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2(5H)-Furanone Derivatives as Inhibitors of Staphylococcal Biofilms

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Abstract

© 2016, Springer Science+Business Media New York.The opportunistic bacteria Staphylococcus aureus and Staphylococcus epidermidis often form rigid biofilms on wounds and artificial surfaces and thereby become extremely resistant to antimicrobials. Here, we report the effect of four novel 2(5H)-furanone derivatives on the cell growth and biofilm formation by these microorganisms. Using the differential fluorescence staining of viable and dead cells, we demonstrated that furanones increase the antibacterial efficacy of chloramphenicol against both biofilm-embedded S. aureus and S. epidermidis with F35 being the most efficient compound, probably by increasing the accessibility of cells against antimicrobials. Compounds F6, F8, and F83 inhibited the biofilm formation at concentrations of 2.5–10 μg/ml, although exhibiting high cytotoxicity for human skin fibroblasts with CC50 of 0.5–1.1 μg/ml. F35 demonstrated minimal biofilm inhibition concentration of 10 μg/ml, while its cytotoxicity was ten times lower than that of the other compounds (CC50 13.1 μg/ml), suggesting its chemotype seems a promising starting point for the development of new antibiofilm agents.

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Keywords

2(5H)-furanones, Antibacterial activity, Biofilms, S. aureus, S. epidermidis, Unsaturated lactones