



Book of Abstracts

III International Conference on Antimicrobial Research

Madrid, Spain, 1-3 October 2014

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Probiotic bacteria as inhibitors of quorum sensing and biofilm formation upon skin pathogens

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The elucidation of cell communication systems in bacteria has been coincident with the growing appreciation of the importance of biofilms in bacterial physiology and virulence. Most bacteria in the environment reside in biofilms, as do many of those involved in human infection. The close proximity of bacteria and limited diffusion of molecules within the biofilm matrix suggest that quorum sensing (QS) may be crucial for the development of biofilm-associated infections [1]. So, bacterial biofilm activity is regulated by QS, a system used by both Gram positive and Gram negative bacteria based on the secretion and/or detection of chemical external signaling molecules called auto-inducers [2]. QS represents a novel target for the development of agents to treat or prevent bacterial infections [1].

Probiotic bacteria such as *Lactobacillus* and *Bifidobacterium* degrade the auto-inducers of pathogenic bacteria by secreting enzymes or auto-inducer antagonists which block the QS among pathogens [3]. The search for inhibition of QS signals might offer evidence on the ability of probiotics to prevent growth and proliferation of pathogenic bacteria and it is an acknowledged strategy for finding and developing new antibiotics.

The aim of this study was, therefore, to evaluate whether spent culture supernatants of probiotic cultures could prevent growth and proliferation of selected skin pathogens through inhibition of their biofilm formation or break down of an established biofilm.

To achieve the proposed objective we carried out three different assays: biofilm inhibition assay, pre-formed biofilm destruction assay and QS inhibition assay. The supernatants from seven probiotics (*Lactobacillus delbrueckii*, *Bifidobacterium lactis* (BB12), *Lactobacillus acidophilus* (LA-5), *Lactobacillus acidophilus* (LA-10), *Lactobacillus paracasei* (L-26), *Propionifera innocua*, *Bifidobacterium lactis* (B-94)) were used to evaluate their capacity to inhibit the biofilm formation and/or break down pre-formed biofilm from four skin pathogens (*S. aureus* (MRSA), *Escherichia coli*, *Pseudomonas aeruginosa* and *Propionibacterium acnes*).

Based in the obtained results from anti-biofilm assays, we can conclude that when put directly in contact probiotic bacteria inhibited or decreased the biofilm formation from the pathogens. However, we observed that the tested probiotics were unable to break down the once formed biofilm. The highest inhibition percentage of adhesion (37%) was observed using for *L. delbrueckii* in the presence of *S. aureus* (MRSA). With respect to the destruction of pre-formed biofilm, *P. innocua* presented 45% of destruction of the biofilm formed by *S. aureus* (MRSA).

To elucidate the mechanism whereby the tested probiotics inhibited the biofilm formation we evaluated if this effect was through of inhibition of QS. Here the results revealed that the probiotics with the exception of *P. innocua* and B-94, showed a reduction of the violet pigment production by *Chromobacterium violaceum*. In particular, the higher inhibition zone (2.83 mm) was observed with LA-10. These results indicate that the capacity of the probiotics to inhibit the adhesion of pathogens might be related to QS inhibition.

Keywords: quorum sensing; biofilm; skin pathogens; probiotic bacteria

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