

 BACTERIAL ECOLOGY

Dental double act

Interactions between *Actinomyces naeslundii* and *Streptococcus gordonii* in the presence of salivary factors are important for stable dental plaque communities. A study published in *FEMS Microbiology Ecology* shows that co-aggregation of *S. gordonii* with *A. naeslundii* temporarily decreases the intracellular levels of hydrogen peroxide (H_2O_2) in *S. gordonii*, thereby protecting streptococcal proteins from oxidative damage.

Saliva, from which oral bacteria derive nutrients, contains low concentrations of the amino acid arginine. Recent work has shown that co-aggregation of *S. gordonii* with *A. naeslundii* results in the stabilization of *S. gordonii* arginine biosynthesis genes, enabling the bacteria to grow under conditions of scarce arginine. However, co-aggregation also led to increased activity of the *S. gordonii* pyruvate oxidase, SpxB, which produces H_2O_2 as a by-product. SpxB activity can produce sufficient H_2O_2 to kill neighbouring bacteria by causing irreversible oxidative damage to amino-acid residues, such as arginine, which leads to a loss of protein function.

Given that streptococci do not produce catalase, which removes H_2O_2 , the benefit gained from increased arginine biosynthesis during co-aggregation may be abrogated by the cellular protein damage that is caused by increased H_2O_2 production. To address this issue, Jakubovics

and colleagues set out to determine whether co-aggregation with *A. naeslundii* affected concentrations of H_2O_2 in *S. gordonii*.

The authors confirmed that co-aggregation with *A. naeslundii* increased the viability of *S. gordonii* grown in the absence of arginine. The concentration of H_2O_2 was reduced in co-aggregate cultures compared with *S. gordonii* monocultures owing to catalase production by *A. naeslundii*. In co-aggregate cultures, decreased protein oxidation corresponded with the reduction in H_2O_2 concentration, but this protective effect was only temporary. As *S. gordonii* became dominant in the co-aggregates, the increasing H_2O_2 concentration became toxic to *A. naeslundii*.

Co-aggregation of *S. gordonii* with *A. naeslundii* might have two benefits for the streptococci: first to increase arginine biosynthesis when required and second to reduce H_2O_2 levels. This work reveals the complexity of inter-bacterial interactions in multi-species communities that occur widely in nature.



BRAND X

Andrew Jermy

ORIGINAL RESEARCH PAPER Jakubovics, N. S. et al. Role of hydrogen peroxide in competition and cooperation between *Streptococcus gordonii* and *Actinomyces naeslundii*. *FEMS Microbiol. Ecol.* 9 Sep 2008 (doi:10.1111/J.1574-6941.2008.00585.X)