

Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About..." list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised, before viewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of student understanding. A couple of suggestions are listed below:

- How is the skeletal system like the frame of a building?
- What actually happens when we move a body part, like an arm? Explain how our bones and muscles work together when we move our bodies.
- What would our bodies be like if we didn't have bones or muscles? Would it be possible to move? Explain your answer.

Follow-up Activities

- Obtain chicken bones from a butcher shop to show how bones and muscles are joined and can move, where tendons and ligaments are located, where marrow is located, and where cartilage coating covers bone tips. If these are placed in sealed plastic bags, students can manipulate them to see how they are connected and how they are able to move.
- Have students create models of the different types of movements and joints we have in our body, using cardboard, paper towel cylinders or oak tag for bones; brass fasteners for joints; and rubber bands stapled on to the bones for muscles. Students can demonstrate how the shoulder can rotate, how the elbow is like a door hinge, and how the wrist can swivel.
- Invite an orthopedic doctor into the classroom as a class visitor. Ask the doctor to share information about how bones and muscles work together to help the body move. Encourage the doctor to bring visuals into the classroom to share with the students, including pictures, models and X-rays.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- www.kidshealth.org/kid/body/mybody_SW.html
The "KidsHealth" Web site developed by the Nemours Foundation is an interactive journey through the human body.
- yucky.kids.discovery.com/flash/body/
These pages called "Your Gross and Cool Body" from The Yuckiest Site on the Internet explain how the muscular and skeletal systems work.
- www.brainpop.com/health/skeletal/skeleton/
The Brain POP Web site has movies and printable activity pages dealing with the skeletal and muscular systems.

Suggested Print Resources

- Ballard, Carol. *How Do We Move?* Raintree Publishers, Inc., Austin, TX; 1998.
- Llewellyn, Claire. *The Big Book of Bones: An Introduction to Skeletons.* Peter Bedrick Books, New York, NY; 1998.
- Sandeman, Anna. *Bones.* Copper Beech Books, Brookfield, CT; 1995.
- Simon, Seymour. *Bones: Our Skeletal System and Muscles: Our Muscular System.* Morrow Junior Books, New York, NY; 1998.

TEACHER'S GUIDE CONSULTANT

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TITLES

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All About Bones & Muscles

Grades K-4

This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

Before Viewing: Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create an "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

After Viewing: After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



Program Summary

Without our systems of bones and muscles, we would be unable to move! The skeletal system creates a frame of 206 bones, which give the body shape, provide places for muscles to hold on to, and protect important body organs from damage. Together with the skeletal system, the muscular system and its 650 muscles help us to walk, run, play and even show facial expressions. Many muscles are attached to bones and when muscles tighten up, or contract, they move the bones, which in turn, moves the body.

Bones are alive! They store an important natural mineral, calcium, which gives them their hardness and strength. We get calcium from drinking milk and eating foods like cheese. Without enough calcium, bones become softer and can break more easily. Bones do not start out being hard and strong. Babies are born with 350 bones, many of which are soft, bendable and made of cartilage (which we still have in our ears and the tips of our noses). Over time, softer cartilage is replaced by hard bone and the number of bones reduces to 206. There are several types of bones: long bones, short bones and flat bones. Long bones, like the arm and leg bones, are the thickest and strongest bones in the body because they support a lot of weight. Hands and feet have many short bones to provide flexibility of movement. Flat bones, like the ones that make up the skull and ribs, provide the armor for protecting important organs like the brain and heart. The long bones in the arms and legs are actually hollow, but they are filled with a special substance called marrow. Marrow is what produces all of the body's red and white blood cells.

Though bones are hard, the body can move easily in certain places because of joints. Joints, as in elbows and knees, are places where two or more bones meet. The tips of bones are coated by cartilage to keep these parts from grinding against each other as they move. Ligaments are tough, flexible cables that connect bones together, holding joints in place. Of course, muscles, which attach to bones by thick, strong cords called tendons, also help to keep the skeleton together. Muscles that attach to bones are called skeletal muscles. When skeletal muscles contract, they pull the bones to which they are attached. That's how the body moves and bends. Whenever we want to move in a certain way, the brain tells the right muscles to contract. The muscles we can control are called voluntary muscles. Other muscles, such as in the heart, lungs and stomach, are not under our control, and are called involuntary muscles. Fortunately, we don't have to think about pumping our heart to make those muscles move!

Bone and muscle systems work together so well! It would be impossible for us to live and move without them.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

bones — Organs that are made of hard, strong tissue. Bones make up the skeletal system.

muscles — Organs that are made of strong, tough tissue that is able to tighten up and relax. Muscles make up the muscular system.

tissue — Living material that makes up the organs of the body.

system — A group of parts that work together to do a job.

skeletal system — One of the major human body systems that is made of a skeleton of 206 bones. The skeletal system gives the body its shape, provides places for many muscles to attach, and provides protection for the major organs.

muscular system — One of the major human body systems that is made of 650 muscles, and gives the body the ability to move and bend.

calcium — The natural mineral that makes bones strong. Calcium comes from foods like milk and cheese.

long bones — The longest and thickest bones in the body. These bones are found in parts of the body that support a lot of weight, like in the legs and arms.

short bones — The smallest bones in the body. Hands and feet have many short bones, because they provide flexibility of movement.

flat bones — The bones that are used to protect major organs. Flat bones make up the skull and ribs.

stirrup bone — The smallest bone in the human body, located deep inside the ear.

marrow — A soft substance that fills some of the long bones in the arms and legs. Marrow makes red and white blood cells.

joint — The place where two or more bones meet, which allows the body to bend and rotate. Examples of joints are the elbow, shoulder and knees.

cartilage — A special substance that is soft, flexible, smooth and slippery, and coats the ends of bones to keep them from grinding against each other. Cartilage is what gives shape to the ears and the tip of the nose.

ligaments — Tough, flexible cables that attach bones to other bones to help keep them in place.

skeletal muscles — The muscles that attach to bones, in order to pull on them to make them move.

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tendons — Thick, strong cords that attach skeletal muscles to bones. There is a large tendon above the heel, which attaches the calf muscle to the heel, so that the foot can move back and forth.

voluntary muscles — The muscles that we are able to control to move the body around.

involuntary muscles — The muscles that tighten and relax when they need to, working automatically to help us breathe, digest our food, and keep the heart beating.

Pre-viewing Discussion

Before students generate their list of “Everything We Know About...” this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What are bones and muscles? Where are they located?
- What do our bones and muscles help us to do?

After the class has completed their “Everything We Think We Know About...” list, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

1. What are bones?
2. What are the main jobs of the skeletal system?
3. What is the muscular system?
4. Why is it important for us to drink milk, and eat foods like cheese, yogurt and leafy green vegetables?
5. How are the bones of a baby different from those of an adult?
6. Describe long, short and flat bones. Give an example of each.
7. Why are thick, strong bones not very heavy?
8. What is marrow?
9. Why is marrow important?
10. Give some examples of joints in the body.
11. What holds the bones together at the joints?
12. How are ligaments and tendons different from each other?
13. What is cartilage? What does it do?
14. Can we move all the muscles in the body if we want to?
15. What is the difference between voluntary and involuntary muscles?
16. Why is regular exercise important for bones and muscles?