Editorial

Multipurpose Silicon-Based Toothpastes: Decision Making for a Better Oral Health

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One could ask: what's the best toothpaste dentists recommend? Next question would be: based on what they recommend this or that product? No wonder whether a scientific-based answer would be provided by these clinicians! But their answers are certainly mostly based on heavy marketing usually done by the main companies. It does not mean that these companies are not investing in R&D and innovation! In fact, companies have really been investing in developing new oral care products. The size of the toothpaste market was valued at $18.5 billion in 2019, and is estimated to reach $24.5 billion by 2027, registering a Compound Annual Growth Rate (CAGR) of 3.7% until 2027 (https://www.alliedmarketresearch.com/). The great majority of toothpaste brands are conventional, with an increased market share for other types, such as herbal toothpastes and whitening ones. The oral care market has long been dominated by five big brands, which each produce a variety of toothpastes with different indications, flavors, ingredients, etc.

Searching about the oral care market, we came across a company website (https://www.maccofinancial.com/blog/investing-is-like-toothpaste) comparing the choice of a toothpaste with investment choices: "More choices are better," one said! It was reported a visit to a grocery store to search for toothpaste. Instead of a handful of good choices, the author mentioned being "assaulted by 122 choices" (according to the author, choices were really counted). So, how do you make the decision about the best option without being overwhelmed? A good (and kind of obvious) starting point to think about a recommendation would be a toothpaste containing fluoride (F).

Concerns have been expressed over the risks and benefits, both individually and collectively, of fluoride-containing therapeutic compounds. The access to F by the population has made possible the drastic reduction of caries all over the world, and toothpaste is the mean that allow the greatest delivery of F. With caries in decline, the world population started to have more teeth in their mouths, which meant other problems in oral health became evident. In this sense, the new habits of modern society have led to greater oral acidity levels in which the effectiveness of F is reduced. In this manner, there are several oral care products on the market with active ingredients to protect teeth against the enamel demineralization associated with fluoride, even in small concentrations.[1] This may contribute to more clinical responses and patient acceptability of break-through products.

Although traditional F technology still remains one of the key preventative strategies today, new formulations of innovative oral care products have been launched. Among them, it has been proposed that biomimetic approaches have a mechanism that reproduces the mineralization process, which can improve the enamel remineralization.[2] This mechanism was possible by associating different ionic compounds in combination with F. The bioactivity of dental hydroxyapatite is dependent on a number of factors, including phase composition, chemical composition, and crystallinity. Biological apatite can also be characterized by the presence of other ions partially substituting calcium, phosphate, and/or hydroxyl ions in the structure, such as magnesium, potassium, sodium, zinc, manganese, orthosilicate, and chloride.[3] The remineralization process can also be enhanced by the substitution of low levels of ionic species, such as carbonate and fluoride.[4] These ionic changes are regarded to occur at the hydroxyapatite surface,[5] but it has also evaluated the potential of F toothpastes to provide hydroxyapatite regeneration deeper into the enamel subsurface.[6]

A potential method of enhancing the bioactivity of hydroxyapatite is favored by the substitution of silicon into the

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remineralizing hydroxyapatite molecular structure.[7] It has already been demonstrated that the assembly of an enamel-like inorganic oriented structure on the surface of natural enamel can be organized when treated with silicon-based toothpastes.[8] In this manner, it acts as a site for the precipitation of calcium and phosphate ions, forming calcium silicate, which leads to the nucleation of hydroxyapatite and mineral formation and intensifies the remineralization process.[9] Calcium silicate is responsible for a protective effect on the surface, stimulating the deposition of other minerals and reducing the effects of demineralization.[9] Although it is claimed that these changes seem to occur mainly at the hydroxyapatite surface,[5] it seems to be the reason for retaining F in the composition, even at lower concentrations.[4] In this manner, associated with the remineralizing effect as induced by F, other activities can be associated with these new technological silicon-based toothpastes, such as antierosive action, tooth sensitivity, among others.[10–12]

The introduction of more advanced toothpastes with optimal levels of F to prevent caries, understanding the consumer's needs, provides a competitive advantage over traditional F technology. The so-called "multi-care," "multi-purpose," "multi-claim," or even "multi-action" toothpaste products seem to be the best choice nowadays. Innovations in oral care have contributed to the formulation of products with a variety of attributes, including prevention of early periodontal disease (gingivitis) and reduction in tooth sensitivity, thus increasing their efficacy against oral diseases due to their superior efficacy. The answer to the indication of a toothpaste must be attentive to the reality of society in relation to multifunctional technological toothpastes. This must be the main recommendation. Among these options, silicon-based toothpastes are quite promising.

Conflict of Interest
None declared.

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