: The circulatory system is comprised of the heart, the blood vessels and the blood. The heart pumps the blood, the blood vessels carry the blood to the body, and the blood carries oxygen and waste products. The basic function of the circulatory system is to carry oxygen to the body and waste products to the lungs.*
**Respiratory System**

The structure of the respiratory system is a bit simpler than that of the other organ systems. The respiratory system starts with the oral cavity (mouth) and the nose. Attached to the back of the mouth is a stiff but somewhat flexible tube. This is the trachea (more commonly called the windpipe). The trachea ends at about the level of the shoulders and is attached to two other stiff but flexible tubes – one going left, the other going right – called the bronchi. At the end of the bronchi are the two lungs.

The lungs are located in the chest cavity, starting just below the shoulders and ending just about at the bottom level of the rib cage. The lungs are large, flexible organs that are filled with many, many small, hollow passages called the bronchial tubes. The bronchial tubes decrease in size, getting smaller and smaller as they extend into the outer parts of the lungs. Eventually the bronchial tubes end in small clusters of air sacs called alveoli (these look very much like clusters of grapes).

When we inhale, air moves through the nose and mouth, down the trachea to the bronchi and then into the lungs. Eventually, the inhaled air reaches the alveoli. At that point, immediately next to the alveoli are large numbers of very small blood vessels. The inhaled air with oxygen moves through the alveoli and combines with the blood that is passing by in these small blood vessels. At the same time, waste products of metabolism and body function move from the blood into the alveoli. When we exhale, these waste products are eliminated.

* A quick summary: The respiratory system is comprised of the oral cavity, the nose, the trachea, the bronchi, the bronchial tubes, the alveoli and the lungs. The basic functions of the respiratory system are to deliver air to the blood when we inhale, and get rid of waste products when we exhale.

**Digestive System**

The digestive system starts with the mouth and the oral cavity and ends with the anus. Beyond the mouth and the oral cavity the digestive system continues with the esophagus. This is a large, flexible tube that (located behind the trachea) connects with the stomach. After the stomach, the digestive system continues with the small bowel. This in turn is connected with the large bowel (also known as the colon) which in turn is connected with the rectum (the terminal part of the large bowel) and ends with the anus.

Although it is not physically connected with the rest of the digestive system, the liver can also be considered part of the digestive system. It is a large organ located on the right side of the abdomen just below the bottom of the rib cage.

Food, fluids, and medications enter the digestive tract, and nutrients, the drugs, and water are absorbed. Undigested food, metabolized drugs, and waste products are passed along through the tract and are eliminated in the form of stool, also known as feces.

The liver produces clotting factors that prevent bleeding, metabolizes drugs and toxins, stores blood sugar for emergency use. The liver also produces bile, a chemical substance that is needed for the digestion and absorption of fat.

* A quick summary: The digestive system starts with the mouth and oral cavity. Following that is the esophagus and then the stomach. After the stomach, the digestive
tract continues with the small bowel, the large bowel, the rectum, and the anus. The digestive system also includes the liver.

The basic functions of the digestive system are to allow for intake of food, fluids, and drugs, and for the elimination of wastes.

Renal System

The renal system has many complex functions that will be discussed in physiology module, but its anatomy is fairly simple. It is comprised of two kidneys. These organs (which look quite a bit like a lima bean) are located in the abdominal cavity, one on the right, one on the left, at about the level of navel. The kidneys are connected by narrow tubes called ureters to the bladder. The bladder is centrally located in the lower abdomen, below the navel and above the crotch. It is a thin-walled, hollow organ similar to a balloon. At the bottom the bladder is another small tube called the urethra. The urethra exits at the end of the penis in males and just above the vaginal opening in females.

A large part of the blood that circulates through the body is directed to the kidneys. As the blood passes through the kidneys, some water and water products from the metabolism are filtered out and concentrated as urine. The urine collects in the bladder and is periodically eliminated.

A quick summary: The renal system is comprised of the kidneys, two ureters, the bladder, and the urethra. The basic function of the renal system is to produce urine.

Endocrine System

The endocrine system is comprised of glands. There are many glands that comprise the endocrine system. The most important are the thyroid gland (located in the neck in back of the esophagus), the adrenal glands (two, located on top of the kidneys), the pancreas (located in the left side of the abdominal cavity), the ovaries (two, in females, located in the abdominal cavity), the testicles (two, in males, located inside the scrotum in the crotch area), and the prostate gland (in males, located in the lower abdominal cavity, below the bladder).

These organs help control body functions and metabolism by the hormones they produce. Hormones are chemical substances that are involved in many body processes. One important example is the hormone insulin. Insulin is produced by the pancreas. It helps control blood sugar levels and assists in the storage of blood sugar.

A quick summary: The endocrine system is comprised of glands. The basic function of these glands is to produce hormones that control body functions and metabolism. Important endocrine glands are the thyroid, adrenals, pancreas, pituitary, ovaries, testicles, and the prostate.

Reproductive System

The reproductive system consists of the organs and body structures that are involved in reproduction and sexual activity. The female reproductive system is comprised of the vagina, the uterus, the fallopian tubes, the ovaries, and the breasts. The ovaries
produce eggs that will be fertilized by sperm to produce a fetus. The eggs are carried from the ovaries by the fallopian tube to the uterus. Fertilization of the eggs and growth of the fetus occurs in the uterus. The vagina provides access for the sperm to the eggs in the uterus. The breasts (also known as mammary glands) produce milk after childbirth.

The male reproductive system is comprised of the penis and the testicles. The testicles produce sperm and the sperm is delivered to the vagina through the penis.

A quick summary: The reproductive system is involved in reproduction and sexual activity. In females, it is comprised of the vagina, uterus, fallopian tubes, ovaries, and breasts. In males, it is comprised of the penis and the testicles.