

Tishk International University  
Faculty of Applied Science  
Nutrition and Dietetics Department



## **NUTRITIONAL BIOCHEMISTRY II/ LAB**

2<sup>nd</sup> Grade  
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# DNA Extraction from Strawberries Pre-Lab



Extraction  
means to  
take  
something  
out

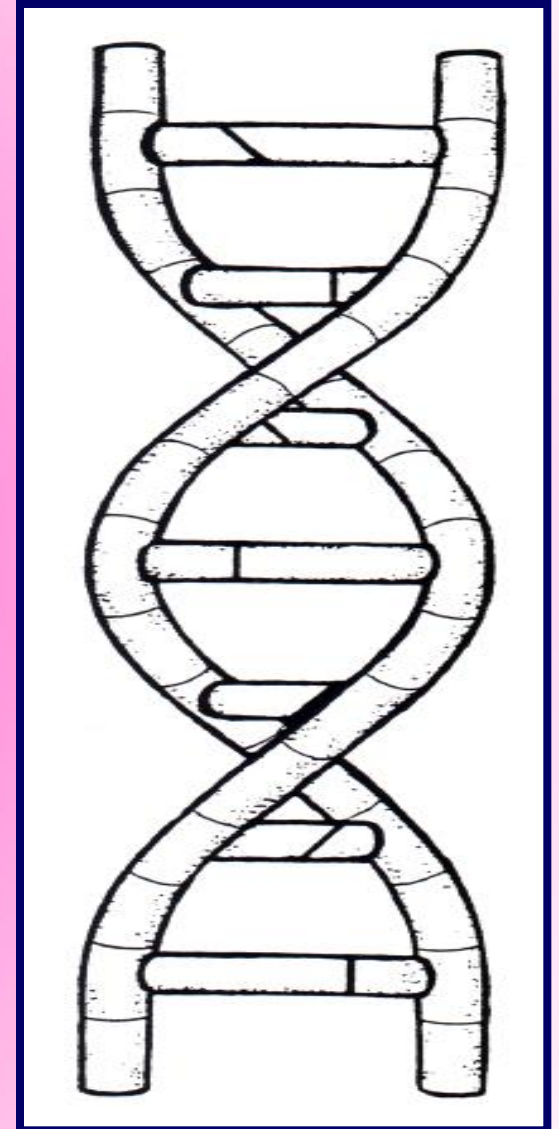


# ***DNA Extraction***

- DNA is present in the **cells of all living organisms.**
- DNA extraction is a process used in many laboratories procedures. DNA can be extracted from human cells and **can be used in forensic science and genetic testing.**
- The scientist must be able to **separate DNA from the unwanted substances of the cell** gently enough so that the DNA does not denature (break up).

# DNA Facts

- Each human cell contains about **9 feet of DNA**.
- **Not all types of cells contain the same amount of DNA.**
- Cells from other organisms can contain more or less DNA than human cells.



- In eukaryotic cells, DNA is found in the **nucleus** of the cell.
- Human cells are **diploid** ( $2n$ ), meaning they have 2 sets of chromosomes
- Many plants are **polyploid** (contain several sets of chromosomes)
- **Strawberries** are **octaploid** ( $8n$ ) meaning they have 8 sets of chromosomes

- DNA is enclosed in a nuclear and a cell membrane made of **phospholipids**.
- DNA is also **coiled around proteins** called **histones**.
- Both the phospholipid layer and the proteins **must be broken down and removed** in order to extract the DNA

# To Extract DNA, You Must Remove

...

- Cell membrane
- Cytoplasm
- Nuclear membrane
- Proteins

# To begin the extraction...

You must break down the cells in the strawberry.  
To do this, you will

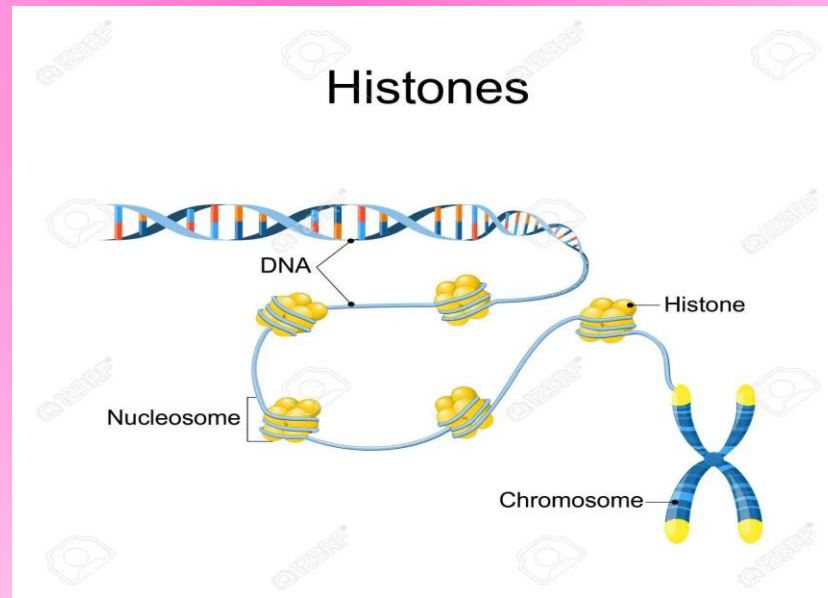
- Place the strawberry in a **zip lock bag** and remove the air
- **Smash** the berry with your hand to begin the process

**After the cells are broken apart, you must break down the cell membrane. You will do this by...**

- Using a small amount of **soap** or **detergent**.
- You will also add a **salt** to the soapy solution, which will punch holes in the membrane allowing the soap to dissolve the membrane more easily.
- Membranes are made of **phospholipids** which, like oils and fats, won't dissolve in water.
- Soap helps to dissolve the phospholipid layer and release the contents of the cell

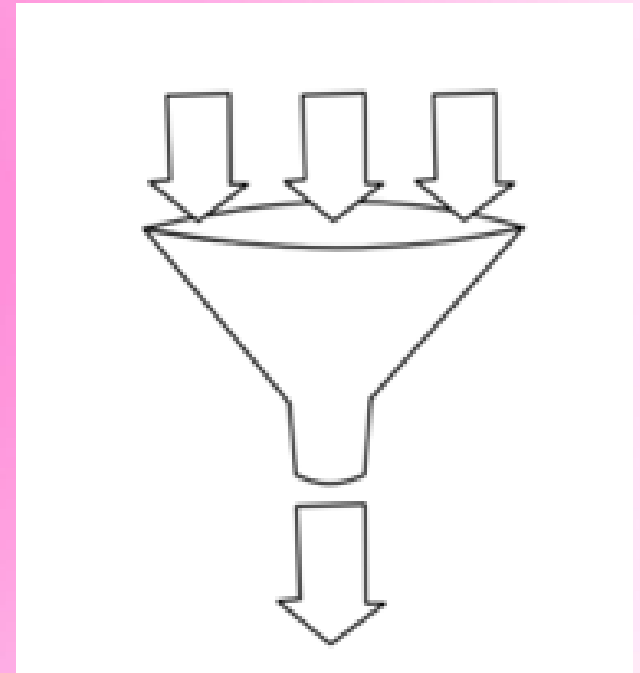
**After the membrane is dissolved, the DNA must be uncoiled from the proteins.**

- DNA is tightly coiled around the histones (proteins). These histones must be denatured or unfolded to release the DNA.



# Separating the DNA from the rest of the cell

- To separate the DNA from the rest of the cell you will use a filter and a funnel.
- This process will remove the **larger cell parts** by filtering the solid from the liquid.

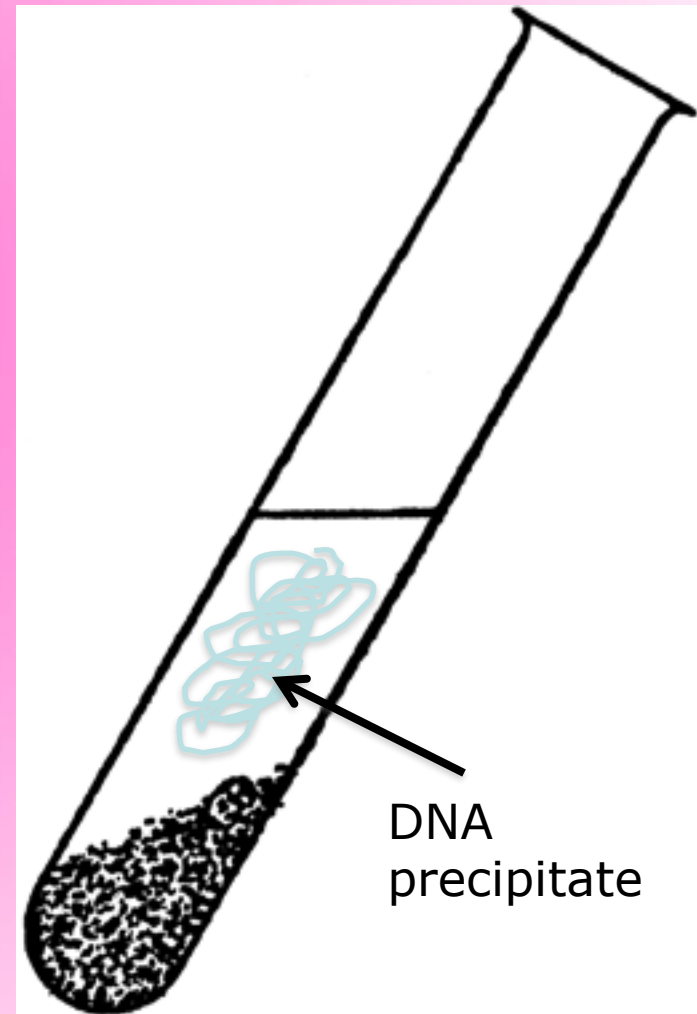


**After filtering, the DNA is left in the liquid solution  
BUT you can't see it yet.**

- To see the DNA, it must be **separated** from the remaining liquid you filtered.
- DNA dissolves in water, but **NOT in alcohol.**
- Adding **COLD ALCOHOL** will cause DNA to **precipitate (separate out)** from the liquid filtrate.

# After the DNA is spooled, what will it look like?

- Once the alcohol is added, the **DNA** will appear as a **white precipitate** above the pink solution.
- **HOLD THE TUBE** by the **TOP**, not the bottom so the DNA strands will stay cold and won't **break apart** from the heat of your hands!



# Spooling the DNA

- DNA is **sticky** and will adhere to other surfaces.
- A **glass stirring rod or wooden stick** can be used to spool (remove) the DNA by using a **turning motion**.

