



Introduction to Body Systems

THE SKELETAL SYSTEM, THE MUSCULAR SYSTEM, & THE
INTEGUMENTARY SYSTEM

References

HOLT SCIENCE & TECHNOLOGY, NORTH CAROLINA, GRADE 7.
HOLT, RINEHART AND WINSTON: A HARTCOURT EDUCATION
COMPANY, 2005. SECTION 5: BODY ORGANIZATION AND
STRUCTURE, PP. 146 – 173.

Introduction to Body Systems

- Homeostasis – the maintenance of a constant internal state in a changing environment
- The environment around you is always changing and your body has to adjust to these conditions
- Maintaining homeostasis is not easy
 - You need nutrients and oxygen
 - Wastes need to be removed
 - Defend itself against disease
- Your cells do different things and have different jobs

Falling Out of Balance

- Sometimes your body can't maintain homeostasis
 - If you don't eat the right foods - cells don't get the nutrients they need
 - Can't fight disease – bacteria and viruses
- What happens when homeostasis is disrupted?
 - Cells may be damaged or die
 - You can become sick
 - You can die

Temperature Regulation

- When you are hot . . .
 - You give off heat
 - You sweat
 - As sweat evaporates on your skin, your body is cooled
 - Sweating is a process to help with homeostasis
- When you are cold . . .
 - You shiver
 - Helps you stay warm
 - If your body can't stay warm – it is called hypothermia (body temperature falls below normal)

Moving Materials

- Cells need nutrients for life processes
- If nutrients are not delivered . . .
 - Cells can not complete their life processes
 - Cells die
- If a cell can not get rid of wastes . . .
 - Wastes are toxic
 - The waste will damage the cell

Body Organization

- Cells – the basic, and smallest units of life
- Tissue – a group of similar cells working together
- Organs – two or more tissues working together
- Organ systems – two or more organs working together

The Skeletal System

WHEN YOU HEAR SKELETON, WHAT DO YOU THINK OF?

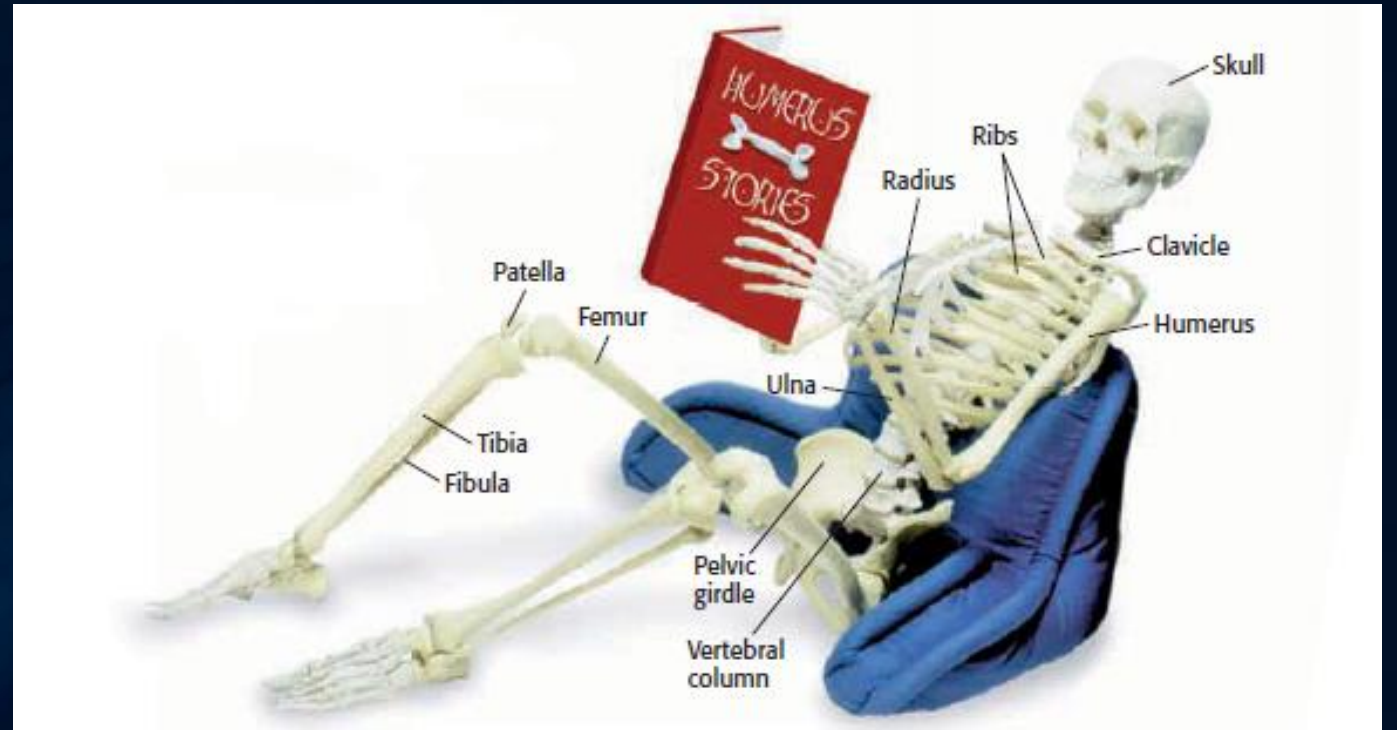
Skeletal System

Skeletal System – the organ system whose primary system is to support and protect the body and to allow the body to move

The average adult human skeleton has 206 bones.

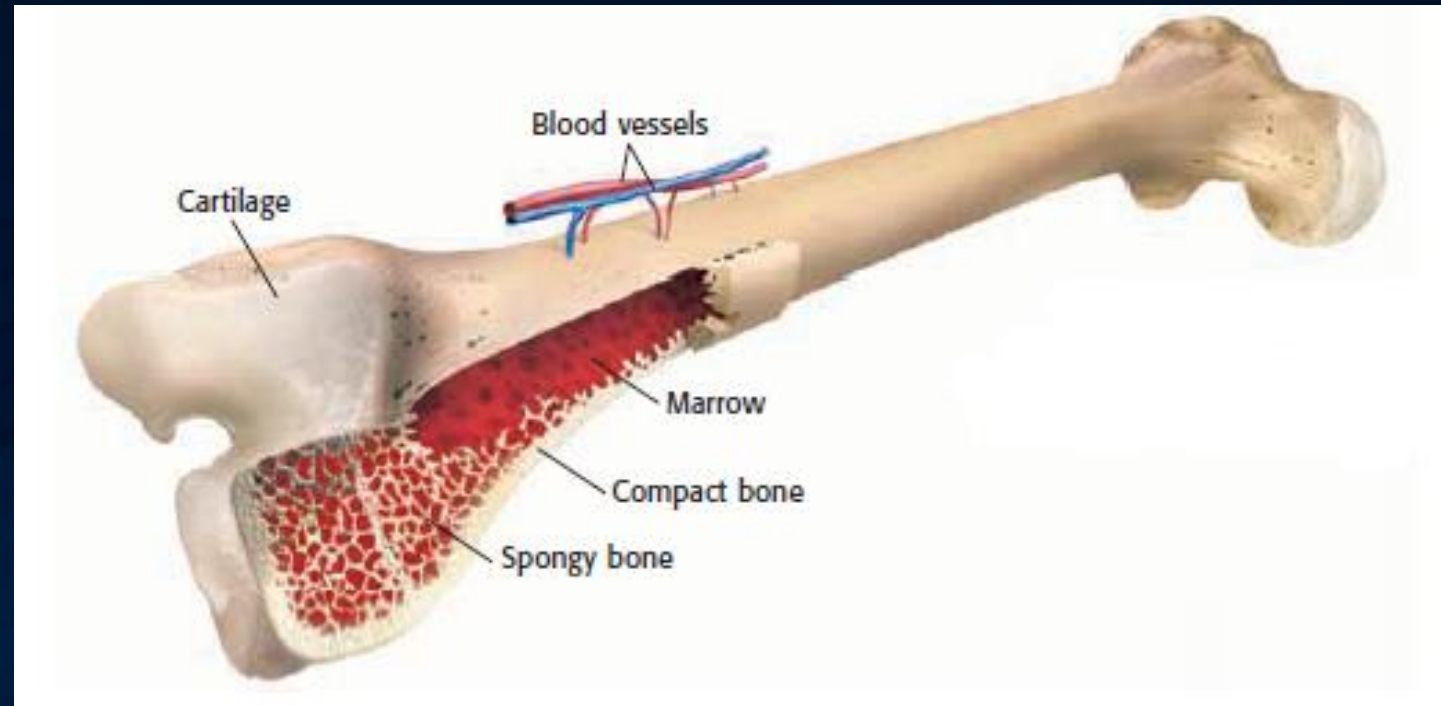
Your bones help:

- Protection (ex.: heart/lungs – ribs; spinal cord – vertebrae; brain – skull)
- Storage (bones store minerals and fat)
- Movement – without bones you would not be able to sit, stand, walk or run
- Blood Cell Formation – bones have marrow that makes blood cells



Bone Structure

- A bone is a living organ made of several different tissues
 - Connective Tissue and minerals
 - Minerals are deposited by living cells (osteoblasts)
- Two kinds of bone tissues
 - Compact Bone – bone tissue does not have any visible open spaces
 - Rigid and dense
 - Tiny canals within compact bone contain small blood vessels
 - Spongy Bone – bone tissue that has many open spaces
- Bones contain soft tissue called marrow
 - Red Marrow produces both red and white blood cells
 - Yellow marrow, found in the central cavity of the long bones, stores fat

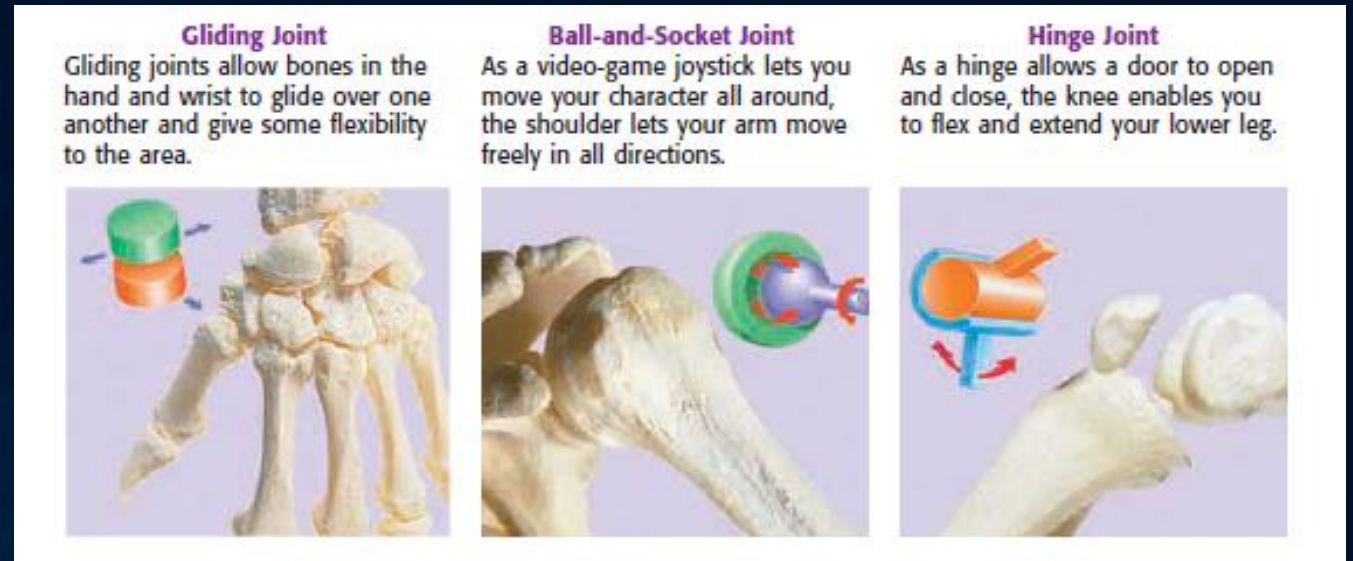


Bone Growth

- Most bones start out as flexible tissue – cartilage.
- As you grow, most of the cartilage is replaced with bone
- Most bones have growth plates of cartilage during childhood
- Nose and top of ear are where cartilage is not replaced by bone

Joints

- Joint – a place where two or more bones meet
 - Allow your body to move when your muscles contract
- Fixed Joints – allow little to no movement (joints in the skull)
- Joints can be classified on how the bones in the joint move
 - Gliding joint – allow bones in the hand and wrist to glide over one another and give some flexibility
 - Ball & Socket Joints – like a video-game joystick
 - Hinge Joint – as a hinge allows a door to open and close, the knee enables you to flex and extend your lower leg
- Joints are held together by ligaments
 - Ligaments – strong elastic bands of connective tissue (connects bone to joints)
 - Cartilage covers the ends of bones – cushions the area in the joint where the bones meet



Injuries & Diseases

- Bones can be fractured or broken
- Joints can be injured (dislocations or sprain)
- Diseases
 - Osteoporosis – disease that causes bones to become less dense (bones become weak and break more easily) – caused by age and poor eating habits
 - Arthritis – joints swell or stiffen. Very painful.



The Skeletal System – Discovery Education



The Muscular System

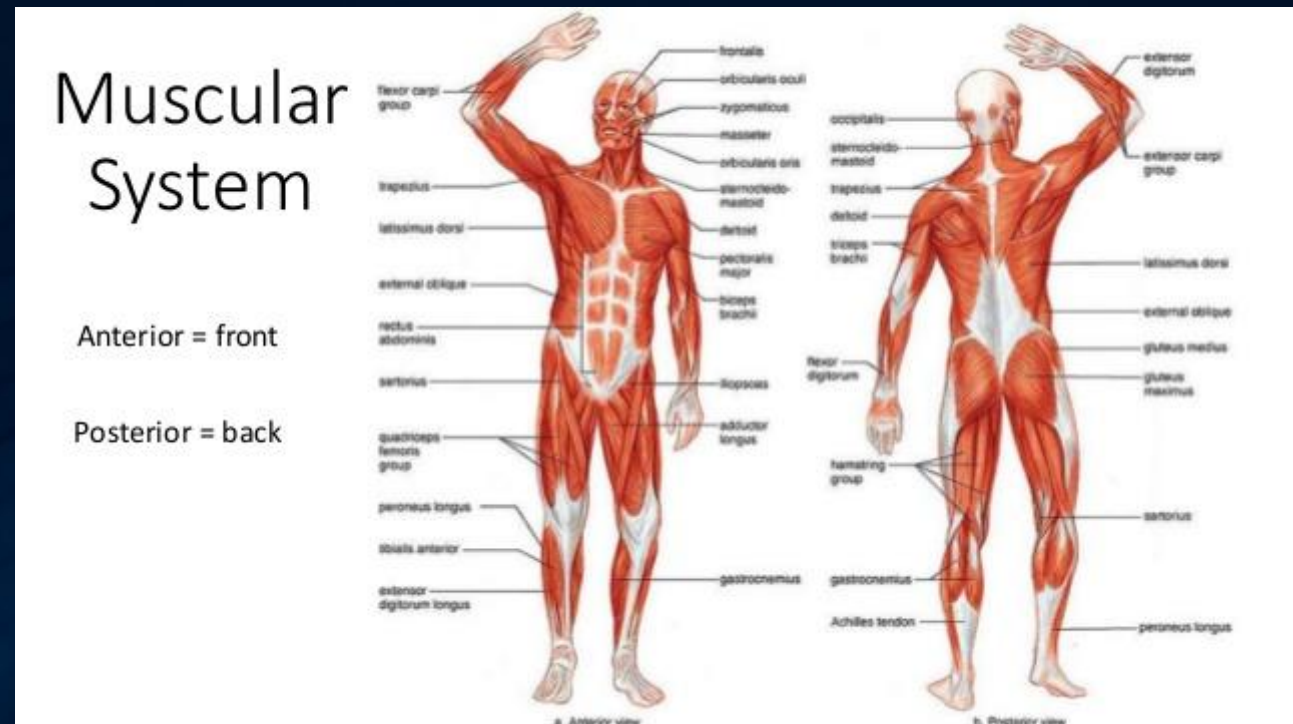
HOW DOES YOUR SKELETON MOVE?

Muscular System

Muscular System – the organ system whose primary function is movement and flexibility

You use muscles when you eat, breathe, hold you upright and let you move!

If your muscles relaxed all at once, you would collapse.



Kinds of Muscle

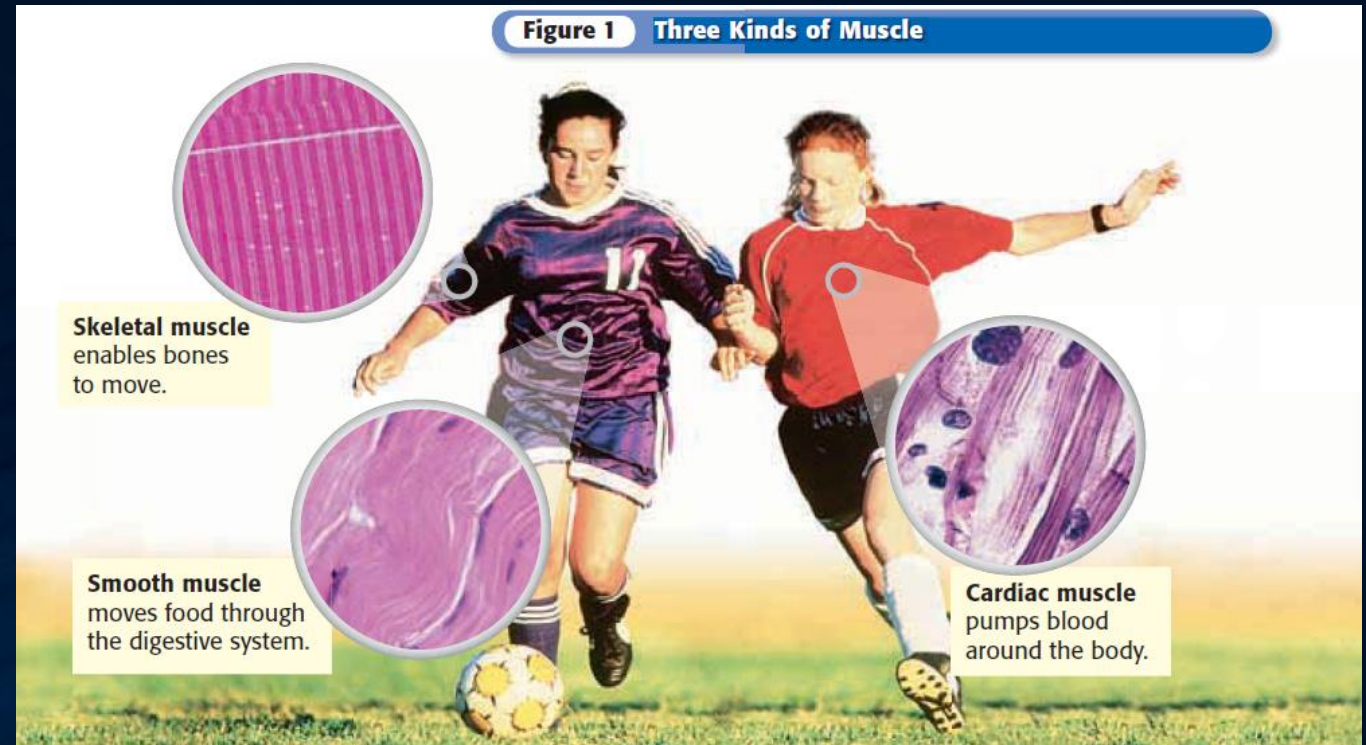
Smooth muscle – found in the digestive tract and the walls of the blood vessels

Cardiac muscle – found only in the heart

Skeletal muscle – attached to your bones for movement

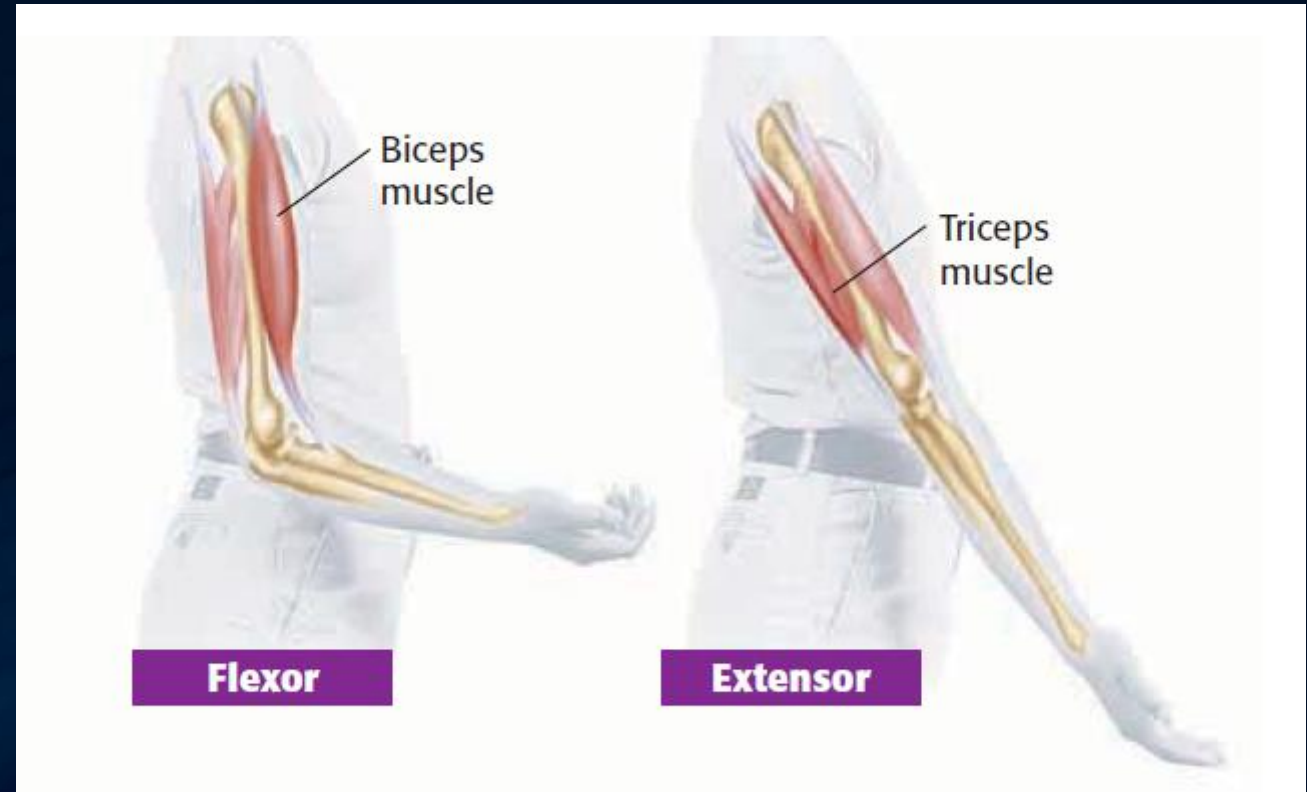
Muscle action can be voluntary or involuntary.

- Muscle action under YOUR control is voluntary
- Muscle action NOT under YOUR control is involuntary (smooth muscle and cardiac muscle)
- Skeletal muscle can be voluntary and involuntary (blinking your eyes)



Movement

- Muscles attach to bone
 - Tendons – tough connective tissue that connect your skeletal muscles to bones
 - When a muscle gets SHORTER (one that connects two bones together) – the bones are pulled closer to each other
- Muscles work in pairs
 - Flexor – muscle that bends part of your body
 - Extensor – muscle that straightens part of your body
 - In your arm, the bicep muscle is a flexor and the triceps is the extensor



Exercise

- Use it OR lose it!
 - What do you think happens when your arm in a cast for a long time?
 - Muscles weaken when they are not exercised (arms, legs, heart)
 - Two kinds of exercise increase muscle strength and endurance: resistance and aerobic exercise.
- Resistance Exercise
 - People work against the resistance or weight of an object
- Aerobic Exercise
 - Steady, moderately intense activity
 - Jogging, cycling, skating, swimming, walking
 - Strengthens the heart and increases endurance



Muscle Injury

- Any exercise program should **START SLOW!**
- Remember to always warm up before you exercise
- Strain – an injury when the muscle or tendon is overstretched or torn
- Tendonitis – tendon becomes inflamed due to overuse (long rest is needed for the injured tendon to heal)



The Integumentary System

THE LARGEST ORGAN IN THE BODY!

Integumentary System

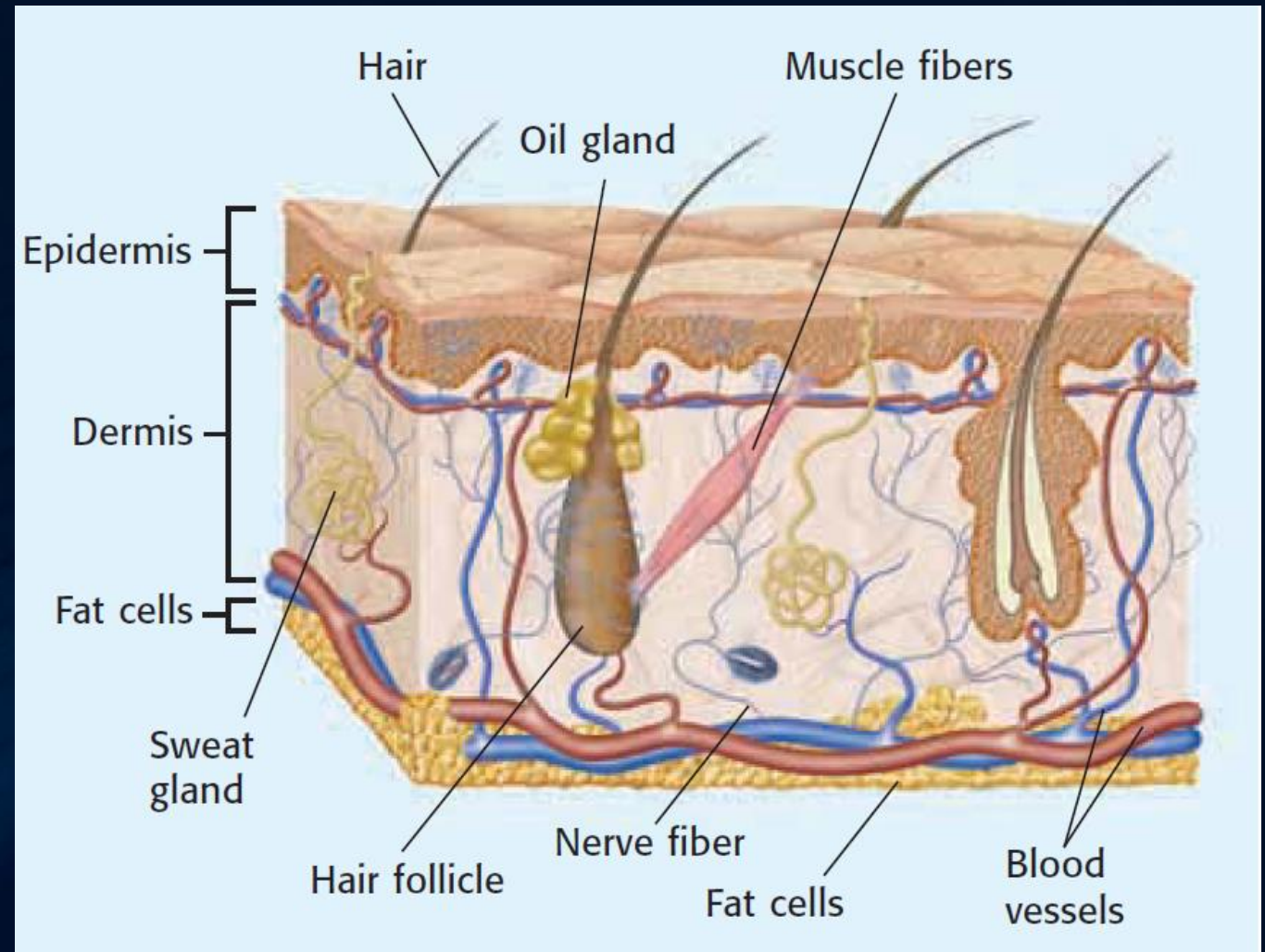
- Integumentary system – covers your body and helps you maintain homeostasis
 - Skin
 - Hair
 - Nails
- Functions of the skin
 - Protects you by keeping water in your body and foreign particles out of your body
 - Keeps you in touch with the outside world (nerve endings let you feel things around you)
 - Helps regulate body temperature
 - Helps get rid of wastes (removed by sweat)

Skin Color

- Skin color is determined by a chemical called melanin
- A lot of melanin – the skin is dark
- Little melanin – the skin is very light
- Absorbs ultraviolet light from the sun
- Skin should be protected from sunlight to avoid skin cancer.

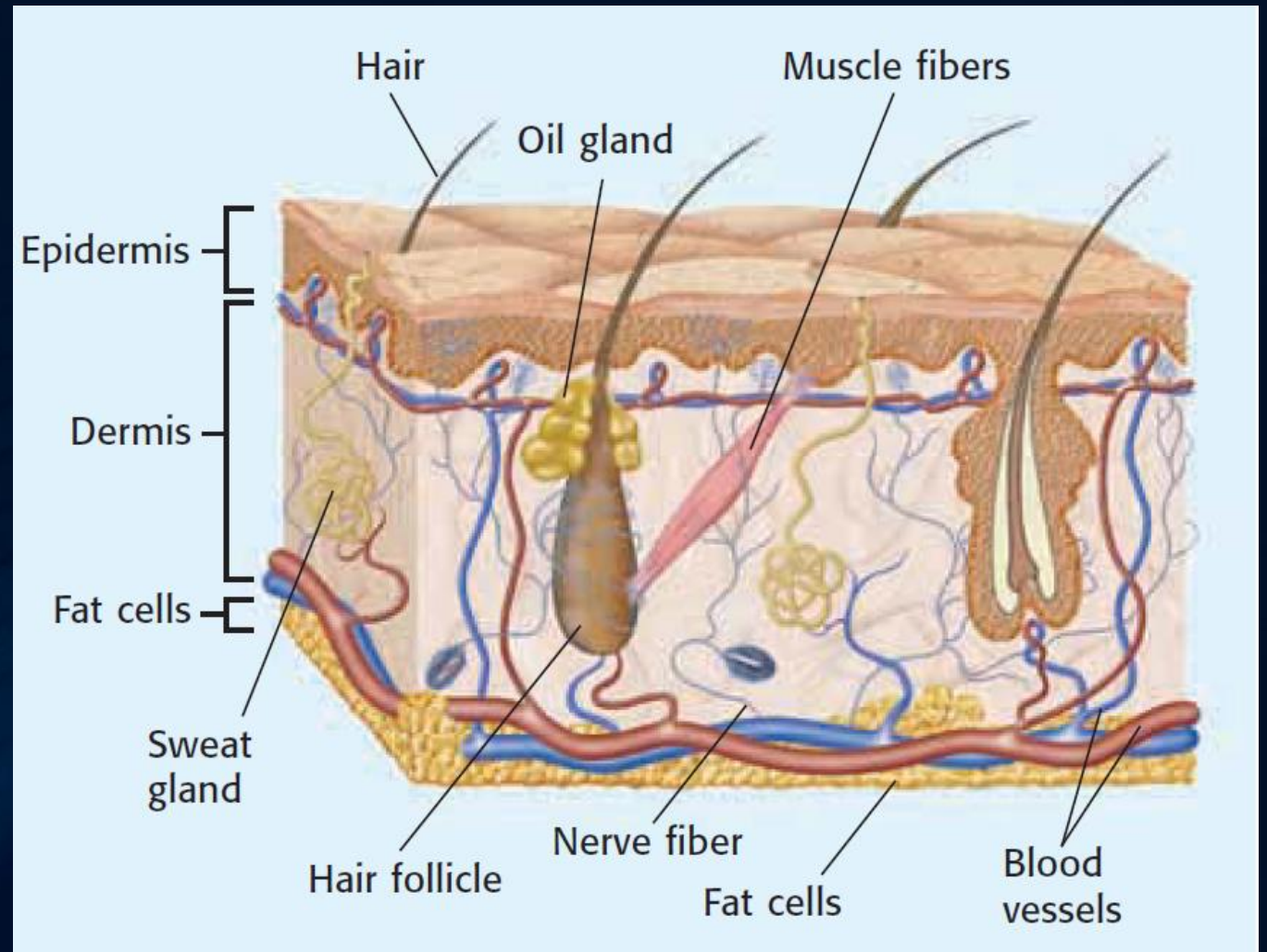
Structure

- Blood vessels – transport substances and help regulate body temperature
- Nerve fibers carry messages to and from the brain
- Hair follicles in the dermis make hair
- Muscle fibers attached to a hair follicle contract and cause the hair to stand up



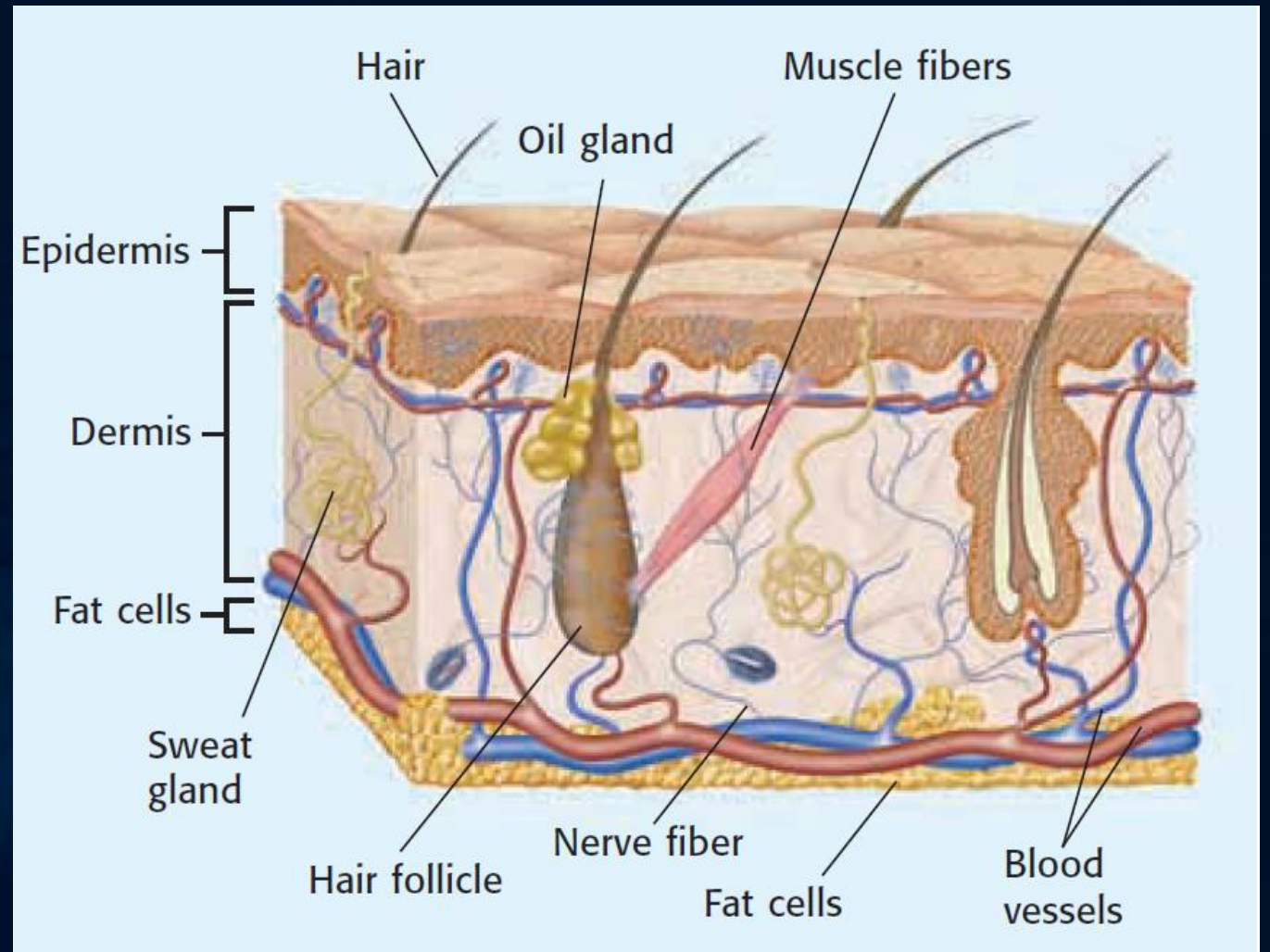
Structure

- Oil glands release oil that keeps hair flexible and waterproofs the epidermis
- Sweat glands release sweat to cool the body and remove wastes



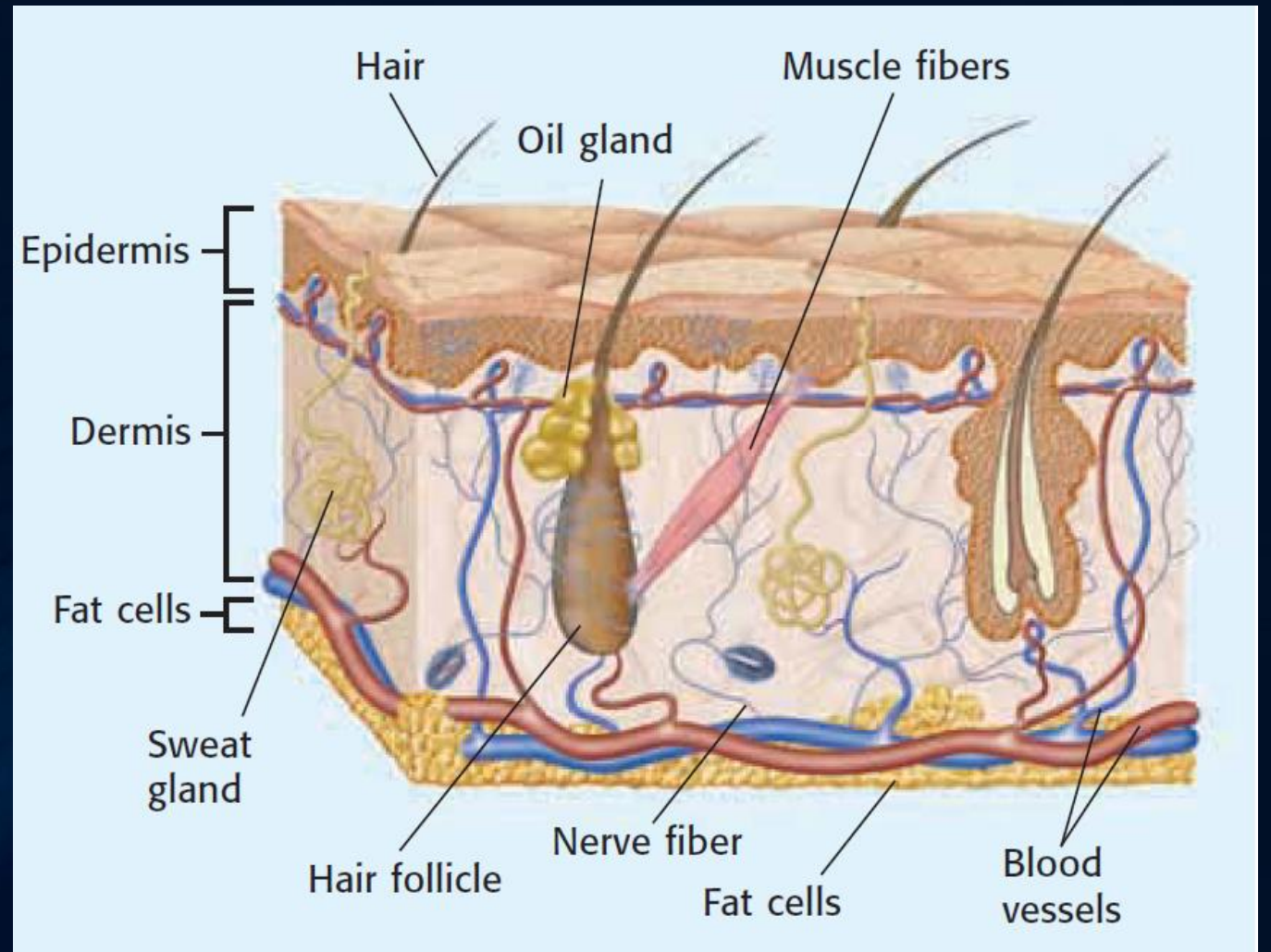
Layers

- Epidermis – the surface layer of cells on a plant or animal
 - Made of epithelial tissue
 - It is as thick as two sheets of paper over the whole body
 - These cells are filled with protein called keratin, which makes the skin tough



Layers

- Dermis – the layer of skin below the epidermis
 - Beneath the epidermis
 - Has many fibers called collagen – to provide strength



Hair & Nails

- Like the skin, hair and nails are made of living and dead cells
- A hair forms at the bottom of a tiny sac called a hair follicle
- The hair grows as new cells are added at the hair follicle – older cells get pushed upward
- Only living cells in a hair are in the hair follicle
- Hair color comes from melanin



Hair & Nails

- Hair helps protect skin from ultraviolet light.
- Keeps particles out of your eyes and nose
- Helps regulate body temperature

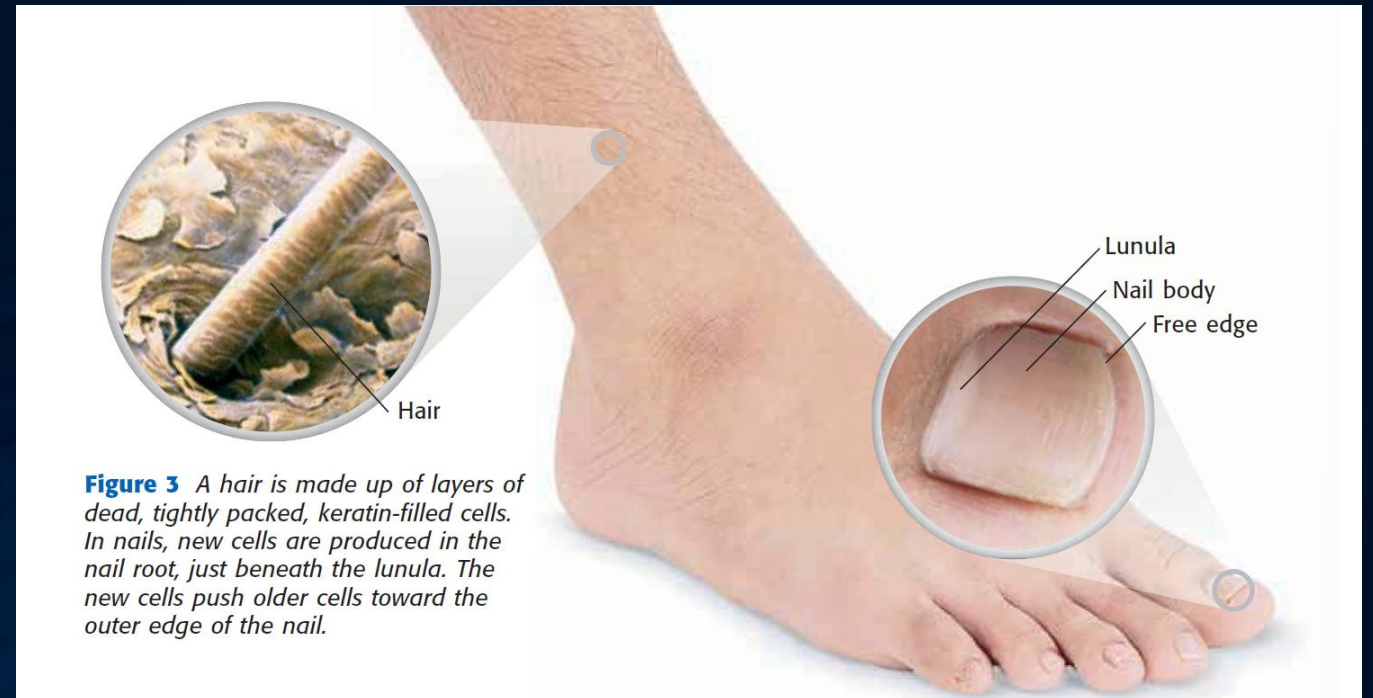


Figure 3 A hair is made up of layers of dead, tightly packed, keratin-filled cells. In nails, new cells are produced in the nail root, just beneath the lunula. The new cells push older cells toward the outer edge of the nail.

Hair & Nails

- Nails grow from living cells in the nail root at the base of the nail
- As new cells form, the nail grows
- Nails protect fingers and toes

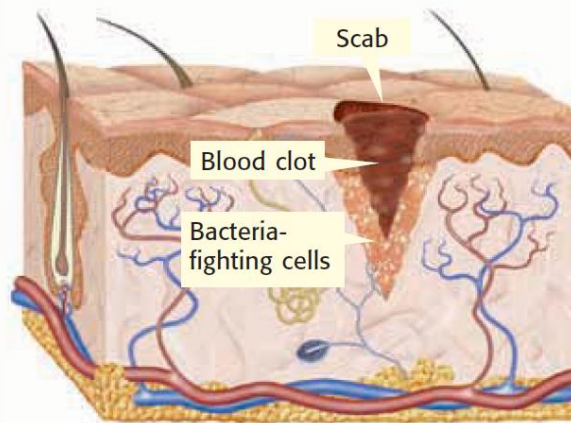


Figure 3 A hair is made up of layers of dead, tightly packed, keratin-filled cells. In nails, new cells are produced in the nail root, just beneath the lunula. The new cells push older cells toward the outer edge of the nail.

Injuries

- Skin can be damaged, but the skin can repair itself
- Damage to genetic material can cause cancer
- Hormones can cause oil glands to make too much oil – which clog hair follicles with dead skin cells - acne

1 A blood clot forms over a cut to stop bleeding and to keep bacteria from entering the wound. Bacteria-fighting cells then come to the area to kill bacteria.



2 Damaged cells are replaced through cell division. Eventually, all that is left on the surface is a scar.

