**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hr. \_\_\_\_\_**

**DNA Necklace LAB**

**Introduction**

**DNA is considered the hereditary “code of life” because it possesses the information that determines an organism’s characteristics and is transmitted from one generation to the next. DNA is contained within the nucleus of every cell in the human body.**

**The length of DNA in a cell is about 100,000 times as long as the cell itself. However, DNA fits into the nucleus. This is because DNA is specially packaged. The basic structure of DNA is that of a twisted ladder called a double helix. To shorten this DNA molecule, the double helix wraps itself around proteins, folds back on itself, and coils into a compact chromosome.**

**If the 46 chromosomes from one human cell were unraveled and lined up end-to-end, they would measure approximately 6 feet long!**

**Chromosomal DNA from a single cell is not visible to the naked eye. However, when chromosomal DNA is extracted from multiple cells, the amassed quantity can easily be seen and looks like strands of mucous-like cotton. In this activity, you will isolate your own chromosomal DNA from a large quantity of cheek cells and fashion the DNA into a pendant necklace.**

**You will first collect a sample of cheek cells by swishing a small amount of sports drink in your mouth. Sports drinks contain salt (sodium chloride) at a concentration compatible with the environment of the cells. The sports drink prevents the cells from breaking open and releasing their DNA before they are collected.**

**You will then rupture the membranes of your collected cheek cells with a detergent-based cell lysis solution. This solution dissolved the cell membranes of the cells. One the cell membranes are broken, the cell contents flow out and create a soup of dissolved membranes, cellular proteins, DNA, and other contents. DNA is soluble in the cell lysate solution so it is not visible to the unaided eye.**

**However, DNA is insoluble in ethanol alcohol. Therefore you will apply a layer of ethanol on top of the cell lysate soup to visualize the DNA. Once the ethanol hits the cell lysate, the DNA will begin to climb out of the solution, forming a cloud of fine, stringy fibers at the point where the ethanol and cell soup meet. The salt in the sports drink allows the strands to clump together as they climb. You will then transfer your clump of DNA to a pendant tube and fashion a DNA necklace with colored thread.**

**Procedure**

1. **Take the 2 mL of sports drink into your mouth (do not swallow) and swish it around for 1 full minute. As you swish, gently and continuously scrape the insides of your cheeks with your teeth to help release the cheek cells.**
2. **After 1 minute of swishing, spit the sports drink with collected cheek cells back into the small cup.**
3. **Now carefully pour the contents of the small cup into your 15 mL tube. You may want to mark your tube. Discard the cup into the trash.**
4. **Bring your 15 mL tube to the solution station. Use a graduated pipette to add 2 mL of cell lysis solution (soap) to your collected cheek cells.**
5. **Cap your 15 mL tube tightly and invert it 5 times. DO NOT SHAKE!!! This action mixes the soap solution with the collected cheek cell sample. Take the tube back to your table and allow it to stand for at least 5 minutes.**

**Answer the following questions while you are waiting:**

1. **Describe how the long strands of DNA are able to fit into the nucleus of a single cell. (Look at the first page of background information)**
2. **Why is the sports drink used to collect the cheek cells instead of water?**
3. **What does the cell lysis solution (soap) do to the cells’ membranes?**

**Procedure Continues:**

1. **Now bring your 15 mL tube to the solution station. Hold the tube at an angle and, using a pipette, carefully add a full pipet of cold 70% ethanol by dripping it down the inside of the tube. YOU NEED TO BE VERY CAREFULL WITH THIS STEP SO YOU DO NOT MIX THE ETHANOL WITH THE SOAP/CHEEK SOLUTION. You should have two distinct layers. Put the cap back on the tube.**
2. **Place the 15 mL tube upright in your test tube rack at your table and let it stand undisturbed for a minimum of 10 minutes. Watch as the DNA will look like a cobweb coming up from the lysed cheek cell layer. Tiny bubbles may appear in the ethanol layer where the DNA is climbing up.**
3. **After at least 10 minutes, use a pipet to transfer your DNA out or the ethanol layer of the 15 mL tube and into the pendant tube. Squeeze the pipet before trying to extract the DNA from the ethanol layer. With the pendant tube open, place the piece of colored thread over the cap hinge. Close the cap, tie the ends of the thread together and put on your DNA necklace.**

**Answer the following questions:**

1. **What is happening to the DNA while in the soap solution to make it become visible?**
2. **How can we now see the extracted DNA with the naked eye in the ethanol (i.e. why is the DNA not mixing with the ethanol)?**
3. **What are some things that a scientist could do with the extracted DNA from a human being, or from any organism?**
4. **What was the most difficult part of this experiment?**
5. **How does your DNA amount and appearance compare with others at your lab table?**