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Inhibition of *Streptococcus* biofilm formation and its degradation by *Streptomyces* α 1,3-glucanases

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Streptomyces thermodiastaticus HF3-3 from soil was screened as an α-1,3-glucanase producing strain. The strain HF3-3 showed the highest α-1,3-glucanase activity in culturing it by using α-1,3-glucan as a sole carbon source. It produces two types of α-1,3-glucanases namely AglST1 and AglST2, which were homogenously purified by column chromatography: DEAE-cellufine A500 and HiTrap QHP-GE. SDS- PAGE showed the approximate molecular weight 62 and 91 kDa for AglST1 and AglST2, respectively. AglST1 and AglST2 specifically acted on α-1,3-glucan. They exhibited the same optimum of pH 5.5. Their optimum temperatures were slightly different, which were 65 °C and 60 °C for AglST1 and AglST2, respectively. The other characteristics including pH stability, the effect of NaCl, the effect of ion metals, and the effect of toothpaste ingredients (NaF, SDS, BTC) had been studied. The results indicated AglST1 and AglST2 were insensitive toward various substances. Notably, the outstanding properties of AglSTS from *S. thermodiastaticus* HF3-3 were thermostable which would be worth in applications. From amino acid sequence analysis, AglST would be classified as a new subfamily of glycoside hydrolase 87, since its sequence has high homologous with mycodextranase, and shows low identity with the known sequences of α-1,3-glucanase. The recombinant α-1,3-glucanases, designated as rAglST1 and rAglST2, were successfully expressed in *E. coli* with showing the most properties same as the wild-type enzyme. rAglSTs could retarded the formation and degraded the fully formed biofilm effectively. In conclusion, α-1,3-glucanases from *S. thermodiastaticus* HF3-3 have been characterized and could be used practically in the application of dental care.

Biography

Mamoru Wakayama has his expertise in enzymology and fermentation technology. He has consistently been studying the enzymes involved in amino acid metabolisms as well as the enzymes responsible for degradation of non-digestible poly saccharides such as chitin and alpha-1,3-glucan.

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