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The role of extracellular polymers on *Staphylococcus epidermidis* biofilm biomass and metabolic activity

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Staphylococcus epidermidis is now well established as being a major nosocomial pathogen, associated with indwelling medical devices. Its major virulence factor is related with the ability to adhere to indwelling medical devices, with consequent biofilm formation.

The present study aimed to evaluate the role of polysaccharides and proteins on biofilm biomass and metabolic activity of five *S. epidermidis* clinical isolates. For this purpose, *S. epidermis* biofilms, formed on acrylic coupons, were characterized in terms of total biofilm biomass, determined through crystal violet assay, cell concentration, established by colony forming units (CFU) enumeration, and biofilm matrix composition, which was assessed for polysaccharides and proteins content. Biofilm metabolic activity was evaluated by two distinct methods: glucose uptake and XTT reduction assays. According to the results, *S. epidermidis* strains revealed different abilities for biofilm formation. In fact, some strains were able to form thicker biofilms than others and this is important because biofilm formation is considered one of the major virulence factors of *S. epidermidis* species. *S. epidermidis* 1457 was the strain that produced the larger amount of biofilm and strain LE7 was the lowest biofilm producer, and these were also the highest and the lowest polysaccharides producers, respectively. This suggests a certain degree of correlation between exopolysaccharides production and total amount of biomass formed. Besides, comparing the results obtained, in terms of exopolysaccharides production and biofilm cellular activity, it seems clear that a strong production of exopolysaccharides can lead to a decrease in the metabolic activity of cells, which was the case of *S. epidermidis* 1457. The protein concentration also varied among strains, with the biofilm matrix of *S. epidermidis* 9142 presenting a higher concentration of proteins comparing to the remaining strains. This fact indicates the different levels of importance that matrix proteins can have on biofilm composition among strains albeit overall, it is suggested that extracellular protein production it is not a determinant factor for biofilm total biomass, despite its qualitative value.

In conclusion, this work provided a reliable approach for a better understanding of *S. epidermidis* biofilms composition and metabolic activity.