The activities in this family guide are adapted from actual experiments conducted on Everest in 2007 by Dr. Mike Grocott, Dr. Denny Levett and the rest of the Caudwell Xtreme Everest team. Their goal: to save lives in the intensive care units where they work, through a better understanding of how the body reacts to low oxygen levels. On January 8, 2009, the *New England Journal of Medicine* published "Arterial Blood Gases and Oxygen Content in Climbers on Mt. Everest." The scientists measured the lowest human blood oxygen level ever recorded. For more information, visit **xtreme-everest.co.uk.** For updates on the scientists' research or more family guides from this series, email **jboxer@slsc.org**. And don't miss *Return to Everest*, a giant screen film from MacGillivray Freeman coming in 2012.

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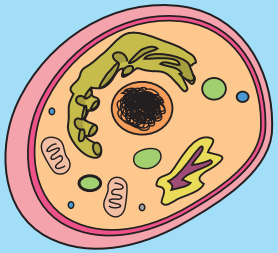
SAINT LOUIS sciencenter

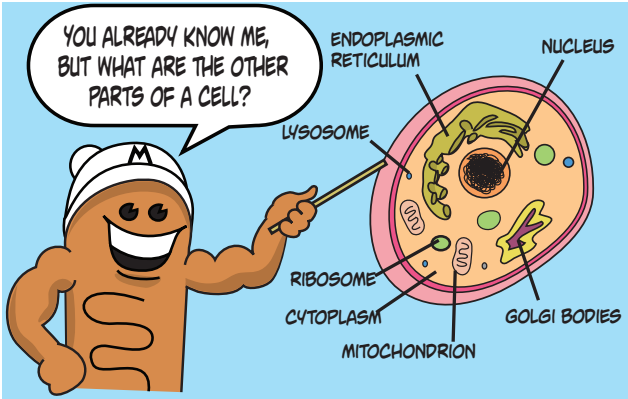
What are the parts of a cell?



The cell membrane is the outermost covering of the cell, represented by the edges of your cookie. The cytoplasm is the jelly-like part of the cell that the other parts of the cell float around in, like your icing. The other parts of the cell are the nucleus, which is sort of like the brain of the cell, the Golgi bodies which sort and package proteins for delivery to the cells, the lysosomes which break down waste, and the mitochondria. The mitochondria are so important to the scientists because they convert oxygen and sugars into energy that powers the cell. The scientists' hypothesis is that our mitochondria become more efficient over time as they adjust to a lower level of oxygen.

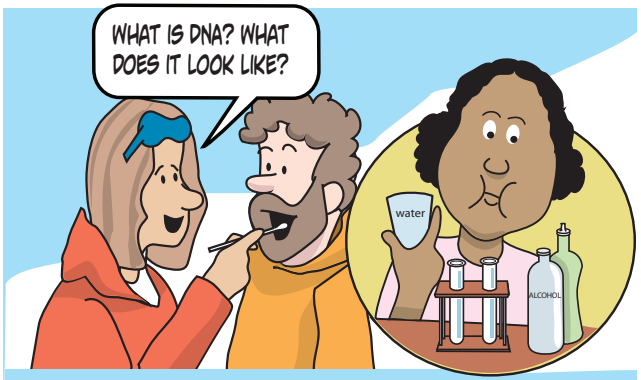
What is DNA? What does it look like?

Inside the nucleus of your cells is your DNA. Your DNA contains information, called genes, that you inherit from your parents. Genes come in pairs, with each of your parents contributing half of a pair. Your friends do not have as many traits in common with you as you do with your family. DNA looks like a twisted ladder, a "double helix." The rungs of the ladder are pairs of nucleotide bases, and its sides are sugars and phosphates. The Xtreme Everest scientists are taking cheek cells from all the volunteers to study their DNA. If they can determine what is different about a person's DNA who does well in a low oxygen environment, they can design medicines to help patients whose bodies aren't able to get enough oxygen on their own.



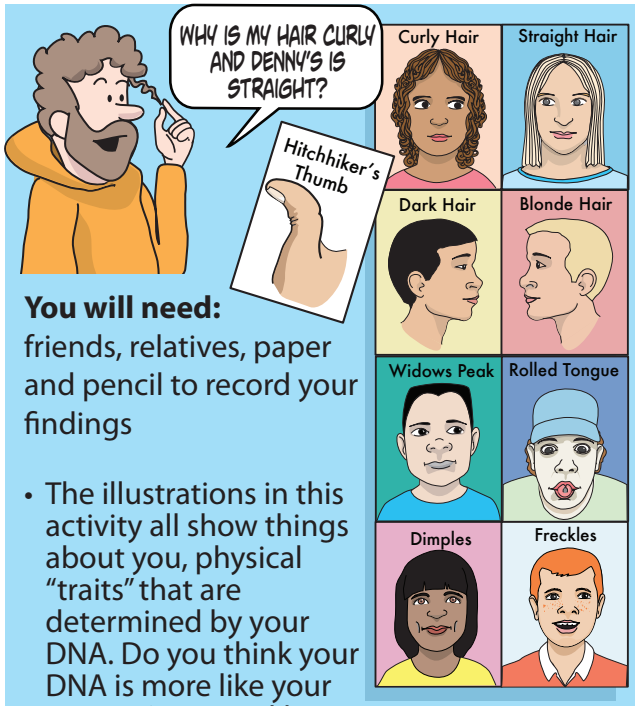
You will need:
large flat sugar cookie, icing, paper plate, plastic knife, 6 different kinds of candy decorations, paper, pencil

- Look carefully at the drawing of the parts of a cell. Think about what each part looks like and what it does. If you were going to make a cell model out of a cookie, what kind of candy would you use for each part of the cell?
- Time to go to the grocery store candy aisle. Pick out 6 different types of candy for your cell cookie.
- Set your cookie out on a paper plate and cover it with icing. The icing is your cytoplasm. Decorate your cookie with the candies you have chosen.
- Draw a key to your cell model. In your key, list each part of the cell, what it does, what candy you have used to represent it and why.
- Why do you think the scientists on Everest are particularly interested in the mitochondria? Hint: they are studying what happens to you when you don't have a lot of oxygen. And when you've figured that out, you can eat your cell cookie!



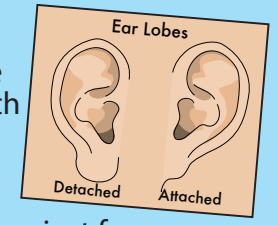
You will need:
an adult to help you, paper cup, test tube with cap, ice cold ethyl alcohol, dish detergent solution (25% detergent -- ¼ c. detergent in ¾ c. water), salt solution (8% table salt -- a pinch of salt in 1 c. water), water

- Ask an adult to help make the detergent and salt solutions and set everything up.
- Fill your cup with 10 ml of water (about 2 tbsp.).
- Put the water in your mouth and swish hard for 30 seconds. Run your tongue against the insides of your mouth to loosen cheek cells. Spit the water in the cup.
- Make a pointed pouring spout on your cup and pour the cheek solution into the test tube, making your test tube half full.
- Add 1 ml. of salt solution to the test tube (about 1 tsp.).
- Add 1 ml of detergent solution to the test tube (about 1 tsp.).
- Cap the tube and gently rock it – don't shake -- back and forth to allow the contents to mix.
- Remove the cap and keep the test tube upright.
- Fill the test tube with cold alcohol, rolling it down the side of the tube.
- Watch the test tube to see small white threads of your DNA forming between the lower layer (cheek, salt and detergent solution) and the upper layer (alcohol).



You will need:
friends, relatives, paper and pencil to record your findings

- The illustrations in this activity all show things about you, physical "traits" that are determined by your DNA. Do you think your DNA is more like your parents' or more like your friends'?
- Make a chart, listing the traits down one side with columns across the top for the names of your friends and family members and one column just for you.



- Get a friend to be your partner and interview and observe each other, recording the traits on your chart. Can your friend roll his or her tongue? Does he or she have attached ear lobes? Compare your results.
- Now conduct the same interview with your parents and siblings and record your results.
- Compare your results for family with those for friends. With which people do you have the most in common? Why do you think this is true?