

TECH: Cheek Cell DNA (HS)

Materials

- Glass or plastic vials with lids
- Vials are available from: Fisher Scientific (www.new.fishersci.com) #02-912-369 8ml @ \$89.76 case of 144
- Pipettes
- Pipettes are also available from: Fisher Scientific #13-711-5A @ \$42.67 case of 500
- Dish Detergent
- Plastic or paper cups
- Meat Tenderizer or Salt
- Rubbing Alcohol

Instructional Procedures

• What is a Biotechnology Technician -- What do they do?

• Biotechnology is the use of living organisms or their products, for a specific purpose. Advances due to this science include virus-resistant crops and livestock, diagnostic techniques for detecting disease, gene therapies to cure diseases, and vaccines to prevent diseases. Many biotechnology technicians work in areas such as the production of medicines and vaccines, plant and livestock improvement programs, conservation genetics, DNA profiling, tissue culture, and genetic engineering.

• Average Salary = \$25,000 - \$40,000/year

• Educational Requirements -- Biotechnology Technicians must have an Associate's degree from a community college or junior college.

• Examples of the benefits we receive from Biotechnologists:

• Higher quality crops; more nutritious; better tasting

• Leaner meat

• Higher quality milk & cheese (lower fat, more protein)

• Forensics and evidence analysis

• Using microbes to clean up oil spills and toxic waste

• Sewage treatment

• Antibiotics and other medications

• Gene therapy

• Tissue transplants

• Vaccines

• Bioenergy -- fuel from plants, wood grain, ethanol

• Deoxyribonucleic Acid = DNA

• Ask how many students can curl their tongues -- many will be able to, but some will not. Why?

How did we get this ability?

• It is an inherited trait. We got the trait/ability from our parents. What is it that transfers traits from our parents to us? GENES -- give our cells instructions for building our bodies (eye color, hair color, etc.)

• Genes are made up of DNA. DNA contains the instructions for making an organism, including YOU! Your DNA determines how you look, what blood type you have, even your tendency to get some diseases. Your DNA is unique -- no one else has your exact same DNA (unless you are an identical twin). If the DNA for just one cell of your body could be laid out end to end, it would measure 6 feet long.

• In this activity, you will isolate your very own DNA from your cheek cells. It's easy and painless -- cheek cells are continuously being sloughed off.

1. Make a solution of water and salt -- approximately $\frac{1}{2}$ teaspoon for 8 oz water. Pour about 2 teaspoons of salt water into a small cup for each student.
 2. Have the students swish the salt water in their mouths for 30 seconds. This amount of swishing will become quite laborious -- hang in there. When 30 seconds are up, have the spit the water back into their cups.
 3. Give students a vial with a few drops of liquid detergent already in it. Now have them pipette or pour some of their cheek cell solution into the vial -- fill the vial about $\frac{1}{2}$ way.
 4. Cap the vials and have the students gently rock the vial on its side for 2-3 minutes. It is important that they are not too vigorous while mixing. Try to avoid creating too many bubbles. The detergent breaks open the cell membranes to release the DNA into the soap solution.
 5. Uncap the vial and have student drop in a pinch of enzymes (meat tenderizer). Enzymes are proteins that help chemical reactions happen more quickly.
 6. Now tilt the tubes slightly and pipette about 1 teaspoon of chilled rubbing alcohol into the vials. Try to pour it gently down the side of the vial so that it forms a layer on top of the cheek cell mixture. **DO NOT MIX THIS!** The alcohol dehydrates and precipitates the DNA.
 7. Let the vials stand for a minute or two.
- â€¢ Observe what happens at the interface between the ethyl alcohol and the cheek cell solution. The clouds of white strands are your DNA. One individual strand of DNA is so thin that you will never be able to see it without using a microscope. What we are seeing are many, many strands of your DNA intertwined together so that they become visible to the eye as whitish strands.

Authors

[THALEA LONGHURST](#)