

FotoSanNewsletter

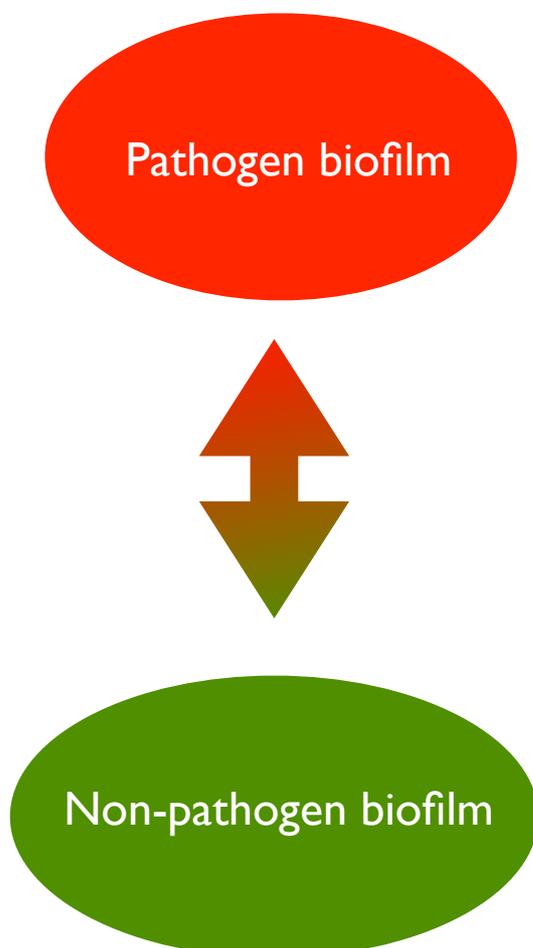
Biofilm modulation

In this issue we will discuss Bacterial Replacement Therapy (BRT) - a new highly effective method to change a pathogen biofilm to non-pathogen.

- 1** Reduce the bacteria's ability to grow:
1. Scaling and root planning (SRP)
 2. Daily oral hygiene

- 2** Reduce the number of bacteria:
1. FotoSan (LAD)
 2. Antibiotics
 3. Surgical laser
 4. Ozone

- 3** Bacterial replacement therapy (BRT), replace pathogen with non-pathogen bacteria:
1. Subgingival
 2. Supragingival



The pathogen biofilm is instrumental in developing gingivitis and progression to periodontitis. Furthermore it is the main cause behind chronic halitosis. It is not possible just based on the bacterial composition of the biofilm to predict the severity of the disease/problem, as several other factors play a key role. It is however a fact, that without pathogen bacteria in the biofilm, you do not get periodontitis, so modulating the biofilm into a non-pathogen is a natural target in the treatment of periodontitis.

So far dentists have focused on two methods:

1. Reduction of the bacteria's ability to grow on the surfaces of the teeth by mechanical debridement.
2. Reduction of the number of bacteria using antibiotics (local or systemic) surgical laser, chemicals, ozone treatment and latest FotoSan LAD (light activated disinfection).

Now CMS Dental is introducing a new method to modulate the pathogen biofilm:

3. Bacterial Replacement Therapy (BRT), by administration of a probiotic in two different ways:
 - a. subgingival administration and
 - b. supragingival administration

The three methods can and should be used combined. On the following pages this is discussed in more details.

Oral cavity probiotic: From promising prospect to a potent new dental treatment modality

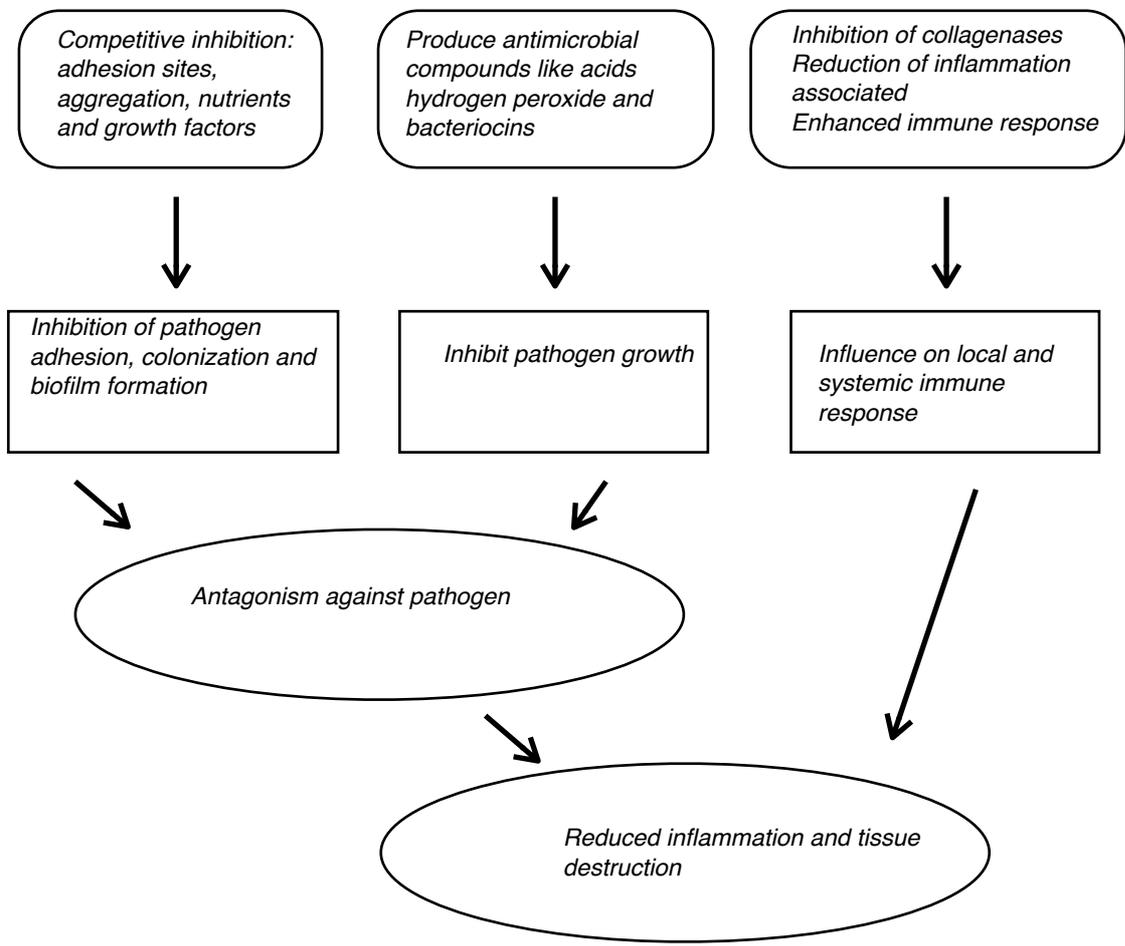
Probiotics

For centuries Probiotics have been known in most cultures as fermented dairy products or fermented vegetables. It is common knowledge that probiotics are beneficial for the stomach and intestines and the general health condition as such. The concept and meaning of the word probiotics as compared to antibiotics was first introduced and defined by Lilley and Stillwell in 1965. In 1994 WHO declared probiotics as the second most important future immune response given that the regular antibiotics are expected to become increasingly ineffective caused by the increasing

Def.: Probiotics are defined as living microorganisms, principally bacteria, that are safe for human consumption and, when ingested in sufficient quantities, have beneficial effects on human health, beyond basic nutrition - WHO

problems of resistance. The development of the widespread use of probiotics within different fields has advanced fast from the well known use in the gastrointestinal field to the use in other fields. Few people are probably aware that probiotics are either in use or on it's way to be launched to treat respiratory diseases, allergies, atopic dermatitis, cystitis, cholesterol control, infant colic and more. The oral use of probiotics is of course obvious thinking of the diversity of the microbiota in the oral cavity and the problems/ conditions caused by a poorly composed microflora. Some of the issues addressed within probiotics are caries, gingivitis,

Probiotic's mechanisms of action



periodontitis and halitosis. Gingivitis, periodontitis and halitosis are somehow related and these conditions are the main topic of this newsletter.

What does science have to say?

Out of 12 published clinical studies (page 7), 11 showed positive results and 1, that there was no difference in the group treated with probiotics compared to the control group.

Minimum 5-6 surveys on oral cavity probiotics have been published, the most comprehensive are done by Gupta (1), Devine (2) and Haukioja (3), all of them I strongly recommend reading.

The conclusions are that treatment with oral probiotics are very promising, but more studies are needed to find the most effective bacteria and application methods. They also demanded more clinical studies. The studies did not show side effects, another advantage in favour of probiotics. There is actually no argument for not using probiotics.

The effects of probiotics

Probiotics have minimum 3 different modes of actions, see the illustration on page 2:

1. Inhibition of the pathogen bacteria through a competition on life conditions, such as space and nutrients.
2. Release of specific and non-specific bactericidal substances
3. Impact on the inflammatory processes

The impact on the inflammatory process leads to beneficial systemic effects with the use of local probiotic treatments.

CMS Dental introduces ProlacSan®

There are 4 good reasons, why you and your patients will benefit from our ProlacSan® product.

Firstly, we have in cooperation with a biotech company found 2 bacterial strains out of 600 possible candidates, with the best properties for an oral probiotic, for more details see page 6. Secondly, we believe that an oral probiotic should be a treatment controlled by the dentist and not sold as an alternative for traditional dental treatment.

As a consequence an oral probiotic is not a

stand-alone treatment, but one of several steps changing the composition of the biofilm. In our opinion the first aim is to minimize the numbers of bacteria in pathogen dental pockets. To treat with probiotics without a prior sanitization is neither logical nor appropriate - who would put seeds in the ground without weeding on beforehand?

Another important point is treating subgingival as well as and supra-gingival. For the treatment in pockets we offer a high concentration of a probiotic gel. For the supra-gingival treatment we offer a lozenge, with a slow release of bacteria over 5 minutes.

Four advantages with ProlacSan®:

1. *The two most potent oral cavity probiotic strains selected from 600 candidates*
2. *The treatment is controlled by the dentist*
3. *Is used as part of a total treatment plan*
4. *Both subgingival- and supragingival treatment (gel and lozenges)*

How is

ProlacSan® treatment combined with other methods?

All treatments must be initiated with a scaling and root planing (SRP).

Combination with a topical treatment killing bacteria:

You could use FotoSan, surgical laser or ozone treatment.

ProlacSan® gel is injected into the dental pockets after the chosen treatment and followed by ProlacSan® lozenges.

Combination with antibiotics:

After ended antibiotic treatment ProlacSan® gel is used and/or ProlacSan® lozenges are offered to the patient, all depending on the follow up and control visits.

Combination with Chlorhexidine gel:

We do not recommend the use of Chlorhexidine gel in dental pockets because it is flushed out too fast to have an impact.

Combination with mouth rinse:

The 2 lactobacillus strains in ProlacSan® are moderately resistant to mouth rinse, but still it is not recommended to use mouth rinse together with ProlacSan®.

Does the ProlacSan® gel stay in the pocket?

As mentioned it is well known that a chlorhexidine gel is flushed out of the pocket too fast to be really effective. What about the ProlacSan® gel? Is it not washed out as well?

No, the difference is that chlorhexidine - or other chemicals for that matter - have no adherence to the surfaces, while the probiotic strains have the ability to adhere to the root and mucosa surfaces.

If the bacteria were flushed out there would never exist a biofilm in the pockets

FotoSan LAD science news

Light-activated disinfection using a light-emitting diode lamp in the red spectrum: clinical and microbiological short-term findings on periodontitis patients in maintenance.

A randomized controlled split-mouth clinical trial:

C. Mongardini et al: Lasers Med Sci DOI 10.1007/s10103-012-1225-x

Abstract: Eradication or suppression of pathogens is a major goal in periodontal therapy. Due to the increase in antibiotic resistance, the need of new disinfection therapies is raising. Photodynamic therapy (PDT) has demonstrated anti-infective potential. No data are available on the use of light-emitting diode (LED) lights as the light source in PDT. The aim of this study was to investigate the microbiological and clinical adjunctive outcome of a new photodynamic LED device, compared to scaling and root planing in periodontitis patients in maintenance [supportive periodontal therapy (SPT)]. In this masked, split-mouth design study, 30 treated chronic periodontitis subjects (mean age, 46.2 years; 13 males) in SPT were included. Two residual interdental sites with probing pocket depth (PPD) 5 mm in two opposite quadrants, with positive bleeding on probing (BOP) and comparable periodontal breakdown, were selected. PPD, BOP and subgingival microbiological samples for real-time PCR analysis (Carpegen® PerioDiagnostics, Carpegen GmbH, Münster, Germany) were recorded at baseline and 1 week after treatment. Scaling and root planing was performed under local anesthesia. Randomly one of the sites was selected to receive adjunctive photodynamic therapy by inserting a photosensitizer (toluidine blue O solution) and exposing it to a LED light in the red spectrum (Fotosan®, CMS Dental, Copenhagen, Denmark), according to the manufacturer's instructions. After 1 week, 73 % of the control sites and 27 % of the test sites were still BOP+. These differences compared to baseline values and in- between groups were statistically significantly different ($p < 0.001$). Mean PPD decreased from 5.47 mm (± 0.68) to 4.73 mm (± 0.74 , $p < 0.001$) in control sites and from 5.63 mm (± 0.85) to 4.43 mm (± 1.25 , $p < 0.001$, test vs control $p < 0.01$) in the test group. Microbiologically, higher reductions of relative proportions of red complex bacteria were observed in test sites (68.1 vs. 4.1 %; $p < 0.01$). This study showed that adjunctive photodynamic treatment by LED light may enhance short-term clinical and microbiological outcome in periodontitis subjects in SPT.

Effect of photoactivated disinfection with a light-emitting diode on bacterial species and biofilms associated with periodontitis and peri-implantitis

S. Eick Photodiagnosis and Photodynamic Therapy (2013)

Background: To determine the effect of photoactivated disinfection (PAD) using toluidine blue and a light-emitting diode (LED) in the red spectrum (wave length at 625–635nm) on species associated with periodontitis and peri-implantitis and bacteria within a periodonto- pathic biofilm.

Methods: Sixteen single microbial species including 2 *Porphyromonas gingivalis* and 2 *Aggregatibacter actinomycetemcomitans* and a multispecies mixture consisting of 12 species suspended in saline without and with 25% human serum were exposed to PAD. Moreover, single-species biofilms consisting of 2 *P. gingivalis* and 2 *A. actinomycetemcomitans* strains and a multi-species biofilm on 24-well-plates, grown on titanium discs and in artificial periodontal pockets were exposed to PAD with and without pretreatment with 0.25% hydrogen peroxide. Changes in the viability were determined by counting the colony forming units (cfu).

Results: PAD reduced the cfu counts in saline by 1.42log₁₀ after LED application for 30s and by 1.99 log₁₀ after LED application for 60 s compared with negative controls (each $p < 0.001$). Serum did not inhibit the efficacy of PAD. PAD reduced statistically significantly ($p < 0.05$) the cfu counts of the *P. gingivalis* biofilms. The viability of the *A. actinomycetemcomitans* biofilms and the multi-species biofilms was statistically significantly decreased when PAD was applied after a pretreatment with 0.25% hydrogen peroxide. The biofilm formed in artificial pockets was more sensitive to PAD with and without pretreatment with hydrogen peroxide compared with those formed on titanium discs.

References:

1. Probiotics and periodontal health, Gupta G: *Journal of Medicine and Life Vol. 4, Issue 4, October–December 2011*, pp.387–394
2. Prospects for the development of oral probiotics and prebiotics, Devine D.: *Journal of Oral Microbiology 2009*. DOI: 10.3402/jom.v1i0.1949
3. Probiotics and oral health, Haukioja A: *European Journal of Dentistry July 2010 - Vol.4*
4. Isolation and characterization of probiotic strains for improving oral health, Bosch M.: *archives of oral biology 57 (2012) 539–549*

FotoSan® LAD + ProlacSan®: FotoSan® 1-2-3

First	Second	Third
FotoSan LAD treatment with application of FotoSan agent in pockets p+ 4 x 10-20 s light	Application of Prolacsan® gel in pockets	The patient takes one lozenge every day, typically in the morning after tooth-brushing
Rationale: Reduce the amount of bacteria as much as possible, and destruct the biofilm matrix as much as possible	Rationale: Boost the colonization of the positive bacteria in the pockets	Rationale: Influence positively on the oral cavity biofilm and thereby sustain a positive change of the biofilm in dental pockets.

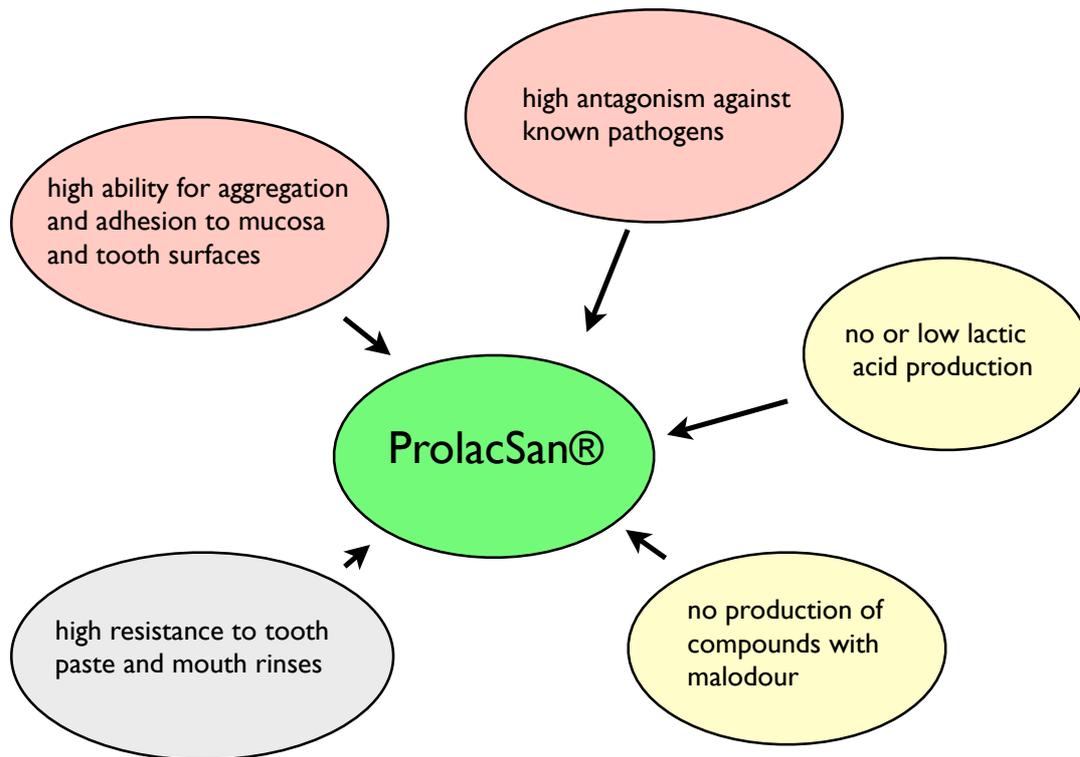
The three treatments may be combined according to the indication

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<div style="background-color: #f4a460; width: 100%; height: 20px; margin-bottom: 5px;"></div> <div style="background-color: #a4f4f4; width: 100%; height: 20px; margin-bottom: 5px;"></div> <p>FotoSan LAD + ProlacSan gel</p> <p><i>Used in cases with localized periodontitis</i></p> <ul style="list-style-type: none"> ◆ localized periodontitis 	<div style="background-color: #a4f4a4; width: 100%; height: 20px; margin-bottom: 5px;"></div> <p>ProlacSan tab</p> <p><i>Used in cases with no pathological pockets, but a change in oral cavity biofilm is needed or as a preventive measure</i></p> <ul style="list-style-type: none"> ◆ gingivitis ◆ patients predisposed to periodontitis (diabetes, other systemic diseases, xerostomi, heavy smokers etc.) ◆ patients treated with cytostatics or antibiotics
<div style="background-color: #f4a460; width: 100%; height: 20px; margin-bottom: 5px;"></div> <p>FotoSan LAD</p> <p><i>Used when the target “only” is to eliminate microorganisms</i></p> <ul style="list-style-type: none"> ◆ endodontic treatment ◆ pericoronitis ◆ herpes, aphtae 	<div style="background-color: #a4f4f4; width: 100%; height: 20px; margin-bottom: 5px;"></div> <p>ProlacSan gel</p> <p><i>Used in cases with pathological pockets, but FotoSan LAD is not indicated</i></p> <ul style="list-style-type: none"> ◆ follow up treatment of periodontitis

How does one choose the perfect oral cavity probiotic?

Why ProlacSan?

Until now oral cavity probiotics were typically selected from gastro-intestinal probiotic strains having a positive effect also in the oral cavity. A biotech company decided 5 years ago, that they could do better than that. Systematically they collected and tested 600 strains taken from children and adolescents with good oral health status in spite of lack of proper preventive effort.



600 candidates reduced to 2 champions

Hundreds of tests later (published in Archive of Oral Biology (4), 2 strains were finally selected due to their particular positive features. The most important characteristics tested against known probiotics were:

- ✓ ability to aggregation and adhesion
- ✓ antagonistic abilities
- ✓ low acid production
- ✓ no compounds of malodour
- ✓ high resistance to tooth paste and mouth rinses

To get the best scores all around two strains that complemented each other were chosen. It is very difficult to find bacteria with an antagonistic effect on *P. gingivalis*, and at the same time meet the

other criteria to be used as a probiotic, however they succeeded. The two strains are specific serotypes of *Lactobacillus brevis* and *Lactobacillus plantarum*, that have never been described before in the literature. Consequently the two serotypes were patented. Collectively they are called AB-Dentis®, and is sold exclusively by CMS Dental A/S under the name ProlacSan®



Studies with oral cavity probiotics

Author/year	Title	Conclusion (abbreviated)
Krasse et al, 2005	Decreased gum bleeding and reduced gingivitis by the probiotic <i>Lactobacillus reuteri</i>	<i>Lactobacillus reuteri</i> was efficacious in reducing both gingivitis and plaque in patients with moderate to severe gingivitis.
Staab et al, 2009	The influence of a probiotic milk drink on the development of gingivitis: a pilot study	Beneficial effect of the probiotic milk drink on gingival inflammation.
Twetman et al, 2009	Short-term effect of chewing gums containing probiotic <i>Lactobacillus reuteri</i> on the levels of inflammatory mediators in gingival crevicular fluid	"The reduction of pro-inflammatory cytokines in GCF may be proof of principle for the probiotic approach alleviating inflammation in the oral cavity."
Harini and Aneundi, 2010	"Efficacy of a probiotic and chlorhexidine mouth rinse: A short-term clinical study	The Probiotic mouth rinse was found effective in reducing plaque accumulation and gingival inflammation.
Slawik et al, 2011	"Probiotics affect the clinical inflammatory parameters of experimental gingivitis in humans"	"The results of our study indicate that a daily consumption of a probiotic milk drink reduces the effects of plaque-induced gingival inflammation associated with a higher plaque score due to the high-carbohydrate content of the probiotic milk beverage."
Iniesta et al, 2012	"Probiotic effects of orally administered <i>Lactobacillus reuteri</i> -containing tablets on the subgingival and salivary microbiota in patients with gingivitis. A randomized clinical trial"	The effect of <i>L. reuteri</i> administered in tablets resulted in a reduction in the number of selected periodontal pathogens in the subgingival microbiota.
Hallström et al, 2013	Effect of probiotic lozenges on inflammatory reactions and oral biofilm during experimental gingivitis	Daily intake of probiotic lozenges did not seem to significantly affect the plaque accumulation, inflammatory reaction or the composition of the biofilm during experimental gingivitis.
Shimauchi et al, 2008	"Improvement of periodontal condition by probiotics with <i>Lactobacillus salivarius</i> WB21: a randomized, double-blind, placebo-controlled study"	Our results suggest that the antiinflammatory effects of <i>L. brevis</i> could be attributed to the presence of AD which prevented nitric oxide generation.
Mayanagi et al, 2009	"Probiotic effects of orally administered <i>Lactobacillus salivarius</i> WB21-containing tablets on periodontopathic bacteria: a double-blinded, placebo-controlled, randomized clinical trial"	Oral administration of probiotic lactobacilli reduced the numerical sum of five selected periodontopathic bacteria and could contribute to the beneficial effects on periodontal conditions
Tsubura et al, 2009	"The effect of <i>Bacillus subtilis</i> mouth rinsing in patients with periodontitis"	Mouth rinsing with E-300 (containing <i>B. subtilis</i>) significantly reduced periodontal pathogens compared with NG.
Vivekanada et al, 2010	"Effect of the probiotic <i>Lactobacilli reuteri</i> (Prodentis) in the management of periodontal disease: a preliminary randomized clinical trial	The present randomized controlled trial confirms the plaque inhibition, antiinflammatory, and antimicrobial effects of <i>L. reuteri</i> Prodentis.
Vicario et al, 2012	Clinical changes in periodontal subjects with the probiotic <i>Lactobacillus reuteri</i> Prodentis: A preliminary randomized clinical trial.	These data indicate that oral administration of <i>Lactobacillus reuteri</i> Prodentis improved the short-term clinical outcomes in non-smoking patients with initial-to-moderate chronic periodontitis.

Product specifications	ProlacSan® gel	ProlacSan® tablets
Content:	1.2 ml	30 lozenges
Active bacteria per dose:	minimum 6 x 10 ⁹ CFU <i>Lactobacillus brevis</i> / <i>Lactobacillus plantarum</i>	minimum 1.2 x 10 ⁹ CFU <i>Lactobacillus brevis</i> / <i>Lactobacillus plantarum</i>
Taste:	neutral	mint
Shelf life:	24 months	24 months



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FotoSan® 630 intro kit	ProlacSan® Pro Kit	ProlacSan® gel	ProlacSan® tablets
FotoSan light and docking station, 2 x 10 cover, 5 x 10 tips, box with 5 ass. FotoSan Agent syringes (5 x 1,2 ml)	15 boxes ProlacSan lozenges + 5 syringes (in sealed bags)	1 syringe in sealed bag	1 box
(syringes are FREE)			

 **CMS Dental**
Our Innovation Your Success

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