

I had a **BRAINY BREAKTHROUGH**
at the Saint Louis Science Center



brain stem

Breathing and Digestion

Coordination

cerebellum

REASONING
LEFT HEMISPHERE

cerebrum

BREAKTHROUGH GALLERY

Activity Guide

cerebrum

RIGHT HEMISPHERE
IMAGINATION

Breathing and Digestion

Coordination

cerebellum

brain stem



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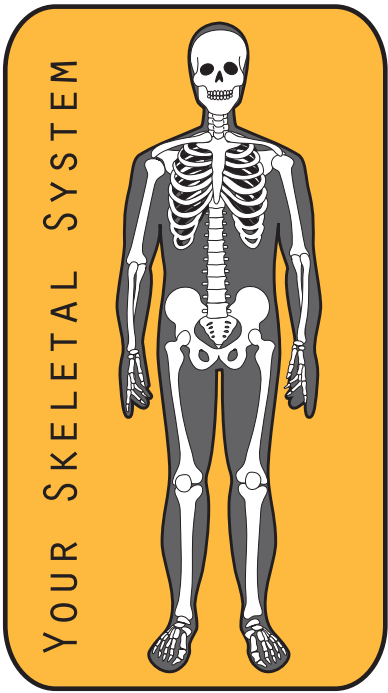
YOUR SKELETAL SYSTEM

What makes your bones strong?

You will need:

- 2 chicken bones with meat cleaned off
- egg
- 2 jars with lids
- vinegar
- paper and pencil

- Pour vinegar into each jar, enough to cover the egg or the chicken bone.
- Put one bone and the egg into each jar, separately. Then put on the lids, and leave them for 4 days. Leave the other chicken bone untreated.
- Record what you notice when you first put the bone or egg into the vinegar.
- Observe and record the changes you see each day.
- After 4 days, remove the bone and egg from the jars. How have they changed? What do you think caused the changes?
- Compare the bone treated with vinegar to the untreated bone. How are they different?



The Breakthrough:

A genetically engineered protein developed at Cardinal Glennon Children's Medical Center stimulates bone growth so that cleft palate, a condition in which tissues of the mouth and lip don't form properly, can be corrected with far fewer surgeries than were previously required.



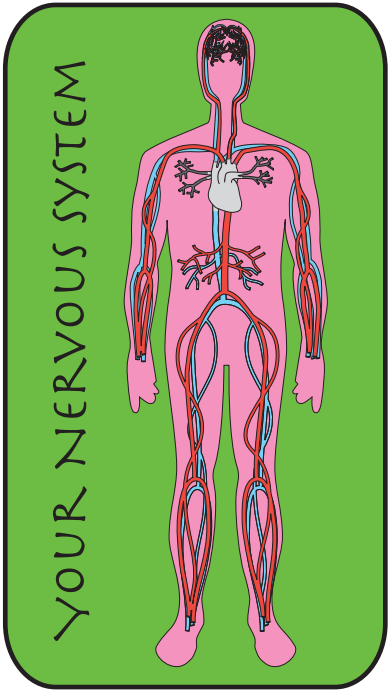
YOUR NERVOUS SYSTEM

What does your brain look like?

You will need:

- scissors
- crayons or markers
- masking tape

- Cut out the two halves of the brain and forehead strap on the outside of this guide. Be careful not to remove the strap from the brain.
- On each half of the brain you will see areas marked with the name of the three main sections of the brain. Each section has a different function.
- Outline the cerebellum, cerebrum and brain stem in three different colors.
- Draw a picture in each section that represents what it does.
- Fit the brain hat around your head so that the left side goes on your left and the right on your right.
- Tape the bottom strap together so that your brain hat fits around your forehead. Then tape the two hemispheres together at the top.



The Breakthrough:

3-D imaging of the brain, developed at Saint Louis University Hospital, allows doctors to perform brain surgery far more accurately.



Your Digestive System

What's happening when you digest your food?

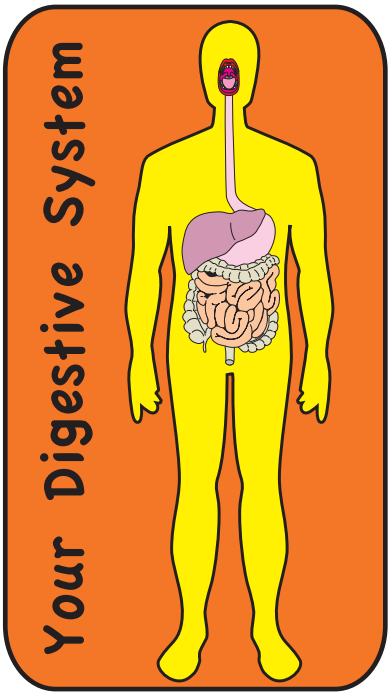
You will need:

- 2 packets of yeast
- measuring cup
- 3/4 c. warm, not hot, water
- 3 large, clear plastic cups
- permanent marker

- spoons
- sugar
- milk or fruit juice
- flour
- paper, pencil



- Pour 1/4 c. of warm, not hot, water into each cup.
- Slowly sprinkle one packet of yeast into each cup.
- Observe the yeast closely and record your observations.
- What will you feed the yeast – processed sugar, milk, fruit juice or a combination? Record your ideas.
- Label one cup "control". Do not add anything to this cup.
- Add sugar, milk or fruit juice to one of the other two cups.
- Add a different substance or combination of substances to the third cup.
- Record the results of your experiment. What happens when you feed the yeast?
- What adjustments could you make to your experiment to learn more?
- After you're done with your experiment, try sprinkling a little flour into the cup to see how bakers use yeast.



The Breakthrough:

Scientists at the Washington University School of Medicine are studying microbes found in the human gut that can be more or less efficient in processing food and may be the key to controlling obesity.



What's Going On?

Your Skeletal System. When your bones grow, they begin as soft, flexible tissues. Bones harden when minerals, such as calcium, are deposited on them. Calcium and other minerals come from the food we eat and are delivered to bone tissue by the bone's blood system. In this activity, the opposite occurs. The hard chicken bone becomes flexible due to a chemical reaction between the vinegar and the calcium, causing the calcium to leave the bone. The vinegar also reacts with the calcium in the egg shell, causing the egg to become rubbery. This activity shows what happens to your bones when they lose calcium. To keep your bones strong, be sure to eat plenty of dairy products!

Your Nervous System. Your brain is a unique organ in that different parts of the brain have different functions. So when doctors perform brain surgery they must be extremely careful only to touch the specific area that is in need of attention. Your brain controls your thinking, your emotions, your imagination, your senses and the functioning of the other organs in your body.

Your Digestive System. There are trillions of microbes living inside your gut, helping you digest and process your food. In this activity you observed a single-cell microbe – yeast – in action. Although yeast does not normally live inside your stomach and small intestine, it is a good organism to observe to understand how microbes help break down the foods you eat. Yeast is a living thing that uses sugar for energy and produces carbon dioxide gas as a by-product. The bubbles you saw were the gas being produced. When you mixed some flour into the yeast, you could see how yeast causes bread to rise.

The Breakthrough Gallery. This exciting new exhibit at the Saint Louis Science Center features developments in scientific research happening today. DVDs and activity guides are available on a variety of topics. Email mwalsh@slsc.org for more information. This guide accompanies the DVDs *Cleft Palate*, *Computerized Brain Surgery*, and *Gut Microbes*.

