

Fermentation of rare sugar kojibiose by the oral bacteria is slow yet bacteria specific

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Abstract

Sucrose is a common ingredient in many foods owing to its desirable technological and sensorial functions (1); however, its ease of fermentation by the diverse oral microbiota is associated with dental caries that affects over 2.5 billion people globally (2, 3). In this study, we have investigated the cariogenic properties of 1% rare sugars; kojibiose and trehalose as potential sucrose alternatives. Sugar incubations were conducted anaerobically for 24 and 48 h in a carbon-limited medium with *in vivo* derived complex microbial communities of saliva from 11 donors and with selected oral bacteria as either single strains (19) or their synthetic communities. Based on the levels of pH and organic acids, kojibiose resisted rapid fermentation by the complex salivary microbiota from all the donors except one. As for pure stains, not all single strains except *A. viscosus* at 48 h were able to metabolize kojibiose highlighting the resistance and strain specificity in kojibiose utilization. A synergistic metabolic interaction was, however, revealed for kojibiose incubations with communities comprising either lactobacilli or *A. viscosus* at 48 h. On the contrary, sucrose and trehalose were rapidly fermented by most of the single strains, all the synthetic communities and salivary bacteria thereby producing comparable high levels of organic acids that coincided with the drop in pH below the critical level 5.5. Taken together, our results have demonstrated that kojibiose is a low cariogenic disaccharide hence a potential sucrose alternative as opposed to trehalose that exhibited comparable cariogenic properties as sucrose.

References

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