



Stiff Bones, Bendy Bones

What makes our bones stiff but flexible at the same time?

Description

Our bones are stiff, which helps us lift heavy things and walk around. Your bones are somewhat flexible too, which lets them bend slightly. In this activity, you will discover what makes bones both stiff and flexible.

Age Level: 10 and up



What makes our bones stiff but flexible at the same time?

Materials

- at least 3 chicken bones
- 3 jars or cups, about 500 mL (16 oz.) each
- access to water
- access to a stove or hotplate
- small cooking pot
- about 500 mL of bleach
- large bowl
- tongs
- paper towels
- masking tape
- marker



Note

You may try other animal bones instead of, or in addition to, chicken bones. The jars or cups should be big enough to hold a few chicken bones.

Safety

Do not spill bleach, which can harm your skin, or breathe in bleach fumes, which can harm your lungs. Have an adult help you use the stove if necessary.

Step 1

Clean off as much of the meat and tendons from the bones as possible. Put the bones in a cooking pot and add enough water to cover the bones completely. Bring the water to a slow boil, and boil the bones for 30 minutes. Be sure to turn off the heat when you're done.



Step 2

After boiling, remove the bones from the water with tongs and let the bones cool on paper towels. Once cooled, remove any remaining pieces of meat and tendons. Using two hands, try bending the chicken bones—do they flex, or are they hard like glass?



Step 3

Place one or more bones in each of the three cups. Using masking tape and a marker, label the cups water, bleach, and vinegar. Add enough water, bleach, and vinegar to the appropriate cups to cover the bones. Add only one kind of liquid to each cup. Be careful not to spill bleach as it can harm some surfaces, clothing and skin. Do not breathe bleach fumes, which can hurt your lungs. Let the bones soak for 24 hours.



Step 4

After 24 hours, use the tongs to remove the bones from each container, and rinse off each bone with water. Place each bone on a paper towel next to its cup. Try to bend and flex each bone. What differences do you notice between the bones?



Step 5

Place each bone back in its cup. Every day, for 2 or 3 more days, check the flexibility of the bones again. How does each bone's flexibility change over time?



What's Going on?

"Human bones are both rigid and slightly flexible. Calcium, a mineral in your bones, makes bones rigid—this lets you stand upright and walk around. Collagen, the protein in your bones, give bones some flexibility—when force is applied, they can bend slightly instead of breaking instantly.

Soaking the bones in vinegar (an acid) dissolved the calcium (a base). What was left was collagen, so the bones were much more flexible. Bleach is a strong base that breaks apart the collagen proteins. When the bone was soaked in bleach, what was left was calcium and the bones became brittle. Soaking the bone in water was a control and didn't do anything noticeable to the bones."



Keep your bones healthy!

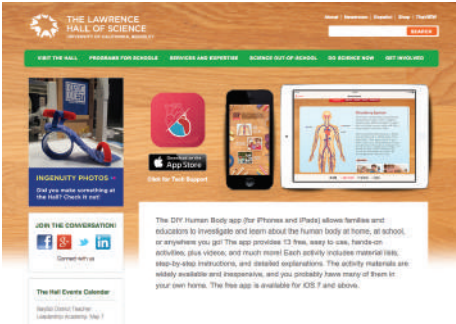
"Lots of people think only old people need to worry about weak bones, but healthy bones start when you're young. The strength of your bones when you're still a kid is important for lifelong bone health.

So drink that glass of milk instead of soda—your strong bones will thank you!

If you don't love milk or can't digest it, you can get calcium from cheese, yogurt, and even calcium-enriched orange juice. You can also get calcium from dark green, leafy vegetables like kale, bok choy, and broccoli, as well as almonds, corn tortillas, and tofu. Many popular foods such as cereals, breads, and other juices now have calcium added. Check the Nutrition Facts label on the package to be sure."



Learn More



For more info and other activities, visit:

LawrenceHalofScience.org/do_science_now/diy_human_body

Credits



This project was supported by the National Institutes of Health (NIH) Science Education Partnership Award program under award number 5R25OD010543-02. Any opinions, findings, conclusions, or recommendations expressed in this program are those of the author and do not reflect the views of NIH.



THE LAWRENCE
HALL OF SCIENCE

This activity from the DIY Human Body app allows families to investigate and learn about the human body at home or on the go! The app features thirteen hands-on investigations, as well as images & videos.

© 2015 The Regents of the University of California.
All rights reserved.