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**THE *CANDIDA ALBICANS* AND *PSEUDOMONAS AERUGINOSA*
INTERACTION CHARACTERISTICS DURING THE
MULTISPECIES BIOFILM FORMATION**

The *Candida albicans* and *Pseudomonas aeruginosa* interaction characteristics during the multispecies biofilm formation were studied. At all formation stages the cultures of a microbial multispecies association influenced each other, manifesting an antagonistic form of interactions. The antagonism degree of the cultured microorganisms was not the same in different media.

Key words: *Candida albicans*, *Pseudomonas aeruginosa*, multispecies biofilm, antagonism.

Historically, interspecies interactions have focused on growth-inhibitory interactions, yet a variety of phenotypic outcomes other than antibiosis are possible, including alterations in developmental processes such as sporulation and biofilm formation or production of secondary metabolites.

Detecting phenotypic or developmental biomodulation between two organisms can indicate when they are communicating via small molecules, and thus can denote the presence of overlooked compounds. In other cases, signaling has been shown to occur via “repurposed” compounds – known molecules that are functioning in an unexpected manner. One exciting potential result of interspecies interactions is the induction of novel secondary metabolite production by the responding organism. Thus, examination of microbial relationships can lead to the discovery of new molecules – in some cases as the small molecule mediating the interaction, and in others as the consequent result of two microbes interacting [3].

The aim of the work was the study of the *Candida albicans* and *Pseudomonas aeruginosa* interaction characteristics during the multispecies biofilm formation.



The work was carried out at Biotechnological Research and Training Center. The studied microorganisms were pre-cultivated in the Sabouraud (for *C. albicans* ATCC 18804) and King B (for *P. aeruginosa* ATCC 15692) media. The interaction of microorganisms during biofilm formation was determined during the strain co-cultivation in polystyrene plates by means of the described method [1].

In the work the gradual formation of monobiofilms in both nutrient media was noted. This process consisted of some stages that corresponded with data [2]. In stage I, planktonic bacteria initiate attachment to an abiotic surface, which becomes irreversible in stage II. Stage III corresponds to microcolony formation. Stage IV corresponds to biofilm maturation and growth of the three-dimensional community. So, the largest number of biofilm cells was observed on the 3rd cultivation day. It is well known that in the case of *C. albicans* biofilm formation the consortium morphology depends on the nutrient composition but in the Sabouraud and King media only the yeast cells were detected.

To determine the microorganism interaction form during the multispecies biofilm creation co-cultivation of *C. albicans* and *P.aeruginosa* was carried out and then obtained results were compared with the sum of monospecies ones that was 100 %.

It was found that at all formation stages the cultures of a microbial multispecies association influenced each other, manifesting an antagonistic form of interactions.

The antagonism degree of the cultured microorganisms in the studied media was not the same. In King B nutrient medium for the first day the microbial interaction level caused decreasing in the biofilm cell number in almost 2 times compared with monocultures and remained unchanged with increasing the cultivation period. In Sabouraud medium the level of antagonism increased over time, reaching a maximum value on 72 hrs after the cultivation start.

Candida albicans is commonly found in mixed infections with *Pseudomonas aeruginosa*, especially in the lungs of cystic fibrosis patients. Both of these opportunistic pathogens are able to form resistant biofilms and frequently infect immunocompromised individuals. The interaction between these two pathogens, which includes physical interaction as well as secreted factors, is mainly antagonistic.

References

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