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**РОЛЬ МОЛЕКУЛЯРНОЙ ГЕНЕТИКИ В МЕДИЦИНЕ****Научный руководитель – ст. преподаватель Кинзягулова Л.Р.**

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Данная научная статья рассматривает важную роль молекулярной генетики в современной медицине. В статье обсуждаются основные принципы молекулярной генетики, ее влияние на понимание генетических заболеваний, диагностику, лечение и профилактику. Также рассматривается перспективность применения молекулярной генетики в персонализированной медицине и разработке новых методов лечения

**Ключевые слова:** Генетика, медицина, молекулярная генетика, ДНК.

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**THE ROLE OF MOLECULAR GENETICS IN MEDICINE****Scientific Advisor – Senior lecturer Kinzyagulova L.R.**

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This scientific article examines the important role of molecular genetics in modern medicine. The article discusses the basic principles of molecular genetics, its impact on the understanding of genetic diseases, diagnosis, treatment and prevention. The prospects of using molecular genetics in personalized medicine and the development of new treatment methods are also considered.

**Key words:** Genetics, medicine, molecular genetics, DNA

## Molecular genetics

Molecular genetics plays very important role in modern medicine, because it makes possible to understand the genetic basis of various diseases, identify genetic mutations, predict the risk of developing diseases, and develop personalized treatments.

The main purpose of this study is to consider the role of molecular genetics in medicine and to identify the main areas of application of genetic research to improve the diagnosis, treatment and prevention of diseases.

The results of this study will allow us to understand the importance of molecular genetics for medicine and determine the prospects for the development of this field of scientific knowledge.

## Basic principles of molecular genetics

1. Genetic code: information about the structure and functioning of the body is encoded in DNA in the form of a sequence of nucleotides.

2. Mutations: changes in genetic information that can lead to disturbances in the functioning of the body.

3. Genetic Variation: The variety of genetic variants in a population that can influence the development of various diseases.

4. Genetic heritability: the transfer of genetic information from parents to offspring.

## Basic research methods and technologies

1. DNA sequencing: a method for determining the sequence of nucleotides in the genome.

2. PCR (polymerase chain reaction): a method of multiplying a specific section of DNA to analyze it.

3. Genetic screening: a method of assessing genetic composition to identify genetic diseases.

4. Gene therapy: a method of treating genetic diseases by correcting defective genes.

Using these basic principles, research methods, it is possible to conduct research on the role of molecular genetics in medicine.

## The role of molecular genetics in diagnostics

Molecular genetics is very important part in diagnostics diseases. Using molecular genetics makes possibility to identify hereditary diseases, count the chance of their development, and also choose right treatment strategies.

One of the most successful examples of the use of molecular genetics in medicine is cancer diagnosis. Genetic tests can help determine the attendance of certain mutations that may be associated with the development of certain types of cancer. This allows you to identify dangerous diseases early, choose the most effective treatment plan.

Another example of the successful application of molecular genetics in medicine is the diagnosis of genetic syndromes such as Down syndrome. Genetic tests can determine the presence of genetic changes, which helps in the early detection and effective treatment of patients with this disease.

#### The role of molecular genetics in the treatment

One of the main areas in molecular genetics is the study of genetic mutations that can cause the development of different diseases. Due to modern techniques, scientists can identify genetic defects that may be associated with a specific disease.

Based on the genetic profile data of the patient, doctors can develop special individual treatment. For example, in the case of hemophilia, molecular genetics makes it possible to develop individual treatment taking into account the genetic characteristics of the patient

#### Ethical and legal aspects of the use of molecular genetics in medicine

The use of molecular genetics in medicine is associated with some issues.

One such issue is privacy and data protection issues. Genetic information is very important and can tell us a lot about a person, including their genetic predispositions to various diseases. Because of this arguments it is very important to protect this information very carefully.

Another important case is the pricing of genetic tests. Although molecular genetics can help patient a lot, the price of genetic tests is too high, for mass of people.

Thus, the main problems of using molecular genetics in medicine require resolution, both to protect confidential patient information and to create the opportunity to use molecular medicine services for people of all social groups.

#### Conclusion

Thus, molecular genetics plays and will continue to play an important role in the development of modern medicine, opening up new opportunities for diagnosis, treatment and prevention of diseases at the genetic level.

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