BACTERIAL BIOFILMS MESS UP IN FOOD INDUSTRY!?

Biljana Curcic-Trajkovska[1*]

[1]Laboratory for Microbiology, Clinical Hospital Acibadem Sistina, Skupi 5a, 1000 Skopje, Macedonia

[*]e-mail: b.curcictrajkovska@gmail.com

Abstract

Bacterial biofilm is structured community of bacterial cells enclosed in a self-produced polymeric matrix adherent to an inert or living surface. Bacteria first adhere to surfaces and begin to excrete a slimy, glue-like substance that can anchor them to all kinds of material, then build the matrix that holds the biofilm together. Disease-causing bacteria begin to behave as a group with a communication network. The presence of biofilm on abiotic materials contaminate the product through direct contact. Bacterial biofilms are responsible for spoilage, microflora transmission, antibiotic resistance and disinfection resistance.

Antibiotic susceptibility testing was by conventional disc diffusion method. A modified microtiter-plate technique for quantification of biolfilm formation was performed. The biofilm-forming ability of each strain was classified under one of four categories: none, weak, moderate or strong, based upon ODs of bacterial films. We defined the cut-off OD (ODc) for the micro-titer plate test as three standard deviations above the mean OD of the negative control.

Optimal density (OD) of the solution was measured at 570 nm, for each well in microtiter-plate, within 24h and 48h of incubation, for each strain (fixing the bacterial film with methanol, staining with 0.25% crystal violet). The biofilm-forming ability of each strain was classified under one of four categories: none adherent (0), weak (+), moderate (++) or strong (+++), based upon ODs of bacterial films. We defined the cut-off OD (ODc) for the micro-titer plate test as three standard deviations above the mean OD of the negative control. The classification was upon this: OD ≤ ODc = non-adherent; ODc < OD ≤ 2 x ODc = weakly adherent; ODc < OD ≤ 4 x ODc = moderately adherent; 4 x ODc < OD = strongly adherent.

All strains showed ability in biofilm formation. It was higher after 48h of incubation compared to 24h. The strains that were resistant to cephalosporins had strong biofilm forming ability. The strains who were isolated in patients with severe infection showed strong biofilm forming ability.

Understanding the ability of biofilm formation in food industry can help understanding the survivability of bacteria. Prevention of colonization is a key in food contamination prevention. Multidrug resistance correlates with the ability to attach polystyrene and epithelial cells (biofilm bacteria can be up to a thousand times more resistant to antimicrobials). More research is needed on possible links between biofilm formation, survival on abiotic surfaces, food contamination, patient's infection, the role of biofilm-forming ability in antimicrobial drug resistance and efforts in controlling the biofilm-related infections.

***Key words**: Biofilm, Resistance, Food.*