

## [最近のトピックス]

## Plant products : Strategy for the prevention of dental caries

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The use of plant extracts, as well as other alternative forms of medical treatments, gained great popularity in the late 1990s. Actually, plant extracts have been used to prevent or treat diseases since several thousand years both in Western and Eastern societies. The term “plant products” is usually refers to secondary metabolites produced by plants. In many cases, these substances serve as the plant’s defence mechanisms against predation by microorganisms, insects, and herbivores. Secondary metabolites can be simply classified in three main groups : (i) phenolic compounds, which are made from simple sugars, containing benzene rings, hydrogen and oxygen ; (ii) terpenoids, which are made from mevalonic acid, composed almost entirely of carbon and hydrogen ; and (iii) alkaloids, which are nitrogen-containing compounds.

Dental caries, resulting from interactions of oral bacteria and their metabolic/virulence products with salivary constituents and dietary carbohydrates that are present on the surface of susceptible teeth. Biofilms formed in vivo comprised mixed microbial flora, although mutans streptococci are recognized as the primary producers of the extracellular polymeric substance (EPS) -rich matrix. *Streptococcus mutans* plays a key role in the development of virulent biofilms. Therefore, inhibition of the viability and biofilm formation of these bacteria is one of the strategies for the prevention of dental caries.

Chlorhexidine is generally accepted as the gold standard antibiofilm agents in the field of dentistry owing to its clinical efficacy on a wide range of microorganisms occurring in the oral cavity. However, the use of chlorhexidine as an anticaries agent not only remains controversial but also has adverse effects, including the staining of the tooth and tongue. As a result, there is a considerable interest in the development of new agents for the control of dental caries. Recently, several plants have been studied for their potential in the prevention of dental caries (Table 1).

Although plant products as traditional medicine are generally not expected to have acute toxicological effects, comprehensive safety studies of these agents need to be evaluated. Clearly, there is a great potential for the development of novel antibiofilm/anticaries using plant products.

## References

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3. Song, J.H., 2007. In vitro effects of a fraction separated from *Polygonum cuspidatum* root on the viability, in suspension and biofilms, and biofilm formation of mutans streptococci. *Journal of Ethnopharmacology* 112, 419-425.

Table 1. Plant products with potential use as prevention of dental caries

Component	Plants	Activity
Catechin-based polyphenols	Green tea ( <i>Camellia sinensis</i> )	1, 3, 4, 5, 6
Oleic acid, linoleic acid, epicatechin polymer	Cacao bean husk	1, 4, 5, 6, 8, 9
Proanthocyanidins, phenolic acids, flavonols	Cranberry ( <i>Vaccinium macrocarpon</i> )	2, 3, 4, 5, 6, 8
Cineole, terpinen-4-ol	Essential oil from <i>Melaleuca alternifolia</i>	1, 9
Terpinene, piperitenone oxide, piperitone, pinene	Essential oils from <i>Mentha piperita</i> and <i>Rosmarinus officinalis</i>	1, 7
Allicin	Garlic ( <i>Allium sativum</i> )	1, 9
Funoran	Seaweed ( <i>Gloiopeltis furcata</i> )	4, 6, 7
Gallotannins	Neem ( <i>Azadirachta indica</i> , <i>Melaphis chinensis</i> )	7, 10, 11
Lenthionine, disulfide derivative, oligosaccharides	Shiitake ( <i>Lentinus edodes</i> )	1, 6, 8, 10
Unknown	Miswak ( <i>Salvadora persica</i> )	1, 9

1 : Antimicrobial activity against planktonic cells of *S. mutans* ; 2 : Antimicrobial activity against biofilm cells of mutans streptococci ; 3 : Inhibitory effect on glucosyltransferase (Gtf) activity ; 4 : Inhibitory effect on *S. mutans* adherence ; 5 : Inhibitory effect on acid production ; 6 : Reduction in caries development in rats infected with mutans streptococci ; 7 : Inhibitory effect on human biofilm accumulation ; 8 : Reduction of formation of *S. mutans* biofilms ; 9 : Reduction in human salivary mutans streptococci counts ; 10 : Inhibitory effect on water-insoluble glucan synthesis by mutans streptococci ; 11 : Induction of bacterial aggregation of various oral streptococci.