Chapter 10

The Human Body

**10-1 From Cells to Systems**

**tissue**- a group of similar cells that work together to do a job

**organ**- a body part made up of one or more kinds of tissue

**system**- a group of organs working together to do a job

**hormone**- a substance made by organs called glands

Name as many human accomplishments as you can think of in three minutes.

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\* Body tissues are made from organs. These organs form into complex systems in the human body. Each type of tissue has its own special function but joins with others to serve a larger common purpose.

\* The human body is made of many kinds of **tissue**.

\* The heart is an example of an **organ**. It has a pump made mostly of **tissue**.

\* The heart is part of a **system**. The circulatory system sends blood around the body.

\* In an average lifetime, the heart beats more than 2.5 billion times, without ever pausing to rest.

How are tissues, organs, and systems related? Cells form into tissues, tissues form organs, and organs form systems.

Make a chart of the human body systems from page 140.

\* Our brain is the control center of the human body. It is made up of BILLIONS of nerve cells, or *neurons*. The brain controls many of the brain’s functions. It also stores information. Share some information from your brain in the space below.

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\*The brain sends messages all around your body. It also receives messages. What are some messages your brain sends out?

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What are some of the messages that your brain receives?

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\* Messages travel from your brain down to your *spinal cord*. This is like a big rope of neurons. It runs along the inside of your backbone.

\* The spinal cord connects the neurons all over your body. Messages travel from one neuron to the next until they reach their destinations.

\* The brain, spinal cord, sense organs, and neurons are all parts of the nervous system.

\* Another way body functions are controlled is by **hormones**. Some glands make hormones that circulate in the blood and cause changes in the body.

\* Different parts of the brain are responsible for thought, memory, learning, speech, reading, sensory information, etc.

\* Neurons pass messages the same way your cable television or video games get images and sound.

**The Five Senses**

**Sight**- Eyes are the organs of sight. Light bounces off objects and enters your eyes.

**Hearing**- Ears are the organs of hearing. All sounds are made by vibrations.

**Taste**- The tongue is the organ of taste. There are only four types of tastes/flavors:

1. Sour
2. Sweet
3. Salty
4. Bitter

**Smell-** The nose is the organ of smell.

**Touch-** Skin is the organ of touch**.**

**How Are Humans Unique?**

\* Even though you might not believe it, the human body is very much like the bodies of other animals. Our brains, however, are much different. It is larger and more complex. Scientists say the human brain may be one of the most complex things in the universe.

\* There are things that we don’t do as well as other animals. Can you name some examples? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* There are some things that we do better than animals. Can you name some?

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**10-2 Your Body At Work**

**skeleton**- the bones that support, allow movement, and protect the organs of an animal with a backbone

**calcium**- a mineral found in teeth and bone

**joint**- a place where two bones meet

**tendon**- a tough band of tissue that attaches muscle to bone

\* The human body has 206 bones in it. Name as many as you can in 3 minutes.

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\* The bones connect together to make your **skeleton**. You would not be able to sit, walk, or stand without a skeleton..

\* The skeleton protects many of your most important organs. Narrow bones, called *ribs*, form a cage around your heart and lungs.

\* Another part of your skeleton forms a hard shell, called a *skull*, that protects your brain.

What living things in nature have protective coats/shells to keep them safe?

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\* Bones are made up of living cells and the mineral called **calcium**.

\* Calcium is found in your teeth, too. It comes from the foods we eat. Some foods rich in calcium are milk, yogurt, and cheese.

\* Bones meet each other at the **joint**. You have joints all over your body:

1.) wrists 2.) knees 3.) fingers 4.) elbows 5.) hips 6.) shoulders

\* The thigh bone is the largest bone in the human body.

\* The smallest bone in the human body, the *stirrup*, is located in the ear.

\* Children have more bones than adults. How can this be?

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\* Muscles can tighten, or flex. Let’s see everyone flex your pythons!

\* The arm muscle is attached to your arm bone by **tendons**.

\* Some muscles do not need bones to work. When you swallow food, certain muscles push the food down into your stomach. Other muscles cause blood to move throughout your body. These are called *involuntary muscles*.

Here is an Internet article about involuntary muscles…

<http://www.livestrong.com/article/154142-involuntary-muscles-in-the-human-body/>

Involuntary muscles are either nonstriated or striated. They are found in the walls of hollow organs, in your eyes and around your hair follicles. Cardiac or heart muscle cells appear striated under a microscope because of the large number of contractile proteins in the cells. Smooth muscles are involuntary because they contract through stimulation from your nervous system, without you actively controlling their movement.

**HEART MUSCLE**

Your heart muscle is a collection of smooth, involuntary muscle cells running in a parallel fashion and connecting from end to end. This anatomical set up enables your heart to effectively contract and push blood out to your body. The size and shape of your heart takes on the characteristic shape of your chest cavity. If you are long and thin, your heart will be elongated. If you are short and stocky, your heart will be wider than it is longer. Improve the structure and function of your heart through regular, moderately- to vigorously-intense aerobic exercise.

**PRECAPILLARY SPHINCTER**

The precapillary sphincter is a ring of smooth muscle at the beginning of capillaries. It controls the flow of blood at specific tissues. For example, when you go out for a run, the precapillary sphincters in your leg muscles open up to let more blood into your working muscles. The precapillary sphincters in your digestive organs constrict those capillaries to reduce blood flow to your gut.

**MUSCULARIS**

The muscularis muscle is located in your digestive tube or GI tract. It runs from your esophagus all the way to your large intestines. The muscularis forms two layers in your esophagus, three layers in your stomach, two in your small intestine and one layer in your large intestine. The primary role of this muscle is to move food through your GI tract so it can be broken down, absorbed and then eliminated from your body.

**EYE MUSCLES**

The iris and ciliary muscles are in your eye. The iris controls the size of your pupil while the ciliary muscle regulates the shape of the lens in your eyes. Your iris contracts and relaxes to let in more or less light through your pupils, helping to form clear images. The ciliary muscle changes the shape of your lens depending on whether the object you are focusing on is close to you or far away from you.

**THE MYOMETRIUM**

The middle layer of a woman's uterus is made of three layers of smooth muscle fibers going in all directions--diagonally, longitudinally and transversely. The myometrium is thicker on the upper part of the uterus, but thinner on the lower end, the cervix. This arrangement of muscle fibers makes it possible for the uterus to contract forcefully on the upper end and expand wider on the lower end.

**REFERENCES**

* "Anatomy & Physiology"; Gary Thibodeau, Ph.D. and Kevin Patton, Ph.D.; 2007
* "Exercise Physiology, Energy, Nutrition & Human Performance"; William McArdle, Frank Katch and Victor Katch; 2007

*Article reviewed by GlennK Last updated on: Jun 20, 2010*

\* Muscles that help you move parts of your skeleton are *voluntary muscles*.

Here is an Internet article about voluntary muscles… http://www.livestrong.com/article/160484-voluntary-muscles-in-the-body/

Voluntary muscles are one of three types of muscle in the body; smooth and cardiac are the other two types. There are more than 600 muscles in the body, and each falls into one of these categories. Smooth muscles are involuntary; cardiac muscles make up the muscles in the heart; voluntary muscles are controllable by your brain — and these are the muscles you use to perform activities.

**MAJOR MUSCLE GROUPS**

The muscles of the chest, back, shoulders, abdominals, arms, and legs make up the body's major muscle groups. Listing all 600-plus muscles in the human body would be difficult, not only because there are so many, but because people disagree on exactly how many there are. The major muscle groups are fairly standard, however, and these can broken down further into component muscles — for instance, the arms can be listed as the biceps and triceps.

**CHEST**

The muscles of the chest are typically called the pecs, short for pectorals. The two significant muscles of the chest are the pectoralis major and pectoralis minor. The pecs account for movement in the shoulder and shoulder blades, also called the scapulae.

**BACK**

There are many muscles of the back. The main muscles include the erector spinae, which run the length of the spine and neck, the latissimus dorsi (middle back), the rhomboids (upper back), and the trapezius (upper back and neck). The back muscles are important for posture, as well as movement of the shoulder blades, spine and shoulders.

**SHOULDERS**

The shoulders join the back and chest with the arms. The name of the shoulder muscles is the deltoids. The deltoids consist of three parts: the anterior (front), medial (side), and posterior (rear). Together, these muscles account for shoulder flexion, extension, and lateral flexion, which means moving the shoulder forward, backward, and to the side.

**ARMS**

The muscles of the arms can be separated into the upper arms and forearms. The upper arm muscles include the biceps on the front, and the triceps on the back. These muscles move the elbow. The forearm muscles, in the lower arm, move the wrist and rotate the forearm.

**LEGS**

The main muscles of the legs include the quadriceps of the front of the thigh, the hamstrings on the back of the thigh, and the calf muscles of the lower leg. The calf muscles include the gastrocnemius and the soleus. Other leg muscles include the adductors of the inner thighs, and the abductors, which are the muscles of the glutes and outer thighs. The glutes, however, are considered core muscles, as they assist with torso stabilization and balance. Other core muscles include the spine, pelvic floor muscles, and the muscles near the spine.

**ABS**

The muscles of the stomach include the rectus abdominus, transverse abdominus, and the internal and external obliques. The rectus abdominus, nicknamed the six-pack muscle, is the visible muscle. The obliques are on the sides of the stomach, and the transverse abdominus is below the obliques. The transverse abdominus compresses the abdominal organs.

**OTHER VOLUNTARY MUSCLES**

There are some important muscles, of course, beyond the major muscles. The muscles of the face, neck, and tongue are useful voluntary muscles that allow you to eat, support and move your head, and make facial expressions.

**REFERENCES**

* [KidsHealth: Your Muscles](http://kidshealth.org/kid/htbw/muscles.html)
* "NASM Essentials of Personal Fitness Training: Course Manual"; Michael Clark, Scott Lucett, Rodney Corn; 2008

*Article reviewed by Will McCahill Last updated on: Jun 30, 2010*

*10-3 Reproduction*

**puberty**- the time when the reproductive organs develop

**testes**- the male organs where sperm cells are made

**ovaries-** the female organs where egg cells are stored

**uterus**- the female organ in which a fetus develops

**fetus**- an unborn baby that develops in a woman’s uterus

**menstruation**- the monthly flow of blood from the uterus of a woman who is not having a baby

\* The human reproductive system does not fully develop until **puberty**. During this time, certain glands begin producing hormones. These are chemicals that cause changes in the body.

\* During this time, boys and girls experience many (some different) changes to the body.

\* Boys develop broader shoulders and more muscles.

\* Girls develop breasts and broader hips.

\* Boys’ voices get lower.

\* Boys begin producing sperm in the **testes**. Adult males make millions per day.

\* Boys and girls grow hair under their arms and around their reproductive organs.

\* Puberty for boys begins between ages 13 and 16.

\* Puberty for girls begins between the ages of 10 and 13.

\* Females are born with all the egg cells they will ever have. These are stored in the **ovaries**.

\* Each month, starting at puberty, an egg cell is released from one of the ovaries.