Study of the Streptococcus mutans cell surface localized adhesin P1 protein using MAS NMR

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Introduction

Streptococcus mutans is a gram positive cocci shaped bacterium involved in dental cavities. The bacterium adheres to a host, colonizes the oral cavity, and ferments carbohydrates into lactic acid, which results in the demineralization of the tooth surface. The primary adhesive protein on *S. mutans* involved in sucrose-independent adhesion is P1, a cell surface localized protein. Based on previous studies [1], P1 is amyloidogenic, and its tertiary structure has been proposed. However, the mechanism of P1 intermolecular interaction remains unknown. Hereby, we demonstrate our preliminary experiments looking into this problem utilizing solid state NMR.

Experiment

All the solid state NMR experiments were done on a 500 MHz Bruker Avance III magnet with a 3.2mm Low-E® Solids Probe at the AMRIS facility.

Results and Discussion

Figure 1 shows one-dimensional 13C spectra of PC3370 (ΔP1 mutant) untreated cell wall before (in blue) and after (in red) the addition of C-term of P1. Similar signal intensities suggest C-term is unable to bind without the existence of P1. Figure 2 shows the same experiments with NG8 (wild type) before (in blue) and after (in red) the addition of C-term of P1. Overall increases in intensities strongly suggest C-term of P1 is binding back to the cell.

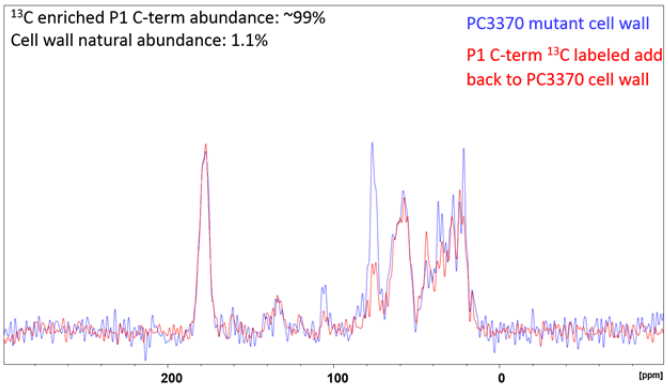

Fig.1 Overlay of one-dimensional 13C spectra of the cell walls of PC3370 strain (ΔP1 mutant) before (in blue) and after (in red) the addition of C-term of P1

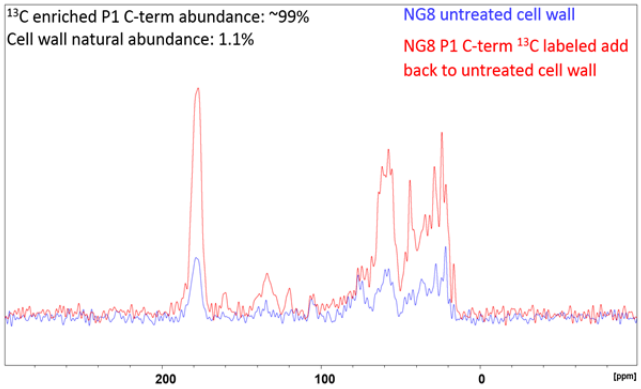

Fig.2 Overlay of one-dimensional 13C spectra of the cell walls of NG8 strain (wild type) before (in blue) and after (in red) the addition of C-term of P1

Conclusions

We have successfully demonstrated that, the C-term of P1 can only be added back to the cell surface with the existence of P1 molecules.

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References

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