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КАФЕДРА МІКРОБІОЛОГІЇ, ВІРУСОЛОГІЇ ТА ІМУНОЛОГІЇ

MINISTRY OF HEALTH OF UKRAINE
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Збірник містить матеріали науково-практичної міжнародної дистанційної конференції «Мікробіологічні та імунологічні дослідження в сучасній медицині». Розглянуто актуальні питання фармацевтичної мікробіології, перспективи створення антимікробних препаратів, їх застосування в медичній практиці, вивчення антибіотикорезистентності мікроорганізмів та визначення шляхів її подолання, клінічної патофізіології та епідеміології інфекційних захворювань, клінічної імунології та алергології, досягнень вірусологічних, молекулярно-генетичних досліджень в лабораторній діагностиці, актуальні питання ветеринарної мікробіології, наукових досліджень з розробки антимікробних лікарських засобів, маркетингових досліджень сучасного фармацевтичного ринку хіміотерапевтичних препаратів.
Для широкого кола наукових, науково-педагогічних і практичних працівників, що займаються питаннями мікробіології, вірусології, імунології, алергології та фармації в цілому.

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The Conference has been included in the list of meetings, congresses, symposia, and scientific-practical conferences to be held in 2023, registration certificate UkrInteI № 825, dated Desember, 12, 2024.

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For a wide range of scientists, educators and practitioners involved in microbiology, virology, immunology, allergology and pharmacy in general.

Materials are submitted in the original author's language.
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ЗМІСТ

THE EFFECT OF BIOLOGICALLY ACTIVE SUBSTANCES THE MEDICINAL LEECH *HIRUDO VERBANA* ON THE REGENERATIVE PROPERTIES OF AN INCISED WOUND
Aminov R.F., Aminova A.S. 13

THE EFFECT OF WATER-SALT EXTRACT OF THE MEDICINAL LEECH HIRUDO VERBANA ON HEMATOLOGICAL BLOOD PARAMETERS DURING INCISED WOUND HEALING
Aminov R.F., Aminova A.S., Piatyhorets T.V. 14

EFFECT OF LACTOBACILLUS AND SACCHAROMYCES BOULARDII ISOLATED FROM PROBIOTICS ON CANDIDA ALBICANS IN WOMEN
Goma Mohamed Huwiage..... 15

ANTIADHESIVE ACTIVITY OF *ACINETOBACTER CALCOACETICUS* IMV B-7241 SURFACTANTS SYNTHESISED WITH COMPETITIVE GRAM-NEGATIVE BACTERIA
Ivanov M.S., Pirog T.P. 17

TOPICAL ISSUES OF STAPHYLOCOCCAL CARRIAGE Kalinichenko S., Bilozerskyi V., Isaenko O., Biryukov M..... 19

PROSPECTS FOR THE DEVELOPMENT OF ANTISTAPHYLOCOCCAL IMMUNOBIOLOGICAL DRUGS
Kalinichenko S., Bilozerskyi V., Isaenko O., Biryukov M..... 20

CORRECTION OF STAPHYLOCOCCAL CARRIAGE: A MODERN PERSPECTIVE
Kalinichenko S., Bilozerskyi V., Isaenko O., Biryukov M..... 21

IMMUNOHAEMATOLOGY TESTS PRIOR TO TRANSFUSION OF BLOOD AND BLOOD COMPONENTS
Małgorzata Gradziuk, Halina Tkaczenko, Natalia Kurhaluk..... 22

OPTIMIZATION OF METHODS FOR MEASURING THE TURBIDITY OF IMMUNE COMPLEXES BY SPECTROPHOTOMETRY
Kordon T.I., Martynov A.V., Kalinichenko S.V., Batrak O.A. 26

DYNAMIC SUPRAMOLECULAR ENSEMBLES IN THE PRODUCTION OF INFLUENZA VACCINES
Martynov A.V., Kalinichenko S.V., Kordon T.I., Batrak O.A., Ovetchin P.V. 27

probiotics as a complementary therapeutic tool for managing recurrent vaginal candidiasis.

ANTIADHESIVE ACTIVITY OF *ACINETOBACTER CALCOACETICUS* IMV B-7241 SURFACTANTS SYNTHESISED WITH COMPETITIVE GRAM-NEGATIVE BACTERIA

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Introduction. The rapid growth of antifungal resistance has led to an increase in hospital-acquired infections due to the ability of pathogens to attach to and form protective biofilms on the surfaces of various materials, including medical instruments such as implants and catheters. Since some strains of the *Candida* genus, such as *Candida albicans*, are already characterized by significant resistance to available antifungal agents, there is an urgent need to develop new safe biocides of natural origin. Among the promising substances with anti-adhesion properties that can be used in surface treatments to reduce adhesion and prevent pathogenic cells from attaching to medical devices are microbial surfactants (biosurfactants), which are known for their diverse biological activities. At the same time, according to the literature, the introduction of biological inductors, such as competitive microorganisms in different physiological states, into the growth medium of the target product producer enhances the antifungal properties of the synthesised metabolites. It is important to emphasise that antimicrobial action is one of the key mechanisms of the antiadhesive effect of these biosurfactants. Previous studies have shown that the addition of cells of the competitive bacterium *Enterobacter cloacae* C-8 to the *Acinetobacter calcoaceticus* culture medium IMV B-7241 promoted the production of surfactants with high antifungal activity. Based on this, it was hypothesized that the use of inductors could also improve the anti-adhesive properties of the synthesized surfactants.

The aim of this study was to analyze the effect of competitive Gram-negative bacteria of the genus *Enterobacter* on the antiadhesive properties of surfactants synthesized by *A. calcoaceticus* with the IMV B-7241 on yeast cells.

Materials and methods. *A. calcoaceticus* strain IMV B-7241 was grown in liquid mineral medium with purified glycerol and crude glycerol (3% and 5% by volume fraction) as a source of carbon and energy. Autoclaved inactivated and live *E. cloacae* C-8 cells were used as a biological inductor. The inductor cell suspension was added to the producer culture medium at a concentration of 10 %. The abiotic materials used in this study included steel, tile, and linoleum plates. The number of yeast test cultures (*Candida albicans* D-6 and *Candida tropicalis* PE-2) that adhered to the abiotic

surfaces of the cells was determined spectrophotometrically and expressed as a percentage.

Results and discussion. It was determined that the adhesion of yeast cells belonging to the genus *Candida* on abiotic materials treated with surfactant solutions (64 μg/ml) synthesized in the presence of live and inactivated *E. cloacae* C-8 cells was significantly lower compared to the use of preparations obtained without an inductor. Therefore, the degree of adhesion of yeast test cultures on tile plates treated with surfactant solutions (64 μg/ml) synthesized in the presence of live and inactivated *E. cloacae* C-8 surfactant inductor cells was 6-13 and 7-9% lower, respectively, compared to the treatment with surfactants obtained without inductor by culturing the surfactant producer on purified glycerol. Furthermore, the surfactants obtained with crude glycerol with the introduction of analogous inductors led to a significant reduction in the adhesion of *C. albicans* D-6 and *C. tropicalis* PE-2 to tiles, with percentages ranging from 23-42% and 3-35%, respectively.

A similar pattern was observed during the study of the adhesion of yeast test cultures on steel plates after treatment with surfactant solutions synthesized by *A. calcoaceticus* IMV B-7241 in the presence of appropriate inductor cells. The degree of adhesion of the test cultures after surface treatment with these preparations was 16-22% lower than under the action of surfactant preparations obtained in a medium without inductors (58-68%) when the surfactant producer was cultivated on purified glycerol. The replacement of the substrate with crude glycerol, along with the introduction of live and inactive inductor cells, led to a reduction in the adhesion levels of *C. albicans* D-6 and *C. tropicalis* PE-2 under surfactant treatment by 17-27% and 9-24%, respectively.

The number of attached cells of *Candida* test cultures to linoleum treated with surfactant solutions synthesized on purified glycerol in the presence of *E. cloacae* C-8 cells was 1.37-1.5 and 1.15-1.24 times lower compared to the effect of preparations obtained in a medium without an inductor. A similar pattern was observed during the study of the adhesion of yeast test cultures on linoleum after treatment with surfactant solutions synthesized by *A. calcoaceticus* IMV B-7241 in the presence of live and inactivated cells obtained on crude glycerol. The adhesion of *C. tropicalis* PE-2 and *C. albicans* D-6 was reduced by 1.5 and 1.6 times, respectively, after treatment with these surfactants in comparison to the treatment with surfactants obtained without inductor.

Conclusions. The experimental data obtained clearly indicated the possibility of regulating the antiadhesive activity against *C. albicans* D-6 and *C. tropicalis* PE-2 of surfactants of *A. calcoaceticus* IMV B-7241 by introducing them into the culture medium of the cell producer of competitive gram-negative bacteria *E. cloacae* C-8 in different physiological states.