

## Extract Your Own DNA

### Materials:

**Small paper cups** (You want the smallest sized cups.)

**1 bottle of colorless sports drink** (You can also use a strong salt water solution, but “Lemon Ice” flavored Gatorade tastes better — and you can use the leftovers for refreshments after the lab!)

**Liquid dish soap** (You want to use the lightest color or colorless brand you can find)

**A few drops of pineapple juice** (You could also try using a quarter-teaspoon of meat tenderizer dissolved in a half-cup of water)

**1 wood skewer** (You want the kind that looks like a very long toothpick. Look in the baking aisle at the grocery store — many people use them to test cakes for doneness.)

**Alcohol** (You can use regular rubbing alcohol, but if you can find 91-percent isopropyl alcohol at the drugstore get that. The closer to 100-percent alcohol you use, the better this will work.)

**Narrow container with a lid** (You can use a test tube with a stopper if you have one. You could also use a small jar like you buy spices in. Make sure it is clean and dry.)

### What to Do:

1. 24 hours before you start, put the alcohol in the kitchen freezer. Don't worry, it won't freeze, but it should be ice cold before you do your experiment.
2. Get a sports drink that is light color or colorless.

When you are ready, take a good mouthful of sports drink and vigorously swish it around in your mouth like mouth wash. Keep going for at least 2 minutes. This takes some stamina — it's harder than it sounds, to swish for that long! It also helps if you scrape the insides of your cheeks a little with your teeth. No blood, please; we are after the DNA from your cheek cells, not your blood type!



3. Spit the sports drink and cheek cell solution into a small paper cup, then pour it into your test tube or spice jar until it is about one-third full.
4. Add liquid dish soap until your container is about half full. Put the lid on and mix the contents by rocking the container and turning it upside down several times. Be gentle, your goal is to mix the contents but to avoid causing bubbles from the soap.
5. Add a few drops of pineapple juice or meat tenderizer solution. Repeat the gentle mixing.
6. Gently add alcohol to the solution.  
Credit: Genetic Science Learning Center

Now it's time to get that icy cold alcohol out of the freezer. Take the lid off of your cheek cell solution and tilt the container in one hand. Use your other hand to **very gently** trickle a small amount of alcohol down the inside of the jar so that the alcohol forms a layer floating on top of the cell solution. Return the container to its upright position and set it aside for 1 minute.



7. After a minute, look carefully at the place where the alcohol makes a layer floating on top of the cheek cell solution. You should see a band of white gooey material suspended between the liquid layers. Gently put the skewer down into the container so that the tip touches this material. Carefully twirl the skewer in one direction only; if you are lucky the stuff will wind around the skewer so that you can lift it out through the alcohol layer to look more closely.

8. Behold your own DNA!

Carefully twirl the skewer to extract the strand of DNA.



### **Why you did what you did:**

#### **1. Why did I have to swish so long?**

First you had to collect enough cells to work. You are also using the salts in the sports drink to begin to break the cell membrane and the membrane around the nucleus to free the DNA.

#### **2. Why did I use the soap?**

Cell membranes are made up of two layers consisting of fats, sugars and salts. The fats are on the inside of the membrane where they can avoid touching the water that surrounds the cell. Detergent molecules have two ends. One end of a detergent molecule is attracted to fat and the other end is attracted to water. When you wash your dinner plate; the fat-loving end of the dish detergent molecule attaches to the grease from your hamburger and the water-loving end attaches to the water in the sink. In the cheek solution, you were using the detergent to move the broken up cell membranes away from the DNA.

#### **3. Why did I use pineapple juice?**

Pineapple juice and meat tenderizer both contain enzymes that further help to break down the cell membrane.

#### **4. Why did I use ice cold alcohol?**

The DNA was dissolved in the water contained in the sports drink. DNA does not dissolve in alcohol. When the cold alcohol was layered on top of the cheek cell solution the DNA precipitated out of solution.

#### **5. Why did I twirl the skewer?**

Remember that famous DNA model. The DNA molecule is a very long strand with a gentle twist. Your visible DNA material is actually many thousands of these strands clumped together. Gently twirling the skewer allowed many of these strands to wind around your skewer like thread around a spool.