

Activity 5.2.2: X-Ray Vision

Introduction

Although bones are very strong, they do sometimes fracture or break when they are placed under extreme stress. Your bones have great tensile and compressional strength and, thanks to both the hard mineral salts and flexible collagen fibers, can endure both stretching and squeezing. But sometimes the forces placed on bone are too great. Bones can crack, they can snap, or they can poke out of your skin. Your body is able to heal some of this damage on its own, but most times, medical assistance is necessary.

X-rays are a painless imaging technique that allows doctors to view internal injury and diagnose a variety of illnesses. A high-energy form of radiation is passed through the body and projected onto a film. Hard tissues such as bone absorb the X-rays and appear white. X-rays pass through softer tissues, such as muscle, and show up in black and gray. Other than the pain you may feel, X-rays are most often the first step in identifying a broken bone.

In this activity, you will take a look at X-rays of broken or damaged bone. Your task is to identify the bones involved, the type of fracture and the possible damage to internal organs. In the next activity, you will look at how the body is able to repair this damage and heal broken bone.

Equipment

* Computer with Internet access
* Broken bones X-ray set
* Activity 5.2.2 Student Resource Sheet
* Laboratory journal
* Skeletal system graphic organizer
* Small tape flags
* Post-it® notes
* Career journal

Procedure

1. With your partner, discuss what you know about broken bones. If you have had a broken bone, describe the experience.
2. Research each of the following types of bone fractures. Draw a diagram for each type of fracture in your laboratory journal that shows how the bone is damaged. Label each drawing. Use the websites listed in Step 3 to begin your investigation.

* Comminuted
* Depression
* Compression
* Transverse
* Oblique
* Spiral
* Greenstick
* Open vs. closed

1. View the following video and websites to help you visualize bone fractures.

* Human Anatomy Online: Broken Bones and Fractures <http://www.innerbody.com/image/skel06.html>
* WebMD: Understanding Fractures <http://www.webmd.com/osteoporosis/understanding-fractures-basic-information>

1. Take out or turn to your skeletal system graphic organizer. You should refer to this document for the names and locations of key bones.
2. Obtain a set of X-rays of broken bones from your teacher. Be careful not to write on, rip or bend each X-ray. The X-rays can be viewed by either laying them on white paper or by holding them up to a window.
3. Use your knowledge of skeletal system anatomy and the types of fractures to analyze the 13 X-rays of broken or damaged bone. Two of the X-rays show dislocations – the separation of two bones where they meet at a joint.
4. First, locate the injury in each X-ray and mark this area with arrows on a tape flag or Post-it® note.
5. Obtain a Student Resource Sheet from your teacher.
6. With your group, work to match the descriptions provided on the Student Resource Sheet with the injuries you identified on the X-rays.
7. Once you think you have matched the description to the X-ray, write the name of the injury on a Post-it® note and attach it to the X-ray. Make sure the Post-it® does not cover key bone areas.
8. Complete the following on each X-ray (except for those showing dislocations):

* To the best of your ability, determine the type of fracture shown in the X-ray. Choose from transverse, comminuted, oblique, compression or depression. Add the type of fracture to the Post-it note (under the name of the injury). Be able to defend your choice.
* Use small tape flags to identify all bones that are visible in the X-ray.
* If the bone protects particular internal organs, make sure to add the name of the organs to the tape flag.

1. Complete the following for the X-rays that show dislocations.

* Identify the site of the dislocation using a tape flag.
* Determine the type of joint that is injured. Add the type of joint to the Post-it® note (under the name of the injury). Refer back to your laboratory journal to review the types of joints.

1. Compare your X-rays labels with another group’s. First, make sure you agree on which X-ray goes with each description. Then check and see if you agreed on the type of break in each X-ray. Debate any differences.
2. Discuss your findings with the class.
3. Remove all tape flags and post-it notes and return the X-ray set to your teacher.
4. Medical professionals who specialize in taking and reading these X-rays are called X-ray technicians. Use the Internet to research this career area. In your career journal, write an advertisement for a job opening in this field. Think about the education that is required, the duties of the job, the salary range and the experience needed. You may want to begin your ad with “Wanted – X-Ray Technician.”

Conclusion

1. Describe at least three bones that function to protect a particular internal organ.
2. Which do you think would have a greater impact on the body’s homeostasis, an open or a closed fracture? Explain your reasoning.
3. Describe at least three types of medical interventions that can be used to treat and repair broken bones. Explain the theory behind each intervention.
4. Explain how a dislocation relates to joints and movement.
5. What do you think happens to the fracture rate of bones as we age? Explain.
6. Explain how damage to a bone could affect other body systems.