Adhesion and biofilm formation of *Staphylococcus epidermidis* on relevant medical surfaces

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Staphylococcus epidermidis and similar coagulase-negative staphylococci (CoNS) are now well established as major nosocomial pathogens associated with infections of indwelling medical devices. The major virulence factor of these organisms is their ability to adhere to medical devices and form biofilms. However, it is not known if adherence and biofilm formation are closely linked phenotypes for clinical isolates.

Silicone and acrylic, among others, are polymers often used in the manufacture of indwelling medical devices. It is known that different clinical isolates of *S. epidermidis* have different abilities to adhere to synthetic surfaces but the molecular basis for this is not known.

In this study, the initial adhesion of 11 strains of *S. epidermidis* to silicone and acrylic were assayed to determine the cell surface tension as measured by contact angle and elemental composition using XPS. Additionally, biofilms were grown on the above mentioned surfaces and the amount of biofilm formed was assessed by dry weight measurements.

As expected, the clinical isolates exhibited different abilities to adhere to the surfaces and form biofilm. Silicone rubber was the most hydrophobic surface studied, and the one having the greatest extent of adhesion of all strains studied. A linear relation between substratum hydrophobicity and the number of adhering cells was obtained. Bacterial cell surface hydrophobicity seemed to have little or no influence on adhesion process. For instance, in the case of acrylic, the strains adhering to the largest extent were the most hydrophilic and the most hydrophobic *S. epidermidis* strains.

It was also noted that strains that produced greater amounts of biofilms were not the ones best able to adhere to the polymers, and vice-versa. This suggests that high levels of initial adherence of *S. epidermidis* to biomaterials do not necessarily lead to strong biofilm formation and that some strains that do not have a high initial adherence can subsequently form a strong biofilm.

Adhesion and biofilm formation may need to be evaluated independently to ascertain the contribution of each to the virulence of CoNS causing device related infections.