O243

1-hour Oral Session

Antimicrobial tolerance of biofilms: mechanisms and solutions

Staphylococcus epidermidis is able to induce *Candida albicans* biofilm tolerance to echinocandins

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Objectives: Single species *Candida albicans* and *Staphylococcus epidermidis* biofilms are known to be resistant to most classes of antimicrobial drugs. Echinocandins represent the newest class of antifungals with potent activity against mature *C. albicans* biofilms. Despite, very little is known about the role of bacterial cells on possible changes in *C. albicans* biofilm susceptibility profile. Because of this reason, we aimed to demonstrate whether *S. epidermidis* and especially extracellular bacterial DNA production may posses the ability to protect fungal biofilms from echinocandins.
Methods: Single and dual species *C. albicans* SC5314 - *S. epidermidis* 1457 biofilms were formed inside serum-coated triple-lumen polyurethane catheter pieces. Mature biofilms (24 h) were treated with different concentrations of micafungin, caspofungin, anidulafungin (1 – 16 µg/ml) alone or supplemented with DNAse I (1.25 and 2.5 mg/ml) for additional 24 h. Next, we assessed the effect of echinocandins against mono and dual species biofilms developed in vivo in a subcutaneous mouse and rat biofilm model. Scanning electron microscopy (SEM) was used to demonstrate the biofilm architecture of caspofungin-treated and control samples.
Results: Presence of *S. epidermidis* during *C. albicans* biofilm development enhanced the tolerance of fungal biofilms to echinocandins *in vitro* and also *in vivo*. Moreover, this effect showed to be biofilm-specific because planktonically-grown *Candida* cells did not display any changes in their susceptibility profile to echinocandins with/without bacteria. SEM micrographs displayed almost complete inhibition of single-species *C. albicans* biofilms when treated with lower concentrations of echinocandins, whereas *Candida* cells in dual-species biofilms remained unaffected. Disruption of extracellular bacterial DNA by DNAse I restored the susceptibility profile of *C. albicans* biofilms-grown in dual-species relationship.
Conclusion: To our knowledge this is a first study, which described failed activity of echinocandins on mature *Candida* biofilms developed under *in vitro* and *in vivo* conditions because of the presence of bacterial cells. Noteworthy, we demonstrated that *S. epidermidis* extracellular DNA reacts as a barrier to protect fungal cells from the effect of echinocandins.