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Searching the potential application of CSA-131 as a coating material for implant surfaces

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Statement of the Problem: Cutibacterium acnes and Streptococcus epidermidis are two important bacteria in the skin flora that also serve to prevent the colonization of pathogens. However, due to any disruption in the skin microenvironment, these two bacteria can become opportunistic pathogens and damage the skin through biofilm formation. They are also the most common causes of biofilms seen in some subcutaneous implants, such as breast implants. Ceragenins are a new group of broad-spectrum antimicrobials, also called Cationic steroid antibiotics (CSA). Biofilms that form on breast implants are very difficult to eliminate, so implants often need to be replaced. The aim of this study is to investigate the usability of ceragenins in the coating of implants.

Methodology and Theoretical Orientation: The MIC values of CSA-131 against one standard and clinical strain of *C. acnes* and *S. epidermidis* were determined by the broth microdilution method. Then, the cytotoxicity of CSA-131 on MCF7-HTB-22 breast cells was evaluated by the MTT method. Additionally, the ability of ceragenins to prevent the formation of biofilms of *C. acnes* and *S. epidermis* alone and together was investigated by the cover assay.

Findings: The MIC value of CSA-131 against *S. epidermis* ATCC 35984 was 2 µg/ml, while the MIC value against the clinical strain was found to be 4 µg/ml. It showed an MIC of 2 µg/ml against both clinical and standard strains (ATCC 11827) of *C. acnes*. CSA-131 concentrations ≥25 µg/ml caused greater than 50% cytotoxicity against breast cells. A concentration of 1000 µg/ml CSA-131 completely prevented biofilm formation. The 10 µg/ml concentration inhibited only *S. epidermidis* mono biofilms and polymicrobial biofilms after aerobic incubation by approximately 40%.

Conclusion and Significance: The results showed that ceragenins can be evaluated as coating materials. However, further *in vivo* experiments are needed to verify applicability of CSAs.

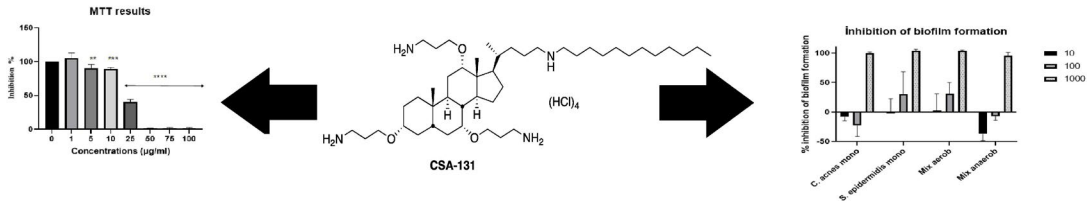

Figure 1: Cytotoxicity and biofilm inhibition results of CSA-131

Biography

Ozlem Oyardi is a research scientist who specializes in microbiology contributing significantly to the fields of pharmaceutical microbiology, bacteriology, mycology, immunology, and infectious diseases. Her academic studies are mainly on investigations into the effects of new antimicrobial agents against multi-drug resistant microorganisms that cause difficult-to-treat infectious diseases. Her early studies are focused on the field of cystic fibrosis lung infections, mechanisms of biofilm formation and novel treatment options. Notably, she has undertaken diverse studies on ceragenins, a novel antimicrobial class currently undergoing phase studies. Beyond her expertise in antimicrobials, She has conducted comprehensive research on various aspects of biofilm formation, biofilm prevention, and has actively collaborated with diverse biofilm models.

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