Candida albicans biofilm pore size and shape affect pore pH

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Previously, we have shown that changes in environmental pH can induce changes to *Candida albicans* biofilm architecture which can affect *Staphylococcus aureus* dispersal through biofilms.

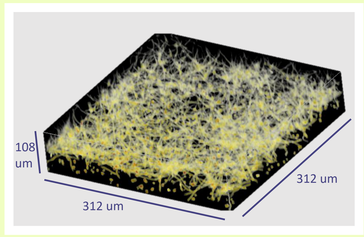
We hypothesized that…

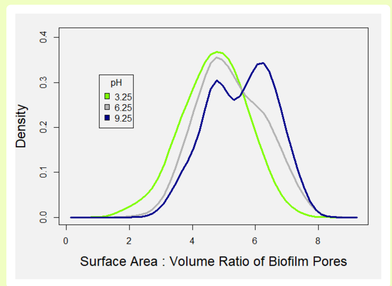
- Biofilms grown at extreme ambient pH would have fewer, smaller pores than those grown at more neutral pH.
- Pores with a higher surface area to volume ratio would have pHs farthest from their starting pH.

Methods

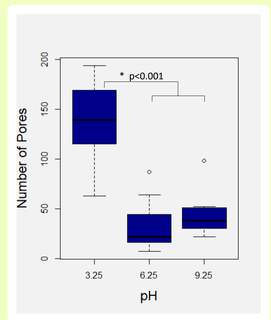
1. *C. albicans* (expressing cerulean fluorescent protein) biofilms grown at a pH range
2. Cell-impermeable pH indicator carboxy-SNARF-1 used to measure pore pH
3. Surface area and volume of biofilm pores measured using ImageJ plugin 3D Object Counter

Candida albicans biofilms form heterogeneous landscapes of yeast cells, hyphae, and pore space.

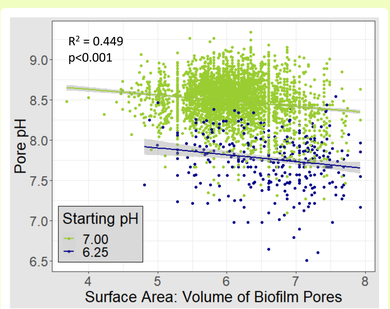




Pores of biofilms grown at different ambient pH vary in number, shape, and size.

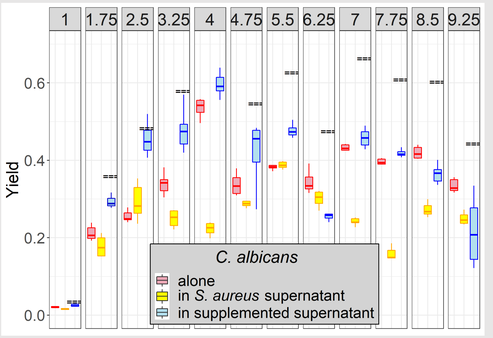


The pH of individual pores varies with pore size and shape.

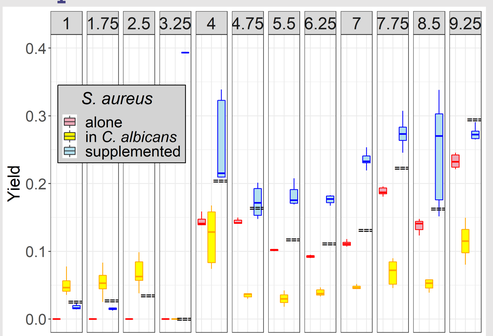


How might we expect this to affect *C. albicans* interactions with other microbes (*e.g. Staphylococcus aureus*)?

C. albicans grows best around pH 4 and its growth is inhibited by the presence of *S. aureus*:



S. aureus grows best around pH 7.75 and its growth is facilitated by the presence of *C. albicans*:



We plan to explore how interactions between these organisms to play out in the heterogeneous pH environment created by *C. albicans* biofilm pores using a combination of mathematical modeling and experimental techniques.

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