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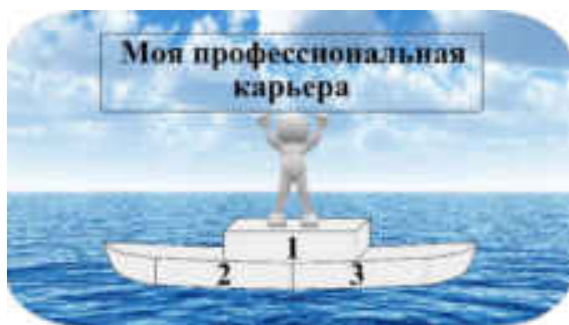


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**Международный научно-образовательный электронный журнал
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Название публикации: «MECHANISMS OF ANTIBIOTIC ACTION ON
PROTEIN BIOSYNTHESIS»

ABSTRACT

This article examines the mechanisms by which antibiotics inhibit protein biosynthesis in microorganisms. Protein synthesis is a fundamental biological process essential for cell growth and survival, and its disruption leads to the inhibition of microbial proliferation. Antibiotics exert their effects by targeting ribosomal subunits and interfering with different stages of translation, including initiation, elongation, and termination. The study highlights the specific actions of various antibiotic groups, such as tetracyclines, aminoglycosides, macrolides, and chloramphenicol, and their

selective impact on prokaryotic cells due to structural differences between prokaryotic and eukaryotic ribosomes. Additionally, the issue of antibiotic resistance is discussed as a major challenge in modern medicine, emphasizing the need for rational use and the development of new therapeutic agents. Overall, understanding the mechanisms of antibiotic action on protein biosynthesis provides a significant foundation for improving clinical treatments and advancing pharmacological research.

Keywords: *Antibiotics, protein biosynthesis, ribosome, translation inhibition, prokaryotic cells, antibiotic resistance, molecular mechanisms, pharmacology.*

INTRODUCTION

In modern medicine, antibiotics are among the most important pharmacological agents for the treatment of infectious diseases. One of their primary mechanisms of action is based on the inhibition of protein biosynthesis in microorganisms. Protein synthesis is a fundamental process essential for the viability of cells, as it ensures the conversion of genetic information into functional products—proteins. Therefore, disruption or inhibition of this process impairs the growth and proliferation of microorganisms.

In bacteria, protein synthesis occurs in ribosomes and involves several stages, including initiation, elongation, and termination, making it a complex process. Antibiotics act at various points within these stages, disrupting ribosomal function or halting the translation process. Notably, structural differences between prokaryotic and eukaryotic ribosomes allow antibiotics to exert selective effects, which is of critical importance for their clinical applications.

In recent years, the widespread and sometimes inappropriate use of antibiotics has led to a significant increase in microbial resistance. This reduces the effectiveness of existing drugs and highlights the need to develop a new generation of antibiotics. From this perspective, a detailed understanding of the mechanisms by which antibiotics affect protein biosynthesis is of both theoretical and practical significance.

LITERATURE REVIEW

The study of the mechanisms by which antibiotics affect protein biosynthesis is one of the extensively researched areas in molecular biology and pharmacology. Early scientific investigations established that the antimicrobial activity of antibiotics is closely linked to their ability to disrupt ribosomal function. Subsequent studies have confirmed that these compounds exert selective effects on different stages of protein synthesis.

According to scientific literature, antibiotics bind to structural components of the ribosome—the small (30S) and large (50S) subunits—thereby interfering with the translation process. For example, tetracyclines act on the 30S subunit, preventing the binding of transfer RNA (tRNA) to the ribosome. Aminoglycosides, such as streptomycin, cause misreading of genetic information, resulting in the synthesis of nonfunctional or harmful proteins.

Other studies have shown that macrolides and lincosamides target the 50S subunit, halting the elongation of the polypeptide chain. Chloramphenicol inhibits the enzymatic activity responsible for forming peptide bonds. Additionally, some antibiotics affect the termination stage, disrupting the proper completion of protein synthesis.

Contemporary research places particular emphasis on the selectivity of antibiotics, highlighting that their effects are based on structural differences between prokaryotic and eukaryotic ribosomes. This selectivity ensures effective antibacterial activity while minimizing harm to human cells. However, in some cases, similarities with mitochondrial ribosomes can lead to unintended side effects.

In recent years, the issue of antibiotic resistance has been widely discussed in scientific literature. Studies indicate that bacteria develop protective mechanisms by altering ribosomal structure, producing enzymes that degrade antibiotics, or restricting antibiotic entry into the cell. Consequently, ongoing research focuses on developing new-generation antibiotics and improving the efficacy of existing drugs.

Overall, current scientific evidence demonstrates that the effects of antibiotics on protein biosynthesis are complex and multifaceted. Research in this area is of

significant importance not only for microbiology and biochemistry but also for the advancement of clinical medicine.

MATERIALS AND METHODS:

In this study, a theoretical and analytical approach was employed to investigate the mechanisms by which antibiotics affect protein biosynthesis. The research was primarily based on scientific literature, contemporary textbooks, peer-reviewed articles, and materials published in electronic databases. Priority was given to reliable sources in the fields of molecular biology, microbiology, and pharmacology during data collection.

The research methodology comprised the following stages:

First, the key stages of protein biosynthesis (initiation, elongation, and termination) were systematically analyzed;

Second, the effects of different groups of antibiotics (such as tetracyclines, aminoglycosides, macrolides, and others) on ribosomal subunits were examined;

Third, their mechanisms of action were compared to identify commonalities and differences.

During data analysis, comparative analysis, a systematic approach, and generalization methods were utilized. The explanation of antibiotic mechanisms was based on molecular-level processes, particularly the structure and function of ribosomes.

Furthermore, the study paid special attention to the selectivity of antibiotics, namely the differences in their effects on prokaryotic versus eukaryotic cells. The obtained results were analyzed based on scientific sources, highlighting their practical significance.

RESULTS:

The results of the study indicate that the effects of antibiotics on protein biosynthesis are primarily associated with disruptions at various stages of ribosomal function. Based on the analyzed data, several key mechanisms of antibiotic action were identified.

First, certain antibiotics act on the small ribosomal subunit (30S), disrupting the initiation phase of translation. Specifically, tetracyclines prevent the binding of transfer RNA (tRNA) to the ribosome, thereby halting the addition of amino acids to the growing polypeptide chain. Aminoglycosides, on the other hand, cause misreading of mRNA codons, leading to the synthesis of nonfunctional or toxic proteins.

Second, antibiotics that target the large ribosomal subunit (50S) were found to interfere with the elongation phase. Macrolides and lincosamides inhibit the extension of the polypeptide chain, thereby preventing the continuation of protein synthesis. Chloramphenicol halts protein biosynthesis by inhibiting the activity of peptidyltransferase, the enzyme responsible for forming peptide bonds.

Third, some antibiotics affect the final stage of protein synthesis—termination. In these cases, the newly synthesized polypeptide chain is either incompletely formed or incorrectly released, resulting in impaired cellular functions.

The results also confirmed the selective action of antibiotics. Most antibiotics exhibit higher sensitivity toward prokaryotic cells, while their effects on eukaryotic cells are comparatively lower. This selectivity is explained by structural differences in ribosomes.

Additionally, the reviewed sources reported the development of antibiotic resistance in bacteria. This resistance can arise through alterations in ribosomal structure, enzymatic degradation of antibiotics, or reduced permeability of the cell membrane.

Overall, the findings demonstrate that the effects of antibiotics on protein biosynthesis involve multi-step and complex mechanisms, and their efficacy is directly dependent on the extent of interference with ribosomal processes..

DISCUSSION

The obtained results demonstrate that the effects of antibiotics on protein biosynthesis involve complex, multi-step processes. As identified in this study, these compounds interfere with ribosomal function at various levels, disrupting critical stages of translation. This disruption leads to impaired cellular activity and a reduction in the proliferative capacity of microorganisms.

The different mechanisms of action exhibited by antibiotics targeting the 30S and 50S ribosomal subunits represent key factors underlying their selectivity. Specifically, antibiotics that act on the small subunit disrupt the reading of genetic information, while those targeting the large subunit inhibit peptide bond formation or the elongation of the polypeptide chain. These distinctions are of significant clinical importance, enabling the optimal selection of antibiotics for the treatment of specific infectious diseases.

The results further indicate that the high selectivity of antibiotics is based on structural differences between prokaryotic and eukaryotic ribosomes. This selectivity ensures that these drugs exert minimal toxicity to human cells. However, in some cases, interactions with mitochondrial ribosomes may lead to adverse effects, necessitating careful consideration during clinical application.

Additionally, the discussion underscores the pressing issue of antibiotic resistance. Microorganisms develop protective mechanisms through alterations in ribosomal structure, enzymatic inactivation of antibiotics, or reduced cellular uptake. Such adaptations decrease the efficacy of existing antibiotics and emphasize the need for the development of new pharmacological agents.

Overall, a thorough understanding of the mechanisms by which antibiotics affect protein biosynthesis provides a critical scientific foundation for enhancing drug efficacy, minimizing adverse effects, and developing next-generation therapeutic agents. Therefore, advancing research in this area remains a vital priority in modern medicine.

CONCLUSION

This study was dedicated to analyzing the mechanisms by which antibiotics affect protein biosynthesis. The results indicate that antibiotics effectively inhibit protein synthesis by disrupting ribosomal function at various stages. They exert selective effects on the initiation, elongation, and termination phases of translation, thereby halting the growth and proliferation of microorganisms.

Furthermore, the selective action of antibiotics is explained by structural differences between prokaryotic and eukaryotic ribosomes, which is of critical

importance for their clinical application. The distinct mechanisms of action exhibited by different groups of antibiotics enable their effective use in the treatment of specific infectious diseases.

However, the increasing prevalence of antibiotic resistance remains a significant challenge. The adaptability of microorganisms and the development of protective mechanisms reduce the efficacy of existing drugs. Therefore, the development of new-generation antibiotics, the optimization of current treatments, and their rational use are of paramount importance.

In conclusion, a thorough understanding of the mechanisms by which antibiotics affect protein biosynthesis not only enriches theoretical knowledge but also provides a crucial scientific basis for developing effective and safe therapeutic strategies in clinical practice.

REFERENCES

1. Abdukaxxorovna, E. X. (2025). MECHANISM OF ACTION OF MEDICATIONS USED IN DIARRHEA AND CONSTIPATION. Medical journal of Uzbekistan, 1(3), 130-137.
2. Abdukaxxorovna, E. X. (2024). GIPERURIKEMIYA TURLARI: PODAGRA, KSANTINURIYA, LESHA NIXAN SINDROMI, ORTTIRILGAN GIPERURIKEMIYA KASALLIKLARI ULARNING DAVOLASH USULLARI. AMERICAN JOURNAL OF APPLIED MEDICAL SCIENCE, 2(5), 114-120.
3. Эргашева, Х. А. (2025). БИОХИМИЧЕСКИЕ ОСНОВЫ РАЗВИТИЯ ПАНКРЕАТИТА. ПРИНЦИПЫ ЛЕЧЕНИЯ И ДИАГНОСТИКИ. Журнал гуманитарных и естественных наук, (23 [2]), 175-181.
4. Носирова, З. Г., & Эргашева, Х. А. (2019). ИССЛЕДОВАНИЕ ВИДОВОГО СОСТАВА И БИОЛОГИЧЕСКИХ ОСОБЕННОСТЕЙ ВРЕДИТЕЛЕЙ МАСЛИЧНОГО ЛЬНА. WORLD SCIENCE: PROBLEMS AND INNOVATIONS: сборник статей XXXVI, 52.

5. Xayrulloevna, O. S. (2025). RADIOLOGIK KONTRAST MODDALARNING BIOKIMYOVIY XUSUSIYATLARI VA ULARNING O'ZIGA TO'G'RI QIMALARIDA TAQSIMLANISHI. SHOKH LIBRARY, 1(11).
6. Xayrulloevna, S. O. (2025). O'ZIGA HAJAYRALARINING BIOKIMYOVIY AHAMIYATI. UNIVERSAL JOURNAL OF MEDICAL AND NATURAL SCIENCES, 3(24), 50-54.
7. Xayrulloevna, O. S. (2025). ENERGIYA ALMASHINUVI: ATF SINTEZI VA ENERGETIK MUVOZANAT. SHOKH LIBRARY, 1(11).
8. Xayrulloevna, O. S. (2025). MURAKKAB LIPIDLAR ALMASHINUVI, XOLESTERIN METOBOLIZMI. SHOKH LIBRARY, 1(11).