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Inactivation of the BceABRS four-component system attenuates the ability of *Streptococcus mutans* to survive in human blood and reduces its cariogenic potential in a rat caries model

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Streptococcus mutans is a primary etiological agent of dental caries worldwide. This bacterium may promote systemic infections, such as infective endocarditis, after gaining access to bloodstream or bacteremia. We previously characterized a four-component system, BceABRS, which is essential for cell envelope stress response and required for biofilm formation and fitness of *S. mutans*. In this study, we provide evidence that the BceABRS system of *S. mutans* is also required for its survival in human blood and cariogenic potential in a rat caries model. An *ex vivo* blood survival assay revealed that a deletion of bceA, bceB, bceR or bceS resulted in a mutant that showed a reduced survival rate in blood compared with their parent strain, S. *mutans* UA159. Introducing a wild copy of each of these genes into the mutants *in trans* increased the survival rates of these strains in blood. Luciferase reporter assay showed that human serum-induced transcription of the *bceABRS* operon at a level similar to that by a physiological concentration of innate defense peptides, such as α-defensin-1 or β-defensin-3. Animal studies showed that all the BceABRS-deficient mutants had significantly reduced abilities for oral colonization and potential for initiation of dental caries based on mean caries scores from the animals: 30.5±7.2 for *ΔbceA*, 28.8±6.8 for *ΔbceB*, 30.2±7.4 for *ΔbceR* and 30.8±6.5 for *ΔbceS* compared with their parent UA159 (56.6±7.8) (P≤0.01-0.005). In conclusion, the BceABRS system in *S. mutans* is required for its survival in human blood and cariogenic potential in a rat caries model. Supported by CIHR grant MOP-115007 and by NSERC grant RGPIN 311682-07.

Biography

Yung-Hua Li received his doctorate in molecular microbiology in the University of Manitoba. Following his postdoctoral fellowships in the University of Rochester, NY. She worked as a scientist in the University of Toronto, with his research focus on molecular dissection of microbial biofilms and pathogenesis. In 2004, she joined the Faculties of Dentistry and Medicine at Dalhousie University, where he has been directing a research team on microbiological and molecular analyses of bacterial pathogenesis, biofilms, and host-bacterial interactions.

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