

ABSTRACT
of the dissertation on the topic "Technology, biological research and standardization of collagen membranes with probiotics" for the degree of Doctor of Philosophy (PhD) in the specialty 6D110400 "Pharmacy"
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Relevance of the research topic

An important direction of the global pharmaceutical industry is the creation of drugs that are similar in structure to natural, relatively safe, significantly beneficial to human health and affordable.

The strategic direction of the policy of the Republic of Kazakhstan is aimed at increasing the base of pharmaceutical industries with the full use of domestic raw materials in order to increase domestic production capacities, scientific and technical potential of the country and reduce dependence on imports. In this regard, many programs have been developed and implemented in the country, in particular, "Kazakhstan - Strategy 2050", "The concept of Kazakhstan becoming one of the 30 developed countries", "Strategic Development Plan of the Republic of Kazakhstan until 2025", in the Message of the President of the Republic of Kazakhstan dated 01.09.2021, in order to increase the efficiency of the healthcare system by 2025, increase the share of domestic products to 50% and pay special attention to the pharmaceutical industry for 2021-2025 "Healthy nation" is based on the implementation of the national project quality and affordable healthcare for every citizen, the development of the domestic pharmaceutical and medical industry.

For the Republic of Kazakhstan, the development of the pharmaceutical sector is of great strategic, social and economic importance. 7555 medicines are registered in the State Register of the Republic of Kazakhstan, the share of domestic drugs is 14%, respectively, 86% of pharmaceutical products are satisfied due to the demand for imported medicines.

In the development of the domestic pharmaceutical industry, providing the population with high-quality, effective and safe medicines and import substitution remain urgent issues.

Currently, one of the urgent problems is the fight against local inflammatory and purulent diseases. During the development and maturation of dosage forms for the local treatment of wounds – for the epidermal administration of biologically active compounds, application dressings are widely used. Antibacterial dressings are necessary to protect wounds from microbial infection at an early stage of re-epithelialization, thereby preventing deep and severe tissue infection. Currently, bandages based on natural polymers are successfully used, which heal wounds by adding antibacterial agents. However, there are relatively few antibacterial natural polymer materials with good biocompatibility, and the rapid flushing of antibacterial agents not only weakens the antibacterial activity of bandages, but can also cause dangerous situations. Due to the decrease in the therapeutic effects of many antimicrobials, especially antibiotics, in the treatment of infectious genesis of skin lesions, the use of drugs based on probiotic bacteria is of interest.

One of the directions of modern biotechnology is the development of drugs based on biologically active substances produced by probiotic bacteria, including representatives of the genus *Bacillus*. They produce a wide range of antibiotics in small quantities, stimulating local and systemic immunity. Proteolytic enzymes synthesized by these bacteria promote tissue regeneration, have a thrombolytic effect, and prevent the formation of *Bacillus spp* scars. with the help of acne, dermatitis, restoration of skin regeneration, wound healing therapy, scientific data are presented. This allows them to be used for local wound healing and prevention of purulent complications. Thus, there is a need to develop a pharmaceutical justification for long-acting collagen-based drugs using these bacteria that stimulate tissue regeneration processes, the production of a wide range of antibiotics and proteolytic enzymes by related *Bacillus* bacteria.

Purpose of the research

It has high producing properties of *Bacillus spp.* isolation of strains and development of pharmaceutical substantiation of collagen membranes based on it.

Objectives of the research

To isolate strains of *Bacillus spp.* and to determine their morphological, cultural, biochemical and molecular genetic properties;

To test the antagonistic activity, antibiotic resistance and viability of *Bacillus spp.* strains;

To develop the optimal composition and rational technology of a collagen membrane with a probiotic;

To evaluate the quality of the collagen membrane with a probiotic and to conduct studies of its stability during storage;

To determine the safety and specific pharmacological activity of a collagen membrane with a probiotic;

To develop a feasibility study of a collagen membrane with the conditional name "Bacicoll"

Methods of research work

The methods used for scientific research comply with the requirements of the State Pharmacopoeia of the Republic of Kazakhstan, the Pharmacopoeia of the Eurasian Economic Union, European Pharmacopoeia, the State Pharmacopoeia of the Russian Federation, the Federal Law and other regulatory documents in force on the territory of the Republic of Kazakhstan. Physical and physico-chemical, biological, bacteriological, molecular genetic statistical methods were used.

Objects of research

Collagen membranes with *Bacillus spp* strains. and probiotics.

Subject of research: Determination of morphological, cultural, biochemical, molecular genetic properties of *Bacillus spp.* strains, as well as antagonistic activity, antibiotic resistance.

The main provisions of the dissertation research submitted for defense:

Results of morphological, cultural, biochemical, molecular genetic properties of isolated strains of the genus *Bacillus spp.*

Results of pharmaceutical development of collagen membranes with probiotics.

The results of the study of the safety and specific pharmacological action of the collagen membrane of the conditional name "Bacicoll".

Scientific novelty:

For the first time:

Morphological, cultural, biochemical and molecular genetic properties of isolated strains of the genus *Bacillus* spp have been studied.

Studies of antagonist activity, antibiotic resistance and viability of strains of pathogenic and conditionally pathogenic *Bacillus* spp strains have been carried out.

The optimal composition and effective technology of the collagen membrane with the conditional name "Bacicoll" has been compiled and quality assessments, stability studies over storage time have been carried out.

The safety of the collagen membrane with the conditional name "Bacicoll" and the pharmacological effect of the wound healing agent were determined.

Practical significance of the results obtained:

A draft ND for the lyophilizate of the probiotic drug *Bacillus subtilis* has been developed;

A project of ND collagen membrane with the conditional name "Bacicoll" has been developed;

An experimental production regulation of a collagen membrane with the conditional name "Bacicoll" has been developed;

The method of obtaining collagen membranes with probiotic was introduced at the scientific and production base of Antigen LLP.

Personal contribution of the author

All the results of the dissertation research were obtained by the author independently, and are a personal contribution of the doctoral student to the science in the field of pharmacy.

The reliability of the results, the main provisions submitted for defense, conclusions and conclusions formulated in the dissertation work is justified by a significant amount of experimental material, fully confirmed by the results of their own research conducted in laboratory conditions, using modern equipment and accurate measurement methods, as well as comparison with the literature data

Approbation of research results

The main provisions of the dissertation work are published in the materials of the following scientific conferences:

International Scientific and Practical Conference "WORLD SCIENCE", "Modern Methodology of Science and Education" (UAE, Dubai, May 26-27, 2016);

- Priorities of pharmacy and dentistry: from theory to practice: collection of materials of the VI scientific and practical conference with international participation (Kazakhstan, Almaty, 2017);

- Proceedings of the II International Scientific and Practical Conference «Topical Problems of Modern Science» (Poland, Warsaw, November 18, 2017);

- Proceedings of the International Scientific and Practical Conference «Topical Problems of Modern Science» (Poland, Warsaw, July 17, 2017);

- Akanov Readings: topical issues of medicine and healthcare" IX International Scientific and Practical Conference "Topical issues of public health" V International Scientific and Practical Conference of Students and young scientists "Science and Medicine: a modern view of youth" (Kazakhstan, Almaty, April 19-20, 2018);
- Nano, Bio, Green and Space – Technologies for a Sustainable Future: conference proceeding of 18th International Multidisciplinary Scientific Geo Conference (Bulgaria, Sofia, July 2-8, 2018.)
- International scientific and practical Conference, dedicated to the memory of R.Dilbarkhanov "Formation and prospects of development of the scientific school of pharmacy: continuity of generations" (Kazakhstan, Almaty, June 16, 2018.)
- International scientific and practical conference dedicated to the 85th anniversary of the Tashkent Pharmaceutical Institute "The current state of the pharmaceutical industry: problems and prospects" (Uzbekistan, Tashkent, November 25-26, 2022);
- International scientific and practical conference dedicated to the memory of Professor R. Dilbarkhanov "Formation and prospects of development of the scientific school of Pharmacy: succession of generations" (Kazakhstan, Almaty, June 30, 2023.).

Information about publications

According to the research results, 15 scientific papers have been published, including: an article in an international peer-reviewed scientific journal included in the Scopus database and Web of Science Core Collection – 2; articles in journals recommended by the Committee for Quality Assurance in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan - 4; abstracts and articles at international scientific and practical conferences (UAE, Poland, Tashkent, Kazakhstan) – 9.

Connection of research tasks with the plan of scientific programs

The dissertation work was carried out in the direction of development of the pharmaceutical industry, implementation of the Comprehensive Plan for the Development of the Pharmaceutical and Medical Industry for 2020-2025, as well as the intra-university scientific and technical project “Pharmaceutical and pharmacological aspects of the development and research of biological drugs” KazNMU named after. S.D. Asfendiyarov (12.2016) No. 0118 RKIO240.

Scope and structure of the dissertation

The dissertation is presented on 152 pages of typewritten text, contains 37 tables and 30 figures, a list of references, including 170 sources, as well as 13 appendices. The work consists of an introduction, a literature review, a section devoted to research materials and methods, three sections of own research, conclusions and conclusions.