Background: *C. auris* has become a globally emerging fungal pathogen, frequently reported to be multi-drug resistant. In addition, it is frequently recovered from hospital environments and has been associated with recurrent fungal infections. Chlorhexidine (CHD) has been shown to be effective, but it has been associated with anaphylaxis reactions. Biofilms disrupting agents (BDAs) in the forms of topical gel (BlasTX), wound wash (TorrentX), and surface disinfectant (NSSD) and compared to chlorhexidine (CHD) on *C. auris*, *C. albicans*, and *C. glabrata* reveals a significant decrease in polymicrobial biofilms composed of either *C. auris* or *C. albicans/S. aureus*.

In vitro Evaluation of Biofilm Disrupting Agents Against *Candida auris* and Other Candida species

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**ABSTRACT**

The primary objective of this study is to evaluate the efficacy of three novel biofilm-disrupting agents (BDAs) and other surfactants and compare them to CHD.

**OBJECTIVE**

**RESULTS**

1. We investigated the microbial activity of three different biofilm disrupting agents (BDAs), a topical gel, a wound wash solution, and a surface disinfectant and compared them against chlorhexidine (CHD) against *C. auris*, *C. albicans*, and *C. glabrata*.

2. All three BDAs and CHD inhibited *C. auris* growth effectively in a concentration dependent manner. In addition, CHD and the BDAs all showed excellent antimicrobial activity against *C. albicans* and *C. glabrata*.

3. BDAs were highly effective against both *C. auris* isolates, whereas CHD was only moderately effective against *C. glabrata*.

4. Furthermore, the emergence of resistance to CHD against *C. auris* and *C. albicans* by kill curve studies showed up to 99.999% killing at conventional concentrations for these agents.

5. **SUMMARY AND CONCLUSIONS**: All three BDAs and CHD have excellent activity against different Candida species, including *C. auris*. In addition, certain isolates of *C. auris* showed increased resistance/resistance to CHD, but not to BDAs. The fungicidal activity of these novel agents will be valuable in eradicating surface colonization of *C. auris* spp, including *C. auris*, and possibly decrease the spread of *C. auris* spp. Further environmental studies are warranted.

**BACKGROUND AND SIGNIFICANCE**

*C. auris* is an emerging multidrug-resistant fungal pathogen that presents a serious global health problem. "Hot spots" of *C. auris* infections have been observed worldwide in Europe, Asia, Africa, North and South America. The infection largely originates from the hospital environment and has been associated with recurrent fungal infections. Chlorhexidine (CHD) has been shown to be effective, but it has been associated with anaphylaxis reactions. Biofilms disrupting agents (BDAs) have been used in the management of chronic wounds and to sterilize environmental surfaces. The goal of this study was to evaluate BDA technology against *C. auris* and other Candida spp and compare them to CHD.

**MATERIALS AND METHODS**

**Microorganisms**: *Candida auris* AR0381, AR0386, AR0381 and AR0386 with *C. auris* and *C. albicans* and *C. glabrata* mono and polymicrobial biofilms were used in this study. *Candida* albicans 90028 and *Candida glabrata* 200918 (American Type Culture Collection) were used in this study.

**Agents Evaluated**: Three biofilm disrupting agents (BDAs): Topical gel, wound wash solution, and surface disinfectant and Chlorhexidine Solution (CHD).

**Sabouraud's Decroste (SD) agar zone inhibition assay**: The effect of the BDAs and CHD were investigated by zone inhibition assay. The details of each experiment are described in Figure 1 legend.

**Time kill study**: Overnight cultures of *Candida* spp. were grown in 3D broth, then washed and resuspended in fetal calf serum at a medium and exposed to various concentrations of BDAs and CHD for 24 h. The formation of biofilm was determined in the presence of various concentrations of the microbicidal agent is determined by FDA assay. For details see legends to Figs. 5 and 6.

**SUMMARY AND CONCLUSIONS**

1. **Wound culture**: Overnight cultures of *Candida* spp. were grown in 3D broth, then washed and resuspended in fetal calf serum at a medium and exposed to various concentrations of BDAs and CHD for 24 h.

2. The formation of biofilm was determined in the presence of various concentrations of the microbicidal agent is determined by FDA assay. For details see legends to Figs. 5 and 6.

3. **RESULTS**: Both 24 h and 48 h incubations in 50% fetal calf serum produced good sustainable polymicrobial biofilm. However, the CFU counts for the 48 h biofilms were approximately a log2, higher than that obtained for 24 h biofilm.

**ACKNOWLEDGMENTS**

The authors would like to thank the Mycology Section of Center for Diseases Control, *Candida alabicans* 90028 and *Candida glabratra* 200918 (American Type Culture Collection) were used in this study. We evaluated the efficacy of various BDAs (topical gel, wound wash solution, and surface disinfectants) and CHD against *C. auris* and *C. albicans* and *C. glabrata* with polymicrobial biofilms composed of either *C. auris* or *C. albicans/S. aureus.*