Adventures In Medicine & Science (AIMS)
Practical Anatomy & Surgical Education
St. Louis University School of Medicine
Distance Learning Program
Mr. Bones

A discussion of the human skeletal system presented by a physician, medical or graduate student using human skeleton model to demonstrate skeletal system anatomy and physiology. Common injuries and disorder of the skeletal system will be discussed as well as ways to keep the skeletal system healthy.

Skeletal System

1. **Pre-Program activites: Pre-test** In cooperative groups have students identify and label bones on a printout of the human skeletal system.
2. **Post-Program Activites**: Post-test. In cooperative groups have students identify and label bones on a printout of the human skeletal system. Make a Boney Mobile

OBJECTIVES:

1. Identify twenty major bones in the body.
2. State the functions of the skeletal system.
3. Describe the composition of bone.
4. Discuss some injuries or disorders of the skeletal system.
5. Students will be able to tell 3 ways to take care of bones
6. Students will understand how bones fit together and how many bones there are in the human body.
7. Students will count and estimate the number and location of their bones.

1. Using a skelton model, the presenter will describe and point out the following major bones of the human skeleton and their structure and function.
The major bones:

Carpals	**Mandible**	**Rib**
Clavicle	**Metacarpals**	**Sacrum**
Coccyx	**Metatarsals**	**Scapula**
Cranium	**Patella**	**Sternum**
Femur	**Pelvis**	**Tarsals**
Fibula	**Phalanges**	**Tibia**
Humerus	**Radius**	**Ulna**
Vertebral Column		

2. **Function of the Skeletal System**

The human skeletal system is designed to support the human body, offer it protection, and provide a means of locomotion. Bone is the essential framework to which muscles are attached.

3. **Composition of Bone**

Bones are made of a mix of hard materials that gives them strength and tons of living cells which help them grow and repair themselves. Like other cells in your body, the bone cells rely on blood to keep them alive. Blood brings them food and oxygen and takes away waste.

Many bones are hollow. Their hollowness makes bones strong and light. It's in the center of many bones that bone marrow makes new red and white blood cells. Red blood cells ensure that oxygen is distributed to all parts of your body and white blood cells ensure you are able to fight germs and disease

The human skeleton consists of 206 bones. We are actually born with more bones (about 300), but many fuse together as a child grows up. These bones support your body and allow you to move. Bones contain a lot of calcium (an element found in milk, broccoli, and other foods). Bones manufacture blood cells and store important minerals.

The longest bone in our bodies is the femur (thigh bone). The smallest bone is the stirrup bone inside the ear. Each hand has 26 bones in it. Your nose and ears are not made of bone; they are made of cartilage, a flexible substance that is not as hard as bone.

Joints: Bones are connected to other bones at joints. There are many different types of joints, including: fixed joints (such as in the skull, which consists of many bones), hinged joints (such as in the fingers and toes), and ball-and-socket joints (such as the shoulders and hips).

Differences in males and females: Males and females have slightly different skeletons, including a different elbow angle. Males have slightly thicker and longer legs and arms; females have a wider pelvis and a larger space within the pelvis, through which babies travel when they are born.

4. **Injuries and disorders of the skeletal system**

- **Review X Rays of problems with bones**
- **Broken bones- Fractures**

Lateral forces, twisting stresses, and powerful impacts may cause the bone to break, or fracture. There are two types of fractures: closed and open. A closed fracture occurs when the skin is not broken. An open fracture is when the skin has been broken and involves an open wound. This type of fracture is more serious because of the increased risk of infection and shock caused by blood loss and damaged tissue.

Keeping the broken body part stationary -- immobilizing it -- will stabilize the injured area and prevent the bones from shifting until further treatment is available. Splints are used to immobilize an area. They can be made from cardboard, newspapers, sticks, or any other rigid material.

When a **cast** is needed, the doctor first checks that the bones are in correct alignment to promote proper healing. A cast is then placed over the fractured area to immobilize it, allowing the bones to grow back and heal in the desired configuration.

Although fractures are an unfortunate occurrence, most of us can take precautions to avoid them. There are certain diseases, however, that make some people more susceptible to fractures.

- Diseases of the bone, including **osteoporosis, rickets,** and **osteoarthritis** can cause bone deterioration or fragility. This can increase the likelihood or severity of a bone fracture.

- Discuss some of these topics: materials used in joint replacements; the effects of aging on bones; and the healing process of bones.

5. Taking Care of Bones
Bones are a big deal: they give our bodies shape and structure, they protect our insides and more! Taking care of your bones isn't hard to do. Here are some tips:

- First, be sure to protect those skull bones (and your brain inside!) by wearing a helmet every time you ride your bike.
- When you go skateboarding, in-line skating, or using your scooter, be sure to add wrist supports and elbow and knee pads - the bones in these places will thank you if you have a fall!
- If you play a sport like football, soccer, or ice hockey, always wear all the equipment that's required for the sport.
- Take care of your skeleton by drinking milk and eating other dairy products (like low-fat cheese, frozen yogurt, and ice cream, for example). The reason? All of these things contain calcium, which helps bones harden and become strong.

- Participate in weight bearing exercises

6.. Estimate the number of bones in your body. Count the number of bones on fhe skeleton. What looks like the longest bone in the skeleton?

Glossary:
Bone Density Tests: A bone density test measures bone density at different sites of the body. This test can determine if a person has low bone mass. A person with low bone mass is at increased risk of fracture.

Calcium: A mineral contained in dairy products and dark leafy vegetables. Calcium is needed by the human body to make and maintain strong bones and muscles.

Calcium-fortified: Foods that have had calcium added to them such as juice, bread, soy milk, and cereal.

Calcium Supplements: These are calcium pills or tablets which can be taken if a person can not get enough calcium in her or his diet. There are different kinds of calcium supplements, such as calcium carbonate and calcium citrate. You can discuss the differences with your health care provider or pharmacist.

cast a device used to immobilize an area or fracture for an extended period of time

Fracture: Broken bone

marrow the soft tissue found inside bones

osteoarthritis a degenerative joint disease of unknown origin causing pain and decreased joint motion

Osteoporosis This is a condition that involves loss of bone mass that often occurs as people age; loss of bone mass weakens bones and creates an increased risk of fracture. Loss of bone mass can also be caused by certain medical conditions and by certain medications, such as corticosteroids, used to treat some illnesses.

rickets a childhood disease characterized by soft, deformed bones caused by a failure to absorb calcium due to inadequate vitamin D or sunlight

Vitamin D: A nutrient resulting from sunshine that helps the body absorb calcium. Vitamin D is found in most multivitamins and is often added to dairy products.

Weight-bearing Exercise: Weight-bearing exercise is exercise that forces you to work against gravity. Think of it this way - gravity is trying to pull you off your feet. Weight-bearing exercise is exercise on your feet - activities like walking, hiking, jogging, dancing, jump-roping, and playing tennis.

Educational Standards: The demonstration meets the following standards.

National Science Education (NSE) content standards for grades 5-8:

- Structure and function in living systems
- Systems order and organization
- form and function
- evidence, models and explanation

Show Me Standards: (Science, and Health/Physical Education)

- characteristics and interactions of living organisms
- properties and principles of matter and energy
- structures of, functions of, and relationships among human body systems
- principles of movement and physical fitness

Supplemental Resources:

Make a Skeleton Mobile:
http://serp.la.asu.edu/Health_dir/Health_dir8/BoneMobl.pdf

Bone builder activities
Labeled diagram:
http://www.beabonebuilder.com/worksheets/page3a.html
Not labeled diagram:
http://www.beabonebuilder.com/worksheets/page3a1.html

The Virtual Body- Bones Narrated- Build a Skeleton Game
http://www.medtropolis.com/vbody.asp

Human Anatomy on-line
http://www.innerbody.com/htm/body.html

Bone builders
http://www.beabonebuilder.com/

Put the skeleton back together
http://sv.berkeley.edu/showcase/pages/bones.html