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Staphylococcus aureus Adherence to Vulvar Epithelial Cells

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Summary

Under uniform conditions, the levels of selective adherence of *S. aureus* and other organisms to various epithelial cells were compared. Autogenous ribitol teichoic acid was found to block the attachment of *S. aureus* to labium majus and labium minus cells by 76% and 81%, respectively; adherence to vaginal cells was reduced by 66%. Adherence is an important attribute of vulvar ecology and perhaps a determinant of infectious disease.

Selective bacterial adherence has been demonstrated in various tissues (2, 3, 5, 6) of the body regions thus far examined for adherence, the vulva has been characterized least satisfactory. Adherence studies have been limited to the vagina only. This report, focusing on the labium majus, labium minor and vagina, demonstrate the features of microbial adherence unique to this genital area.

Staphylococcus aureus, Candida albicans, Escherichia coli, Acinetobacter calcoaceticus, Streptococcus pyogenes, and an alpha-hemolytic streptococcus were used.

Seven healthy women not using oral contraceptives were included. Cells from the mid-labium majus, labium minus, vagina and buccal and nasal mucosa were harvested, washed with phosphate buffer and incubated with the test bacteria by previously described methods (2). In some studies, using a micrometer eyepiece to measure the size of at least 20 epithelial cells and counting their respective test organisms, the average density of adherence was computed. Microscopic

Table 1: Comparison of *S. aureus* adherence to various epithelial cells[a].

Cell Source	Area (μm^2)	Coccal Tally	Density
Nose			
Spinous	294.7 ± 105.3[b]	4.70 ± 3.83	0.019 ± 0.016
Low granular	541.9 ± 140.2	18.70 ± 4.45	0.037 ± 0.015
High granular	882.3 ± 129.6	59.67 ± 14.86	0.068 ± 0.017
Keratinized	1095.0 ± 217.3	119.73 ± 31.10	0.113 ± 0.036
Forearm	1196.7 ± 340.9	29.87 ± 14.19	0.026 ± 0.012
Buccal mucosa	2075.3 ± 640.9	63.27 ± 28.29	0.031 ± 0.013
Labium majus			
Medium, smooth	708.5 ± 276.9	37.47 ± 9.78	0.059 ± 0.026
Large, rough	832.5 ± 345.8	87.75 ± 28.00	0.119 ± 0.052
Labium minus	1468.2 ± 351.6	20.26 ± 7.34	0.015 ± 0.001
Vagina	1406.2 ± 575.5	13.10 ± 7.68	0.011 ± 0.009

[a] Standard buffer: 0.067 M PBS, pH 6.8.
[b] Mean of 20 cells ± SD.

slide preparations were heat-fixed, stained with crystal violet and examined under the light microscope. Two general cell types from the labium majus could be distinguished: those of medium size with smooth texture, and even perimeter and those of large size, rough consistency and irregular shape. Transitional cells were also common. Superior adherence of *S. aureus* to labium majus cells was noted. Streptococci attained intermediate levels. *C. albicans* and *A. calcoaceticus* demonstrated poor adherence. *E. coli* did not attach to these tissues.

The comparison of *S. aureus* to various epithelial cells is shown in the Table 1. The largest cells examined were from the buccal mucosa, but the density of attached staphylococci, despite their moderately large number, was similar to forearm and lower granular layer nasal cells. Fully keratinized nasal cells and the large, rough cells of the labium majus had superior and nearly equivalent capabilities of adherence. The densities of *S. aureus* on labium minus and vaginal cells were the lowest of the group.

We previously demonstrated that autogenous ribitol teichoic acid could block the attachment of *S. aureus* to epithelial cells, suggesting that the wall component in an adhesion for these host cells (1, 2). In this investigation the bacterial receptors on both types of labial cells were neutralized, 76% and 81% respectively. Vaginal cells, assayed at pH 3.5, also were affected; adherence scores were reduced by 66%.

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