RESEARCH OF THE FUNGUS ASPERGILLUS NIGER AS A PERSPECTIVE PRODUCER OF A CITRIC ACID

Rezvan O. I., Trutaev I. V., Strilets O. P.
Scientific supervisor: assoc. prof. Kalyuzhnaya O. S.
National University of Pharmacy, Kharkiv, Ukraine
mr.rezvan95@yandex.ru

Introduction. Citric acid is a white crystalline substance, a natural or synthetic antioxidant (chemical formula - $C_6H_8O_7$). Salts and esters of citric acid are called citrates. When heated above 175°C, it decomposes into carbon dioxide and water. Citric acid is an important metabolic product in living organisms, participates in a cycle of tricarboxylic acids and a glyoxylate cycle. Along with other components of the tricarboxylic acid cycle, citric acid is contained in small amounts in the mitochondria of all cells. Another function of citric acid is the maintenance of acid-base balance in the body and ionic composition. Unlike animals, a number of plants and microorganisms are able to accumulate citric acid in large quantities (5-6% in lemon juice, 3-14% in tobacco letter, up to 10% in culture fluid of fungus Aspergillus niger). Citric acid is used in the food industry, medicine (for canning blood) and photography. In industry, citric acid is obtained from tobacco (after extraction of nicotine), more often by fermenting sugar or molasses with Aspergillus niger or other type of fungus.

Aim. Investigation of the properties of the main producer of citric acid Aspergillus niger for the further possibility of introduction of biotechnological production in Ukraine.

Materials and methods. Mycelial fungus Aspergillus niger is used as a model producer. The study of the possibility of culturing the fungus was carried out by the method of surface cultivation of the producer on such media: hydrolyzed grinding of native grain of wheat, hydrolyzed grinding of native grain of rye, molasses, glucose.

Results and discussion. It was found that the biggest difference between the initial pH of the medium and the final one was for the samples under study (with deliberate acidification), that is, for the producer, the acidic medium is more optimal, then in the process of vital activity, it produces more acids. Comparing all the prototypes with each other, we see that the biggest difference between the initial pH of the medium and the final one is characteristic of molasses, and even some alkalization occurs for the medium with glucose. Also for all variants, the best quality indicators (the size of the mycelium in the flask and its mass) are characteristic in a more acidic version, only for the medium with glucose solution (there is a slight alkalinization of the medium due to fungal metabolism and uneven consumption of the same type of sugar - only glucose) not positive in comparison with the control.

Conclusions. For all the results, we see that the following conditions are the best for the cultivation of the fungus Aspergillus niger as a producer of citric acid: molasses medium, temperature 30°C, pH initial 5.5-6.5 (with additional acidification). It is under these conditions that the producer forms a larger amount of organic acids, including citric acid. These experiments can be used to develop a domestic method for the production of citric acid by a biotechnological method.

THE STUDY OF THE THERAPY EFFECTIVENESS VACCINES BASED ON *C. ALBICANS* AND *C. TROPICALIS* FUNGI

Rybalkin M. V., Strelnikov L. S., Strilets O. P.
Scientific supervisor: prof. Filimonova N. I.
National University of Pharmacy, Kharkiv, Ukraine
Ribalkin.nikolay@gmail.com

Introduction. Candidiasis appears in various forms, the most dangerous of them are systemic and visceral candidiases. Many researchers believe that using drugs that are able to stimulate a protective immune response against candidal infections, i.e. immunobiological drugs, is a promising direction in the fight against candidiasis, and that these drugs are an alternative to antifungal agents.

Aim. The aim of the work was to compare the therapeutic properties of the inactivated and subunit vaccines of cells of *C. albicans* and *C. tropicalis* fungi.

Materials and methods. Previously the animals were infected with the candidal infection. In 5 days, after infection the vaccines studied were injected to mice intramuscularly in the volume of 0.2 ml in the upper part of the rear right paw. In 14 days, mice were injected these vaccines in the volume of 0.2 ml in the upper part of the rear left paw. In 14 days, the protection functions of the animals' organism were determined by the titer of *C. albicans* specific antibodies when performing the enzyme-linked immunosorbent assay (ELISA).

Results and discussion. With the first injection of the associated inactivated vaccine the antibody titers of *C. albicans* fungi were observed at the level of 1:800, indicating the insufficient immune response of a single injection since the antibody titers remained at the level of infected animals without their growth. After a double injection of the associated inactivated vaccine with an interval of 14 days there was an increase in the antibody titers by eight times (1:3200) compared to the titers in healthy animals and by four times compared to the infected animals. In 1 and 3 months of the studies the antibody titers remained at the same level and were 1:3200.

After the first injection of the associated subunit vaccine the antibody titers of *C. albicans* fungi were observed at the level of 1:800, indicating the insufficient immune response of a single injection. After a double injection of the associated subunit vaccine with an interval of 14 days there was an increase in the antibody titers by eight times (1:3200) compared to the titers in healthy animals and by four times compared to the infected animals. The studies conducted in 1 and 3 months demonstrated that antibody titers were eight times increased compared to the original data and were 1:3200.

Therefore, both vaccines provide the increase of the titers by eight times. For further studies the associated subunit vaccine was selected since it had the maximum purification and was without ballast substances. Ballast substances can provoke adverse immune reactions that will have a negative impact on the vaccine.

Conclusions. However, the subunit vaccine has the maximum purification from ballast substances; therefore, it is promising to use exactly this vaccine for further studies.

DEVELOPMENT OF THE MEDICINAL FORM BASED ON BACTERIOPHAGE STAFILOCOCCAL

Sheremet M. P.
Scientific supervisor: prof. Strilets O. P.
National University of Pharmacy, Kharkiv, Ukraine
biotech@nuph.edu.ua

Introduction. In modern clinical practice, there is a tendency to change the diseases of the upper respiratory tract and increase the number of strains-microorganisms resistant to atibiotikoterapii. A possible alternative to antibiotics and chemotherapeutic drugs can be considered drugs based on bacteriophages with a wide range of antimicrobial effects, which will suppress both sensitive and antibiotic-resistant types of microorganisms. Infections of the ENT organs are a group of the most common acute diseases. Most of the infections of the ENT organs occur in viral diseases. The main pathogens of bacterial acute infections in otorhinolaryngology are: *Staphylococcus aureus, Haemophilus influezae, Pseudomonas aeruginosa, Streptococcus pyogenes.* In addition to antibiotic resistance in pathogens of ENT diseases, the increasing frequency of allergic reactions to antibiotics is also a big problem.

Aim. Consequently, one of the main tasks is the development of medicines for the treatment of ENT diseases, namely the development of the composition and technology of pharmaceutical forms based on bacteriophages.

Materials and methods. At the Department of Biotechnology of the National University of Pharmacy, research is being conducted to develop the composition and technology of a combined dosage form with bacteriophage staphylococcal for the prevention and treatment of ENT diseases. To expand the spectrum of the antimicrobial action of the drug form with the bacteriophage, it is necessary to conduct studies on the choice of APIs to create a combined dosage form. For studies as an API, an extericide was chosen. Ekteritcid - a drug obtained from fish oil, contains aldehydes, fatty acids and peroxides. It has an antimicrobial effect against pyogenic (pyogenic) microflora (*Staphylococcus, Proteus, Pseudomonas*