論 文 要 旨

Recombinant Sox enzymes from *Paracoccus pantotrophus* degrade hydrogen sulfide, a major component of oral malodor

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Hydrogen sulfide (H_2S) is emitted from industrial activities, and several chemotrophs possessing Sox enzymes are used for the removal of H_2S. In dental field, oral malodor is a common problem and major malodorous components are volatile sulfur compounds (VSCs), including H_2S and methyl mercaptan. *Paracoccus pantotrophus* is an aerobic, neutrophilic facultatively autotrophic bacterium that has sulfur-oxidizing (Sox) enzymes to use sulfur compounds as an energy source. In this study, we cloned Sox enzymes of *P. pantotrophus* GB17 and evaluated their VSC-degrading activity with respect to oral malodor prevention. Six genes, *soxX, soxY, soxZ, soxA*, *soxB*, and *soxCD*, were amplified from *P. pantotrophus* GB17. Each fragment was cloned into a vector for the expression of 6×His-tagged fusion proteins in *Escherichia coli*. Recombinant Sox (rSox) proteins were purified from whole-cell extracts of *E. coli* using nickel affinity chromatography. The enzyme mixture was investigated for the degradation of VSCs using gas chromatography. Each of the rSox enzymes was purified to apparent homogeneity, as confirmed by SDS-PAGE. The rSox enzyme mixture degraded H_2S in dose- and time-dependent manners. All rSox enzymes were necessary to degrade H_2S. The H_2S-degrading activity of rSox enzymes was stable at 25-80°C, and the optimum pH was 7.0. The amount of H_2S produced by periodontopathic bacteria or oral bacteria collected from human subjects decreased after incubation with rSox enzymes. These results suggest that the combination of rSox enzymes from *P. pantotrophus* GB17 could be useful for the prevention of oral malodor.