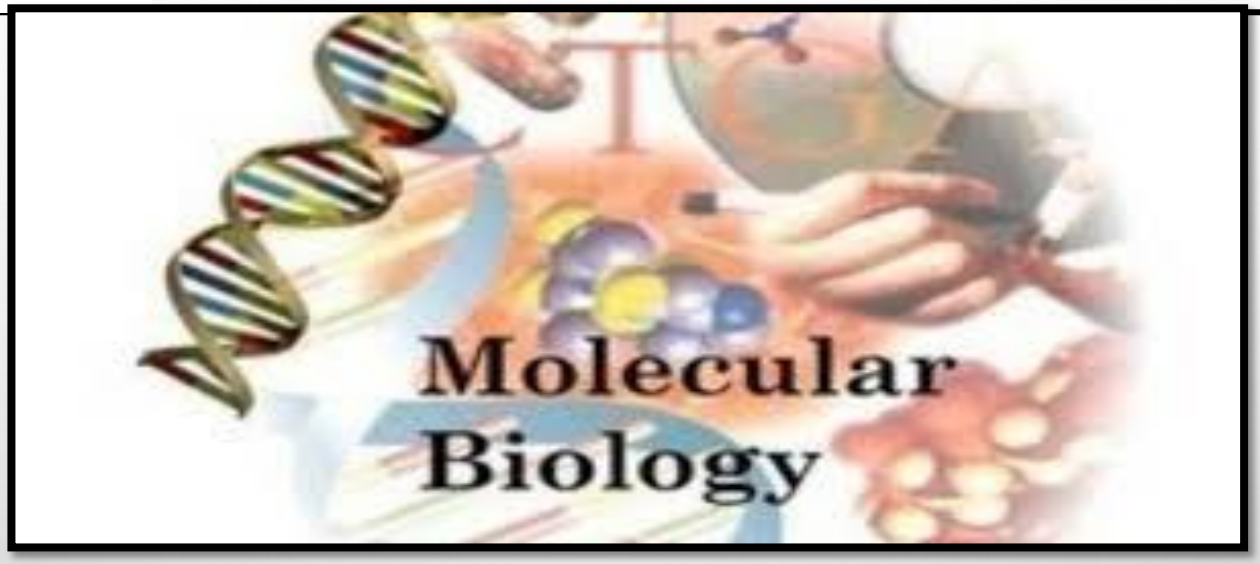
بسم ألله الرحمن الرحيم

{يَا أَيُّهَا النَّاسُ قَدْ جَاءتْكُم مَّوْعِظَةٌ مِّن رَّبِّكُمْ وَشِفَاء لِّمَا فِي الصُّدُورِ وَهُدًى وَرَحْمَةٌ لِّلْمُؤْمِنِينَ}.

صدق ألله العظيم

(سورة يونس – الآية 57)



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Introduction

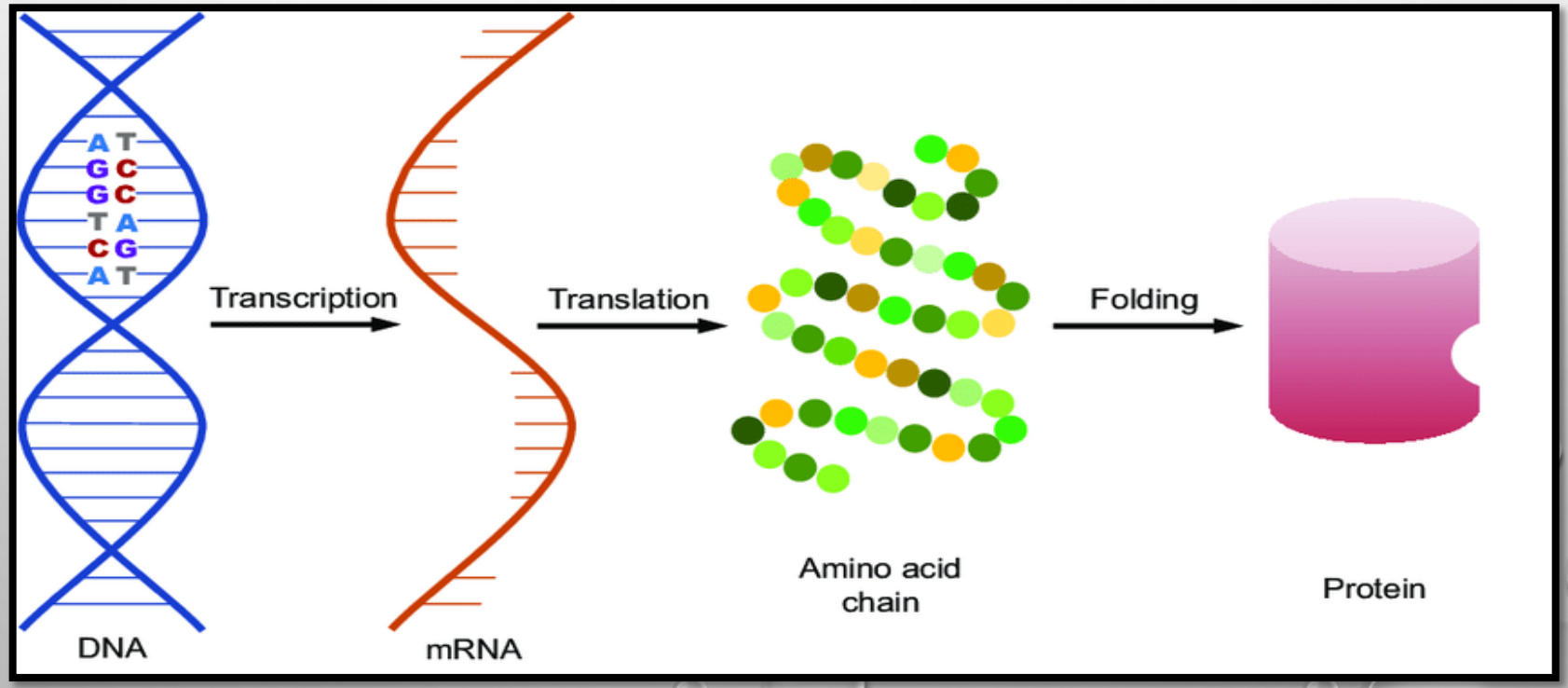
- **Molecular biology: The important topics covered in this subject are nucleic acids (DNA, RNA and protein) biosynthesis and how these molecules interact and behave within in cells.**
- **Molecular biology is emerged in the 1930s. It is a branch of biology that is also closely related to other sub-disciplines like: biochemistry, cell biology, genetics, and genomics.**
- **The discipline particularly seeks to understand the molecular basis of genetic processes, molecular biologists map the location of genes on specific chromosomes, associate these genes with particular characters of an organism, and use genetic engineering (recombinant DNA technology) to isolate, sequence, and modify specific genes.**
- **These approaches can also include techniques such as: polymerase chain reaction, western blotting, and microarray analysis.**

Molecular biologists work to identify and understand the parts of biological pathways. Proteins can:

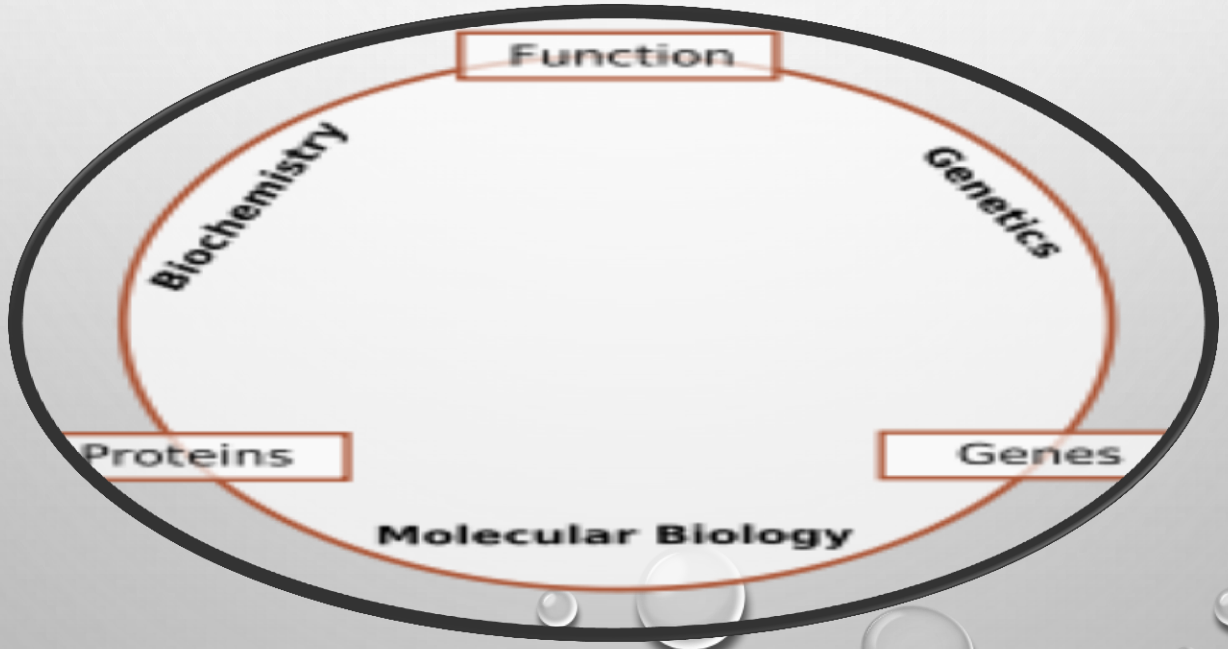
1- Regulate and impact each other.

2- Respond to signals from genes.

3- Respond to signals from outside a cell.



- **Molecular biologists can also seek to understand ways the structure of a molecule, including details such as: the location and shape of active sites on a protein, affect how a molecule functions.**
- **Collecting this information not only provides basic knowledge into how biology works, but helps inform the efforts of other scientists who seek to manipulate that biology.**
- **Those scientists include: drug designers and genetic engineers.**



The Differences in Molecular Biology, Biochemistry & Genetics

- **Molecular biology focuses on a narrower slice of biology and genetics, biochemistry combines knowledge from biology and chemistry.**
- **Molecular biology has much in common with two related sciences: biochemistry and genetics. The three sciences all concern themselves with details of how organisms work at the molecular level. However, each focuses on a different area and has different applications.**

A/ Biochemistry

I. **Biochemistry often devotes more of its attention to molecules other than proteins.**

II. **It also focuses on nucleic acids and to chemical effects that happen when larger quantities of a substance are present, such as the effects of venoms.**

III. **Additionally, biochemistry uses many methods based in organic chemistry research.**

B/ Genetics

I. Genetics is focused specifically on heritable traits and how changes in the genetic code affect an organism. This focus on heritability means that genetics is often best studied at the population level, making it a much larger-scale sort of field than molecular biology.

II. Each of these three fields overlaps and influences the others. Genetics, in particular, has shared much with molecular biology, particularly with regards to the role of RNA. RNA can both store information like DNA and perform active functions like a protein.

Q/Is molecular biology a part of medicine?

a) Besides being useful in diagnosing disease, molecular biology techniques are important in disease treatment.

b) Gene therapy can be defined as therapeutic intervention via molecular modification.

c) Molecular biology also plays a critical role in the understanding of structures, functions, and internal controls within individual cells, all of which can be used to efficiently target new drugs, diagnose disease, and better understand cell physiology.

Molecular Biology Laboratory Methods

Molecular biology is perhaps most famous for its distinctive suite of laboratory methods. Molecular biologists make extensive use of:

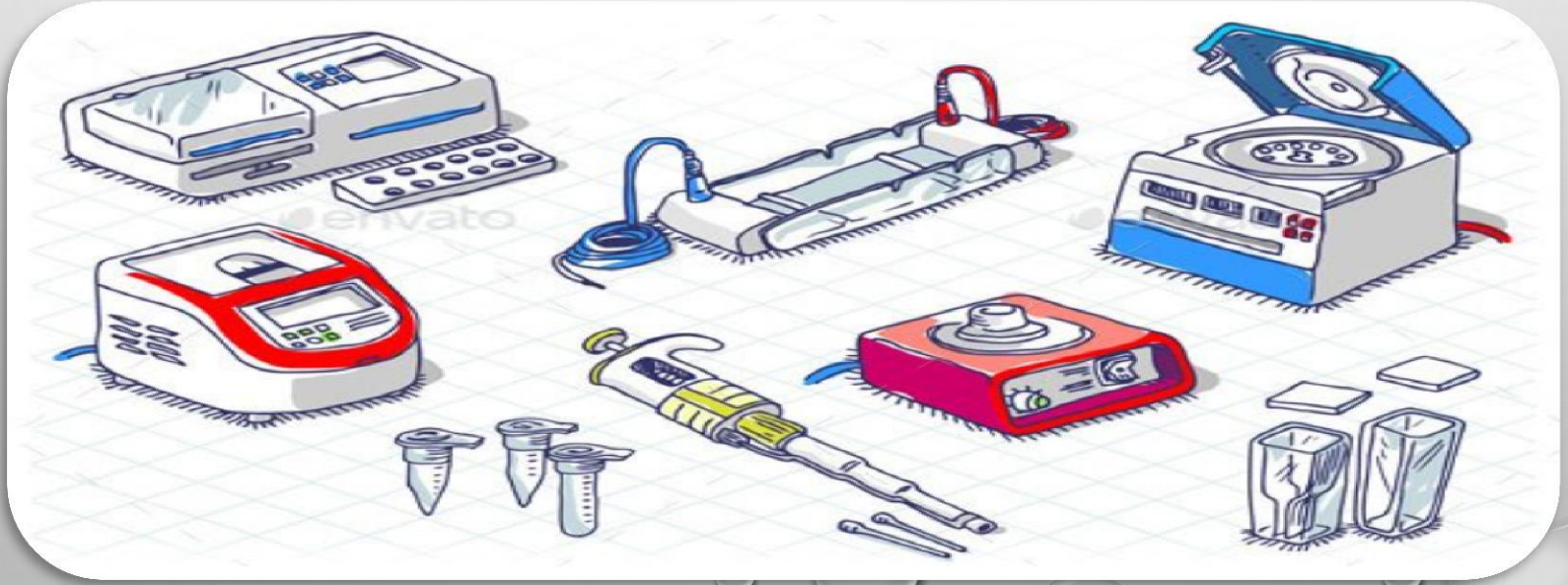
1- Molecular cloning.

2- Polymerase Chain Reaction (PCR).

3- Gel electrophoresis.

4- Blotting.

These techniques facilitate collecting, isolating and quantifying molecules of interest.

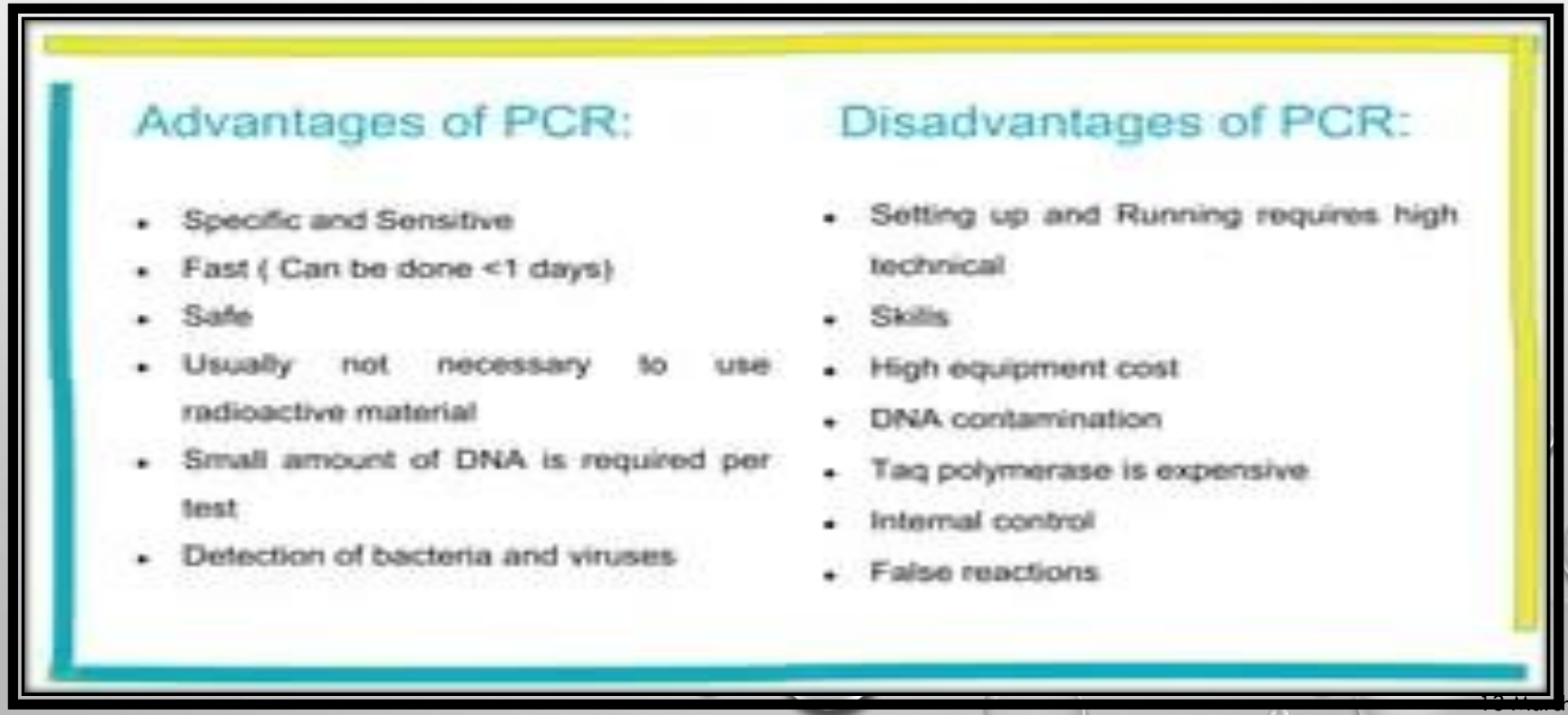


Q/ What are the disadvantages of molecular biology?

Molecular methodologies, while highly advantageous, do contain <u>limitations and certain disadvantages.</u> These can include:

1- Cost: Molecular methodologies are usually more expensive than standard traditional methodologies.

2- Equipment and reagent costs could be prohibitive to some laboratories.

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