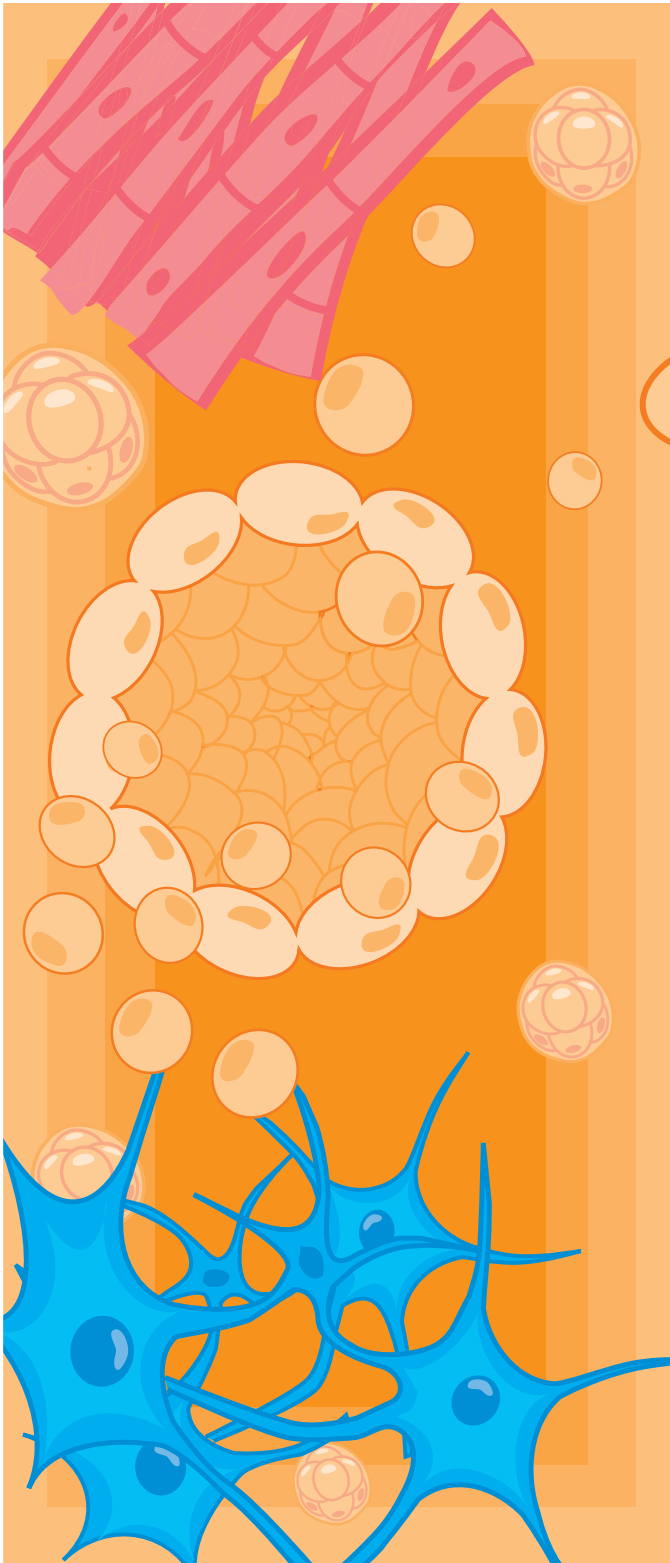


The Saint Louis Science Center's Breakthrough Gallery features new developments in scientific research happening today. DVDs and activity guides are available on a variety of topics. Email mwalsh@slsc.org for more information. This guide accompanies the DVD *Stem Cells* which features scientists at the Washington University School of Medicine in St. Louis. Their new discovery would allow them to work with stem cells from an adult, avoiding the ethical controversies of cloning and destroying human embryos. Adult stem cells are converted to a less specific type of cell and then transformed into other kinds of cells needed to treat presently incurable diseases. This is only in the experimental stage at this point and not ready to use to treat people. The scientists emphasize that they find the continued progress very promising, but the public needs to have patience because careful research can take a long time before significant results are achieved.

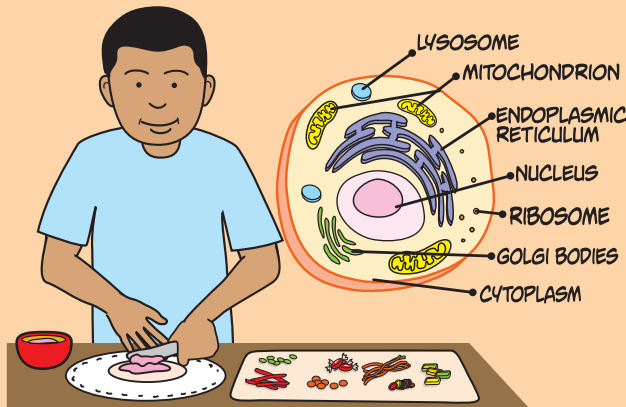


WHAT'S A STEM CELL?

WHAT'S A CELL?

A CELL IS THE SMALLEST LIVING PART IN YOUR BODY. YOU HAVE TRILLIONS OF CELLS DOING ALL KINDS OF DIFFERENT JOBS. INSIDE THE CELL ARE "ORGANELLES", EACH WITH A DIFFERENT JOB. THE CYTOPLASM IS THE JELLY-LIKE PART OF THE CELL THAT THE OTHER PARTS OF THE CELL FLOAT AROUND IN. THE OTHER PARTS OF THE CELL ARE THE NUCLEUS, WHICH IS SORT OF LIKE THE BRAIN OF THE CELL, THE ROUGH ENDOPLASMIC RETICULUM (WITH RIBOSOMES), WHICH MAKES PROTEINS, THE SMOOTH ENDOPLASMIC RETICULUM, WHICH MAKES THE FAT PRODUCTS OF THE CELL, THE GOLGI BODIES WHICH SORT AND PACKAGE PROTEINS FOR DELIVERY TO OTHER CELLS, THE LYSOSOMES, WHICH BREAK DOWN WASTE AND THE MITOCHONDRIA WHICH CONVERT OXYGEN AND SUGARS INTO ENERGY THAT POWERS THE CELL.

YOU CAN MAKE A MODEL OF A CELL USING A COOKIE.



You will need:

large flat cookie, icing, paper plate, plastic knife, six different types of candy, paper, pencil

- Look carefully at the picture of the parts of a cell. Think about what each part looks like and what it does. To make a cell model out of a cookie, what candy would you use for each part of the cell?
- Time to go to the grocery store candy aisle! Pick out six different types of candy for your cell cookie.
- Place your cookie on a paper plate and cover it with icing. The icing is your cytoplasm. Decorate the cookie with the candies you have chosen.
- Draw a key to your cell model. List each part of the cell, what it does and what candy you used to represent it. When you finish your key, you can eat your cell cookie!

WHAT'S A STEM CELL?

A STEM CELL IS A SINGLE CELL THAT CAN BOTH COPY ITSELF AND TRANSFORM INTO MANY DIFFERENT CELL TYPES. A STEM CELL CAN REGENERATE, OR CONTINUOUSLY MAKE MORE COPIES OF ITSELF. MOST OF YOUR CELLS CANNOT. SOME ANIMALS, LIKE SALAMANDERS, HAVE REGENERATIVE CELLS AND CAN GROW A NEW TAIL IF THEY LOSE THEIRS, BUT HUMANS CAN'T GROW A NEW FINGER IF THEY LOSE ONE. STEM CELLS FOUND IN EMBRYOS CAN TURN INTO ALL THE DIFFERENT CELLS OF THE HUMAN BODY. ADULTS HAVE STEM CELLS THAT CAN ONLY TURN INTO CERTAIN TYPES OF CELLS. STEM CELLS MAKE MORE COPIES OF THEMSELVES BY DIVIDING AND SPLITTING INTO TWO CELLS, A PROCESS CALLED CELL DIVISION.

YOU CAN SIMULATE CELL DIVISION BY MAKING A FLIPBOOK.



You will need:

"Post-It" note pad at least 3" x 3", pencil.

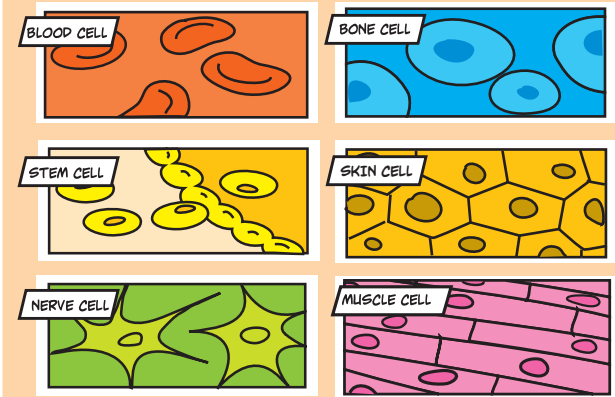
- Look carefully at the drawings of cells shown here. To show how a cell divides from one cell into two, which drawing would go first, second, etc.? Number the drawings in order.
- Starting with the first "Post-It" note page, draw the single cell, drawing #1.
- On each following page draw the cell again, changing it slightly to show that it is dividing into two parts, until you have transformed it into drawing #2.
- Continue with the next pages, changing the drawing slightly each time until you have transformed it into drawing #3, and so on.
- When you finish the final drawing, flip through the pages to see the cell divide.



WHAT ARE CELLS' DIFFERENT JOBS INSIDE OUR BODIES?

DNA, DEOXYRIBONUCLEIC ACID, IS A CHEMICAL COMPOUND FOUND IN YOUR CELLS THAT CONTAINS THE GENETIC INSTRUCTIONS NEEDED TO DEVELOP AND DIRECT EVERYTHING THAT GOES ON INSIDE YOUR BODY. EACH CELL'S DNA HAS THE INSTRUCTIONS FOR MAKING IT BECOME A PARTICULAR KIND OF CELL WITH ITS OWN SPECIAL JOB. ALTHOUGH EACH CELL CONTAINS EXACTLY THE SAME INFORMATION WITHIN ITS DNA, CERTAIN SETS OF INSTRUCTIONS (CALLED GENES) ARE TURNED ON OR OFF, ALLOWING A CELL TO BECOME A MUSCLE CELL BUT NOT A BONE CELL, OR A SKIN CELL BUT NOT A BRAIN CELL.

YOU CAN MAKE A CARD GAME WITH DIFFERENT TYPES OF CELLS.



You will need:

cardstock cut into 24 rectangles about 2" x 3", colored pencils, a friend to play cards with.

- Mark six sets of four cards each using the drawings shown here, one set for each type of cell.
- Shuffle the cards and deal three to each player. Put the rest of cards in a pile face down.
- It's time to play "Go Fish", but instead of "Do you have any eights?" you might say: "Do you have any muscle cells?"
- A stem cell card is a wild card and can be used to complete any set. Impress your friend by explaining why the stem cell card is special.
- Good luck! Whoever puts down all their cards first, wins.
- You can use your cell cards for any other game you like.