جامعة المستقبل
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قســم الادلة الجنائية

المحاضرة الثالثة

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Gel Electrophoresis of predigested DNA

Introduction

Gel electrophoresis is one of the fundamental techniques in molecular biology, used to separate and analyze DNA and proteins. In this lecture, we will focus on the use of this technique to separate pretreated DNA, which refers to DNA that has been prepared by specific methods, such as cutting with restriction enzymes.

1. What is gel electrophoresis?

Gel electrophoresis is a technique used to separate molecules such as DNA and proteins based on their size and charge. This is done by placing samples in a gel and then applying an electrical voltage. The molecules are affected by the electrical charge and move through the gel, resulting in their separation.

2. How the Process Works

1- Gel: Agarose gel, a type of polymer, is used to form a matrix that separates molecules. The gel concentration depends on the size of the target molecules.

2- DNA Sample: The pretreated DNA must be preserved and set to an appropriate level. It is cut into smaller pieces using enzymes such as EcoRI or HindIII.

3- Voltage Application: After placing the samples in the gel cavities, an electrical voltage is applied. The molecules move toward the anode (positive electrode) due to their negative charge.

4- Separation: Molecules are separated based on their size, with smaller molecules moving faster than larger ones.

3. Analysis Steps

1. Gel Preparation: Agarose gel is prepared by dissolving it in a solution of agarose. It is poured into a tray and a mold is used to form cavities.

2. Sample Preparation: The pre-treated DNA is mixed with a dye such as bromophenol blue to monitor movement during separation.

3. Loading: The samples are loaded into the prepared cavities in the gel.

4. Electrophoresis: A voltage is applied for a specified period of time.

5. Staining: After the process is complete, the gel is treated with a dye such as ethidium bromide to visualize the DNA under ultraviolet light.

4. Applications

1- Genotype Analysis: This technique is used to determine genetic diversity and classify individuals.

2- Investigating Genetic Manipulation: Electrophoresis can be used to study the genetic effects of genetic manipulation.

3- Medical Applications: It is used to diagnose genetic diseases.

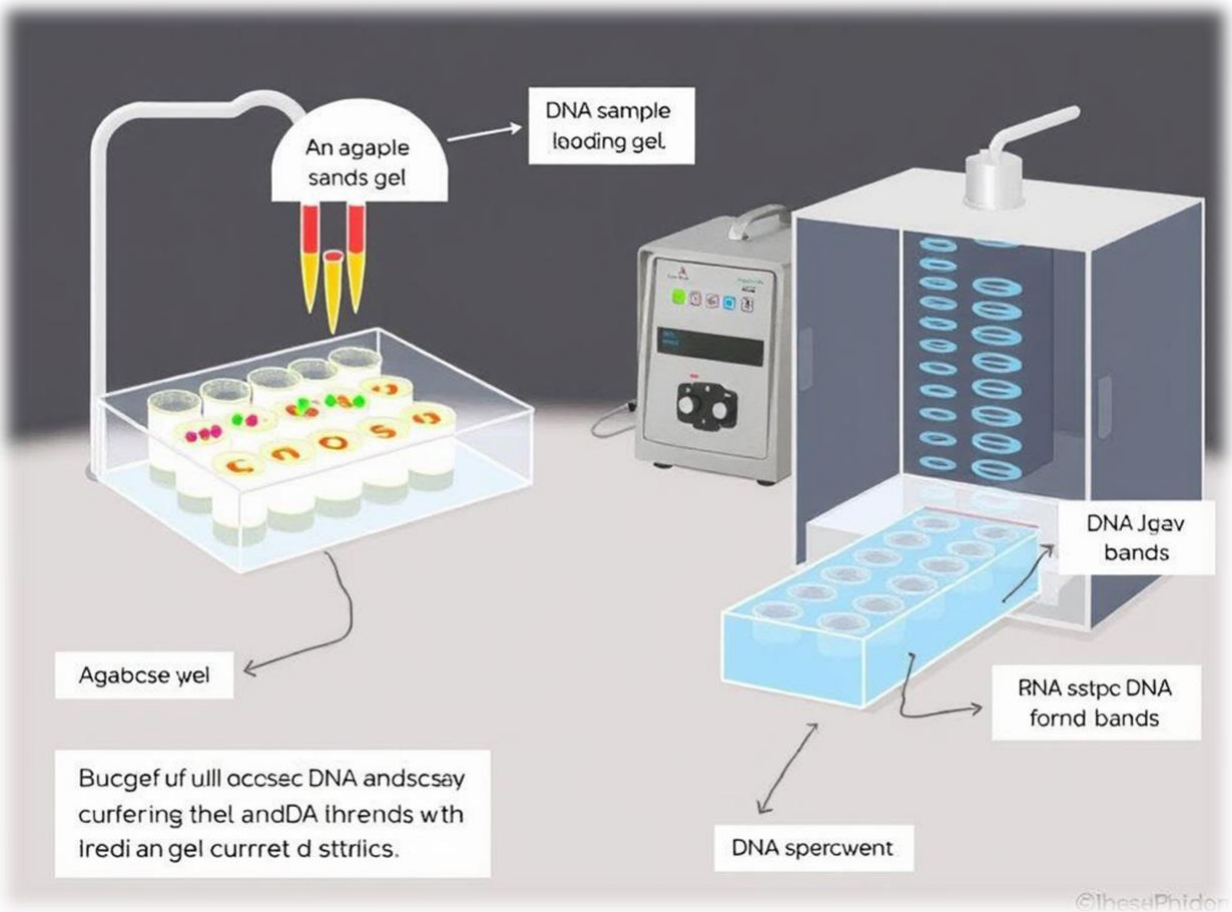
5. Precautions and Safety

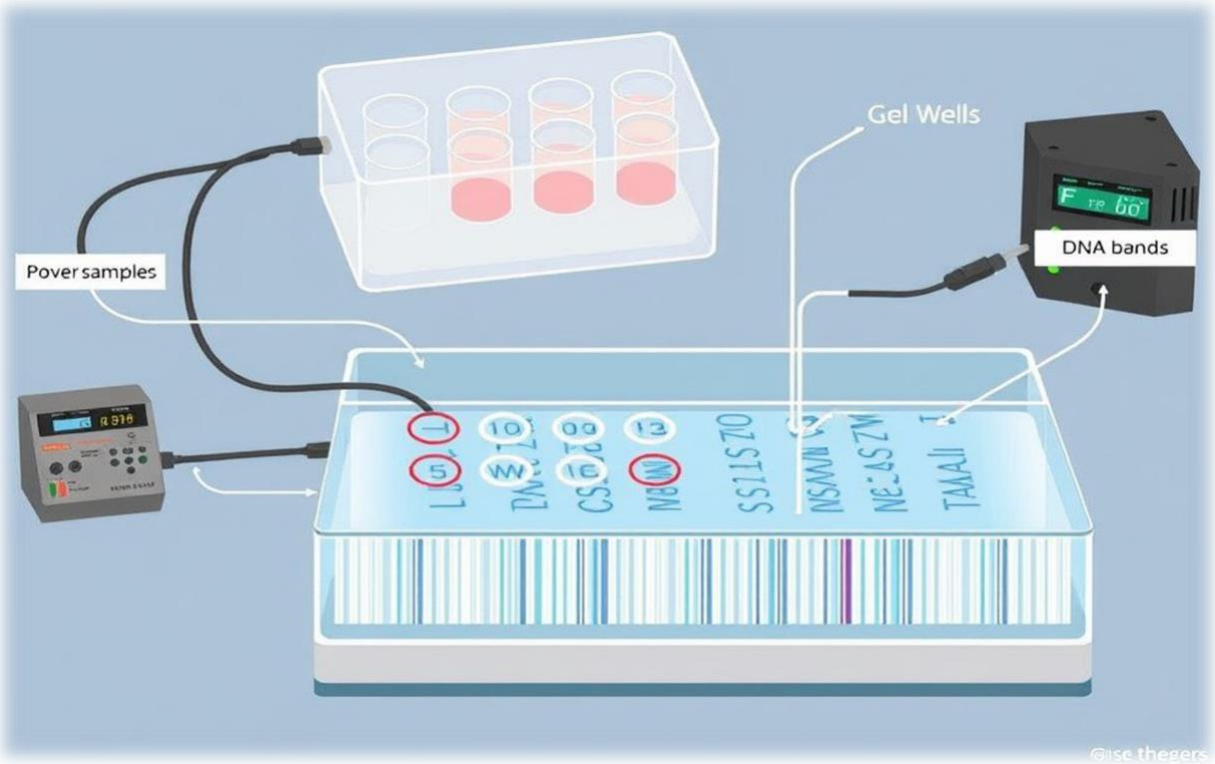
1- Chemicals: Chemicals such as ethidium bromide should be handled with caution because they are carcinogenic.

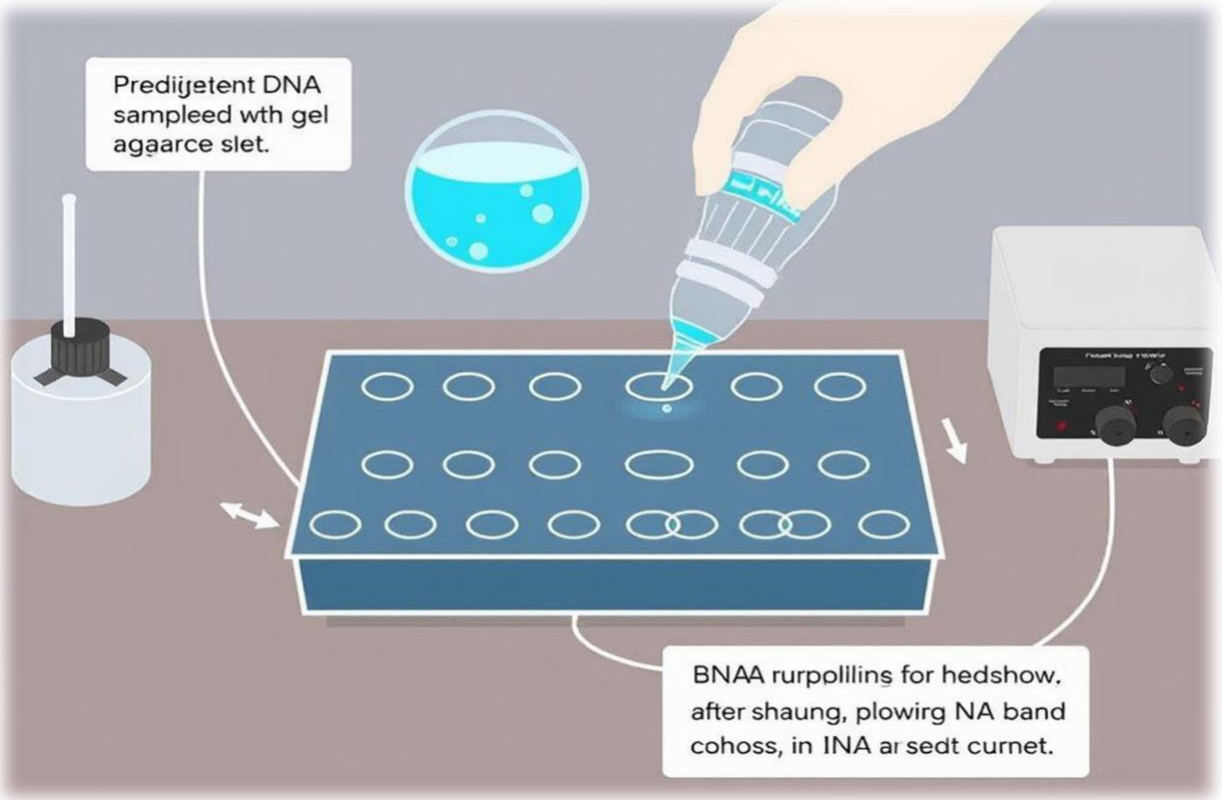
2- Electrical Devices: Safety procedures should be followed when handling electrical devices.

Conclusion

Gel electrophoresis is an essential tool in molecular biology. Separating pretreated DNA is a vital step in understanding genes and cellular processes. This technique enables researchers to discover genetic information and analyze the interaction between genes, enhancing the advancement of medical and biological sciences.




Gel Wells
Pover samples
DNA bands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