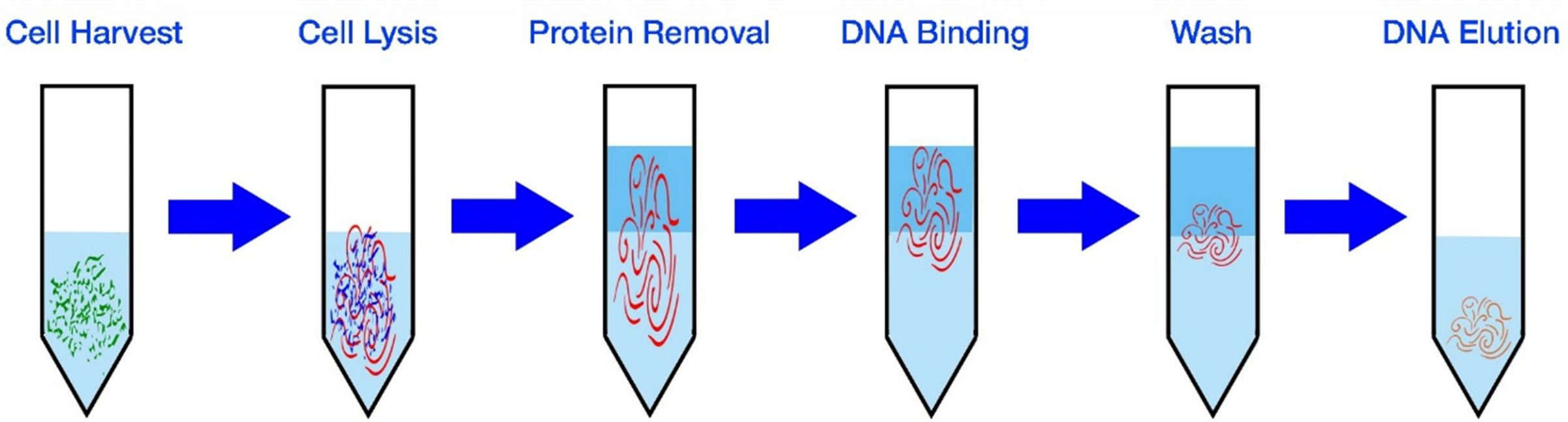
Medical Genetics: Lab 1

Third stage

Medical laboratory technique

DNA Extraction from Bacterial- Infected Human Tissues



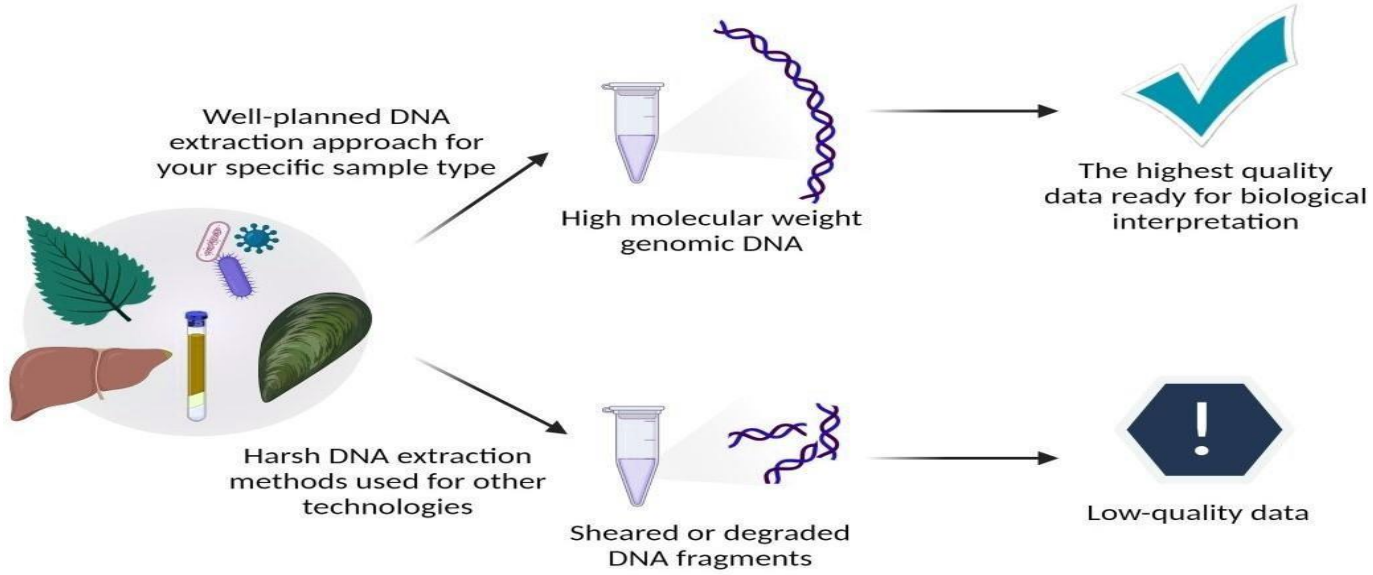
What is a DNA.. ?

DNA, also known as **deoxyribonucleic acid,**

A fundamental molecule found in all living things carries the genetic information in the cell contains instructions for our body cells to perform their specific functions. The sequence of nucleotides determines individual hereditary characteristics. Nearly **every cell** in a person's body has the same DNA and carries genetic information.

DNA Extraction

- DNA extraction is a method to **purify DNA** by using physical and/or chemical methods from a sample , separating DNA from cell membranes, proteins, and other cellular components.
- Friedrich Miescher in 1869 did DNA isolation for the first time.



Basic Principles of DNA Extraction

- Cell lysis.
- Lipid and Protein removal.
- DNA collection.

- **Steps DNA Extraction**

1-Sample Preparation:

The process usually begins with growing the bacteria in a suitable nutrient medium to stimulate growth.

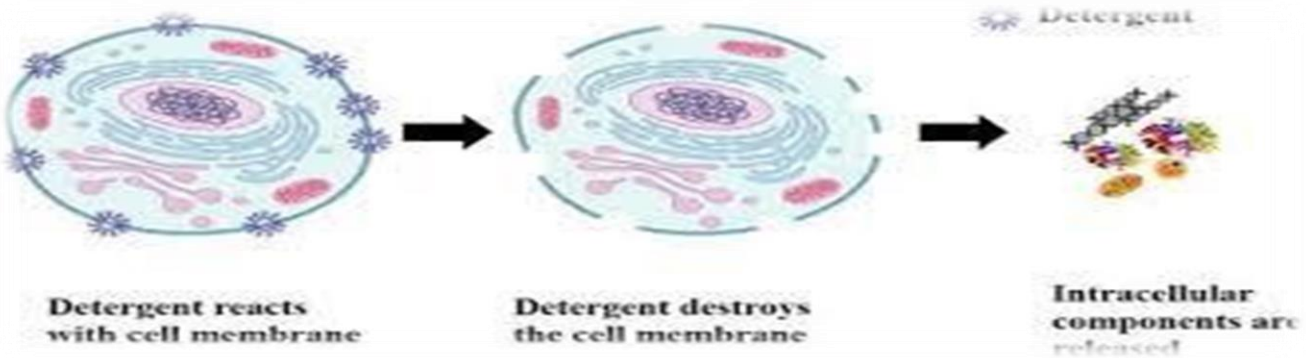
After growth, the bacteria are collected by centrifugation to separate them from the growth medium.

Steps DNA Extraction

2-Cell Lysis:

- Breaking the cell membranes and release DNA along with the cytoplasm. This is commonly achieved by:
- -Chemical methods (ex: lysozyme enzyme, NaOH, etc.)
- -Physical methods (ex: grinding, sonication, beads beats, etc.)

Some protocols may use heat or freeze-thaw cycles to disrupt the cell wall.



3- Lipid removal:

- Remove **lipids** from the cell membrane and the nucleus is broken down with **detergents** and surfactants (contain sodium dodecyl sulfate **SDS**).

4-Protein Removal:

A solution containing **Proteinase K enzyme** or other reagents to remove proteins from the mixture.

The mixture is gently mixed and incubated for several minutes at room temperature or at elevated temperatures, depending on the protocol.

5-DNA Separation:

After protein removal, centrifugation is used to separate the heavier components (like proteins) from the DNA.

The supernatant, which contains the bacterial DNA, is collected.

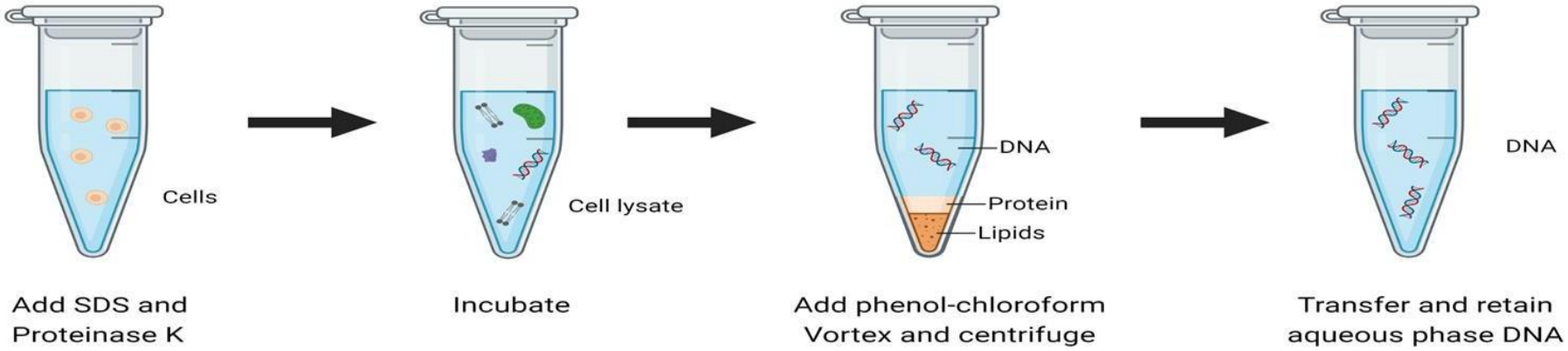
DNA collection:

- **DNA Purification:**

The DNA can be purified through methods such as filtration or using columns (e.g., silica gel or spin columns) that selectively bind DNA, allowing contaminants to be washed away.

- **DNA Precipitation:**

In some protocols, **ethanol or isopropanol** is added to precipitate the DNA from the solution. The DNA is then collected by centrifugation and dried.




EasyPure Bacteria Genomic DNA Kit
Wash Buffer
Binding Buffer
Elution Buffer


thermo scientific
Lysis Solution
Precipitation Solution
Genomic DNA Purification Kit
thermo scientific


NEW ENGLAND
BioLabs Inc.
Monarch® Genomic DNA Purification Kit
#T3010S
This product is intended for research purposes only. This product is not intended to be used for therapeutic or diagnostic purposes in humans or animals.
For health and safety information, visit www.neb.com/T3010
QUALITY

Quality Check

The quality of the extracted DNA is often checked using **spectrophotometry or nanodrop machine** (e.g., measuring absorbance at **260 nm**) or by running the DNA on an agarose gel to assess its size and purity.

This is the general procedure for extracting DNA from bacteria. Protocols may be adjusted based on the type of bacteria and available equipment.

Practical Applications of extracted DNA in DNA Technology

1) Medical Diagnose disease; Human gene therapy

2) Pharmaceutical Hormone production (insulin, human growth hormone)

3) Forensic DNA Fingerprinting

4) Agricultural Plant Breeding

5) Research making


Thank You!