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THE INVESTIGATION OF THE ASPECTS OF BIOLOGICAL ACTIVITY SUBSTANCES FROM ACER NEGUNDO

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Summary. The study of antimicrobial activity of thick extracts of *Acer negundo* leaves and bark in relation to 9 standtard test strains of microorganisms has been carried out. The activity in relation to St. aureus ATCC 25923 and St. aureus ATCC 6538 has been determined. In the experiments in vitro thick leaf and bark extracts of *Acer negundo* have shown marked cytotoxic activity and had no affect on cell immunity. The results obtained confirm the promising possibility of developing new kinds medicine on their basis and their further implementation in medical practice.

Introduction. The percentage of diseases amoung the population of Ukraine associated with chronic pathologies, including immunosuppressive processes is increasing rapidly. This is due, to firstly high urbanization of our country, and secondly extensive way of production in most sectors of the economy, and thirdly, the consequences of the Chernobyl accident. So the problem of diversification of the reange of immunomodulators of natural origin and fitosorbents is very urgent. In this regard, national perspective herbal preparations, such as thick *Acer negundo* leaf and bark extracts [3]. Drau particular attention in the available literature we found information on the lack of antimicrobial activity of extracts from the raw material of *Acer negundo* from North America [6] and on the anticancer activity of this plant leaves [5], which is associated with triterpene saponins present in other *Acers* [7] having a contraceptive effect as well [2].

Our work aims at the study of several species of the biological activity of *Acer negundo* substances to confirm the promising possibilities of the new kinds of medicine on their basis and their implementation in medical practice.

Objects and methods. The objects of the study are thick extracts from the leaves and bark of *Acer negundo* as well as polysaccharide complex of this plant

leaves. The investigation of antimicrobial activity of thick extracts from *Acer negundo* of leaves and bark (in doses of 100 mg/ml and 200 mg/ml according to the agar diffusion metod) with respect to the standard test strains of microorganisms St. aureus ATCC 25923, St. aureus ATCC 6538, E. coli ATCC 25922, P. vulgaris ATCC 4636, B. subtilis ATCC 6633, P. aeruginosa ATCC 27853, P. aeruginosa ATCC 9027, Candida albicans ATCC 855/653, S. pyogenes Dick-1 [4]. The investigation of immunomodulator activity has been carried out using the test which is based on the reaction of «T-rosette», based on the spontaneous formation of the socket of human lymphocytes and sheep erythrocytes. As comparison drugs rekutan and Echinacea tincture have been used [4]. (We are grateful for their assistance in conducting the research. Staff of Kharkov Research Institute of Microbiology and Immunology named Mechnikov senior researcher, doctor of pharmaceutical sciences A. V. Martynov and doctor of medical sciences T. V. Colyada).

The investigation of the cytotoxic effect has been made using the improved Shrek method [1, 9]. The complex of research has been conducted on the basis of the laboratory of morphofunctional research of NUPh under the supervision of Professor, doctor of biological sciences. L. M. Maloshtan.

Results and discussion. Thick extracts of *Acer negundo* leaves and bark had a very narrow spectrum of antimicrobial activity. Thick leaf extract showed activity in relation to two strains, and thick bark extract - to 5 strains of microorganisms. More marked activity of thick extracts from the plant leaves and bark in a dose of 200 mg/ml in relation to the strains St. aureus ATCC 25923 (22,4± 1,4 mm and 20,0± 0,9 mm respectively) and St. aureus ATCC 6538 (20,8± 1,0 mm and 19,6± 0,6 mm respectively). In addition, the thick bark extract reduced the diameter of B. subtillis growth ATCC 6633 (17,8± 1,0 mm), C. albicans ATCC 885/653 (15,0± 0,9 mm), St. pyogenes Dick-1 (21,4± 1,4 mm). The results of the impact on cell immunity are shown in table 1. Thick bark of *Acer negundo* extract had no stimulating effect on cell immunity in a dilution of 10,0 – 2,5%. As for the dilution of 1,25 – 0,5% it had depressing effect. Dilution of

0,3% had no significant effect. Thick leaves of *Acer negundo* extract in the dilutions under investigation didn't show stimulating activity. In dilution 1,25% it inhibited «T-rosette» and in dilution 0,62-0,3% it did not cause significant changes.

Polysaccharide complex of *Acer negundo* leaves in dilution 10,0 – 5,0% caused the lysis of cells. In dilution of 2,5 – 0,62% it showed depressing effect on cell immunity, did not cause changes in the dilution of 0,5% and increased «T-rosette» by 5,0% in dilution 0,3%. Reference drugs which were chosen for the study (rekutan and Echinacea tincture) have revealed immunomodulating activity – they have increased «T-rosette», by 4,2% (rekutan) and 6,8% (tincture Echinacea) respectively.

These investigations of the cytotoxic effect of the substances under study, are given in Table 2. The results shown that the polysaccharide complex of this plant leaves has revealed no cytotoxicity. Thick extracts of *Acer negundo* leaves and bark at a concentration of 1% have shown marked cytotoxic activity (73,80±2,04% and 83,00±3,05% respectively), which varied directly proportionally at lower concentrations of the substance solution under study.

CONCLUSIONS

1. The study of antimicrobial activity of thick extracts of *Acer negundo* leaves and bark in relation to 9 standart test strains has been carried out. Marked activity in relation to St. aureus ATCC 25923 and St. aureus ATCC 6538 has been found.
2. In the experiments in vitro thick extracts from *Acer negundo* leaves and bark have shown marked cytotoxic activity and had no affect on cell immunity.
3. These results obtained confirm the promising possibility of further study of these substances for developing new kinds of medicine on their basis and their further development in medical practice.

Table 1

The test of *Acer negundo* substances impact on cell immunity

№	Experimental samples	Reaction rosette, (m = 10, in%)						
		dilutions of experimental samples (concentration,%)						
		10,0	5,0	2,5	1,25	0,62	0,50	0,30
1.	*A.negundo* bark thick extract	lack of receptors			6,40±0,68	52,00±2,49	57,20±2,70	62,80±2,05
2.	*A.negundo* leaves thick extract	lack of receptors			45,40±1,89	52,40±2,42	61,80±2,55	61,60±2,72
3.	*A.negundo* leaves polysaccharide complex	lysis of cells		34,00± 1,76	42,40±2,08	52,00±2,33	62,40±2,58	67,00±2,92
4.	control T-ROK	63,20±2,04	–	–	–	–	–	–
5.	rekutan	68,00±2,33	–	–	–	–	–	–
6.	Echinacea tincture	70,60±3,36	–	–	–	–	–	–

Table 2

Cytotoxic action of *Acer negundo* substances on bone marrow cells of rats (m = 5, in%, the number of dead cells)

№	The concentration of the solution of substance under investigation	The object of investigation			
		leaves thick extract	bark thick extract	leaves polysaccharide complex	control
1.	1%	73,80±2,04	83,00±3,05	45,80±1,62	2,00±0,79
2.	0,25%	40,80±1,62	54,40±2,26	22,40±1,11	2,00±0,58
3.	0,06%	18,40±1,11	26,80±1,36	9,60±0,68	2,00±0,81
4.	0,02%	–	6,80±0,56	–	2,00±0,65

Note: «–» have shown no activity

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