The effect of novel heterocyclic compounds on cryptococcal biofilm

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Background

Biofilm formation by microorganisms depends on their communication by quorum sensing, which is mediated by small diffusible signaling molecules that accumulate in the extracellular environment. During human infection, the pathogenic yeast *Cryptococcus neoformans* can form biofilm on medical devices, which protects the organism and increases its resistance to antifungal agents. The aim of this study was to test two novel heterocyclic compounds, S8 (thiazolidinedione derivative, TZD) and NA8 (succinimide derivative, SI), for their anti-biofilm activity against strains of *Cryptococcus neoformans* and *Cryptococcus gattii* in a microtiter plate model

Results

The effect on biofilm metabolic activity

Treatment of *C. neoformans* H-99 and *C. gattii* R-272, with S8 or NA8 compounds during biofilm formation, reduces the biofilm metabolic activity (XTT)

Methods

Confocal microscopy

Staining with live/dead dye (Syto9/propidium iodide), and analysis of biofilm thickness by confocal microscopy. Green and Yellow/Red represent live and dead yeast, respectively.

NA8 and S8 reduce nucleic acid staining by Syto9. S8 also causes yeast death in the biofilm

S8 and NA8 reduce nucleic acid staining by Syto9

Summary and conclusions

The formation of biofilm by *C. neoformans* and *C. gattii* on the polystyrene plates was inhibited significantly by two novel heterocyclic compounds in concentrations below the MIC value.

Our results indicate that the development of cryptococcal biofilms may be prevented by S8 and NA8 heterocyclic compounds, suggesting the possibility of preventive or even therapeutic measures against fungal biofilm development on indwelling medical devices.