
Bones

Summary

- Bones are made up of connective tissue reinforced with calcium and specialised bone cells.
 - The body is constantly remodelling the skeleton by building up new bone tissue and breaking down old bone tissue as required.
 - Healthy bone needs a balanced diet, regular weight-bearing exercise and the right levels of various hormones.
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Bones provide the structure for our bodies. The adult human skeleton is made up of 206 bones. These include the bones of the skull, spine (vertebrae), ribs, arms and legs. Bones are made of connective tissue reinforced with calcium and specialised bone cells. Most bones also contain bone marrow, where blood cells are made.

Bones work with muscles and joints to hold our body together and support freedom of movement. This is called the musculoskeletal system. The skeleton supports and shapes the body and protects delicate internal organs such as the brain, heart and lungs.

Bones contain most of our body's calcium supply. The body is constantly building up and breaking down bone tissue as required. Healthy bone needs a balanced diet, regular weight-bearing exercise and the right levels of various hormones.

The skeleton

The human skeleton is made up of 206 bones, including bones of the:

- Skull – including the jaw bone
- Spine – cervical, thoracic and lumbar vertebrae, sacrum and tailbone (coccyx)
- Chest – ribs and breastbone (sternum)
- Arms – shoulder blade (scapula), collar bone (clavicle), humerus, radius and ulna
- Hands – wrist bones (carpals), metacarpals and phalanges
- Pelvis – hip bones
- Legs – thigh bone (femur), kneecap (patella), shin bone (tibia) and fibula
- Feet – tarsals, metatarsals and phalanges.

Bone types

There are four different types of bone in the human body:

- **Long bone** – has a long, thin shape. Examples include the bones of the arms and legs (excluding the wrists, ankles and kneecaps). With the help of muscles, long bones work as levers to permit movement.
- **Short bone** – has a squat, cubed shape. Examples include the bones that make up the wrists and the ankles.
- **Flat bone** – has a flattened, broad surface. Examples include ribs, shoulder blades, breast bone and skull bones.
- **Irregular bone** – has a shape that does not conform to the above three types. Examples include the bones of the spine (vertebrae).

Bone tissue

The different layers of bone tissue include:

- **Periosteum** – the dense, tough outer shell that contains blood vessels and nerves
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- **Compact or dense tissue** – the hard, smooth layer that protects the tissue within
- **Spongy or cancellous tissue** – the porous, honeycombed material found inside most bones, which allows the bone to be strong yet lightweight
- **Bone marrow** – the jelly-like substance found inside the cavities of some bones (including the pelvis) that produces blood cells.

Bone marrow

Bone marrow is where blood cells are made. The three different types of blood cell made by bone marrow include:

- **Red blood cells** – carry oxygen around the body.
- **White blood cells** – make up the body's immune system.
- **Platelets** – are used for clotting.

Bone cells

Our body is constantly remodelling its skeleton by building up and breaking down bone tissue as required. As a result, each bone is rebuilt from scratch about every decade. The bone cells involved in this process include:

- **Osteoblasts** – the cells that build bone tissue
- **Osteocytes** – the cells that maintain bone tissue by controlling the mineral and calcium content
- **Osteoclasts** – the cells that break down old bone tissue.

Bone density

Many factors work together to ensure the strength and health of bones. Bone density relies on:

- A steady supply of dietary calcium
- Adequate vitamin D from sunshine and food
- A healthy diet with plenty of vitamins and minerals
- Various hormones including parathyroid hormone, growth hormone, calcitonin, oestrogen and testosterone
- Regular weight-bearing exercise.

Bone conditions

Some conditions of bone include:

- **Fractures** – broken bones of various types
- **Osteoporosis** – loss of bone density and strength
- **Osteomyelitis** – infection of the bone
- **Osteitis** – bone inflammation, for example, Paget's disease of the bone
- **Acromegaly** – overgrowth of bones in the face, hands and feet
- **Fibrous dysplasia** – abnormal growth or swelling of bone
- **Rickets** – a child's growing bones fail to develop due to a lack of vitamin D
- **Multiple myeloma** – cancer of the plasma cells in bone marrow
- **Bone cancer** – primary bone cancers include osteosarcomas and chondrosarcomas. However, most cancers found in bone have spread from other organs such as the breast, prostate, lung or kidney.

Where to get help

- Your doctor
- **Musculoskeletal Australia**. National Help Line Tel. **(03) 8531 8000** or **1800 263 265**
- **NURSE-ON-CALL** Tel. **1300 60 60 24** – for expert health information and advice 24 hours, 7 days

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