

Combined antiseptics for external use based on *Streptomyces albus* products

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Among the modern developments of antiseptics for external use, soft forms (ointments, gels, liniments) and solutions prevail, and their activity is determined by substances with different mechanisms of action to increase their effectiveness [1]. Streptomycetes have long been one of the sources of antimicrobial substances [2], and the *Streptomyces albus* 2435 is a well-known synthetic of antimicrobial enzymes, and more recently antibiotics [3], which gave grounds for the development of combined antiseptics based on them.

Therefore, the aim of the presented work was the development of combined antiseptics based on a complex of enzymes (Cytal) and antibiotics (Streptofungin) of *S. albus* 2435, both separately isolated and purified (for ointment form), and in liquid form obtained and purified directly as a result of biosynthesis. The effectiveness of the compositions was evaluated by the lytic activity and the ability to inhibit growth of *S. aureus* ATCC 6538, *C. albicans* ATCC 10231, *B. subtilis* ATCC 6633, *P. aeruginosa* ATCC 9027 [1,3].

The ointment form of antiseptic with Cytal and Streptofungin based on polyethylene oxide-400, polyethylene glycol (600 and 1000) and proxanol 268 with an enzyme and antibiotic content of 2–2.5 and 0.1–1.12%-weight in accordance was developed. The liquid form of the antiseptic was obtained by baromembrane purification of the culture filtrate and stabilized with 0.5% polyvinyl alcohol.

Ointment composition has a wider spectrum of action than the comparative drugs (IruXol, Argolon) and combines the bacteriolytic action of Cytal and the fungicidal action of Streptofungin; has a 10–13% higher ability to inhibit the growth of *S. aureus* and *C. albicans* than Cytal and Streptofungin alone, respectively. The liquid form of antiseptic showed high activity in preventing the formation and destruction of test-cultures biofilms, primarily *P. aeruginosa* (by 5–6 times). Therefore, the developed antiseptics have prospects as means of superficial wounds treating with the ability of removal of necrotic tissues due to presence of proteinases enzymes.

References

1. Pilar R.F., Emaneini M., Beigverdi R., Banar M., van Leeuwen B. W., Jabalameli F. Combinatorial effects of antibiotics and enzymes against dual-species *Staphylococcus aureus* and *Pseudomonas aeruginosa* biofilms in the wound-like medium // PLoS One. — 2020. — Vol. 15(6). <https://doi.org/10.1371/journal.pone.0235093>.
2. Zaburannyi N., Rabyk M., Ostash B., Fedorenko V., Luzhetskyy A. Insights into naturally minimised *Streptomyces albus* J1074 genome // BMC Genomics. — 2014. — Vol. 15 Article 97. <https://doi.org/10.1186/1471-2164-15-97>
3. Todosiichuk T. S., Klochko V. V., Savchuk Ya. I., Kobzysta O. P. New antibiotic substances of the *Streptomyces albus* enzymatic complex // Microbiol. Journ. — 2019. — Vol. 81(5). — P. 62–72. <https://doi.org/10.15407/microbiolj81.05.062>