Muscles use electricity and energy

Muscles can only move because they get electrical instructions and a continuous supply of energy.

You have seen how we are held up by a kind of scaffolding called a skeleton, and how the skeleton is moved by muscles. But the muscles can only move if they are told to do so by the brain, and if they have enough **ENERGY**.

Signals from the brain

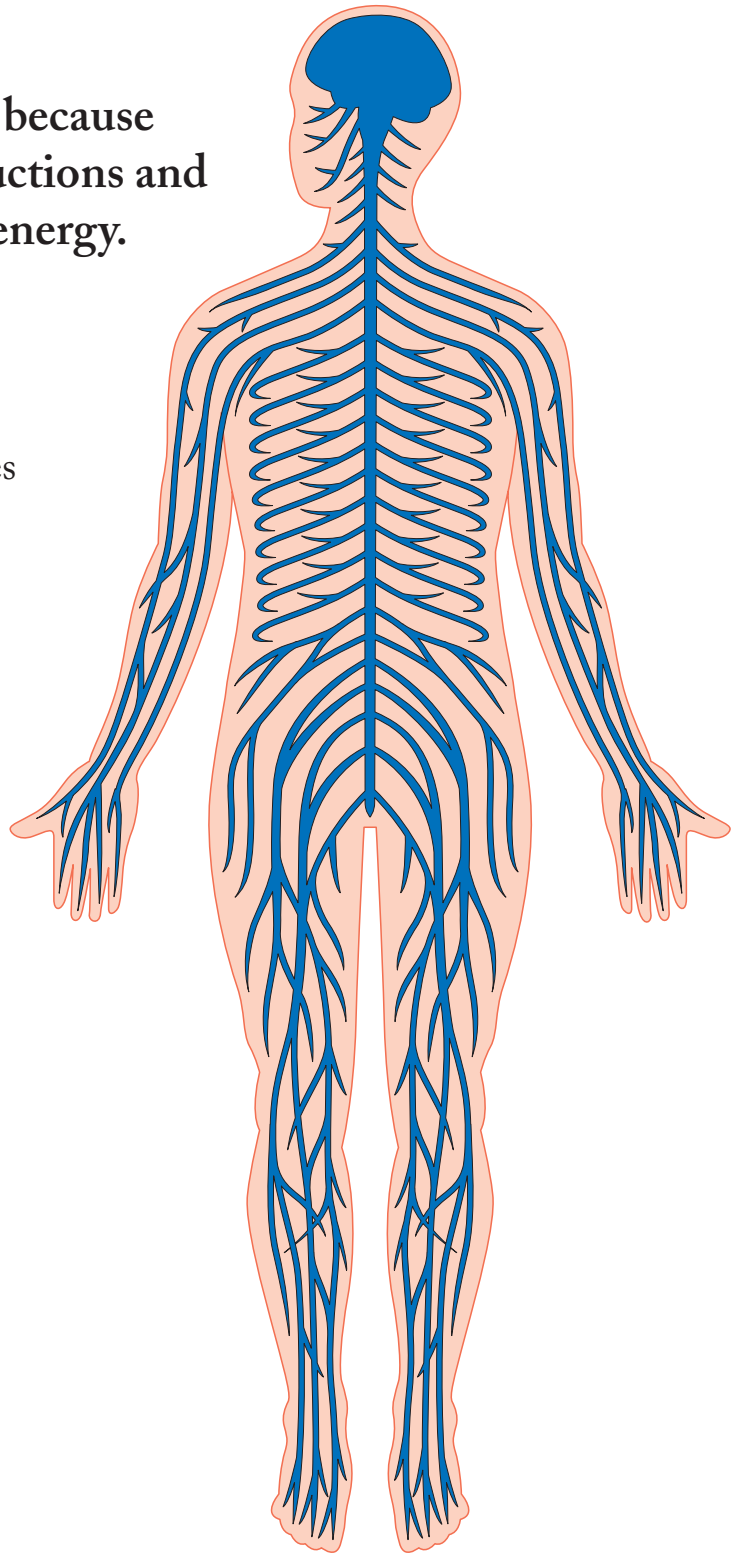
In a very famous scientific experiment in 1786, an Italian scientist named Luigi Galvani made a dead frog's leg twitch by connecting the muscles between two pieces of metal.

By accident, Galvani had made a battery using the two pieces of metal, and this battery then sent an electric current down the frog's leg. This current is what caused the leg to twitch.

Galvani had discovered that muscles receive signals of electricity.

We now know that all muscles are controlled by tiny electrical signals. The signals are sent from the brain along tiny fibres called **NERVES** (Picture 1).

When we want to raise our arm, for example, the brain sends a tiny electric signal down the nerve leading to the muscle called the biceps. This causes the biceps to shorten and the arm is lifted (Picture 2).



▲ **(Picture 1) The brain is constantly taking in information from your senses and sending instructions to your body on how to respond. It does this using millions of tiny electrical signals that pass up and down your nerves.**

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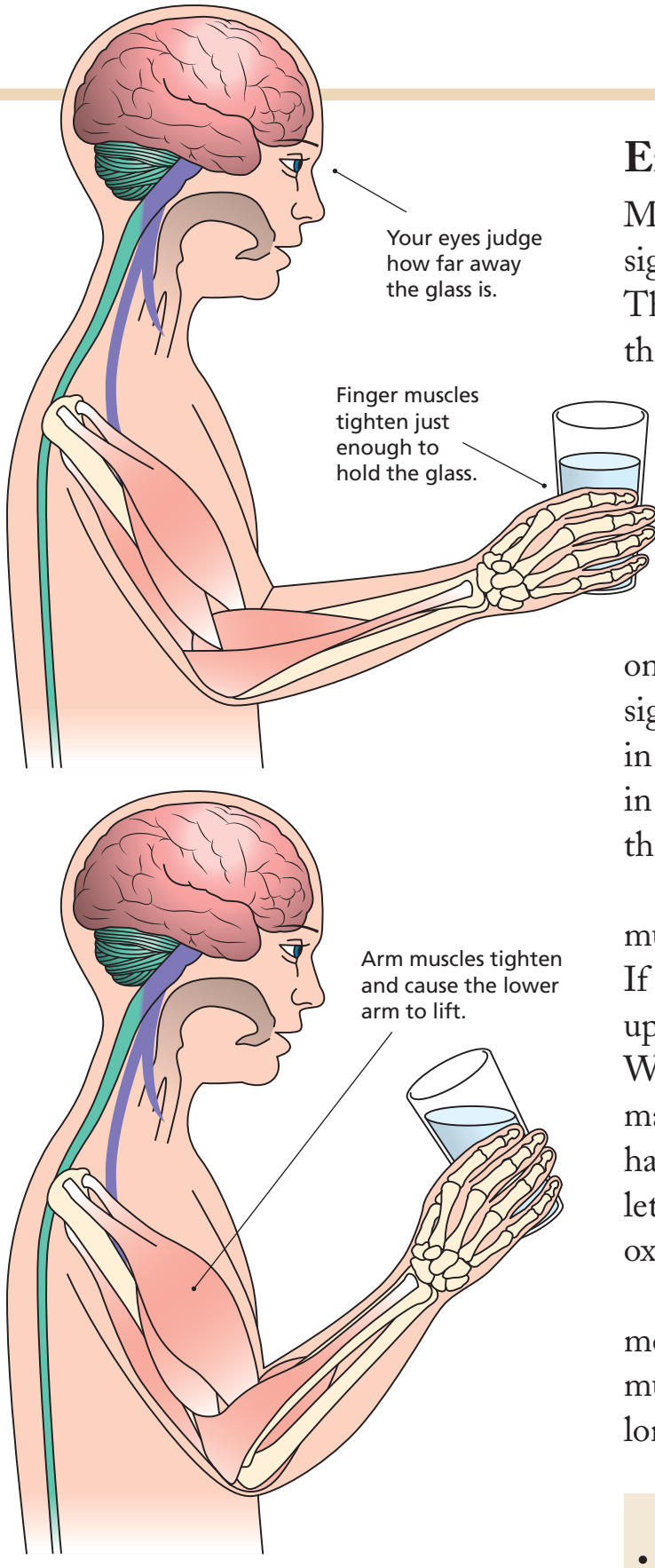

▲ **(Picture 2) In order to perform even a simple action, such as holding a glass of water, your brain must constantly send signals between the muscles in your fingers, hand, arm and eyes. These signals must all work together to allow you to hold the glass.**

Energy and oxygen from blood

Muscles move because of electrical signals, but they also need energy. This is brought to the muscles through the blood.

The blood carries a great variety of chemicals that have been extracted from the food we eat. It also carries oxygen. Some of the chemicals in the blood are a useful source of energy. Sugar is one of these. When the brain sends a signal to a muscle, the oxygen and sugar in the blood change the stored energy in the sugar into movement energy for the muscle.

Every time the brain signals the muscle to move, some energy is used up. If we move for a long time, we may use up all of the spare energy in the muscle. When this happens, we feel tired and may even get cramps. That is why we have to slow down or stop moving to let the blood bring new chemicals and oxygen to the muscles.

People who exercise regularly have more stored energy and oxygen in their muscles, so they can move quickly for longer without feeling tired.

Summary

- **Muscles move when they receive electrical signals from the brain.**
- **Muscles need energy and oxygen to work.**
- **When we have used up the oxygen and energy stored in the muscles we feel tired and slow down.**