CRITICAL CARE

LETTER

Impact of nystatin on *Candida* and the oral microbiome

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See related research by Giglio *et al.*, http://ccforum.com/content/16/2/R57

In a recent issue of *Critical Care*, Giglio and colleagues [1] reported that oral nystatin reduced *Candida* colonization in a cohort of critically ill surgical patients, even when colonization was present at baseline. Colonization is a prerequisite for systemic infection, which is associated with significant morbidity and mortality. Although it is possible to stratify individuals at risk of invasive fungal disease, diagnosing this condition is complex, and the present study [1] represents a potential mechanism for reducing the burden of fungal infection. *Candida albicans* has a complicated relationship with potential bacterial respiratory pathogens and augments their growth in mixed biofilms [2,3]. *Pseudomonas aeruginosa* is unable to bind yeast forms of *C. albicans* but forms a dense biofilm on *C. albicans* filaments [3]. This is relevant to clinical investigations in which respiratory tract colonization with *C. albicans* is associated with an increased risk of *Pseudomonas* ventilator-associated pneumonia (VAP) [4], which is reduced with antifungal treatment [5]. The impact of nystatin on other infections, such as VAP caused by *Pseudomonas* or *Staphylococcus*, or indeed on other indices, such as length of stay and mortality, was not measured [1]. One might anticipate that the benefit of nystatin treatment will extend beyond infections caused directly by *Candida*, but there is an important caveat. Nystatin generally is used as a suspension with high sucrose content (49.8% wt/vol), and growth of oral plaque is driven by sugars. Dental plaque becomes colonized with potential respiratory pathogens in critically ill patients and is important in the etiology of VAP. Future studies, therefore, should investigate the impact of nystatin on the oral microbiome, VAP, and mortality.

Authors' response

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The relationship between bacteria and fungi is gaining interest since it has great environmental, medical, and economic importance. *C. albicans* favors *P. aeruginosa* and *Staphylococcus aureus* growth in mixed biofilms [3]. Fungal colonization increases the risk of *Pseudomonas* infection [4], and antifungal treatment reduces the risk of *Pseudomonas* VAP [5]. Therefore, it is intellectually appealing to use a simple antifungal prophylaxis regimen, such as the one recently proposed [1], to reduce the risk of *Candida* colonization and the risk of *Pseudomonas* and *S. aureus* VAP.

Unfortunately, the dynamics of bacterial-fungal interaction are poorly understood, and results in the literature are conflicting, since *in vitro* studies suggest an antagonistic relationship between *C. albicans* and *P. aeruginosa* while *in vivo* studies described a synergistic one In a murine model, a short-term *C. albicans* colonization reduces *P. aeruginosa*-related lung injury, and caspofungin can reverse this effect, depending on the time of administration [6].

We reviewed our data to investigate these interactions. Of 99 patients, 12 exhibited *P. aeruginosa* and *Candida* tracheal colonization (six patients in each group) whereas two (both in the C group) showed *S. aureus* and *Candida* tracheal colonization. These sparse data do not help to elucidate *Candida*-bacteria association. Nystatin prophylaxis significantly reduces *Candida* tracheal colonization [6], but no definite conclusions about nystatin impact on oral microbiome or about intensive care unit stay and mortality can be drawn. Larger trials are needed to study the potential benefit of nystatin prophylaxis on bacterial trachebronchial colonization. Moreover, since nystatin was administered in the nasogastric tube [6], it can be safely used without the risk of dental plaque increase and subsequent bacterial colonization.

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Abbreviation
VAP, ventilator-associated pneumonia.

Competing interests
The authors declare that they have no competing interests.

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References

1. Giglio M, Caggiano G, Dalfino L, Brienza N, Alicino I, Sgobio A, Favale A, Coretti C, Montagna MT, Bruno F, Puntillo F: **Oral nystatin prophylaxis in surgical/trauma ICU patients: a randomised clinical trial.** *Crit Care* 2012, **16:**R57.
2. Harriott MM, Noverr MC: ***Candida albicans*** **and** ***Staphylococcus aureus*** **form polymicrobial biofilms: effects on antimicrobial resistance.** *Antimicrob Agents Chemother* 2009, **53:**3914-3922.
3. Hogan DA, Kolter R: ***Pseudomonas-Candida*** **interactions: an ecological role for virulence factors.** *Science* 2002, **296:**2229-2232.
4. Azoulay E, Timsit JF, Tafflet M, de Lassence A, Darmon M, Zahar JR, Adrie C, Garrouste-Orgeas M, Cohen Y, Mourvillier B, Schlemmer B; Outcomerea Study Group: ***Candida*** **colonization of the respiratory tract and subsequent pseudomonas ventilator associated pneumonia.** *Chest* 2006, **129:**110-117.
5. Nseir S, Jozefowicz E, Cavestri B, Sendid B, Di Pompeo C, Dewavrin F, Favory R, Roussel-Delvallez M, Durocher A: **Impact of antifungal treatment on** ***Candida-Pseudomonas*** **interaction: a preliminary retrospective case-control study**. *Intensive Care Med* 2007, **33:**137-142.
6. Ader F, Jawhara S, Nseir S, Kipnis E, Faure K, Vuotto F, Chemani C, Sendid B, Poulain D, Guery B: **Short term** ***Candida albicans*** **colonization reduces** ***Pseudomonas aeruginosa*****-related lung injury and bacterial burden in a murine model.** *Crit Care* 2011, **15:**R150.

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