Antimicrobial activities of YycG histidine kinase inhibitors against Staphylococcus epidermidis biofilms

Staphylococcus epidermidis has become a significant pathogen causing infections due to biofilm formation on surfaces of indwelling medical devices. Biofilm-associated bacteria exhibit enhanced resistance to many conventional antibiotics. It is therefore, important to design novel antimicrobial reagents targeting S. epidermidis biofilms. In a static chamber system, the bactericidal effect of two leading compounds active as YycG inhibitors was assessed on biofilm cells by confocal laser scanning microscopy combined with viability staining. In young biofilms (6-h-old), the two compounds killed the majority of the embedded cells at concentrations of 100 μM and 25 μM, respectively. In mature biofilms (24-h-old), one compound was still effectively killing biofilm cells, whereas the other compound mainly killed cells located at the bottom of the biofilm. In contrast, vancomycin was found to stimulate biofilm development at the M13C (8 μg mL(-1)). Even at a high concentration (128 μg mL(-1)), vancomycin exhibited poor killing on cells embedded in biofilms. The two compounds exhibited faster and more effective killing of S. epidermidis planktonic cells than vancomycin at the early stage of exposure (6 h). The data suggest that the new inhibitors can serve as potential agents against S. epidermidis biofilms when added alone or in concert with other antimicrobial agents.

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