
Muscles

Summary

- There are about 600 muscles in the human body.
 - The three main types of muscle include skeletal, smooth and cardiac.
 - The brain, nerves and skeletal muscles work together to cause movement – this is collectively known as the neuromuscular system.
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There are about 600 muscles in the human body. Muscles have a range of functions from pumping blood and supporting movement to lifting heavy weights or giving birth. Muscles work by either contracting or relaxing to cause movement. This movement may be voluntary (meaning the movement is made consciously) or done without our conscious awareness (involuntary).

Glucose from carbohydrates in our diet fuels our muscles. To work properly, muscle tissue also needs particular minerals, electrolytes and other dietary substances such as calcium, magnesium, potassium and sodium.

A range of problems can affect muscles – these are collectively known as myopathy. Muscle disorders may cause weakness, pain or even paralysis.

Different types of muscle

The three main types of muscle include:

- **Skeletal muscle** – the specialised tissue that is attached to bones and allows movement. Together, skeletal muscles and bones are called the musculoskeletal system (also known as the locomotor system). Generally speaking, skeletal muscle is grouped into opposing pairs such as the biceps and triceps on the front and back of the upper arm. Skeletal muscles are under our conscious control, which is why they are also known as voluntary muscles. Another term is striated muscles, since the tissue looks striped when viewed under a microscope.
- **Smooth muscle** – located in various internal structures including the digestive tract, uterus and blood vessels such as arteries. Smooth muscle is arranged in layered sheets that contract in waves along the length of the structure. Another common term is involuntary muscle, since the motion of smooth muscle happens without our conscious awareness.
- **Cardiac muscle** – the muscle specific to the heart. The heart contracts and relaxes without our conscious awareness.

Make-up of muscle

Skeletal, smooth and cardiac muscle have very different functions, but they share the same basic composition. A muscle is made up of thousands of elastic fibres bundled tightly together. Each bundle is wrapped in a thin transparent membrane called a perimysium.

An individual muscle fibre is made up of blocks of proteins called myofibrils, which contain a specialised protein (myoglobin) and molecules to provide the oxygen and energy required for muscle contraction. Each myofibril contains filaments that fold together when given the signal to contract. This shortens the length of the muscle fibre which, in turn, shortens the entire muscle if enough fibres are stimulated at the same time.

The neuromuscular system

The brain, nerves and skeletal muscles work together to cause movement. This is collectively known as the neuromuscular system. A typical muscle is serviced by anywhere between 50 and 200 (or more) branches of specialised nerve cells called motor neurones. These plug directly into the skeletal muscle. The tip of each branch is called a presynaptic terminal. The point of contact between the presynaptic terminal and the muscle is called the neuromuscular junction.

To move a particular body part:

- The brain sends a message to the motor neurones.
- This triggers the release of the chemical acetylcholine from the presynaptic terminals.
- The muscle responds to acetylcholine by contracting.

Shapes of skeletal muscle

Generally speaking, skeletal muscles come in four main shapes, including:

- **Spindle** – wide through the middle and tapering at both ends, such as the biceps on the front of the upper arm.
- **Flat** – like a sheet, such as the diaphragm that separates the chest from the abdominal cavity.
- **Triangular** – wider at the bottom, tapered at the top, such as the deltoid muscles of the shoulder.
- **Circular** – a ring-shape like a doughnut, such as the muscles that surround the mouth, the pupils and the anus. These are also known as sphincters.

Muscle disorders

Muscle disorders may cause weakness, pain, loss of movement and even paralysis. The range of problems that affect muscles are collectively known as myopathy. Common muscle problems include:

- Injury or overuse, including sprains or strains, cramps, tendonitis and bruising
- Genetic problems, such as muscular dystrophy
- Inflammation, such as myositis
- Diseases of nerves that affect muscles, such as multiple sclerosis
- Conditions that cause muscle weakness, such as metabolic, endocrine or toxic disorders; for example, thyroid, and adrenal diseases, alcoholism, pesticide poisoning, medications (steroids, statins) and myasthenia gravis
- Cancers, such as soft tissue sarcoma.

Where to get help

- Your doctor
- Physiotherapist
- Exercise physiologist **ESSA Exercise & Sports Science Australia**
- Osteopath
- NURSE-ON-CALL Tel. 1300 60 60 24 – for expert health information and advice 24 hours, 7 days

Things to remember

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