

The Role of *Acinetobacter calcoaceticus* IMV B-7241 Surfactants in Biofilms Destruction

Inga Savenko, Mykola Ivakhniuk, Tetyana Pirog, Jelyzaveta Smirnova

National University of Food Technologies

Introduction. The surfaces colonization by bacteria and further formation of the biofilms in food industry and medicine can cause not only the products damage, but also the spreading of infectious diseases that endanger the consumers' health. It is well known from the literature [1] that microbial surface-active substances (SAS, surfactants) can not only prevent adhesion of microorganisms on biotic and abiotic surfaces, but also destroy already formed biofilms on them. Before it was found out that SAS of *Acinetobacter calcoaceticus* IMV B-7241 synthesized on ethanol, glycerol and n-hexadecane had possessed antiadhesive properties [2]. The purpose of this paper is an investigation ability of strain B-7241 SAS to destroy bacterial biofilms. **Materials and methods.** *A. calcoaceticus* IMV B-7241 (the producer of SAS) was grown in a liquid mineral medium containing ethanol, n-hexadecane (2 %, v/v) and glycerol (1 %, v/v). Such preparations of surfactants were used in studies: preparation 1 – supernatant of culture liquid, to obtain which the culture broth was centrifuged (5000 g, 45 min); the surfactant-containing supernatant was subjected to extraction with the 2:1 chloroform/methanol (Folch) mixture to isolate the surfactant (preparation 2). The strains of bacteria (*Bacillus subtilis* BT-2, *Escherichia coli* IEM-1, *Staphylococcus aureus* BMC-1) were used as test-cultures in researches. The destruction degree of test-cultures biofilms, pre-formed on holes of polystyrene immunological plate, was determined by spectrophotometric method according to the procedure described in the paper [2]. **Results.** The experiments have shown that all synthesized surfactants in concentration 0.04–2.3 mg/ml can destroy the bacterial biofilms, regardless of the carbon sources nature in the cultivation medium of *A. calcoaceticus* IMV B-7241 and purity of preparations. However, the degree of biofilms destruction depended on the concentration of surfactants in the preparations. Thus, the surfactants preparations synthesized on ethanol in concentration of 1.7 mg/ml were the most effective and their presence was accompanied by the destruction of *B. subtilis* BT-2, *E. coli* IEM-1 and *S. aureus* BMC-1 biofilms by 14, 23 and 28 %, respectively. **Conclusion.** The capacity of *A. calcoaceticus* IMV B-7241 surfactants to destroy already formed bacterial biofilms has been determined. That certifies the possibility to use microbial surfactants in creation of new effective disinfectants.

References.

1. M. Zezzi do Valle Gomes, Marcia Nitschke. Evaluation of rhamnolipid and surfactin to reduce the adhesion and remove biofilms of individual and mixed

cultures of food pathogenic bacteria // Food Control. – 2012. – Vol. 25. – P. 441–447.

2. Т.П. Пирог, И.В. Савенко, Т.А. Шевчук. Влияние условий культивирования *Acinetobacter calcoaceticus* ИМВ В-7241 на антиадгезивные свойства поверхностно- активных веществ // Микробиол. журнал. – 2016. – Т. 78, № 1. – С. 2–12.