

# *Muscles*

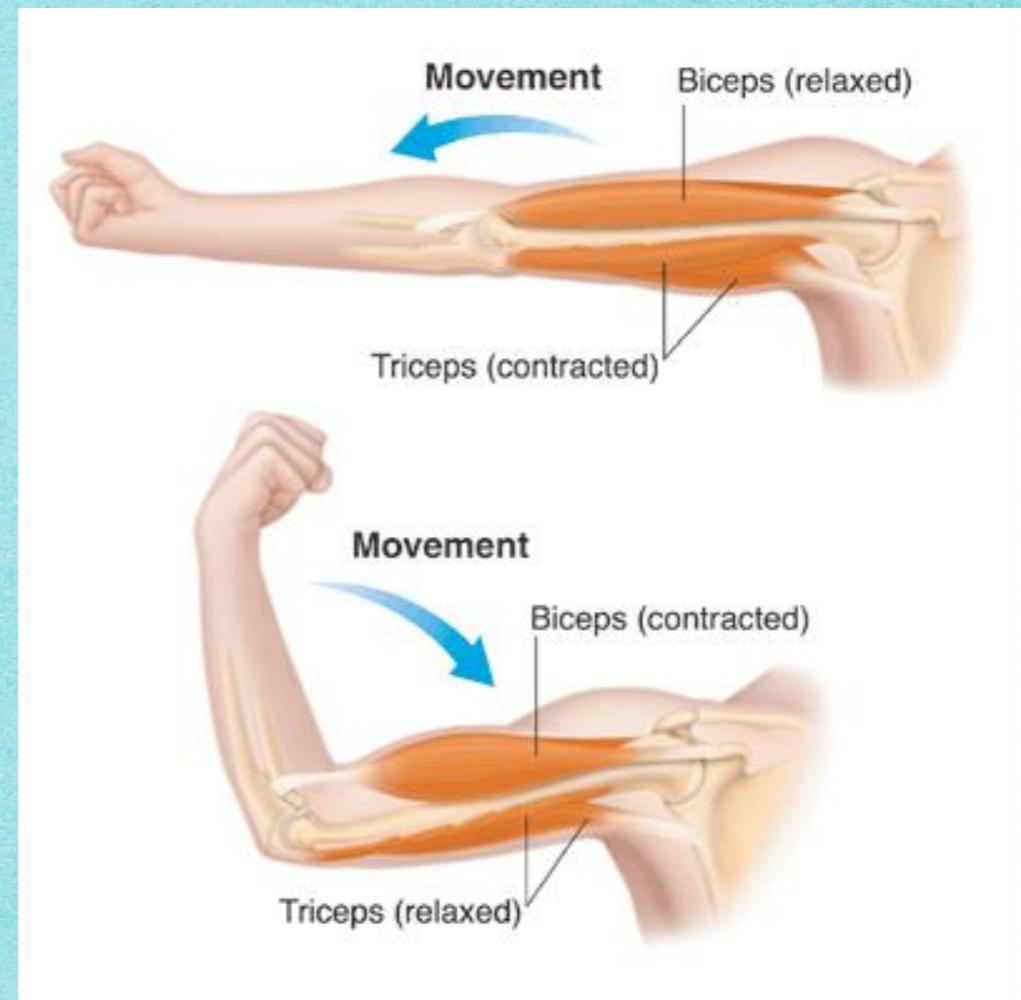
Muscles are how we **move** and **live**. All movement in the body is controlled by muscles. Some muscles work without us thinking, like our heart beating, while other muscles are controlled by our thoughts and allow us to do stuff and move around.

There are over **650** muscles in the human body. They are under our skin and cover our bones. Muscles often work together to help us **move**. We don't really have to think about moving each individual muscle. For example, we just think of running and our body does the rest.

## How Muscles Work

Muscles work by **expanding** and **contracting**. Muscles have long, thin cells that are grouped into bundles. When a muscle fibre gets a signal from its **nerve**, proteins and chemicals release **energy** to either contract the muscle or relax it. When the muscle contracts, this pulls the bones it's connected to closer **together**.

Many of our muscles come in **pairs**. An example of this is the **biceps** and **triceps** in our arms. When the biceps contract the triceps will relax, this allows our arm to bend. When we want to straighten our arm back out, the biceps will relax and the triceps will contract. Muscle pairs allow us to move back and forth.



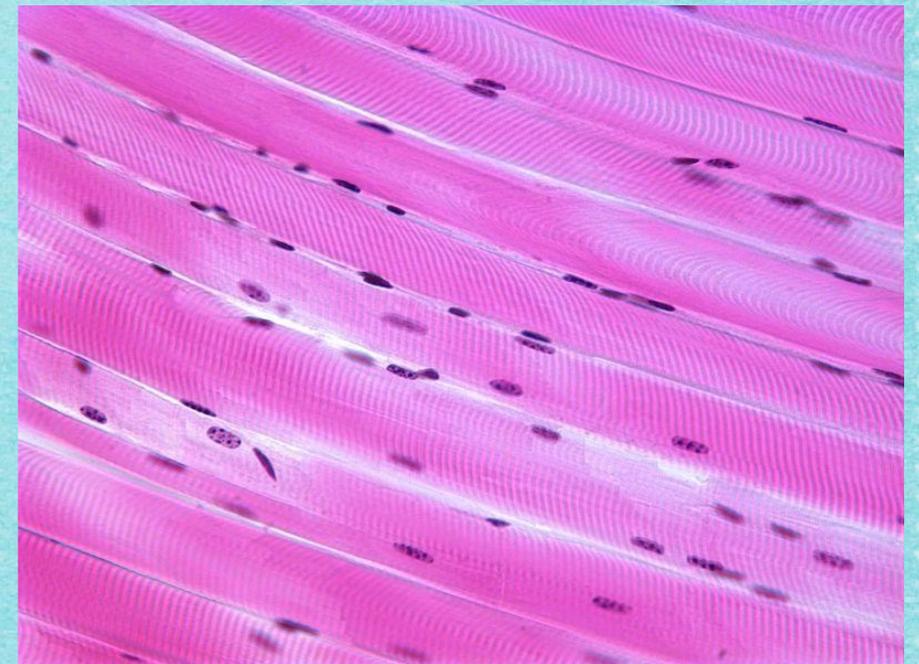
# Types of Muscles

**Skeletal Muscles** - These are the muscles we use to move around. They cover our skeleton and move our bones. Sometimes they are called **striped muscles** because they come in long dark and light bands of fibres and look striped. These muscles are **voluntary** because we control them directly with signals from our brains.

**Smooth Muscles** - Smooth muscles are special muscles that don't connect to bones, but **control organs** within our body. These muscles work **without** us having to think about them.

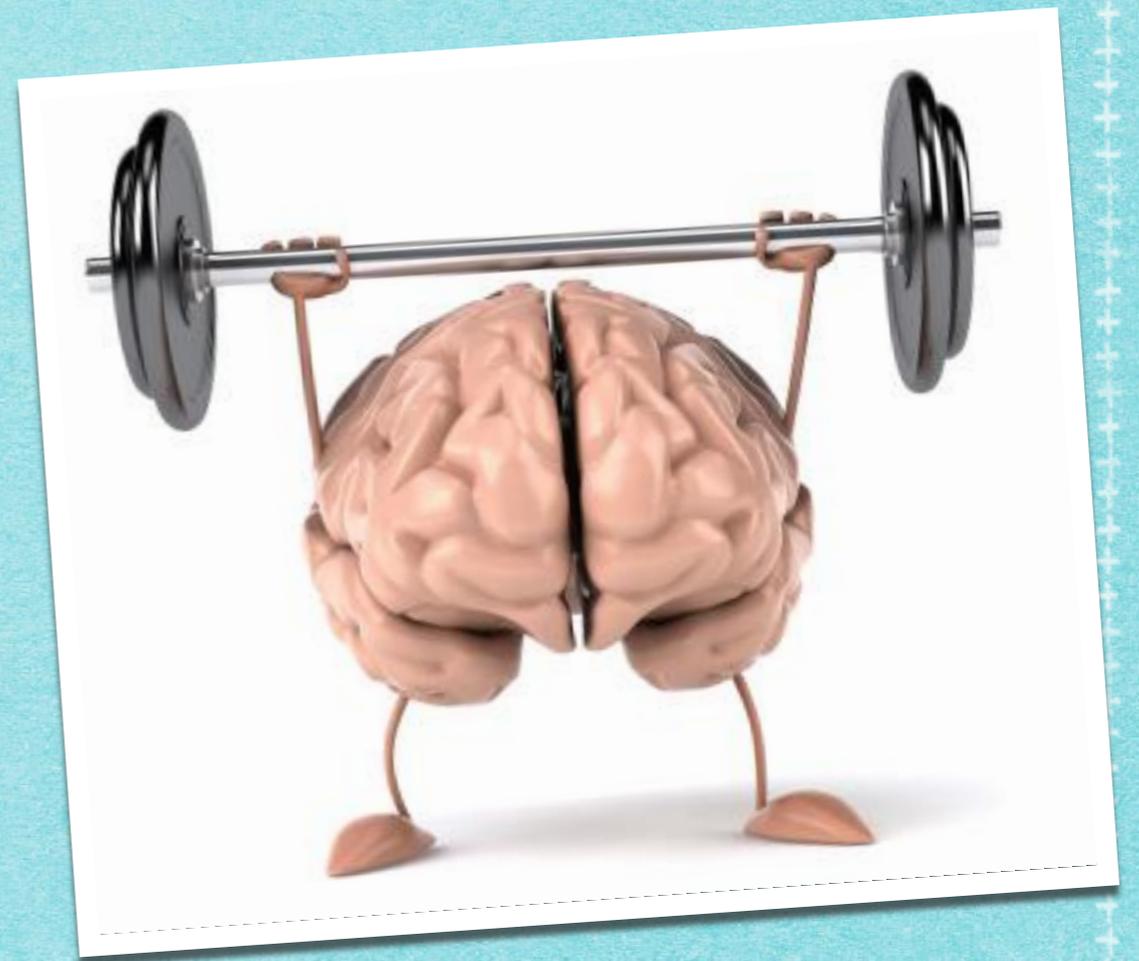
**Cardiac Muscle** - This is a special muscle that **pumps** our **heart** and **blood** through our body.

**Tendons**- Tendons connect **muscles** to **bones**. Tendons help form a connection between soft contracting muscle cells to hard bone cells.



# Muscle Memory

When we **practice** an action over and over again, we get what is called muscle memory. It allows us to become **more skilled** at certain activities such as sports and music. As we practice, our muscles tune themselves to become more precise in their motions and to do exactly what our brain wants them to do. So remember, practice makes perfect!



When we exercise we work our muscles allowing them to become bigger and stronger. Exercise helps keep your muscles **strong** and **flexible**. If you don't use your muscles they can **atrophy**, or shrink and become weak.

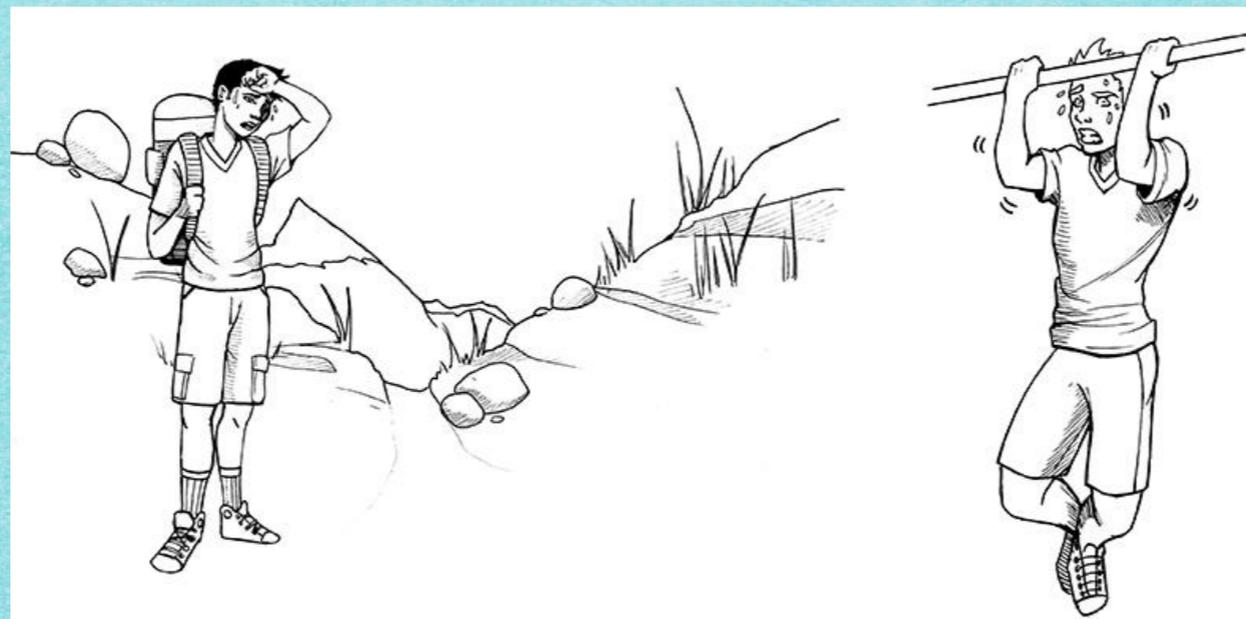


Muscle **Fatigue**- occurs when the muscle experiences a **reduction** in its ability to produce force and accomplish the desired movement. The factors that explain fatigue are complex and after more than 100 years of investigation are still a topic of active research.

For example, **short term** fatigue (failure to lift a heavy weight, do more push-ups, etc.) is different than **long term** fatigue such as as a marathon run, a 100 mile bicycle ride, or a full-day hike through the Rocky Mountains of Colorado.

We do understand though some of the basic reasons that muscles become fatigued during high intensity exercise, most notably that the **demand for oxygen** can be greater than the supply. The blood flow to the muscle can be reduced because of

- 1) muscles **intensely contracting** can reduce blood flow and thus oxygen availability, or
- 2) the muscle is simply working so **intensely** that there literally is **not enough** oxygen to meet demand (a sprint at top speed).



## Fun Facts about Muscles

- Shivering** is caused by hundreds of muscles **expanding** and **contracting** to produce heat and make us warmer.
- It takes **17** muscles to smile and **43** muscles to frown. All the more reason to smile instead of frown!
- The strongest muscle is in our **jaw** and is used for chewing.

