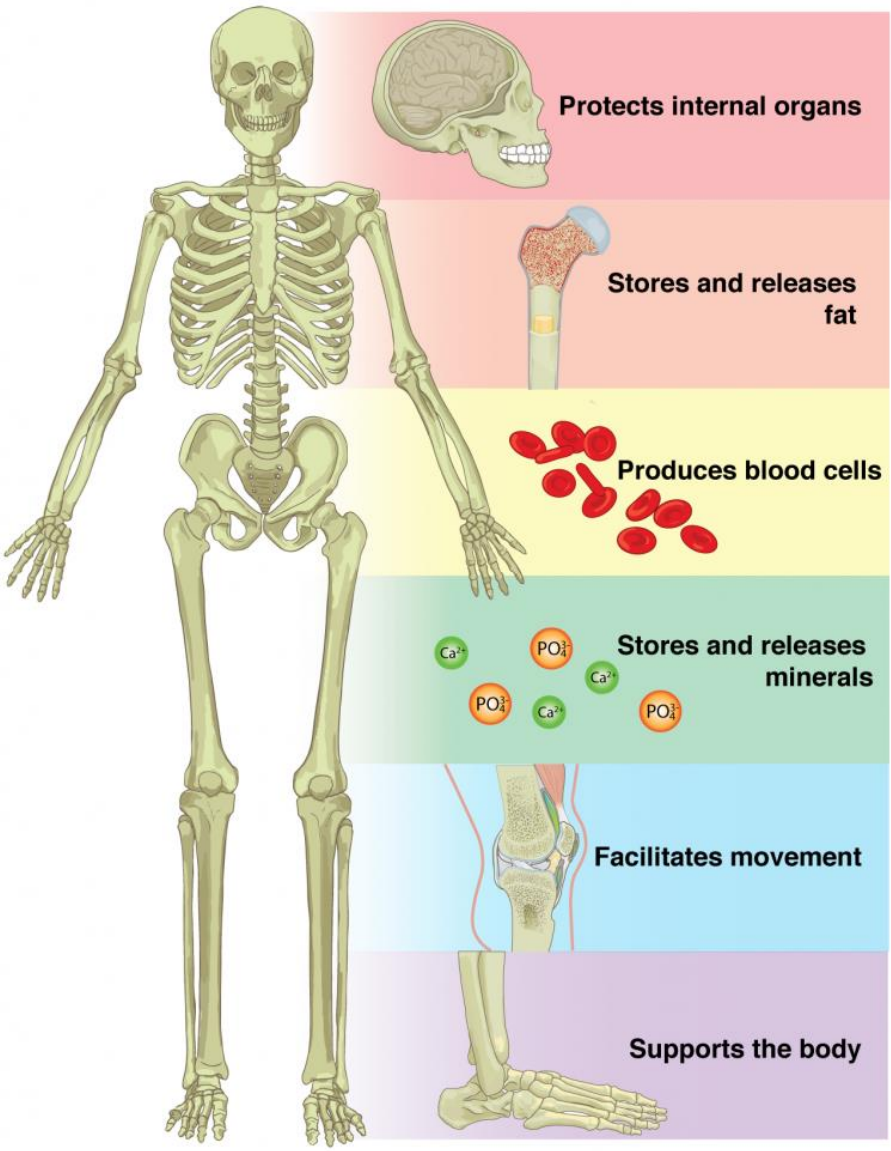
Skeletal, Muscular and Cardiovascular Systems

The Skeletal System

The Contributions of the Skeletal System



SO - What Does This System Do?

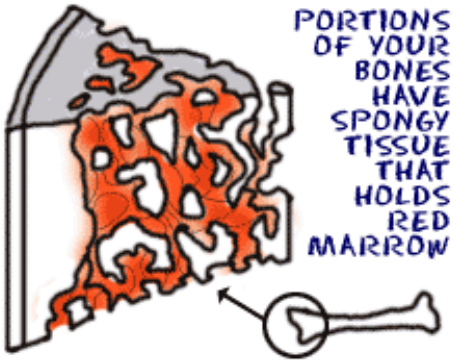
Protection and support are the two big reasons that organisms have skeletal systems.

In your body, the skeleton works very closely with the muscular system to help you move.

Without the bones of your skeleton, you would be a blob of water-filled tissues. The bones create a framework to which your muscles and organs can connect.

Your skeleton also plays a role in protection, especially in your head. The bones of your **skull** protect your all-important brain.

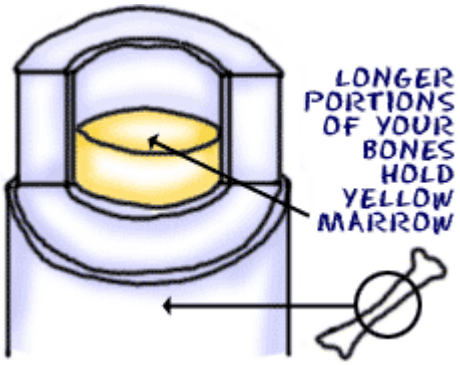
Your ribs protect most of your internal organs from impact as well.



Interacting with Other Systems

Your skeletal system does not work alone. Muscles connect to your skeleton and they contract and move the skeleton along. Your skeletal system is made up of cartilage and calcified bone that work together. They help the process of movement happen in a smoother manner. The calcified bones of your skeleton also work with the circulatory system. Marrow inside of your bones helps produce the cells inside of you blood. Both red blood cells and white blood cells are created in your bones.

Genetic Variation

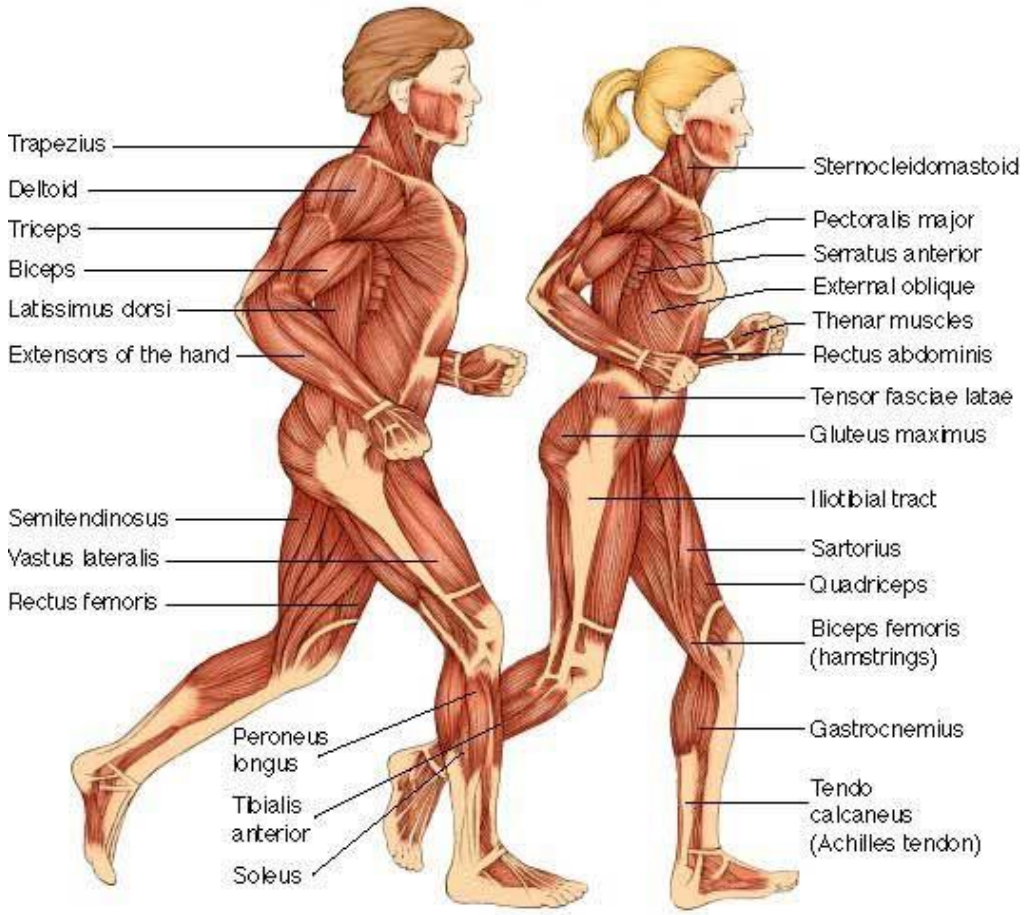


Sometimes your skeletal system and the tissues of your skeleton can have problems. Some genetic diseases cause individuals to grow excessive large and thick bones. **Acromegaly** is the term used to describe a condition that affects the pituitary gland and causes an excessive amount of growth hormone to be produced.

Other diseases cause problems with bone formation and related connective tissues including **collagen**. These genetic diseases can cause bones to become brittle and break easily, while the collagen of the body does not have the strength of a healthy individual. **If everything is working correctly, bones are able to break and then heal.** Even older people who break their bones can grow new bone and connective tissue that returns the bone to a usable state.

TASK: Summarise the main functions of the SKELETAL SYSTEM in note form.

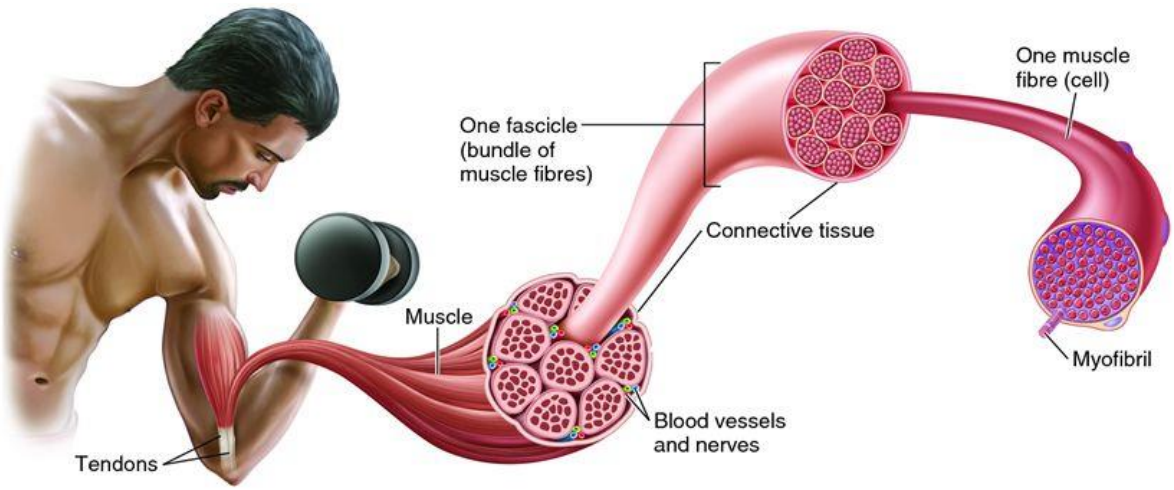
The Muscular System



Many advanced animals have **muscular systems, like us!** Did you know that your muscular system is made up of three different types of muscular tissue? You have **smooth**, **cardiac**, and **voluntary** muscle tissue in your body.

- **Smooth muscle** is muscle you rarely control such as the muscle in your intestinal tract.
- **Cardiac muscle** is very specific tissue found in your heart.
- **Voluntary muscle** is the muscle that helps you move.

MUSCLE ANATOMY



All of those tissues add up to a muscular system that is found through your body. There is more to the muscular system than the muscles that help you move.

What Does This System Do?

The big purpose of the muscles found in your body is movement. We could be talking about the movement of your legs while you walk. We could be talking about the beating of your heart. We could also be talking about the contraction of a very small blood vessel in your brain.

You have no control over most of the muscular system. You do control the voluntary muscle in your arms, legs, neck, and torso. You have little or no control over the heart or smooth muscle. Those other muscles are under the control of the **autonomic nervous system** (ANS).

Interacting with Other Systems

Your muscular system is closely connected to the nervous system. That makes sense since you usually have to think before you can move. Even though thinking is not always involved, the neurons of the nervous system are connected to most of the cells in your muscular system. You have smooth muscles that line your digestive system and help move food through your intestines. Smooth muscle also surrounds your circulatory system and lymph system. Those muscle tissues are spread throughout your body and are even involved in controlling the temperature of your body.

Muscles Help You Move

The main parts of your voluntary muscular system include the muscles, and tendons. The muscle is called the **meatus**. So your bicep is the 'meat' and that meat needs to connect to the bones so that you can move. Tendons connect your muscles to your bone at insertion points.

When the **actin and myosin** contract in the muscles, the muscle shortens and the bones are pulled closer together. Muscles called **flexors** force your joints to bend. Muscles called **extensors** cause your limbs to straighten. A bicep is a flexor and the triceps are extensors. You may have also heard of ligaments. They are batches of connective tissue that bind bones to each other. Muscles, tendons, and ligaments can been found working together in almost all of your joints.

TASK: Draw and label an image of the MUSCULAR SYSTEM and make notes to summarise its main functions and key points.

The Cardiovascular (Circulatory) System

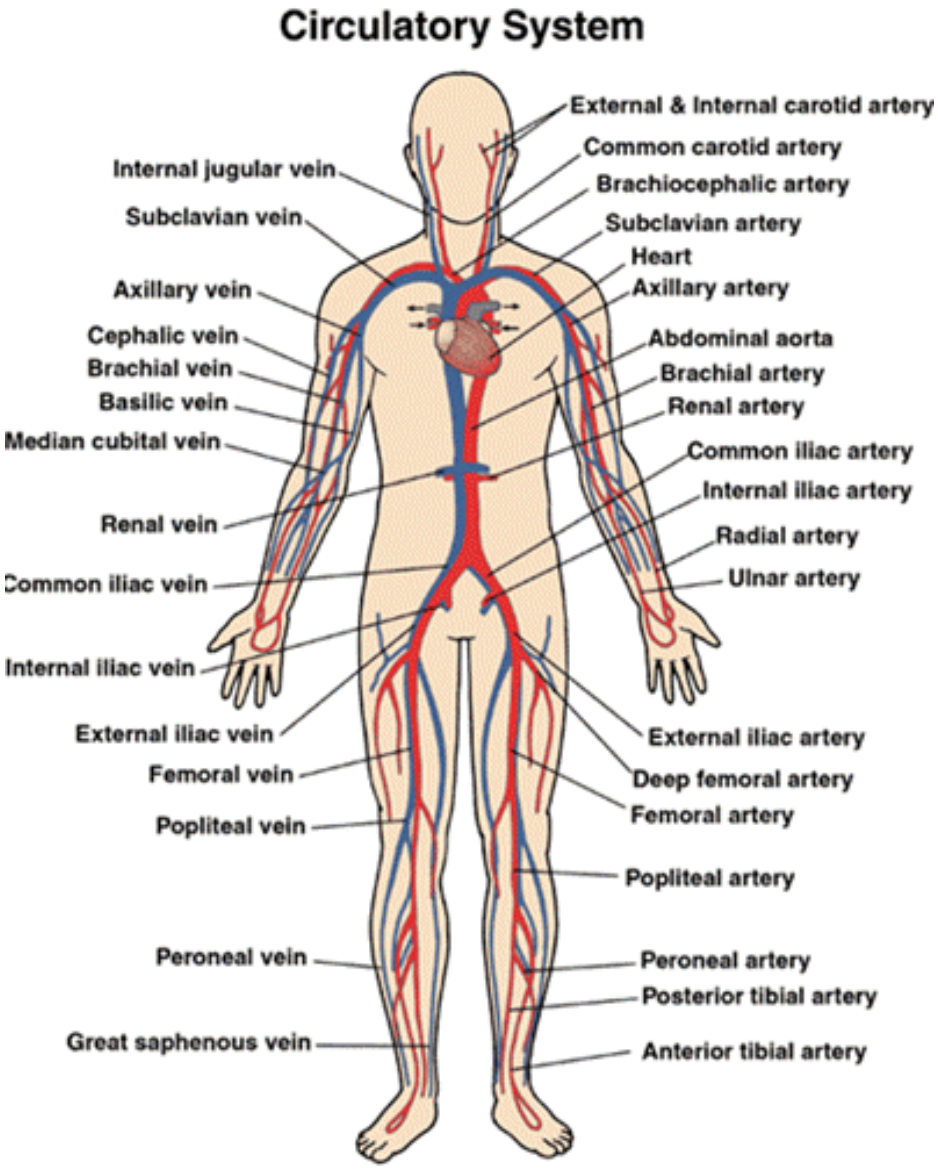
All cells in the body need to have oxygen and nutrients, and they need their wastes removed.

These are the main roles of the circulatory system.

The heart, blood and blood vessels work together to service the cells of the body.

Using the network of arteries, veins and capillaries, blood carries carbon dioxide to the lungs (for exhalation) and picks up oxygen.

From the small intestine, the blood gathers food nutrients and delivers them to every cell.



Blood

Blood consists of:

- Red blood cells – to carry oxygen
- White blood cells – that make up part of the immune system
- Platelets – needed for clotting
- Plasma – blood cells, nutrients and wastes float in this liquid.

The heart

The heart pumps blood around the body. It sits inside the chest, in front of the lungs and slightly to the left side. The heart is actually a double pump made up of four chambers, with the flow of blood going in one direction due to the presence of the heart valves. The contractions of the chambers make the sound of heartbeats.

The right side of the heart

The right upper chamber (atrium) takes in deoxygenated blood that is loaded with carbon dioxide. The blood is squeezed down into the right lower chamber (ventricle) and taken by an artery to the lungs where the carbon dioxide is replaced with oxygen.

The left side of the heart

The oxygenated blood travels back to the heart, this time entering the left upper chamber (atrium). It is pumped into the left lower chamber (ventricle) and then into the aorta (an artery). The blood starts its journey around the body once more.

Blood vessels

Blood vessels have a range of different sizes and structures, depending on their role in the body.

Arteries

Oxygenated blood is pumped from the heart along arteries, which are muscular. Arteries divide like tree branches until they are slender. The largest artery is the aorta, which connects to the heart and picks up oxygenated blood from the left ventricle. The only artery that picks up deoxygenated blood is the pulmonary artery, which runs between the heart and lungs.

Capillaries

The arteries eventually divide down into the smallest blood vessel, the capillary. Capillaries are so small that blood cells can only move through them one at a time. Oxygen and food nutrients pass from these capillaries to the cells. Capillaries are also connected to veins, so wastes from the cells can be transferred to the blood.

Veins

Veins have one-way valves instead of muscles, to stop blood from running back the wrong way. Generally, veins carry deoxygenated blood from the body to the heart, where it can be sent to the lungs. The exception is the network of pulmonary veins, which take oxygenated blood from the lungs to the heart.

Blood pressure

Blood pressure refers to the amount of pressure inside the circulatory system as the blood is pumped around.

Some Common Problems

Some common problems of the circulatory system include:

- Aneurysm – a weak spot in the wall of an artery
- Atherosclerosis – a narrowing of the arteries caused by plaque deposits
- Heart disease – lack of blood supply to the heart because of narrowed arteries
- High blood pressure – can be caused by obesity (among other things)
- Varicose veins – problems with the valves that stop blood from running backwards.

Things to Remember

- ✓ The circulatory system delivers oxygen and nutrients to cells and takes away wastes.

- ✓ The heart pumps oxygenated and deoxygenated blood on different sides.
- ✓ The types of blood vessels include arteries, capillaries and veins.

TASK: Draw and label an image of the CARDIOVASCULAR SYSTEM and make notes to summarise its main functions and key points.

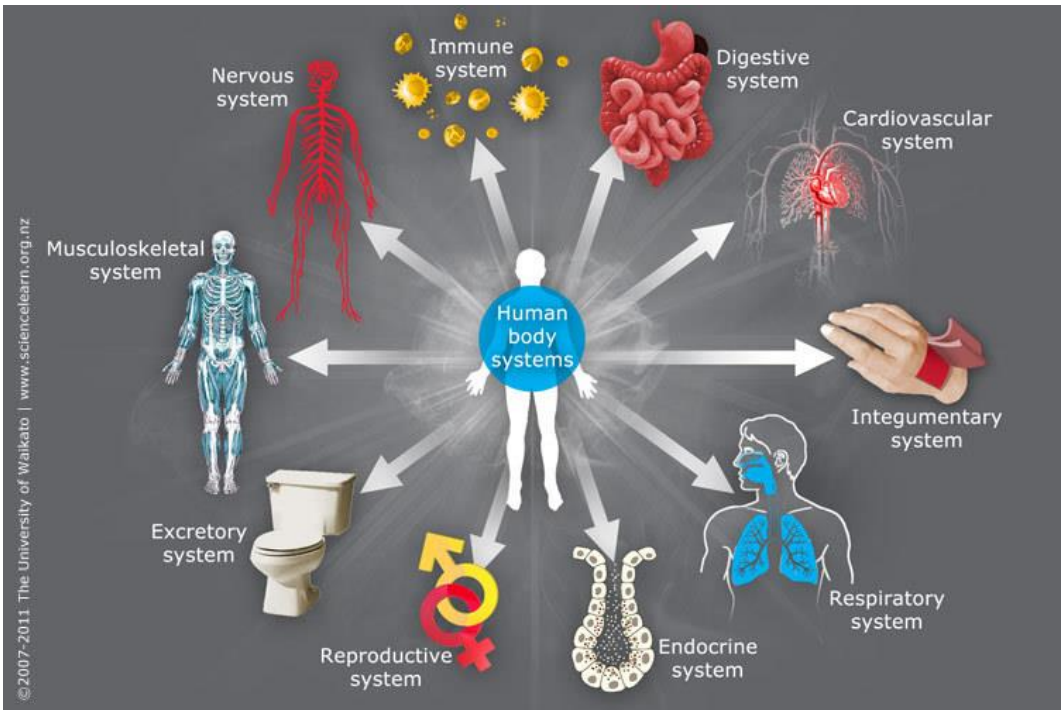
How the Systems interrelate!

Both the Skeletal and Muscular systems are vital in everyday activities. These two body systems interrelate in many ways to create a healthy daily life. Skeletal muscle makes up about 40 per cent of body weight. The skeletal system is very strong but flexible. The skeletal system includes the 206 bones in the human skeleton, these work as a protection for the body's muscles and organs.

The muscular system has many layers of muscles which helps cover the bones of the skeletal system and helps cover vital organs in our body which are our heart, brain, kidneys, liver and lungs.

The Cardiovascular system and the skeletal system interrelates with each other, which plays a vital role in keeping the human body alive. The bone marrow within your bones form new red and white blood cells and removes dirty blood cells. After making these new blood cells, it sends them to the circulatory system. After this process is complete the red and white blood cells are sent to the heart and then goes back through the circulatory system. If the circulatory and the skeletal system did not interrelate, then our body would not be able to function properly because blood would not be able to flow to our heart and throughout our entire body.

The muscular and circulatory system interrelate on a daily basis to keep each of the other system healthy. The circulatory system helps the muscular system by pumping blood and oxygen to the working muscles. The circulatory system also helps the muscular system because it allows muscles to receive the oxygen they need to function properly. Also when the muscles are at rest the blood circulating helps provide nutrients and helps take away unwanted waste. On the other hand the muscular system helps the circulatory by when we move our muscles it helps the blood flow freely and reach the veins and heart.



TASK: Summarise the connections between the systems.