Why interdental brushes are essential for good oral health

Prof. Denis Bourgeois is not only the Dean of the University of Lyon’s dental faculty in France—he is a pioneer in research on oral prophylaxis, interdental biofilm management and interdental brushing techniques. Bourgeois was the first dental researcher to identify the 19 major pathogens in the interdental biofilm known to be involved in periodontitis in young healthy adults. Furthermore, he has pushed for proper tools like interdental brushes to be used to prevent interdental biofilm accumulation and the development of periodontal disease. “An interdental brush can remove around 16 billion bacteria from each interdental space,” said Bourgeois during his presentation at the 2016 FDI Annual World Dental Congress in Poznań in Poland.

Despite advances in oral health care, many patients and dental professionals remain uncertain about oral physiopathology and the concept of biofilm disruption. Although patients may have bought more oral care products and become more interested in their dental hygiene, many still do not know how to use them correctly. Various toothbrushing techniques have been developed for maximum cleaning efficacy, but brushing alone is not sufficient to reach and maintain a high level of oral hygiene in the long term. “Most of the current dental cleaning techniques are outdated: the main brushing techniques that most consumers use today were established around 1946,” said Bourgeois.

While dentistry has advanced, these outmoded techniques have continued to be used among the general population. “A classical manual toothbrush with 800–1,200 bristles is not sufficient to disturb the biofilm,” asserted Bourgeois. “To do so, a toothbrush should be soft, efficient and atraumatic. When used in combination with the Bass technique, a soft-bristled toothbrush with 5,000–6,000 filaments is the only option for effectively preventing biofilm development.”

But what about the biofilm between the teeth? The anatomy of the interdental space does not allow for an efficient salivary self-cleaning mechanism and makes cleaning this area difficult. Though useful otherwise, conventional toothbrushing is not effective in removing interproximal plaque. Recommendations for oral hygiene practices from dental practitioners have now begun...
to incorporate interdental brushes for these spaces. However, many individuals object to using these tools, as uncertainty about interdental spaces and the importance of cleaning them daily persists.

**Sixteen billion bacteria in one interdental site**

So, why does interdental cleaning actually matter? As the average adult has 30 interdental spaces, should more than just toothbrushing be done in order to prevent gingivitis, periodontitis and related diseases? Are there any scientific studies that describe the composition of the interdental microbiota among generally healthy patients and explain the importance of disrupting this biofilm?

Bourgeois wanted answers to these questions. To understand the mechanism of periodontal pathologies, he took a unique approach, using real-time polymerase chain reaction to quantify and qualify the interdental biofilm in healthy adults. By using interdental brushes to collect the interdental biofilm effectively, he contributed significantly to establishing the role of interdental biofilm management in preventative oral health.

In his study, approximately 16 billion bacteria were collected on average from each interdental site, an astounding figure. To identify these interdental bacteria, Bourgeois and his colleagues used Socransky complexes, which reflect microbial succession events in developing dental biofilms. While the blue, yellow, green and purple complexes are correlated with periodontal health, orange and red complexes reflect periodontal disease.

Of the 19 major periodontal pathogens quantified in the study, bacteria of red and yellow complexes constituted the majority of interdental bacteria. In particular, red complexes such as Porphyromonas gingivalis, Tannerella forsythia and Treponema denticola were recognised as the most important pathogens in adult periodontal disease, representing around 8 per cent of the 19 pathogens analysed. P. gingivalis was detected in 19 per cent of healthy subjects and represented 0.02 per cent of the interdental biofilm. As much previous dental research has confirmed, P. gingivalis alone can induce alveolar bone loss, and in combination with T. denticola and T. forsythia, is likely to lead to periodontal disease. Bourgeois’s findings mean that even the interdental biofilm of healthy patients is composed of the 19 major periodontal pathogens quantified in the study, bacteria of red and yellow complexes constituted the majority of interdental bacteria. In particular, red complexes such as Porphyromonas gingivalis, Tannerella forsythia and Treponema denticola were recognised as the most important pathogens in adult periodontal disease, representing around 8 per cent of the 19 pathogens analysed. P. gingivalis was detected in 19 per cent of healthy subjects and represented 0.02 per cent of the interdental biofilm. As much previous dental research has confirmed, P. gingivalis alone can induce alveolar bone loss, and in combination with T. denticola and T. forsythia, is likely to lead to periodontal disease. Bourgeois’s findings mean that even the interdental biofilm of healthy patients is composed...
of bacteria that could lead to periodontitis and, potentially, systemic disease.

**Bleeding as a clinical reference**

Dental professionals agree that, despite clinical evidence in its favour, effective daily cleaning of interdental spaces remains a challenge among their patients. So what happens if patients do not use interdental cleaning tools? Despite otherwise good oral hygiene habits, many patients experience interdental bleeding. According to the latest research, 41 per cent of young adults without periodontal disease or clinical gingivitis have experienced interdental bleeding at least once. This information is crucial for daily oral hygiene, particularly regarding interdental cleaning. "There is a need to use interdental cleaning tools," reasoned Bourgeois. "If you do not use them, you could essentially stop using a toothbrush, as bleeding will occur anyway in the future."

The access widths of interdental spaces are relevant to the use of interdental cleaning tools as part of individual oral prophylaxis. As the access widths of interdental spaces were mostly unknown in young adults, Bourgeois and his colleagues assessed their distribution in "Access to interdental brushing in periodontal healthy young adults: A cross-sectional study". Importantly, 40 per cent of the sites studied showed bleeding upon passage of an interdental brush. However, this was not significantly affected by the width of the interdental space.

**Interdental brushes prove to be superior**

The CPS prime series of interdental brushes by oral health care brand CURAPROX were selected for the study. The researchers concluded that the latest generation of brushes was able to access 94 per cent of all interdental spaces, with participants able to easily use the brushes following instructions. As a result, the study concluded that most interdental sites could be cleaned using interdental brushes after their accessibility is established in the dental practice.

Conventionally, interdental brushes were only recommended for patients with large interdental spaces, with dental floss used for narrow spaces. As the technology has progressed, interdental brushes can now be used in very small interdental spaces effectively. "Dental floss is no longer a priority, as its use is not supported by scientific evidence. For interdental brushes, we have scientific evidence. Clearly, interdental brushes have now become the best tool for cleaning interdental spaces," said Bourgeois.

"The majority of studies have reported a positive significant difference in the plaque index when using an interdental brush compared with floss," continued Bourgeois. "Indeed, interdental brushes were found to be more effective in removing plaque compared with brushing alone or the combined use of toothbrushing and dental floss." With
this in mind, establishing the accessibility and widths of interdental spaces should clearly be a routine part of patient examinations.

**The colorimetric probe: Key to success**

An important message from the aforementioned study is that the size of the interdental brush matters. As interdental brushes have an access diameter defined by the thickness of their wire core, an efficient cleaning diameter needs to be taken into consideration. Another study by Bourgeois et al. emphasised the need for choosing the right diameter so that the interdental brush can fit comfortably into the interdental space. Apart from an individual’s anatomy, interproximal spaces differ and change due to age, periodontal health or dental treatment. While under-sizing of the interdental brush will affect its efficiency, oversizing might reduce acceptability and efficiency while increasing gingival trauma.

Essentially, Bourgeois and his colleagues suggested that the use of a colorimetric probe and interdental brushes is more beneficial than interdental brushes alone. By using the IAP CURAPROX calibrating colorimetric probe, patients were able to measure the interdental space and choose a suitably sized interdental brush, whereas over half of them had previously chosen brushes with a suboptimal diameter. According to the study, the colorimetric interdental probe is the only predictable way in which the interdental space can be measured by the dental professional and the patient.

A properly sized interdental brush will help individuals achieve optimal biofilm disruption through safe and thorough interdental cleaning. Concerns regarding the difficulty of penetrating the interdental space and identifying and recommending interdental brushes of the correct size to patients are now resolved, and interdental cleaning is now easier than ever. The comparison of efficiency with dental floss is, generally speaking, no longer valid.

**Individual instruction important for good interdental health**

Despite the clinical evidence, availability and selection of tools, and development of appropriate techniques, the main problem with interdental cleaning is patient ability and motivation. Damage to the interdental papilla often results from a lack of training. Furthermore, bleeding may deter patients from using interdental brushes even though it will cease after several uses of an appropriately sized brush.

“From a clinical point of view, the oral prophylactic goal of achieving thorough cleaning with minimal damage is important,” said Bourgeois. “Only the right technique, repetition and training can reduce the risk of bleeding, harm to soft or hard tissue, and presence of oral bacteria while attaining a high level of cleanliness.”