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Outreach magazine  
of the **SEPA** Foundation  
for Periodontology and  
Dental Implants

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Editor:  
Regina Izquierdo

TAKE CARE OF YOUR

# **gums** 21



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personalised  
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IN DEPTH

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PRESENTATION

Regina Izquierdo  
Scientific editor of the magazine  
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## Time for health

THE MEANING OF HEALTH has evolved over time. If its definition traditionally centred on considering health to be a normal state of functioning that could be changed occasionally by disease, the World Health Organization (WHO) has proposed an innovative definition which aims higher by linking the concept of health to physical, mental, and social wellbeing and not considering it to be only the absence of disease. HEALTH is a state of balance, but it is also a process, a means to "live life" that includes both personal and social resources and the physical and psychological capacities that are needed to main homeostasis and recover from aggressions. Thus, the current concept of HEALTH also refers to a person's capacity to adapt to adverse situations with positive results. HEALTH is also an ATTITUDE.

This concept opens infinite possibilities for HEALTH to be taught, strengthened, and above all learned. Our magazine continues to work in PROMOTING THE HEALTH of the population: informing, expanding knowledge, encouraging people to opt for healthy lifestyles, and ultimately raising awareness to participate responsibly in the care of HEALTH. YES, in capitals, because there is only one, that of the whole body.

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Periodontology is a constantly evolving discipline within dentistry that deals with problems with the gums. The basic concepts of periodontal treatment essentially continue as before but there have been some very interesting changes

# The future of periodontology is already here



SECTION CO-ORDINATED BY:

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IN RECENT YEARS, there have been several important innovations in the field of the prevention and management of periodontal diseases, changes which have outlined a new periodontology.

## What's new?

One of the main innovations derives from a new classification of periodontal disease, which puts the spotlight on following all the phases of periodontal treatment and motivating the patient to play an active role during the treatment.

There has also been substantial progress in the identification and control of the main risk factors associated with the appearance and development of periodontal disease (smoking, diabetes...).

Fundamentally, progress in this field originates in the consolidation of periodontal medicine and, specifically, in the significant advance of research and clinical evidence that relates oral health to general health, which even shows how an optimal treatment of periodontitis can have a positive systemic repercussion in other parts of the organism and a benefit beyond the mouth, highlighting the relation of periodontal diseases to systemic diseases (such as diabetes, certain cardiovascular diseases, rheumatoid arthritis, and Alzheimer's disease).

All this has gone hand in hand with a substantial change in the role of the periodontist-dentist, who today is also involved in the role of achieving good

## Periodontitis is not confined to the periodontium but is linked to the body as a whole

general health in their patients. The dental clinic, and the whole dental team, is now a centre for promoting general health.

## New classification

The new classification of periodontitis, which incorporates different stages and grades of periodontal disease, helps to relate the disease to the complexity of treatment and individual risk.

The stage depends on the severity of the disease and the complexity of the treatment required, while the grade

## One of the main innovations comes from a new classification of periodontal disease

expresses the risk that the periodontal disease can affect the patient's general health, taking into account risk factors such as smoking and the presence or absence of diabetes; it can thereby determine the existence of a slow (grade A), moderate (B), or rapid (C) progress of the disease.

The priority is to differentiate whether the individual has periodontal health (without inflammation, bleeding on probing, or bone loss) or presents inflammation of the gums, whether in the form of gingivitis (inflammation

of the gum without bone loss) or periodontitis (loss of supporting bone).

The European Federation of Periodontology (EFP) proposes a clinical sequence to perform the diagnosis of periodontitis:

- 1) **Identify the patient with periodontitis**
- 2) **Confirm the diagnosis**
- 3) **Classify the case of periodontitis in stages**
- 4) **Classify the case in grades**

## "Meetings" (with the treatment) in 4 steps

Once the diagnosis has been made and the type of periodontitis has been classified, the treatment phase begins, where it is fundamental that the patient knows and assumes that the periodontitis must be treated correctly, following the various stages established and ending with regular and life-long periodontal maintenance.

It is also fundamental to make patients aware of the importance of good oral hygiene and of the necessary motivation to achieve and maintain good periodontal health in the long term.





### 5 things (at least) that the dental clinic does to promote general health

- Promote smoking cessation.
- Early diagnosis of diabetes mellitus.
- Informing and promoting a healthy diet to improve quality of life.
- Promoting physical exercise and controlling stress.
- Incentivizing oral health before, during, and after pregnancy.

### Did you know that these diseases are associated with periodontitis?...

- Cardiovascular diseases
- Diabetes
- Premature birth / low-weight birth
- Respiratory diseases
- Kidney diseases
- Rheumatoid arthritis
- Metabolic síndrome
- Cognitive deterioration (Alzheimer's disease)
- Cancer

And there are some 50 more

## Periodontitis risk factors that must be controlled:

**Smoking**  
**Diabetes** } Main risk factors

**Healthy lifestyle**  
**Good diet**  
**Physical exercise**  
**Stress reduction**  
**Losing weight** } Less solid factors

- **Step 1:**
- a) Teach the patient to control their supragingival oral biofilm (with motivation and personalized oral-hygiene instructions) and risk factors (quitting smoking, better control of diabetes...). The control of the biofilm should be mechanical (manual or electric toothbrush and interdental cleaning) and chemical (antiseptic toothpastes and mouth washes).
  - b) Professional removal of dental biofilm, supragingival (visible) calculus, and local retentive factors.

**Step 2:**  
Cause-related therapy is started, removing the subgingival biofilm (which is not visible because it is located below the gum) and calculus using subgingival instrumentation (scaling with curettes or sonic/

ultrasonic instruments), and this can be accompanied by the use of antimicrobial agents.  
Later, there needs to be a re-evaluation of the response of the periodontal tissues to the treatment carried out. If periodontal health has been achieved, the patient moves to the maintenance phase; if deep periodontal pockets remain, it needs to be evaluated whether to perform a new scaling, periodontal surgery, or tooth extraction.

**Step 3:**  
With the aim of treating teeth that have not responded to scaling and which continue to present periodontal packets greater than 4 mm with bleeding or pockets of greater than 6 mm, a surgical phase is started. The aim is to achieve better access for subgingival instrumentation, regenerate tissues, or carry out a resective treatment. In areas with

**Performing a complete periodontal treatment and achieving/maintaining periodontal health is essential for successful interdisciplinary treatment at a later stage**

residual pockets, a new scaling is performed (if the pockets are of less than 4-5 mm), and if they are deeper (more than 6 mm) periodontal surgery is recommended, whether access (conservative surgery), resective (change of the soft- and hard-tissue architecture), or regenerative (using bioregenerative materials).  
There are conventional techniques for achieving coverage of the exposed dental roots, techniques that are backed by numerous studies that support their long-term effectiveness. Mucogingival surgery to cover gingival recessions is indicated to improve gingival health, control

Controlling risk factors during periodontal maintenance achieves a significant benefit for general health

→ dental hypersensitivity, improve toothbrushing, and improve dental aesthetics in areas with aesthetic requirements.

In recent years, new techniques of mucogingival microsurgery<sup>6</sup> have emerged such as the Pinhole and Vista techniques, which also offer good results – at least in the short and medium term. The dentist should perform a good prior diagnosis of the cause of the recession and an in-depth study of which surgical technique should be used in each specific case, in order to obtain the best possible result. **Just because they are new techniques does not always mean that they are better techniques.**

**Step 4:** When the periodontal stability of the patient has been established after the successful conclusion of the active phase of treatment, patients should start a programme of periodontal maintenance.

To conserve the periodontal health achieved by the treatment, periodontal maintenance must always be followed.

Periodontal maintenance is both preventive and therapeutic: monitoring systemic and periodontal health, reinforcing personalized oral-hygiene instructions, motivating the patient to control their risk factors, professional removal of the subgingival plaque and calculus of the residual pockets.

It is recommended to perform maintenance at intervals of 3-6 months, depending on the patient’s risk of bone loss. According to the clinical practice guideline of the European Federation of Periodontology (EFP), it is not recommended to replace conventional professional plaque removal with the use of new techniques with little scientific evidence, such as treatment with Er:YAG laser, sub-antimicrobial doses of doxycycline, and photodynamic therapy.

**From gum health to general health**

The mouth is not isolated in the organism but is intimately linked to the body in general. Inflammation is not left confined to the periodontal tissues but the bacteria that cause periodontitis and their endotoxins enter the blood stream and spread systemically.

The dental clinic is now a centre for promoting general health

In recent years associations have been found between periodontal disease and chronic diseases such as cardiovascular, respiratory, and kidney diseases, premature births, diabetes, rheumatoid arthritis, metabolic syndrome, cognitive deterioration, and cancer, highlighting the importance of good oral health in preventing the systemic consequences of periodontitis.

Based on this reality, dentists – as health professionals – are involved in achieving good general health →

# Steps of periodontal treatment

- 1

**1st STEP – Initial**
  - To show the patient how to control their supragingival dental plaque (motivation and personalized oral-hygiene instructions).
  - Control their risk factors (smoking cessation, better control of diabetes...).
  - Plaque control:
    1. Mechanical (manual or electric brushing and interdental cleaning).
    2. Chemical means (toothpastes and antiseptic mouthwashes).
  - Professional removal of dental plaque, supragingival calculus, and local retentive factors.
- 2

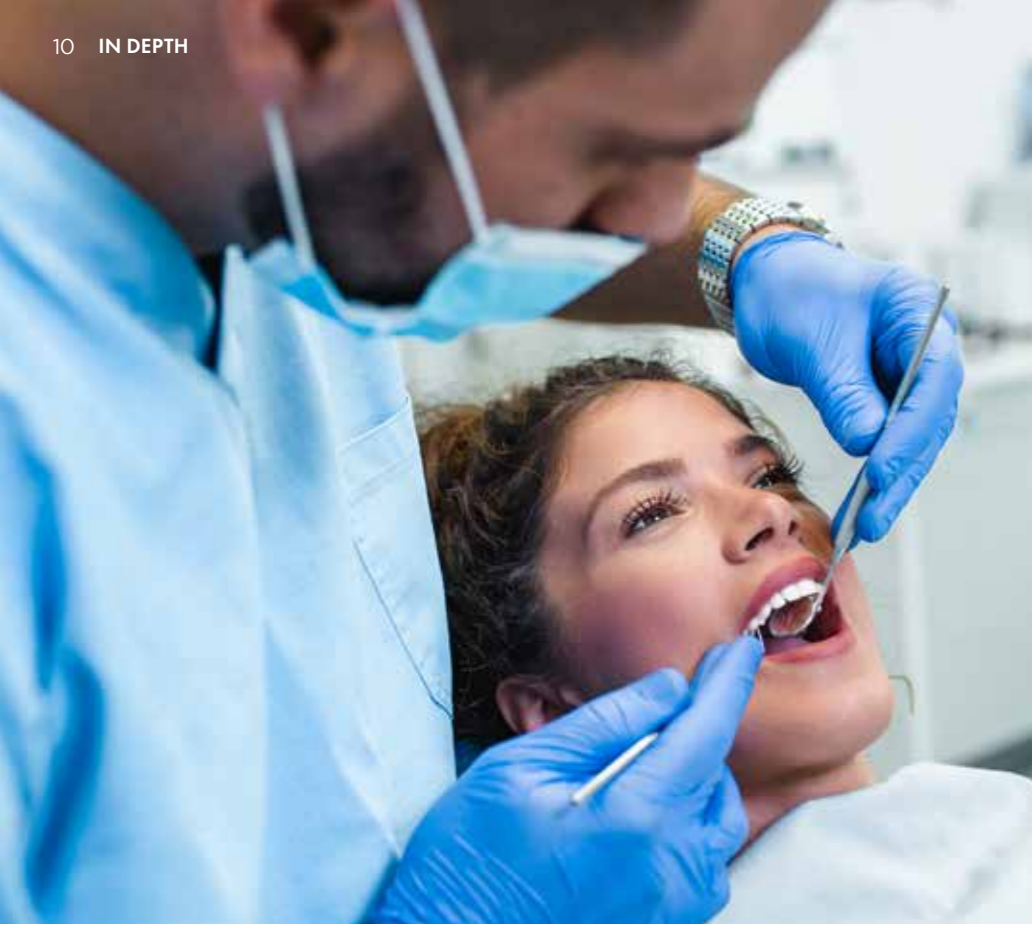
**2nd STEP – Cause-directed treatment**
  - Professional removal of subgingival plaque and calculus.
  - Antimicrobial agents may be used.
  - Followed by periodontal evaluation of the response to the treatment.



- 3

**3rd STEP – Surgical (with periodontal pockets ≥ 6 mm):**
  - Periodontal access surgery (conservative).
  - Resective surgery (change of the architecture of the soft and hard tissues).
  - Regenerative surgery (with bioregenerative materials).
- 4

**4th STEP – Periodontal maintenance**
  - Monitoring of periodontal and general health.
  - Strengthening of oral-hygiene instructions.
  - Motivation to control risk factors.
  - Professional removal of subgingival plaque/calculus from residual pockets.



→ among their patients, for which the promotion of good nutrition, physical activity, stress reduction, and smoking cessation is essential in their work.

#### And do not forget...

Performing a complete periodontal treatment and achieving/maintaining periodontal health is fundamental to the future carrying out of a successful interdisciplinary treatment.

Obtaining good aesthetics and good results with orthodontic and prosthodontic treatment, as well as successfully placing and maintaining osteointegrated implants, requires good periodontal health and a good compliance with hygiene and control of health habits by patients.

**Controlling risk factors during periodontal maintenance achieves an important benefit on general health**

#### GLOSSARY

1. **Oral biofilm:** the natural form of bacterial growth in the mouth is the biofilm which, among other effects, is responsible for caries and periodontal diseases and is highly resistant to antimicrobials.
2. **Periodontal pocket:** space between the gum and the tooth which deepens as bacteria accumulate below the gum and form subgingival plaque, provoking the destruction of supporting bone and the worsening of the periodontal disease.
3. **Subgingival instrumentation:** part of the non-surgical treatment of periodontitis which, through the use of different types of instrument (manual – curettes; electric – sonic or ultrasonic devices), aims to reach the surfaces of the roots in the interior of the periodontal pocket to remove the biofilm and the subgingival calculus, as well as to treat the root surface.
4. **Resective treatment:** surgical treatment of the gums which, as well as obtaining a better access for subgingival instrumentation, tries to change the architecture of the soft and tissues to thereby achieve a greater reduction of periodontal pockets.
5. **Mucogingival surgery:** set of surgical techniques designed to treat disorders of the gingival soft tissues, mainly root recession or exposure of the tooth root because of gum loss.
6. **Mucogingival microsurgery:** techniques of periodontal plastic surgery that are carried out with magnification (using magnifying lenses, magnifying glasses, or microscopes) with the aim of significantly improving the precision of the intervention, encouraging the stability of the tissues and the results of reconstructive surgery.

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# Keys for a personalized oral hygiene

Oral hygiene is essential for preventing diseases of the mouth and even for improving general health. However, everyone is different, has varying needs and risks, which means that the optimal care of their mouth should be personalized

SECTION CO-ORDINATED BY:

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## Preventing gingivitis with oral hygiene

Long-term studies have shown that carrying out adequate oral hygiene is efficient in preventing gingivitis. This fact implies a reduction in the number of cases of periodontitis and consequently a reduction in tooth loss.

Certain mechanisms – such as physiological forces, mastication, and tongue movement – can lightly influence the development of bacterial plaque, interfering in its accumulation in specific zones of the molars. Furthermore, the contact of the cheeks can also have a slight impact on the decrease of the accumulation of plaque. However, saliva alone is not sufficiently effective for the removal of bacterial plaque.

## A rigorous and precise mechanical plaque control is essential in the prevention of periodontal diseases

Given that physiological mechanisms have a limited effect on the preventing of inflammation, performing rigorous and precise mechanical plaque control by patients is of great importance in the prevention of periodontal diseases.

The lack of patient dexterity, advanced age, certain anatomical and morphological conditions (such as tooth crowding), and the presence of root irregularities are some of the main factors that limit the effectiveness of plaque control by patients.

The presence of restorations and orthodontic devices can also imply an added difficulty in some cases.

## Which brush to use?

One of the most common doubts in relation to oral hygiene is what type of toothbrush should be used. The use of manual brushes has been shown to have an effectiveness of 42% (30%-53%) in reducing levels of bacterial plaque. Effectiveness seems to be higher with brushes that have crossed angulated bristles compared with those that have straight bristles. However, the morphology of the bristle – whether it has a flat or rounded end – does not involve significant differences.



## Every mouth, a world

The saying "*everyone is different*" is not only true but is also a statement that can be applied specifically to the mouth. While any individual's mouth has its different and unique traits, it is also subject to a person's specific genetic influences and environmental conditioning factors. This means that not only is everyone different but also that oral care needs to be shaped and adapted to each person.

There is a dental side to personalized medicine, whose essential premises extend even to oral care and hygiene. Because of this, dental professionals should provide an individualized oral-hygiene assessment, based on scientific evidence, as well as remind their patients that routine oral hygiene is not always sufficient and that sometimes certain improvements and additional resources are necessary.

Some electric brushes have shown greater effectiveness than manual ones, with levels of plaque reduction of 46%

→ Some electric brushes have shown greater effectiveness than manual brushes, with levels of bacterial-plaque reduction of 46% (36%-65%). Long-term comparative studies have shown a greater efficacy of electric brushes with a rotational-oscillating system compared to manual brushes in reducing levels of bacterial plaque. The effectiveness of sonic brushes to reduce bacterial plaque also seems to be higher than that achieved with manual brushes. However, the clinical relevance of this benefit in periodontal patients in regard to the progression of periodonal disease is still not clear.

How should I brush?

An essential factor for achieving individualized toothbrushing is adopting some specific advice to perform this activity in the correct way. The toothbrushing of every patient must be evaluated by dental professionals, to identify possible deficiencies and to instruct them in how to perform an effective hygiene that avoid damaging the soft tissues (gum) and the hard tissues (tooth surfaces). These instructions have to be adapted depending on whether an electric or a manual brush is used.

Oral-hygiene recommendations have to be individualized in accordance with the needs of each patient (age, dexterity...). Furthermore, an educational programme of individualized oral health has demonstrated greater long-term adherence to oral hygiene in periodontal treatment.

However, one of the topics that most concerns people is the possible risk of gingival recessions appearing with

brushing. Performing a horizontal brushing, an excessive force and/or frequency in toothbrushing, the use of brushes with hard bristles, an excessive duration of brushing, and changing toothbrushes infrequently increase the risk of provoking gingival recessions through toothbrushing. For this reason, they are factors to evaluate and to avoid in daily oral hygiene. The indication of a type of manual or electric brush depends on the patient. If they are sufficiently able to reduce levels of bacterial plaque in combination with a pathological process, the use of an electric rotating-oscillating or sonic toothbrush is the most recommendable. Even so, the differential benefits between an electric and a manual brush in clinical and microbiological parameters have not been evaluated in periodontal patients.

How often should I brush?

Although a frequency for all patients has not been definitively established, it is generally recommended to brush the teeth twice a day for two minutes using a fluoride toothpaste, although patients with periodontal problems may need more time to complete the cleaning of their mouths.

Rather than focus on the time, patients should focus on performing a correct oral hygiene effectively and systematically, reaching the zones that are difficult to access in an optimal way.

Benefits of toothpaste

At the mechanical level, the use of toothpaste does not provide additional benefits compared with brushing alone in terms of reducing levels of bacterial plaque. However, the use of this product is important for the release of fluoride or other antiseptic/anti-inflammatory agents, which act to prevent the development of caries and improve gingival health.

It is generally recommended to brush the teeth twice a day for two minutes with a fluoride-based toothpaste

Interdental cleaning, an essential task

The interdental surfaces of molars and premolars are the most common areas for the development of caries and periodontitis because they have a greater accumulation of bacterial plaque and are harder to access. Because of this, it is essential to include interdental hygiene in the daily habits of dental care. Of the various tools for interdental hygiene, the most notable are dental floss, interproximal brushes, irrigators, and toothpicks. Using one or another will often depend on the preferences of the patient as well as on the scientific evidence.

**Dental floss:** This has been one of the most-used tools for interdental hygiene since antiquity. It is recommended to use it for interdental cleaning, especially when other tools cannot be used without provoking trauma (that is, when the spaces between the teeth are closed). Among the different types available, there is still no evidence about which ones provide greater effectivity, although it seems that waxed and monofilament floss can move more easily through the interproximal space (that is, the space between tooth and tooth, and which is occupied by the gum), reducing the risk of producing any kind of damage.

**Interproximal brushing.** Its use is recommended when the spaces between the teeth are open. It allows access to areas not reachable with the toothbrush. Its use removes up to

An educational programme of individualized oral health encourages a greater long-term adherence to oral hygiene

an additional 30% of dental plaque, reaching up to 2-2.5mm below the gingival margin. It seems to be the most effective tool for removing interproximal bacterial plaque. There are different designs, forms, and sizes, so your dentist must be the one who indicates which are the ones most suitable for your mouth. Recently, interdental brushes made of rubber have been introduced into the market, with results equally good as those achieved by classical interdental brushes and they seem to be accepted by many patients.

**Oral irrigator.** This is a device that removes only weakly attached bacterial plaque via a jet of water. Its use with chlorhexidine is more effective than with water alone in terms of reducing bacterial plaque and gingivitis. One of the main risks of its use is that it can cause a bacteriemia and, although this risk is minimal, it should be taken into account by people with risk of endocarditis. For their part, mouthwashes are a complement to (never a substitute for) the other measures and resources that are used for oral hygiene. In ideal conditions, they should be used after receiving advice or specific recommendations from an oral-health professional, and attending to the characteristics or conditions of each individual.





→ **To take into account**

Patients must be aware that the presence of bleeding does not indicate the need to suspend interdental hygiene; on the contrary, it reveals the need to improve hygiene in the interdental areas.

As the evidence associated with oral hygiene is based mainly on studies carried out in patients with gingivitis, conclusive recommendations in terms of the prevention of periodontal disease cannot be given.

Oral-hygiene instructions that are individualized and adapted to the needs of each patient are essential for improving their oral-hygiene levels. ■

**Mouthwashes are a complement to (never a substitute for) the other measures and resources used for oral hygiene**

## 5 tips to remember

- 1) In general, oral-hygiene recommendations should be based on scientific evidence, the experience of the clinician, and the dexterity of the patient.
- 2) To maintain gingival health, it is essential to carry out correct interproximal hygiene as well as toothbrushing.
- 3) Interproximal brushes have been shown to be the most effective interdental-hygiene tool.
- 4) Interproximal brushes should be used when the space allows their use without causing damage, for which it is appropriate to indicate to patients to be careful in interproximal areas that are very narrow where they cannot be used safely.
- 5) Improving oral hygiene involves implementing instructions that are individualized and adapted to the needs of each person.

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# Burning mouth syndrome: questions and answers

Burning mouth syndrome (BMS) is a complex clinical condition about which there are still many questions and considerable controversy. We help you know understand it better

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THE WORLD HEALTH ORGANIZATION defines this syndrome as: “a chronic orofacial pain characterized by intraoral burning or alteration of sensitivity which is repeated from more than two hours daily, for at least 50% of days for a period of more than three months, and without evidence of causal lesions in a clinical examination.”

According to recent data, the prevalence of BMS is very variable and changes substantially according to the studies and the population analysed. It affects 0.6-15% of the general population (depending on the studies) and is more frequent in women than in men (by a proportion of 7:1). The average age of people who suffer this disorder is between 55 and 60 years of age. The studies show that the greatest incidence of this disease is registered in peri- or post-menopausal women, who often suffer from anxiety or depression.

**It can affect up to 15% of the general population, and is more frequent in women than in men**

## Where and when do these symptom show?

In about half the patients, the tongue is the only site affected. In some 70-80% of cases, the burning sensation is felt above all in the front two thirds of the tongue, followed by the back and the edges. Other areas can be affected, such as the soft palate, the gum, the lip, or the mucosa of the cheeks. Symptoms are typically bilateral and symmetrical.

Pain tends to follow a temporal pattern, generally worsening during the day. Throughout the day, it can vary in intensity, from a light irritation to a very acute and intense pain. Certain foodstuffs (such as spicy and acidic food) have been associated

with increasing the pain that patients suffer; on the other hand, cold drinks or chewing gum can alleviate this pain.

## Why does it emerge?

The exact cause of BMS is not yet known, although neuropathic and psychogenic components have been noted. In terms of the neuropathic mechanism, various research studies have found alterations in the peripheral nervous system and in the central nervous system.

Regarding the psychogenic factors, it is known that BMS is frequently associated with psychological factors, and multiple studies have related it to conditions such as depression, anxiety, cancerphobia, and hypochondria. It is still debated whether the psychological factors are a cause of consequence of BMS; but independently of this, psychological factors are important in the development of this syndrome. →

## Profile of a patient with BMS

- There is a burning in the mouth without objective clinical lesions at the time of the examination.
- People of middle or advanced age, more often women.
- In general, they are patients who have been referred various times by other health professionals and can therefore often be suspicious.
- They have been attended by numerous specialists and have taken numerous medications without positive results.
- They present a significant anxious or depressive component, sometimes with cancerphobia.
- The burning can be accompanied by other symptoms such as a sense of dry mouth and/or alterations in taste.
- They can have a compulsive need to look at their tongue every time they are in front of a mirror.



## What do patients with BMS really feel?

THE MOST COMMONLY used terms to describe the symptoms of BMS are "burning" or "itching", but many patients use other terms such as "stinging", "numbness", "tingling", "stabbing feeling", "throbbing sensation", "discomfort", "scalding", "swelling", "foreign body feeling", "feeling of grit or string", or "pain when brushing".

The characteristic triad of BMS is classically considered to be the feeling of burning, the feeling of dry mouth,

and alteration of taste, but it should be emphasized that not all patients present these three symptoms simultaneously.

Other symptoms associated with BMS can be thirst, headache, pain in the temporomandibular joint, pain or sensitivity in the masticatory muscles or the neck. In addition, some patients show "tics", such as biting the tongue or licking or pursing their lips.

**The exact cause of BMS is still not known, but neuropathic and psychogenic components are noted.**

### → How is it diagnosed?

Diagnosis is clinical and is generally based on subjective symptoms. BMS is an exclusionary diagnosis and therefore other factors and systemic diseases that can manifest similar symptoms need to be discounted: Sjögren's syndrome, diabetes mellitus, yeast infection, deficiencies (iron, folic acid, zinc, and B-group vitamins), medication that produces dry mouth, defective or ill-fitting dental prosthesis.

### Is there any treatment?

The main therapeutic resources have a triple objective: improve the symptoms, correct the biological and/or morphological disorders, and control the psycho-emotional changes. There are many ways to alleviate the discomfort caused by BMS and various treatments have been proposed. The most common treatments are:

- **Pharmacological therapies:** benzodiazepines, anti-convulsive, and anti-depressive.
- **Psychological/psychiatric therapies:** because of the psychogenic factors closely related to BMS.
- **Therapies with low-powered lasers:** because of their possible analgesic, anti-inflammatory, and reparative effect.





Information,  
calmness,  
and patience

IT IS VERY IMPORTANT to explain and inform patients with BMS that it is a complex disorder for which there is no definitive cure. They should be aware that their suffering is real but that it is not related to any form of cancer or serious disease.

The diagnosis is clinical and tends to be based on subjective symptoms

The exact cause of BMS is still not known, but neuropathic and psychogenic components are noted.

→ **Information, calmness, and patience**  
This is a complex disorder for which there is no definitive cure.  
Patients should be aware that their suffering is real but is not related in any way to any form of cancer or serious illness, that the treatment will be prolonged, and that it is likely that not all the symptoms will disappear definitively, but that these therapeutic resources will help them in their day-to-day lives. ■

\*Popkin DL, Zilka S, Dimaano M, et al. Cetylpyridinium Chloride (CPC) Exhibits Patent, Rapid Activity Against Influenza Viruses in vitro and in vivo. Pathog Immun. 2017;2(2):252-269. doi:10.20411/pai.v2i2.200

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# “Vaccines against caries have not worked and are never going to work”

ALEJANDRO MIRA  
OBRADOR

EXPERT IN THE ORAL  
MICROBIOME AND  
RESEARCHER OF THE  
FISABIO FOUNDATION  
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SECTION CO-ORDINATED BY:

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**One of the world's foremost experts in research into the microorganisms of the oral cavity and their genetic material (the oral microbiome) is Spanish. He leads a working group that is revolutionizing the understanding of bacteria in the mouth and driving the application of these findings in clinical practice. We interview Dr Alejandro Mira, head of the oral microbiome group of the Foundation for the Promotion of Health and Biomedical Research (Fisabio) of the Community of Valencia.**

**The mouth, and the bacteria that inhabit and colonize it, have passed from being virtually unknown to being at the forefront of our understanding of how many diseases arise and develop... including even some which extend beyond the oral cavity. Why is this? And how much of role has been played by the appearance of new techniques of genomic sequencing?**

More than half the bacteria that reside in the mouth have never been cultivated, and until only a few years ago we did not even know that they were there. As a result, the arrival of the techniques of mass DNA sequencing has been a

**It is the bacteria that provoke the development of diseases such as caries and periodontitis, although there needs to be a triggering factor and genetic factors are also important**

revolution, because it has allowed us to identify for the first time all those microorganisms that are present in a caries lesion or in a periodontal pocket, to provide some examples.

The clinical impact of all this is huge. For example, for almost 100 years it was thought that *Streptococcus mutans* was the main cause of caries, and we have now quantified that it accounts for only 1% of the bacteria present in caries lesions. Thus, suddenly, we have understood why vaccines against caries have never functioned in clinical trials and why they are never going to work, as we do not have a single target to aim at. Because of this we say that caries, periodontitis, and halitosis are polymicrobial diseases and not normal infectious diseases that we can treat with a vaccine.

**What role do bacteria play in the development of oral diseases?**

It is the bacteria that cause the disease: in caries, they generate acids that demineralize the enamel; in periodontitis, they induce the inflammation of the gums; and in halitosis they produce the volatile compounds that generate bad breath.

That said, these bacteria do not by themselves cause these diseases. There needs to be a triggering factor which, in the case of caries for instance, is the consumption of sugars and in the case of periodontitis it is the accumulation of dental plaque through poor oral hygiene. And then there are the genetic factors of each individual (the immune system or the amount of saliva that they produce), which condition the disease. Thus, when bacteria are joined to external factors (diet, hygiene) and internal ones (genetics) a “perfect storm” is generated which triggers the disease. Because of this, these three aspects need to be taken care of in an integrated way. →

## The discoverer of the “shield” against caries

IN 2019, THE GENERAL COUNCIL OF DENTISTS awarded the Juan José Suárez Gimeno Prize for Promoting Oral Health to Dr Alejandro Mira, in recognition of his discovery of the bacterium *Streptococcus dentisani* as a probiotic against dental caries.

The bacterium *Streptococcus dentisani*, discovered by the research team led by Dr Mira, acts as a 'shield' against the bacteria that provoke caries, as it produces a substance that inhibits them and prevents their appearance. Once the use of this bacterium as an anti-caries product is patented, the research team will study the ideal way to allow the bacterium to be used as a probiotic.

This development is particularly important if one considers that caries is considered to be the most extensive infectious disease in the world as it has affected or affects 80-90% of the population.



→ **In any case, in the case of predominantly bacterial diseases, why do they not respond to antimicrobial treatments?**

From my point of view, this because we are not talking about infectious diseases strictly speaking. Let me explain myself. If you drink water with *Vibrio cholera* or eat a salad with *Salmonella*, you can contract cholera or salmonellosis, because you did not previously have these bacteria in the body; that is to say, you have been infected by them. What our research shows is that even people who have never had gingival bleeding or who have never had caries do have the bacteria that cause them: this is what I call “having the enemy in the house”.

Thus, it is not a question of removing these bacteria but more a question of equilibrium: encouraging beneficial bacteria and keeping the harmful ones at bay. We have more and more tools to be able to do this.

**How do bacteria behave in the oral environment?**

The latest advances in microscopy have enabled us to see how the bacteria of dental plaque are organized, and they are much more organized than we had thought.

**And can these oral bacteria emigrate and affect other parts of the organism beyond the mouth?**

It is extraordinary to see how the oral bacteria affect other parts of the body. In recent years there has been a series of discoveries that have shown that some oral bacteria can cause not only endocarditis but also aggravate pneumonias or generate lactational mastitis.

On top of that, in 2013 we found that a typical bacterium of dental plaque was present in high proportions in colorectal cancer tumours, which led us to design a test for the disease measuring this oral bacterium in faeces. Some years later, other laboratories showed that this bacterium can directly transform healthy cells into tumoral ones and, furthermore, in a mouse model the development of tumours was halted

**If 10 years ago someone had told me that oral bacteria could improve cardiovascular health, I would not have believed it – but this is the case!**

after the use of antibiotics!. And a couple of years ago, in the post-mortem brains of patients who had suffered from Alzheimer’s disease we found the toxin that produces one of the periodontitis bacteria.

All this highlights that oral health affects the whole body. I do not tire of stressing this to patients and professionals: research in oral microbiology over the last decade has put the mouth at the centre of systemic health. We look after our mouth to look after our body.

**And are there also bacteria that protect us against oral diseases such as caries or gum diseases?**

Indeed there are. We tend to think that microbes are pathogenic entities that generate diseases, but perhaps the contribution of our laboratory of which I am proudest is that of having identified a multitude of bacteria that are in fact beneficial. The first of these was *Streptococcus dentisani*, a new species that appears in high quantities in people who have never had caries and which protects against pathogens. It occurred to us because a work colleague told us that her partner had stopped having caries since they started to go out together, and I immediately thought that she was passing beneficial bacteria through contact or kissing. From then, the idea of the “anti-caries kisses” was popularized.

The second type of beneficial bacteria that we have developed use the nutrients of the vegetables that we consume to produce a vasodilator, which reduces blood pressure. If 10 years ago someone had told me that oral bacteria could improve cardiovascular health, I would not have believed it. But this is the case.

**Do all people with caries have the same bacteria?**

That is a big question, because here is the key reason why a vaccine against caries does not work: each caries has a distinct composition of bacteria.

**What is the importance of knowing how bacteria of the oral cavity act and interact for developing prevention protocols for oral diseases?**

It is fundamental. I always tell students of dentistry that they are going to treat or prevent a disease of which the cause (aetiology) is not known. Some techniques can be applied because the protocols say so and good work can be done, but to be a great professional you need to know and understand the enemy – the microorganisms – and take your informed decisions. Furthermore, this knowledge gives us clues on how to prevent diseases.

**It is essential to know how the bacteria of the oral cavity act and interact to be able to develop prevention protocols for oral diseases**

**Is it only a matter of acting against the presence of bacteria in the mouth or can we act against their mechanism of action?**

That is a very interesting question. In fact, it is not necessary to remove bacteria but rather to change their behaviour. For example, if we eat green vegetables, the nitrate that they contain means that certain beneficial bacterial produce an acidity neutralizer, which protects us from caries for several hours. Another case is chewing gum with xylitol, a sweetener that does not kill the bacteria that cause caries but alters their metabolism so that they do not produce acid. And we have just published some results of experiments that show that fluoride in toothpaste, as well as the chemical effect that strengthens the enamel, also reduces the production of sugars by the plaque bacteria.

→

## 6 discoveries that change many things

ALEJANDRO MIRA HOLDS A DEGREE IN BIOLOGY from the University of Alicante and a doctorate in microbiology from the University of Oxford (United Kingdom). He is the author of more than 100 scientific publications in international magazines and the inventor of five patents in the field of dentistry and biomedicine.

His Fisabio Foundation oral-microbiome research group follows major lines of work such as the microbiology of oral diseases, the development of prebiotics and probiotics for oral health, the design of new systems to measure sensitivity to antibiotics, the creation of diagnostic tests for oral health, the development of new antimicrobials and intelligent nanoparticles, and even the study of the effect of oral bacteria on general (systemic) health and on cancer. There have been many achievements, but we highlight six specific landmarks:

**2010.**  
**The discovery of the bacteria *Streptococcus dentisani*, now in development as a probiotic against dental caries.**

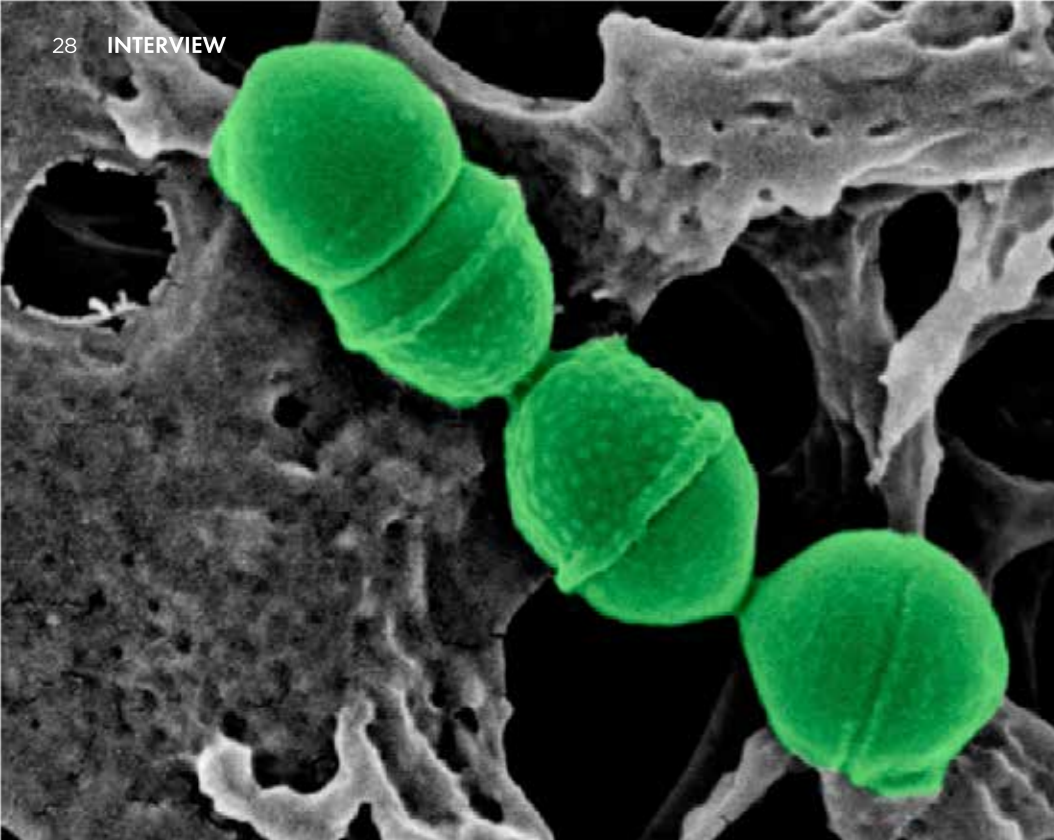
**2012.**  
**First studies of the DNA and RNA of dental plaque at a global level .**

**2014.**  
**Aetiology of dental caries using DNA techniques and tissue-dependent caries hypothesis.**

**2016.**  
**Inventing the SIMMA (Salivary Immune and Metabolic Marker Analysis) test which determines the risk of suffering caries and their cause via analysis of a drop of saliva (2016).**

**2018.**  
**Discovery of a peptide produced in saliva by the innate immune system, which is active against the flu virus, now at the preclinical stage (2018).**

**2020.**  
**The role of vegetables in oral health (2020).**



Electron microscopy photograph at 5000x magnification of *Streptococcus Dentisani*.

**We should create well-informed currents of opinion and explain, both to society and to the authorities, the risks implied by the epidemic of sugar**

**So, we can forget about the idea of one day having a 'vaccine' against caries?**

Over decades there have been both active (vaccine) and passive (application of antibodies) immunization strategies, both of which have failed. The problem is that they chose as the target bacteria that were believed to be “the only cause” of caries, and what we know now is that there are dozens of these bacteria which also vary between individuals, and which are also present in most people without disease (albeit in low proportions). Because of this, the current tendency around the world is to try to re-establish the equilibrium of the dental plaque, not to remove the bacteria from the mouth by sterilizing it, as we know that this is not only useless but also counterproductive.

Toothbrushing helps here because it encourages aerobic and beneficial bacteria.

**And what can prebiotics and probiotics contribute here?**

Prebiotics and probiotics are the great hope. Probiotics are beneficial bacteria applied live in people who do not have them; it is an idea similar to the bifidus of the intestine. For their part, the prebiotics are nutrients that encourage beneficial bacteria, such as those that are found in some vegetables and fruits, that is to say, which would function as a bacterial fertilizer for those microorganisms that improve oral health.

**Despite your eminently research-oriented profile, in light of your the work and discoveries, could you offer our readers a series of tips on oral health for them to take into account?**

The latest research suggests that:

**Toothbrushing is fundamental:** people who brush their teeth twice a day have fewer caries than those who brush once a day... and three times is better than two.

**It is not necessary to eliminate bacteria, but to change their behaviour**

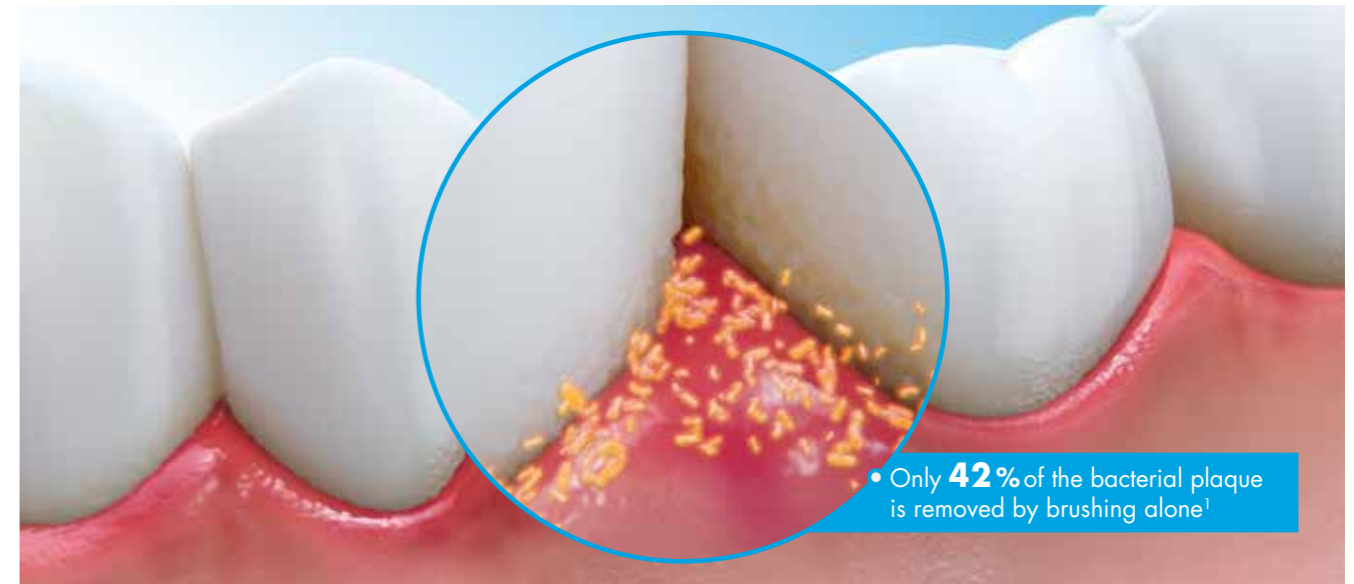
**Until supplements and toothpastes with nitrate are developed,** increasing the consumption of vegetables improves oral health, above all green vegetables (spinach, chard, lettuce, rucola) and beetroot, among others.

**The daily use of oral antiseptics** as part of normal hygiene is not recommended in people without periodontitis, because it alters the ecosystem and even affects cardiovascular health.

**It is positive to brush the tongue** as part of the habitual routine, as it is a reservoir of many pathogens of the gums and brushing improves systemic health.

Much of this research also confirms the advantages of more extensive healthy habits, such as looking after the saliva flow that is fundamental for having good oral health (many medications, such as tranquilizers, reduce saliva production) and also significantly reducing our sugar intake. Regarding this last point, regulatory measures that have increased the tax on sugar or which have limited its use have produced some excellent results in other countries. I believe that we are obliged to create currents of informed opinion and explain – both to society and to the authorities – the risks implied by its consumption to put an end to the epidemic of sugar. ■

# Effective plaque control requires more than just brushing

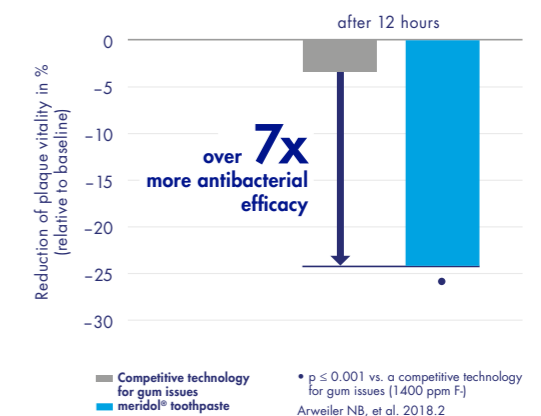


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# Talking about your tongue and its conditions

It is an essential part of the organism, subject to multiple threats that can alter its health. Learn about some of the main disorders that can affect the tongue, if you should be worried about them, and how to treat them



SECTION CO-ORDINATED BY:

**Mónica Muñoz**  
Master's degree in periodontology. Complutense University of Madrid. Certified in implantology. University of the Basque Country.

THE TONGUE IS A SENSORY organ that belongs to the digestive system although it is found within the oral cavity. It is involved not only in the digestive process but also, thanks to its taste buds, allows capturing the taste of food and it also plays a role in oral functioning, in speech, and in diction.

Despite these very important functions, there is a certain lack of knowledge about the health of the tongue. It is common to wonder whether a little stain, deformity, or wound that appears in this organ is of concern and requires a specific treatment. We help you learn a little more about the different conditions and/or diseases that can appear on the tongue and how to act in response to them.

## A tongue that is smaller or larger than normal can interfere in correct swallowing and speech

### Size matters

In terms of size, the tongue can present alterations and it is even possible not to have a tongue, which is known as aglossia; this disorder tends to be associated with genetic syndromes and alterations and is very infrequent.

**Microglossia**, or a tongue of a smaller than normal size, involves problems both in speaking and in ingesting food. On the other hand, macroglossia is when the tongue

presents a larger-than-normal size (causing the feeling that the tongue does not fit inside the mouth), and it can interfere in correct swallowing and diction, and can sometimes cause occlusion problems by pushing the incisors forward. This disorder is associated with diseases such as diabetes and certain syndromes, such as Down's syndrome.

### A question of taste

One of the most frequent disorders in relation to the tongue is the alteration of the sense of taste, something that has become especially evident during the coronavirus pandemic. It can mean a loss of the sense of taste (ageusia) or a confusion between tastes (disgeusia).

Fortunately, in the case of COVID-19 it seems that these conditions are temporary, although depending on the patient's job it can be quite worrying and even incapacitating.

Difficulty in moving the tongue may also occur at times, which may be related to neurological problems that should be evaluated by a specialist to rule out any vascular, cerebral, or cardiac pathology.

### Physical alterations of the tongue

One of the clinical characteristics of many of the alterations that originate in the tongue is that they are easily visible, which hugely facilitates their detection and evaluation by a

## A tongue that is smaller or larger than normal can interfere in correct swallowing and speech

specialist. Among the many alterations that can be produced in the physical appearance of the tongue, we highlight the following:

**Fissured, scrotal, or plicated tongue.** This is a benign condition that is characterized by presenting numerous fissures on the dorsal surface (the one we see when opening the mouth). It has an incidence of 21% of the global population and

is associated more frequently with males and young people. It may be related to different syndromes. It does not tend to show specific symptoms. A specific treatment cannot be given other than maintaining correct oral hygiene to avoid halitosis and fungal superinfections that can house themselves in the fissures.

**Lingua indentada.** A very common condition and which is often not noticed because it is nothing more than the mark left by the teeth on the lateral edges of the tongue.

**Geographic tongue or benign migratory .** This is an alteration of unknown origin, although there is a →

## The danger of piercings

It is important to warn about the risks to health implied by piercings in the mouth and especially in the tongue. Given the presence of bacteria in the oral cavity and the role that the tongue plays in the mouth, the possibility that a tongue piercing will become infected is greater than in other parts of the body.

But, if we decide to have piercings despite this, we need to be sure that the material from which the piercing is made is suitable for this site, with the aim of avoiding or minimizing corrosion and the lesions resulting from that process. The American Dental Association advises against piercings because of the risk of complications such as haemorrhages, infections, tears, and nerve injury disorders.

In general, oral-health professionals consider that wearing a piercing in the tongue is a real risk to health.

**With any change of colour, the appearance of pain, ulcers, or a change of the size and shape of the tongue – visit your doctor or dentist**



familial tendency to suffer from it. It appears suddenly and settles on the dorsal surface of the tongue. It manifests in the form of multiple red stains, well delineated, of irregular shape and a ring-like appearance, which makes the tongue resemble a geographical map (these stains being surrounded by slightly raised edges of a white colour). Some 40% of cases develop into fissured tongue. It tends to be asymptomatic, although it can sometimes present a certain discomfort in the intake of specific foods (fruit, vinegar, etc.). In general, it does not require treatment, and it is sufficient to remove excessively hot or spicy foods from the diet.

**Atrophic tongue.** Characterized by the atrophy of the papillae. A smooth tongue is noted, of intense red colour,

depapillated, and shiny. Its origin may be for various reasons, it can be a product of gastrointestinal infections or vitamin deficiencies, among other causes. It disappears without the need for treatment when the triggering factor subsides.

**Saburral tongue.** The phylliform lingual papillae (round, small, and the most common) form a yellowish-white substance that accumulates during the night together with cellular debris and mucous, above all in the rear area of the back of the tongue; it is known as saburra. When it is concentrated in large quantities on the front two thirds of the dorsal surface of the tongue, it is considered pathological. It can be produced by multiple causes, including a soft diet, anorexia, excessive alcohol consumption, and certain infections that alter the oral bacterial flora. This saburra is removed by contact with harder foods and by brushing the tongue, something which should be done every time we brush our teeth after every meal.

**Hairy tongue.** This is a benign condition but attracts attention because of the look it gives to the tongue. It mostly affects the male sex. A lesion of imprecise limits appears suddenly on the front two third of the tongue's dorsal surface that make it look like it is covered in hairs (in reality, they are lingual papillae increased in size). The most common colouring is brownish-black, which gives it such a striking appearance. It causes only minor irritation, such as dry mouth, a metallic taste, and halitosis. Sometimes it can appear after the intake of certain antibiotics, oral antiseptics, corticoids, in situations of deficient oral hygiene, and/or in smokers. Treatment involves performing correct oral hygiene in general and especially on the tongue as well as eliminating the possible causes.

**Median rhomboid glossitis.** This is an asymptomatic condition, more frequent in men, and relatively uncommon. Clinically it is characterized by the appearance of a blotch with a reddish rhomboid shape, smooth, well



## And now... COVID tongue

THROUGHOUT THE CORONAVIRUS PANDEMIC, new symptoms related to the development of COVID-19 have been described. Among the most common and which has attracted attention is the so-called COVID tongue, which is the manifestation of this disease and which was initially described as the appearance on the tongue of "strange mouth ulcers".

Today it is assumed that in a high percentage of patients with COVID-19 as well as the common changes to taste (both in the perception of tastes and in the absence or decrease of this sense), mouth ulcers can appear (as happens in other viral processes) along with inflammation of the tongue. When the COVID-19 passes, these symptoms that affect the tongue tend to disappear, although not always immediately.





**The possibility that a piercing in the tongue will become infected is greater than in other parts of the body**



defined, of a variable size, and located on the dorsal surface. Its cause is not at all clear.

**Infections, cancer...**

There are other kinds of lesions that can appear on the tongue as part of an infectious process, cancer, autoimmune diseases, and/or metabolic diseases.

Among the infectious process, viral infections stand out (such as herpes simplex and herpes zoster) which, as well as presenting vesicular or blister-like lesions in other parts of the body, can be associated with lesions on the tongue. The lesions disappear as the disease abates, but not always at the same time as the lesions in the rest of the body.

In terms of the manifestations of cancer on the tongue, these can result from a primary lingual cancer or can be a consequence of a cancer outside the mouth. The clinical appearance may be very variable and appear like a white or red blotch or a combination of the two, and it can emerge on the tongue itself or on its base (observable when raising the tongue towards the palate). Special mention should also be made of ulcers, sores, or wounds located at the edge of the tongue which do not heal after a maximum of 21 days. In such cases, even if there is no irritation, it is necessary to contact a specialist for an assessment of the lesion.

In immunodepressed patients, lesions caused by fungal infections can sometimes appear.

**Do not hesitate**

With any change of color, the appearance of pain, or a change in the size and shape of the tongue, it is best to visit the doctor or dentist for a diagnosis and to rule out that any disease at the systemic level is manifesting initially in the mouth. Often a wound or lesion on the tongue is no more than a common lesion (provoked, for example, by the rubbing of a filing/ broken tooth or by the intake of very hot food), but sometimes it can be the manifestation of something more serious. ■



# PROTECT YOUR MOUTH NOW MORE THAN EVER

These days it is very important to step up hygiene measures, including oral hygiene.  
**Reduce the microorganisms in your mouth.**

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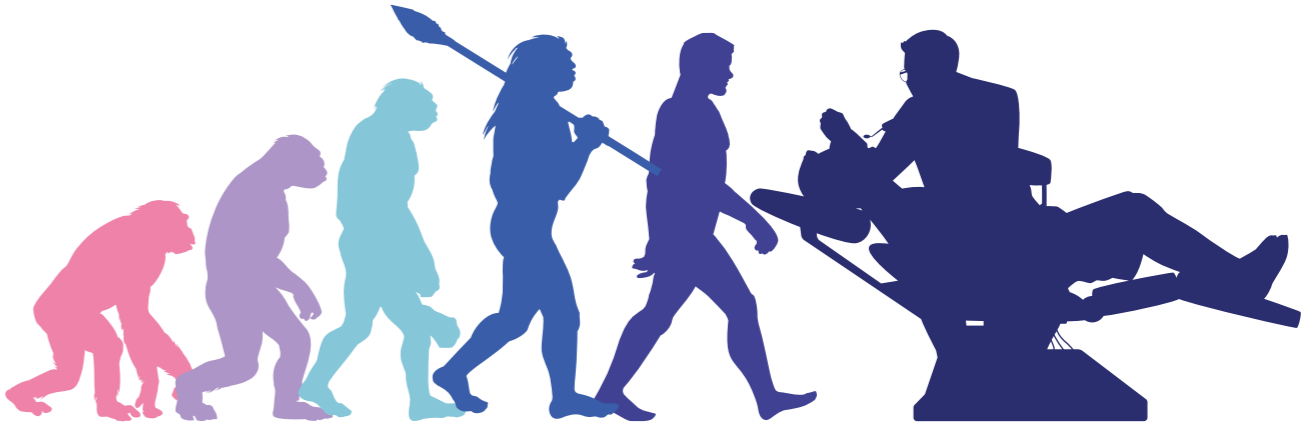
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# Dentistry with history

Dentistry is very much tied to the history of humanity. Oral health has been a constant concern of the human being and teeth have become the indicators of our evolution. But not only that... there are many more dental curiosities with history



SECTION CO-ORDINATED BY:

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HISTORY IS THE STORY of how we have got to where we are. It helps us to understand the changes, comprehend the evolution, know where we come from, and learn from the past. Because of this, it is important to look back and cover various historical events where oral health is the protagonist.

## Where do we come from? Prehistory

Dental problems have affected humanity since its beginnings. In the Neolithic era, one of the most decisive stages of humanity, human beings started to cultivate their own food, to eat cereals very rich in carbohydrates; as a result, cases of caries began to appear and increase as a result, and the change in diet also led to a considerable increase in inflammation of the gums and in dental abscesses.

The paleontological analysis of the remains found in the Caves of Taforalt, of between 13,700 and 15,000 years old, show the high prevalence of caries: up to 51% of cases, many of them related to the consumption of oats and starch.

It is known that “Otzi”, the iceman (who died more than 5,300 years ago) suffered from periodontitis, caries, and significant tooth erosion. The dentist Roger Seiler has analysed his teeth with computerized tomography and observed a great loss of bone support.

An article published in American Journal of Physical Anthropology mentions the finding that five humans from 12,740 to 13,000 years ago presented cavities in teeth that were filled with a mix of vegetable fibres and hairs. And in a jawbone dated to 6,500 years ago, a filling made with beeswax

## “Otzi”, known as the iceman, suffered from periodontitis, caries, and significant tooth erosion

has been identified. These are the first signs of dental treatments.

## The roots of dentistry. Antiquity

In Mesopotamia, people started to write texts on clay tablets dedicated to medicine and dentistry. Thus, we know that they believed that worms were the cause of dental caries and that, according to the tablet written by Arad-Nana, doctor to Esarhaddon, the king’s illness was caused by an infection in his teeth and that extracting them would cure it.

Also noteworthy are two prescriptions written in the “Code of Hammurabi” (1792 BCE), referring to what we could call legal and forensic dentistry.

Dentistry has its origins in Egypt in 3000 BCE. The first known dentist was Hesy-Re, who was fundamentally concerned with treating the pharaohs’ dental pains and abscesses. The Egyptians suffered from a great variety of diseases, including periodontal disease, a discovery that has been made possible through the study of embalmed mummies. It has also been possible to document their tendency to drill holes in teeth to place precious stones as inlays. The Ebers papyrus explains many oral diseases and their treatment: gum ulcers are treated with a mixture of terebinth resin, cow’s milk, dates, dried carob beans, beer, and other plants.

From Asian culture, we have numerous accounts of the role that was historically given to the treatment of oral disorders. The Chinese, 2700 BCE, were already using such resources as acupuncture to treat dental pain.

Between 2500 and 800 BCE, the Etruscans and Phoenicians used gold bands and wires, and extracted teeth to design and make dental prostheses. In fact, the Etruscans were the first to use material for implants, such as marble and seashells.

The Maya, between the ninth and third centuries BCE, used inlays of gold, precious stones, or minerals for the restoration of teeth not only for aesthetic reasons but also as a symbol of social standing. Using a rudimentary drill, a hole was made in the tooth, and it was filled with jade, turquoise, and quartz. These stones fitted very well, as the space between the stone and the cavity was filled with cement (which explains why they have lasted for thousands of years). This culture also filed teeth to change their shape.

Fray Bernardino de Sahagún, a Spanish monk, dedicated his life to collecting and annotating the plant and herbal remedies used by the Aztecs to treat mouth ailments. For his part, Sebastián Garcilaso de la Vega, a descendent of the Incas, described how this culture treated dental problems with a hot toothpick.

The Greeks were already performing tooth extractions. It was Hippocrates (460-370 BCE) who described teeth, their formation, function, and the diseases that affect them, and he wrote masterful formulas for calming tooth pain. Primitive and rudimentary

instruments – the antecedents of modern forceps – are also known from this period.

Galen, in 131 BCE, was the first to associate dental pain with inflammation of the pulp (pulpitis) and he classified teeth into central, cuspid, and molar. In the year 100 BCE, the Roman writer Celsius wrote several notes on diseases of the mouth. At that time certain remedies were already being recommended, such as cloves, which continue to be used even today.

Pliny the Elder (79 BCE) proposed this remedy for molar pain: look for a frog in moonlight and spit into its mouth while reciting a formula. He also recommended rinsing the mouth with wine before going to bed.

In the second century, the patron saint of dentists was born in Alexandria: Saint Apollonia, a martyr who was tortured by the violent extraction of all her teeth. Her feast day is February 9.

Doctors of Indian origin in 650 CE identified 75 oral ailments. The “Buddha’s Tooth” is in the most sacred place in the Buddhist religion in the Temple of the Tooth in Sri Lanka. Once a year, on the festival of the “Sacred Tooth”, this relic is processed in a golden urn on the back of an elephant.

## From the Middle Ages to Modern Times

In the fifth century, the Roman Empire fell and with it the primacy of Greco-Roman culture. In central and Western Europe, Christianity occupied all fields of knowledge, which stagnated and even regressed. Doctors were replaced by healers and charlatans, along with

## Hippocrates, in 500 BCE, described the teeth, their formation, function, and the diseases that affect them

procedures without any scientific basis. Apart from among the aristocratic classes, dental hygiene was not given importance.

The Middle Ages (V-XV centuries) stand out, above all, for the work of the monasteries in gathering and documenting information. In these centres of meditation and worship, various texts about dentistry coming from the Arab world were translated. Abulcasis (Al-Zahrawi), one of the fathers of modern surgery (including dental) described dental implants, treatment for epulis (a cyst that forms on the gum or on the soft parts of the mouth), and the dangers of dental tartar. Born in Cordoba in 936 CE, he is an important figure in the history of periodontology, making known hundreds of surgical instruments (such as the first tools for removing tartar, the predecessors of today’s curettes).

For his part, the Persian Avicena (Ibn Sina), a contemporary of Abulcasis, discovered new materials such as gum Arabic to fill teeth.

Also important was the educational, documentary, and research work carried out in the first universities, founded in the 12th century, notably those of Paris, London, and Oxford.

At this point of human history, tooth extraction was performed by friars, barbers, and empiricists, who used an iron instrument known as a dentario.

In Spain, the guild of Barber dentists was created; after its legal regulation during the period of the Catholic Monarchs, the Protobarberato was formed to grant licences and regulate the profession.

Until the Renaissance (XV-XVI centuries) no specific works on dentistry can be found. The invention of the printing press in 1453 allowed the dissemination of medical texts on a massive scale. In 1557, Francisco Martínez de Castrillo wrote the first text with a compilation of remedies for maintaining oral health. And Bernardo de Gordon promoted the theory of the loosening of the teeth.

Leonardo da Vinci described the maxillary sinus and established the difference between premolars and molars. The study and knowledge of human anatomy developed especially with Andreas Vesalio (1514-1564). The contributions of Ambroise Paré to dentistry range from palatal obturators to new techniques to drain abscesses. For his part, Artzney Bouchlein published the first book devoted exclusively to dentistry in 1530.

In the 16th and 17th centuries, the “dental profession” was represented mostly by the figure of the charlatan tooth-puller, inept and fake, who carried out their work in towns and village squares.

In the 18th century, the concept that caries is produced by worms was banished and the bacterial theory appeared. Dental tubules and the bacteria of dental plaque were discovered.





**While the doctor has been a doctor since historical time, the figure of the dentist has been many other things before becoming a dentist**

→ Modern thinking implied a change in the paradigms of medicine and dentistry. In this renovation, a particularly important role was played by the Royal Society in the United Kingdom and the Académie des Sciences in France. It is generally agreed that Pierre Fouchard, who in 1728 published the book *The surgeon dentist*, is the 'father' of modern dentistry. He was praised for his scientific explanations of basic oral anatomy and pioneering dental procedures (such as the elimination of caries and the transplanting of teeth) and for the new practices of dental hygiene. He also developed new surgical instruments.

In terms of scientific advances, in the 18th century the first porcelain dental pieces were produced (Chaman) as well as the first gold crowns (Mouton).

#### Contemporary Period

Around 1800 the Royal Schools were created to examine surgeons and the Proto Medicato and Protobarberato were abolished. With the creation of the first faculties of dentistry to train and examine professional dentists, the discipline advanced towards what we know today. This made Spain a pioneering country in the legal regulation of the dental profession in Europe.

As milestones of interest at the end of the 18th century and beginning of the 19th, one can highlight the commercialization of the first dental chair (in 1790), the first porcelain inlays in 1900, and the first use of fluorides for the prevention of caries in 1815. The use of dental floss was promoted, and the first anaesthetic practices were performed.

The first school of dentistry emerged in Baltimore in 1830. In 1895 Roetgen discovered intraoral radiology, for which he was awarded the Nobel Prize in Physics. The first X-ray apparatus was invented in 1923.

The first university degree in dentistry in Spain was awarded in 1901. It was not until 1930 that the compulsory membership of a college to legally practice dentistry in Spain was approved, and the respective regional delimitations with their professional colleges were constituted. Soon after the enactment of the Royal Decree that created the title of "Surgeon-Dentist" (in 1875), groups of dentists emerged headed with various names (circle, institute, society...); the College of Dentists of the Province of Seville occupies a pioneering position in the history of Spanish dental associations.

In the 19th century, Lucy Beaman Hobbs was the first woman to be admitted to a dental society. In 1871, Morrison patented the first mechanical dental drill. In 1832, the first folding chair was made, by James Snell, incorporating mirror and an alcohol lamp to illuminate the mouth. The first hydraulic chair dates from 1877. In 1882, the first modern saliva ejectors were created, allowing the removal of saliva and maintaining the teeth dry. ■



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**For patients with mouth  
guards or retainers**

<sup>\*</sup>In vitro studies.

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# Another "fashion" to avoid: the "magic eraser" to whiten teeth



SECTION COORDINATED BY:

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SOCIAL NETWORKS ARE NOW reaching a level of social penetration that we could consider “dangerous” given that their followers tend to pay more attention to “influencers” than to qualified professionals. The so-called “challenges” on the TikTok network have sometimes reached the point of inciting practices that are dangerous to health.

This is the case with the latest “challenge”: videos show how to rub teeth with the so-called “magic eraser” with the aim of removing stains from tobacco or tea. It is a very abrasive sponge, based on melamine foam used to deep-clean stains on walls or in toilets. The composition of this sponge includes formaldehyde, a toxic and potentially carcinogenic substance which – it goes without saying – should not be used as a dental product.

The “magic eraser” also presents a very high abrasiveness. It does not really whiten but performs a process of abrasion that, when applied to teeth, would be like using sandpaper – and that’s another trend that has been

## This sponge contains formaldehyde, a toxic and potentially carcinogenic substance

promoted on TikTok as a challenge to make teeth more like each other.

These sponges, by erasing the enamel, can initially make an external stain disappear but the tooth will be left much more rugged, which would provoke an increased risk of accumulating many more stains in the future. In addition, contact with the gum can provoke erosion or gingival ulceration.

Because of this, it is important to stress that if the aim is to have white teeth, apart from adopting suitable oral-hygiene habits and applying a good toothbrushing technique, you should first quit smoking and then visit your dentist who can recommend the best option for tooth whitening in each case and thereby avoid erosion of the teeth.



# Zinc, the ‘solition’ for recurrent mouth ulcers?

WE HAVE ALL SOMETIMES HAD those annoying mouth ulcers or canker sores, which on their own can take between one and two weeks to heal themselves spontaneously. But some patients present these ulcerations quite often, in a repetitive way, leading to recurrent aphthous stomatitis (RAS). It is one of the most common and painful alterations of the oral mucosa that the patient can suffer; it is characterized by recurrent ulcers – single or multiple – which are small, round, with a yellow background and erythematous halo, and which are shallow but painful.

There is a series of factors that predispose people to suffer RAS, such as genetics (there is a similar family history in up to 40% of cases), traumas, certain medications, or as a result of deficiencies in the blood of certain substances such as iron, vitamin B12, and folic acid. This disorder is also frequent in people with intestinal inflammatory diseases, such as Crohn's disease and ulcerous colitis, as well as in people with gluten intolerance, which has led some studies to suggest an evaluation of possible celiac disease in patients with RAS. Its relationship with hormonal changes in women and with stress is also being evaluated. And the appearance of RAS has also been linked to some microorganisms, such as *Helicobacter pylori* and the Epstein Barr virus.

## SEARCHING FOR SOLUTIONS

Despite these predisposing factors, the causes of RAS remain unknown, which hinders a treatment that prevents its appearance. Today, the aim of treatment is to reduce the discomfort it produces, reduce the risk of secondary infection, and strengthen wound healing; but patients who suffer from this condition would want it not to return, something which has still not been achieved.

A recent study, with more than 2,000 patients (about half with RAS and the other half controls) showed that patients with this condition presented blood levels of zinc that were lower than the controls. Despite the existence of this relationship, the causality can still not be affirmed, as situations of stress or inflammation, which can often trigger a RAS crisis, also produce a reduction in the plasmatic levels of zinc. If the zinc deficit in these patients is confirmed in later studies, its supplementation could be a simple and safe measure to adopt in these cases.

# Can radiofrequency aesthetic treatments affect implants?



RADIOFREQUENCY TREATMENTS are therapeutic modalities of aesthetic medicine based on the application of high-frequency electromagnetic waves to the skin. They produce an increase in the temperature of the soft tissues in a controlled and selective way, with a penetration depth in the dermis that depends on the level of energy used. The aim is to create thermic damage that provokes changes in the formation of collagen and, as a result, a new formation of collagen in the deeper layers of the skin and the subcutaneous tissue. These techniques are applied to different areas of the body and to the face, with the aim of improving the distension of the skin produced by aging.

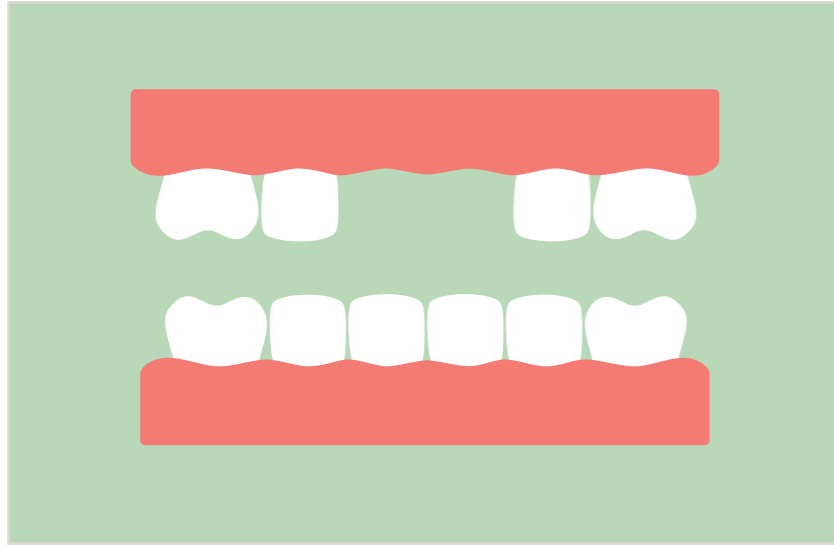
There are many types of radiofrequency apparatus (with monopolar, bipolar, tripolar, or multipolar radiofrequency) with different intensities of frequency and penetration of the deep dermis. At higher frequencies, there is less penetration of the deepest tissues and, on the contrary, at lower frequencies, there is greater penetration.

The uniform distribution of heat is very important to avoid the risk of provoking burns on the patient’s skin and there is also the controversy of whether this increase in temperature can go deeper than the dermis and overheat the alveolar bone.

The possibility of provoking alterations in the osteointegration of dental implants has even been suggested, and in fact one of the contraindications for this type of treatment alludes directly to metallic prostheses.

At present, there are no scientific publications that relate, for example, the use of facial radiofrequency and alterations in the osteointegration of implants. Even so, radiofrequency is a relatively new technique, which means that there are no publications that can claim emphatically whether there are interferences with metals in the mouth. So, it remains wise to maintain all possible precautions.

## Advanced periodontitis and tooth loss, factors associated with increased mortality



Both periodontitis and its ultimate consequence – edentulism – are related to an increased risk of death

PERIODONTITIS IS AN INFLAMMATORY disease of the periodontium, caused by bacteria of the plaque biofilm, which provokes the progressive destruction of the soft and hard tissues that surround the tooth and which, if left untreated, can lead to the loss of teeth. It is a global problem, with a very high prevalence, affecting more than 700 million people in the world, including 150 million who have lost all their teeth.

Periodontitis is also related to other systematic diseases through two means: 1) the direct entry into the blood of bacteria from the mouth and the invasion of distant organs, such as the cardiac valves; and 2) the response of the immune system to these bacteria, which provokes a situation of systemic inflammation. These two mechanisms are responsible not only for the fact

that patients with periodontitis (above all, those with the disease in its most advanced state) have an increased risk of suffering other diseases – such as diabetes, cardiovascular diseases, and cancer – but also for an increased risk of mortality associated with these diseases or any other cause.

With the loss of all the teeth, the periodontal infection disappears. However, edentulism (the partial or total loss of teeth) is very often the reflection of having suffered a very serious periodontal infection over many years and in an accumulative way, which has probably resulted in provoking an atherosclerotic disease, among other systemic problems.

In 2021, a systematic review conducted by the Complutense University of Madrid, which analysed 48 studies with more than five million participants, was published, with the

conclusion that both periodontitis and its ultimate consequence – edentulism – are related to an increased risk of death from any circumstance, especially resulting from coronary and cerebrovascular disease and cancer.

This leads us to emphasize more than ever the importance of good oral health and regular check-ups with the dentist, as health is something holistic and our mouth is not isolated from the rest of the organism.

# canker, thrush, sore, chafing, ulcer

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The joint working group of experts from the National Committee for the Prevention of Smoking (CNPT) and the Spanish Society of Periodontology (SEPA) are making available to the more than 22,000 dental practices in Spain a protocol to encourage smoking cessation from the dental clinic

## The dental practice, at the forefront of the fight against smoking

SECTION COORDINATED BY:  
Paco Romero  
Writer Take Care  
of Your Gums

THE “PROTOCOL FOR SMOKING cessation in the dental clinic” is an ambitious initiative that seeks to place the dental practice as a reference and leading collaborator in the battle against the epidemic of smoking. As well as being an enemy to health overall, the smoking habit is also a significant risk factor for oral health, significantly increasing the risk of suffering periodontitis and in turn worsening the response of the treatments performed.

Although there has been a slight downwards trend in smoking among people living in Spain, it is estimated that today at least one in every five people older than 15 smokes daily, with the resulting harmful effects for their general – and particularly their oral – health. Because of this, “as health professionals, we dentists have a responsibility towards our smoking patients and we should tackle smoking in the dental practice, using suitable strategies in each case to thereby help them give up smoking, improve their general and oral health, and obtain a better response to the treatments carried out,” highlights Dr Antonio Bujaldón, president of SEPA, who stresses the need for the oral-health team “to be trained and have available practical tools that are easy to apply”

It is proposed to implement this protocol in routine visits that require periodontal treatment to be able to set goals and interventions aimed at smoking cessation

### A simple, useful, and necessary protocol

As Leyre Gaztelurrutia, secretary of the board of the National Committee for the Prevention of Smoking, explains, “the dental practice is an ideal place to indentify the consumption of tobacco among patients and encourage them to start a process of smoking cessation”.

To encourage this process, experts from SEPA and the CNPT have designed a simple, flexible, and practical action protocol.

The protocol guides members of the oral-health team in an effective, simple, and practical way, with the aim of applying an intervention based on brief advice on smoking cessation. Together with this, continues the community pharmacist Leyre Gaztelurrutia, “motivational tools are used as a method to achieve cessation, together with various strategies that generate a change of behaviour, routine,

and lifestyle, providing a psychosocial approach”.

The protocol can be applied to over-18s who are smokers of cigarettes, hand-rolling tobacco, cigars, vapes, and electronic cigarettes, whether they are habitual consumers of social smokers, and independently of the number of cigarettes smoked each day. Dr Regina Izquierdo, editor of the magazine Cuida tus Encías and coordinator of the SEPA-CNPT working group, explains, “there are many reasons to get involved in smoking cessation, as a high percentage of patients who smoke want to stop, but the reality is that only a small number manage to do this without help. Informing, helping, and accompanying the patient in this process is easy if you know how to focus it, and it is also very satisfying”.

## Solidarity initiative to donate oral-hygiene products to people with limited resources



The collaboration between the Spanish Society of Periodontology (SEPA) and the Banco Farmacéutico [pharmaceutical bank] allowed some 250,000 people to receive some basic oral-hygiene products during the Christmas period

THE SEPA FOUNDATION AND SEPA signed a collaboration agreement with Banco Farmacéutico, an NGO that aims to fight against pharmaceutical poverty. Among other actions, it has put in place a campaign for donations of oral-hygiene products, which has already been joined by Colgate and Laboratorios KIN.

The Asociación Banco Farmacéutico, the Spanish Society of Periodontology and Osteointegration, and the Sepa Foundation of Periodontology and Dental Implants agreed that companies that habitually collaborate with SEPA could donate toothbrushes, toothpaste, mouthwashes, dental floss, and other oral-hygiene products to the Banco Farmacéutico. This entity was responsible for channelling the collection of the donations and distributing them in the form of 50,000 lots for people in need during a Christmas campaign.

It was hoped that more than 250,000 people would benefit from this campaign

Distribution was handled by the Associació Cívica La Nau (Banco de Productos No Alimentarios), which delivered the lots to more than 300 social entities with a total impact of more than 250,000 beneficiaries.

The first reaction was from Colgate, which made a donation of 27,200 28ml units of gum toothpaste and a 100ml mouthwash. For its part, Laboratorios KIN donated more than 10,000 products, including toothbrushes, toothpaste, mouthwashes for adults and for children, and other products for gum care and oral health. All these products were on top of other donations that arrived in the weeks leading up to Christmas.

This collaboration between SEPA and the Banco Farmacéutico is a demonstration of how the collaborative culture between industry and the Third Sector allow specific needs of vulnerable groups to be met – groups of people who, for economic reasons, are often deprived of products that are essential for the rest of the population. In the case of oral-hygiene products, the lack of these resources is particularly important given the direct repercussion that this has on health and everyday quality of life.

# SEPA, educating in oral health from childhood



Source: Take Care Plus.

Five years ago, the Spanish Society of Periodontology and Osteointegration (SEPA) joined an innovative initiative whose aim is to instill prevention, health education, and healthy lifestyles in childhood. The fifth edition of this educational programme is now under way in Salud/"CuidatePlus"

THIS INITIATIVE IS PROMOTED by Unidad Editorial's health outreach platform (CuidatePlus) and the Community of Madrid's regional department of education and youth, and – among other scientific entities and societies – counts on the collaboration of SEPA, in fulfilment of the latter's commitment to outreach and education of society. Training in oral health is one of the fundamental pillars on which this educational programme – aimed at children in the fourth, fifth, and sixth grade of primary education – is based. Of the online workshops given, SEPA is responsible every year for training the youngest people in oral-health habits, holding audiovisual sessions to teach students how to maintain a healthy mouth

and check their dental health, with the help of experts from this scientific society. The educational programme is designed to show pupils basic concepts about diet, oral health, hygiene and safety, physical activity, and new technologies, doing so via workshops given by health professionals and thanks to the collaboration of societies, professional colleges, and specialist health entities of great added value, such as the College of Physiotherapists of Madrid, the General Council of Nursing, the Spanish Society of Clinical, Family, and Community Pharmacy, the Spanish Society of Periodontology and Osteointegration, Empantallados (a digital platform for parents), and School Nurses. As well as offering educational content to pupils in a simple and practical way, this project also encourages teamwork, strengthens creativity, and promotes innovation. Once the training workshops have been completed, the students must develop a final project, making a video recording of a professional journalistic interview addressing the topics taught in the workshops. In the previous edition, around 6,000 students from a total of 46 educational centres in the Community of Madrid took part in this initiative.

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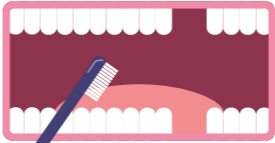
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**25%**  
OF THE MOUTH<sup>2</sup>



MILLIONS OF BACTERIA LEFT  
AFTER BRUSHING LEAD TO  
**PLAQUE ACCUMULATION,**  
A PRIMARY CAUSE OF DENTAL CARIES  
AND PERIODONTAL DISEASES<sup>3,4</sup>



MORE THAN  
**80% OF ADULTS\***  
SHOW SIGNS OF  
**GUM DISEASE**  
LIKE BLEEDING<sup>5</sup>



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with the spanish  
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**Sepa.**  
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SIGNIFICANTLY IMPROVES ORAL HYGIENE IN BETWEEN DENTAL VISITS<sup>6</sup>

\*UK population of dentate adults. Based on data from Adult Dental Health Survey 2009.

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# Take care of your gums

It is important to **keep your gums healthy** to be able to enjoy life to the full. To do this, **brush your teeth twice a day** and use **dental floss** and a **mouthwash**.

Two times a day



Brush your gums and teeth with toothpaste



Use dental floss or interdental brush



Reinforce your hygiene with mouthwash

Every 3 months    Every 6 months



Change your tooth brush



Visit your trusted dentist or periodontist every six months to check your oral health

## WHAT ARE GUM DISEASES?

### GINGIVITIS

**Superficial inflammation of the gum.** Bleeding is the main warning sign. If not treated appropriately, it can lead to periodontitis.

### PERIODONTITIS

**Profound infection of the gum and the other tissues** that support the tooth. It can provoke the loss of teeth and has an impact on general health: it increases the risk of cardiovascular disease, diabetes, and premature birth.

## WARNING SIGNS

- Bleeding or reddening of the gums
- Bad breath
- Hypersensitivity to cold
- Mobility-separation of teeth
- Longer teeth
- Loss of teeth

## RISK FACTORS

- Tobacco
- Stress
- General diseases: diabetes, osteoporosis, HIV, herpes, transplants, etc....
- Hormonal changes
- Hormonal antecedents