



Chemical and **B**iopharmaceutical **T**echnologies

collection of scientific
papers

by general edition
V. Bessarabov, V. Lubenets

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Kyiv National University of Technologies and Design
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CHEMICAL AND BIOPHARMACEUTICAL TECHNOLOGIES

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The collection of scientific works is devoted to the current problems of development, research and production of active pharmaceutical ingredients, medicinal and cosmetic products, fundamental and applied physical and organic chemistry, molecular pharmacology and chemogenomics, ecology, toxicology and pharmaceutical technology, technology of polymer and composite materials, marketing research in the field pharmacy and pharmaceutical production organizations. The collection contains abstracts of reports and research articles that were presented as part of the VI International Scientific and Practical Conference "KyivLvivPharma-2023. Pharmaceutical Technology and Pharmacology in Ensuring Active Longevity" (November 16-18, 2023, Kyiv, Lviv). This collection of scientific works is the direct successor of the collection of scientific works "PHYSICAL ORGANIC CHEMISTRY, PHARMACOLOGY AND PHARMACEUTICAL TECHNOLOGY OF BIOLOGICALLY ACTIVE SUBSTANCES", which was published annually from 2017 to 2021.

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KYIVLVIVPHARMA-2023: PHARMACEUTICAL TECHNOLOGIES IN ENSURING ACTIVE LONGEVITY

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The pharmaceutical industry plays an important role in improving public health and makes a significant contribution to the economy. On November 16-18, 2023, the VI International Scientific and Practical Conference «KyivLvivPharma-2023. Pharmaceutical Technology and Pharmacology in Ensuring Active Longevity» was held at the premises of the National University of Technologies and Design and the National University of Lviv Polytechnic with the support of the Chamber of Commerce and Industry of Ukraine.



Figure 1 – Participants of the Conference «KyivLvivPharma-2023» in the Lviv Polytechnic National University

The event was held under the auspices of the Ministry of Education and Science of Ukraine and co-organized by the L.M. Lytvynenko Institute of Physical and Organic Chemistry and Coal Chemistry of the National Academy of Sciences of Ukraine. Farmak JSC, the leader of the Ukrainian pharmaceutical industry, was the main partner of the conference. Norla-Ukraine LLC is also a partner of the conference. The main media partner is Apteka Weekly.

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Figure 2 – Partners of Conference «KyivLvivPharma-2023»

The Conference «KyivLvivPharma-2023» was held in a mixed format and was attended by more than 250 participants from different countries, including Ukraine, Poland, Lithuania, France, Switzerland, the USA, Israel and Estonia. The Conference has become a powerful platform for sharing scientific and practical experience of achievements in the field of drug development and manufacturing, discussing the prospects for the development of the pharmaceutical industry and its European integration, as well as the problems of training specialists for the pharmaceutical industry of Ukraine. Some of the presented research was carried out as part of the international educational project Erasmus+ Jean Monnet 101085257 - GoodPharma.



Figure 3 – The work of the Conference at the Kyiv National University of Technologies and Design



Figure 4 – The work of the Conference at Lviv Polytechnic National University

Vladyslav STRASHNYI, Doctor of Pharmaceutical Sciences, Professor, Head of the Department of Industrial Pharmacy of KNUTD, spoke about the trends in the development of the pharmaceutical industry and the importance of quality education for the training of highly qualified specialists. He noted that the quality of human life directly depends on the level of development of the health care system, disease prevention and healthy lifestyle. Healthcare is an industry based on the successes of pharmaceutical science and production, which, in turn, are impossible without proper education. The constant progress of the pharmaceutical potential of our country is based on the interaction of pharmaceutical education, science and industry. Vladyslav STRASHNYI emphasized that the permanent interactive platform for healthcare is functioning to effectively ensure the unity of all these components.



Figure 5 – Speech by Vladyslav STRASHNYI, Doctor of Pharmaceutical Sciences, Professor, Head of the Department of Industrial Pharmacy of KNUTD

Achievements in synthesizing active pharmaceutical ingredients (APIs) and developing new drugs

Today, thiazole/thiazolidinone derivatives are being intensively studied. The results of 20 years of experience in the search for new biologically active compounds in this group of drugs were presented by Roman LESYK, Doctor of Pharmaceutical Sciences, Professor, Head of the Department of Pharmaceutical, Organic and Bioorganic Chemistry of Danylo Halytsky Lviv National Medical University.

The main problems associated with the study of anti-tumor (and other) drugs are caused by non-targeted action, which can lead to negative effects on normal tissues and organs, rapid development of drug resistance, which can reduce the effectiveness of chemotherapy; poor solubility and stability of some synthetic drugs in water. Rostyslav STOIKA, Doctor of Biological Sciences, Professor, Head of the Department of Cell Proliferation and Apoptosis Regulation at the Institute of Cell Biology of the National

Academy of Sciences of Ukraine, explained how researchers are trying to cope with these problems.

Vira LUBENETS, Doctor of Chemical Sciences, Professor, Head of the Department of Technology of Biologically Active Substances, Pharmacy and Biotechnology of Lviv Polytechnic National University, presented a meaningful and relevant report on the use of thiosulfonates as reagents, biologically active compounds and APIs.

Implementation of «Green Chemistry» principles for the sustainable development of API drug technologies

The principles of "green chemistry" include, in particular, waste avoidance wherever possible, minimization of hazardous substances that may be toxic to the environment, use of "nuclear economy" (i.e. maximizing production efficiency to produce less harmful substances in the final product), use of safe solvents and auxiliary substances in chemical processes, development of energy-saving chemical and technological processes, use of renewable raw materials. Volodymyr BESSARABOV, Doctor of Technical Sciences, Professor, Professor of the Department of Industrial Pharmacy of KNUTD, outlined the implementation of green chemistry principles for the sustainable development of technologies for active pharmaceutical ingredients in geriatric medicines.



Figure 6 – Speech by Volodymyr BESSARABOV, Doctor of Technical Sciences, Professor, Professor of the Department of Industrial Pharmacy, KNUTD

He reported on the results of research by scientists of the Laboratory of Molecular Pharmacology, Chemogenomics and Biogerontology of KNUTD in the field of "green chemistry", in particular the use of solid decontamination systems based on hydrogen peroxide for cleaning pharmaceutical production equipment from residues of organophosphorus active pharmaceutical ingredients within the framework of the lean manufacturing concept.

Cosmetics technology and pharmaceutical biotechnology

Liudmyla PETROVSKA, Doctor of Pharmaceutical Sciences, Associate Professor of Department of Cosmetology and Aromology of National University of Pharmacy (NUPh), shared her thoughts on training specialists in the development of cosmetic products technology. She believes that the components of training specialists in the program «Technologies of perfumery and cosmetics» are the formation of students' theoretical knowledge and practical skills in developing the composition of domestic cosmetic and perfumery products, manufacturing and quality control of the main groups of products in the perfumery and cosmetics industry, providing future masters with the qualification of a cosmetic pharmacist with the ability to perform their duties

efficiently, produce cosmetics of different directions of action, and provide multifaceted advisory services.

Inna BARANOVA, Doctor of Pharmaceutical Sciences, Professor of Department of Organization and Economics of Pharmacy of the National University of Pharmacy the National University of Pharmacy, spoke about the peculiarities of modern labeling of cosmetics (labeling elements, information signs, graphic symbols, labels, etc.).

Olena FEDOROVA, Candidate of Chemical Sciences, Associate Professor, Associate Professor of the Department of Technology of Biologically Active Substances, Pharmacy and Biotechnology of Lviv Polytechnic National University, addressed the issue of creating modern medicinal and cosmetic products based on natural raw materials in her report. The speaker presented the results of the department's work in finding alternative solutions for the production of biologically active compounds from natural raw materials. In particular, the development of a new cosmetic product based on the biomass extract of *Arnica montana*, obtained by cultivating plants *in vitro*.



Figure 7 – Speech by Olena FEDOROVA, Candidate of Chemical Sciences, Associate Professor of the Department of TBSFB of Lviv Polytechnic National University

Pharmaceutical Science in Ensuring the State's Defense Capability

On November 17, during the second day of the VI International Scientific and Practical Conference «KyivLvivPharma-2023. Pharmaceutical Technology and Pharmacology in Ensuring Active Longevity», the reports presented in the section «Pharmaceutical Science in Ensuring the State's Defense Capability» aroused great interest among a wide range of participants.

Liubov VAKHITOVA, Candidate of Chemical Sciences, Senior Researcher, Leading Researcher at the Institute of Physical-Organic Chemistry and Coal Chemistry of the National Academy of Sciences of Ukraine and pedagogical staff of the Department of Industrial Pharmacy of KNUTD, namely Galina KUZMINA, Candidate of Chemical Sciences, Associate Professor of the Department of Industrial Pharmacy of KNUTD and Olena ROIK, Candidate of Pharmaceutical Sciences, Associate Professor of the Department of Industrial Pharmacy of KNUTD presented reports on the creation of decontamination systems for chemical warfare agents, means for treating wounds and rehabilitation of soldiers, who bring our Victory closer.

Also in this section, Viktoriia LYZHNIUK, a postgraduate student of the Department of Industrial Pharmacy of KNUTD, a Researcher at the Laboratory of Molecular Pharmacology, Chemogenomics and Biogerontology, presented the results of joint work with Norla-Ukraine LLC, which is dedicated to the development of compositions to ensure antibacterial, anti-decubitus and anti-burn properties of a series of medical

devices - medical coatings produced by Norla-Ukraine LLC. This development is used in the surgical departments of military hospitals, hospital wards, ambulances, as well as in social welfare institutions and at home to care for bedridden patients. During the presentation of the report at Lviv Polytechnic National University and KNUTD, the conference organizers provided the participants with materials from Norla-Ukraine LLC, a partner of the conference, which included the company's product catalog, samples of medical devices and instructions for their use.

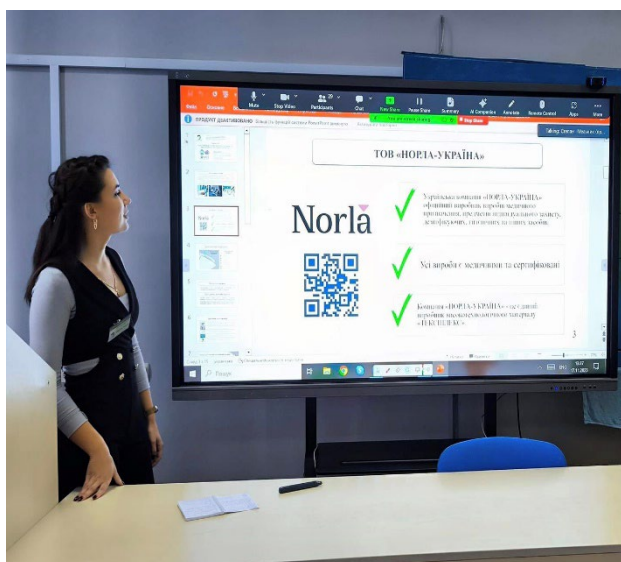


Figure 8 – Report by Viktoriia LYZHNIUK on joint development with Norla-Ukraine LLC



Figure 9 – Familiarization with the materials provided by the conference partner Norla-Ukraine LLC

Panel discussions

The conference included panel discussions on various topics that were of interest to all representatives of the pharmaceutical industry. Each panel discussion brought unique views and insights.

On the first day, November 16, the scientific and pedagogical staff of the leading national higher education institutions, as well as representatives of the Ukrainian Chamber of Commerce and Industry, discussed the most recent and relevant issues regarding the design of training specialists in the specialty 226 Pharmacy, Industrial Pharmacy and whether a specialist with a master's degree in the specialty 226 «Pharmacy, Industrial Pharmacy», specialization 226.02 «Industrial Pharmacy» can work effectively in a pharmacy chain, and a specialist in the specialty 226.01 «Pharmacy» can work effectively at an enterprise.

The panelists expressed the opinion that an industrial pharmacist can work effectively in a pharmacy. Just as a pharmacist can work effectively at a pharmaceutical company. Graduates of both specialties receive a sufficient level of knowledge for this. However, in terms of the legal framework and documentation, there are issues that need to be addressed in this context. For example, in practice, the main problems arise at the beginning of pre-certification cycles when the question of internships arises. The specialty 226.01 provides for an internship, while 226.02 does not. The discussion participants recommended amending the legislation to allow graduates of the specialty 226.02 «Industrial Pharmacy» to undergo postgraduate internships, if necessary, if they

decide to realize their potential in a pharmacy chain. Such graduates should have the opportunity to be certified and have an open path to professional growth.

On the second day, the panel discussion focused on the issue of lean pharmaceutical manufacturing and its compatibility with GMP. Experts from leading Ukrainian pharmaceutical companies joined the discussion. They discussed the similarities and differences between the concepts of lean manufacturing and GMP philosophy, as well as the practical experience of domestic companies in implementing the lean manufacturing methodology.

Competition for the best youth research work based on the results of reports and poster session among students of the second and third levels of higher education

As part of the Conference «KyivLvivPharma-2023», in the Department of Biologically Active Substances Technology, Pharmacy and Biotechnology of Lviv Polytechnic National University was held a competition for the best youth research paper based on the results of reports and poster session among students of the second and third levels of higher education. The competition committee selected three winners among the authors of the submitted papers, who were awarded valuable prizes at the closing ceremony of the conference:

🏆 1st place – Anastasia BEHDAI for the work «*In vitro* study of the effect of desloratadine and loratadine on 15-lipoxygenase» (Department of Industrial Pharmacy, KNUTD);

🥈 2nd place – Artem KHARCHENKO for the work «Functionalized vitaminized product with antioxidant properties» (Department of Industrial Pharmacy, KNUTD);

🥉 3rd place – Sofia KLIUCHYK for the work «Applications for Improving the Quality of Life» (Department of TBSFB, Lviv Polytechnic National University).



Figure 10 – Anastasia BEHDAI – winner of the competition for the best youth research paper based on the results of the poster session (1st place)

The Scientific (Program) and Organizing Committees of the VI International Scientific and Practical Conference «KyivLvivPharma-2023. Pharmaceutical Technologies and Pharmacology in Ensuring Active Longevity» express their gratitude to the co-organizers, all conference participants, the main partner of the conference, Farmak JSC, the conference partner Norla-Ukraine LLC and the information partner of the conference, APTEKA Weekly.

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