Al-Mustaqbal University
College of Sciences
Intelligent Medical Systems Department

جامـــــعة المـــــستقبل
AL MUSTAQBAL UNIVERSITY

كلية العـــــــلوم
قـســـــــم علوم الأنظمة الطبية الذكية

LECTURE: (2)

Subject: Molecular biology (lab)
Level: first
Lecturer: MSc. Sura Mohammed jasim

Instruments and material That used in Medical genetics field:-Part

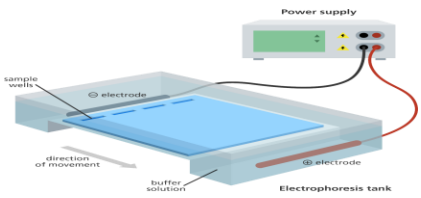
1:- Instruments

There are many devices used in the field of medical genetics, but we will address the main devices commonly used in this aspect.

1-Microliter pipettes: A pipette is a laboratory tool commonly used in chemistry, biology and medicine to transport a measured volume of liquid.

2-**centrifuge** : Refrigeration constitutes an important added feature to any laboratory centrifuge. Refrigerated laboratory centrifuges temperature ranges as wide as -20C – 40C, making them perfect for DNA, RNA, PCR or antibody analysis.

3-**Gel Electrophoresis**: It used in laboratories to separate macromolecules based on size. The technique applies a negative charge so proteins move towards a positive charge. Electrophoresis is used for both DNA and RNA analysis.



4-**Nanodrop device**: This system allows scientists to quickly and easily quantify and assess purity of samples such as proteins and nucleic acids

5-**PCR device**: technique used in genetics molecular biology to exponentially amplify a single copy or a few copies of a specific segment of DNA to generate thousands to millions of copies of a particular DNA sequence

6-**Water bath:** A water bath is laboratory equipment made from a container filled with heated water. It is used to incubate samples in water at a constant temperature over a long period of time

7- **Ultra Violet Light Transiluminator** : An ultra-violet (UV) transilluminator is a standard piece of equipment used in life science laboratories for visualization of target

DNAs and proteins. The UV transilluminator works by emitting high levels of UV radiation through the viewing

8-**Vortex:** A piece of laboratory equipment used to mix the contents of small tubes of liquids by means of rapid oscillation.

Part 2:- Material used in Medical genetics field

1.**Agarose** : is a polysaccharide, generally extracted from certain red seaweed.. Agarose is frequently used for the separation of large molecules, especially DNA, by electrophoresis. Shorter DNA molecules can travel farther in an agarose gel in a given amount of time than longer counterparts.

2.**Ethidium Bromide**: Ethidium bromide is a molecule commonly used to visualize DNA in agarose gel electrophoresis experiments. It both binds to DNA and fluoresces under the proper conditions. Ethidium bromide is known as an intercalating agent. The flat structure of ethidium bromide allows it to intercalate, or insert, between nitrogenous bases of a DNA molecule. When it is exposed to ultraviolet light, ethidium bromide fluoresces. most organizations and agencies do consider it a risk. Because of the intercalating characteristic of ethidium bromide, it is believed by many to pose a mutagenic risk. However, with strong safety protocols in place, ethidium bromide continues to be one of the most common methods of visualizing nucleic acids in agarose gel electrophoresis experiments.

3- **Loading dye**: It contains two different dyes (bromo-phenol blue and xylene cyanol) function of loading dye in electrophoresis is to allow the DNA sample to sink into the wells of the gel and to allow scientists to visually track the DNA sample as it runs through the gel.

4- **Ethylene diaminetetra acetic acid (EDTA)**: EDTA is a chelator of divalent particularly of magnesium ions are necessary co factors for many enzymes, including contaminant nucleases, the role of the EDTA is to protect the nucleic acidsagainst enzymatic degradation. Mg2 many useful DNA-modifying enzymes such as restriction enzymes and DNA polymerases.

5- **Tris Base Buffer**: Tris (hydroxymethyl) amino-methane, is a common biologicalbuffer, It is an established basimetric standard and buffer used in biochemistry and molecular biology1. It is used in the formulation of buffer solutions in the pH rangebetween 7.5 and 8.5. Tris buffer solutions are widely used in cell and molecular biology for processes such as protein and nucleic acid extraction and purification.

6- **TE buffer** : TE buffer is a commonly used buffer solution in molecular biology, especially in procedures involving DNA and RNA. "TE" is derived from its components: Tris, a common pH buffer, and EDTA, a molecule that . The purpose of TE buffer is to solubilize DNA +chelates cations like Mg2 or RNA, while protecting it from degradation. 7-DNA or RNA marker or ladder :- Molecular weight markers, orladders, are a set of standards that are used for determining the approximate size of a protein or a nucleic acid fragment run on gell electrophoresis.
