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ZAHN-ZEITUNG SCHWEIZ

# Magazin

Special Print

from the supplement in the Zahn-Zeitung Schweiz 11/2020

Oral  
Hygiene



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## Guided Biofilm Therapy (GBT)

Systematic solutions for biofilm management –  
questions and answers



# Guided Biofilm Therapy (GBT)

## Systematic solutions for biofilm management – questions and answers

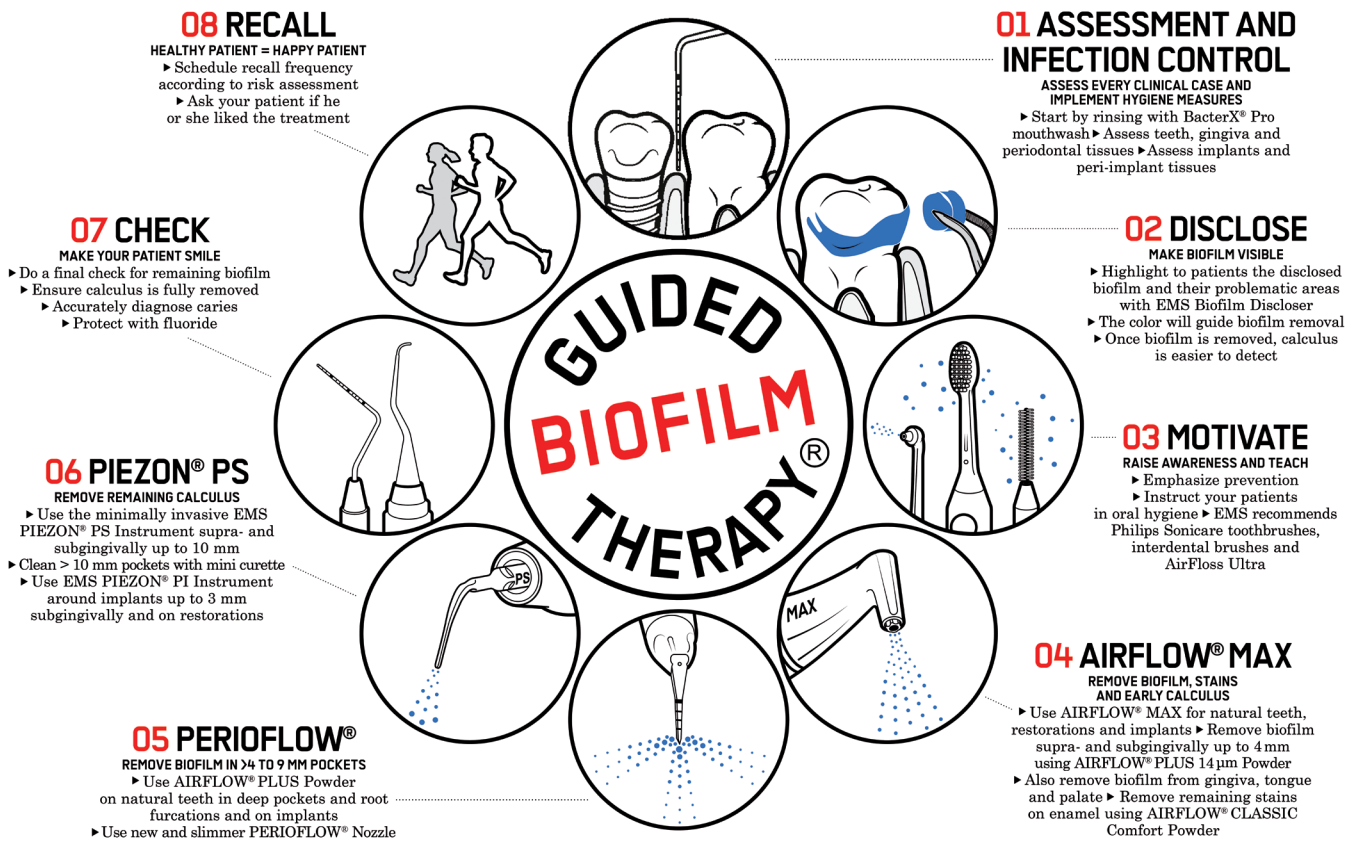
From the Middle Ages to modern times, calculus has been considered as the main cause of dental diseases – such as caries, gingivitis and periodontitis. Later on “infected cementum” was defined as the main cause of periodontitis. Today, the “Ecological Plaque Hypothesis” according to Marsh (2003) is the generally accepted hypothesis [1]. This suggests that the dysbiosis of the biofilm’s bacteria and the reaction of the body’s own defense system determine the development and course of the diseases, both of the hard tooth substance and the soft tissue surrounding the tooth.

The scientific and technical progress of the last decades should also be reflected in the process protocol for the preservation of tooth hard and soft tissue, non-surgical periodontitis therapy and maintenance treatment. Adequate prophylaxis must be based on the causes of a disease. Therefore, technical progress should closely correlate with new scientific findings. In the past, the removal of calculus as well as plaque (biofilm) with manual instruments was the main focus. These led and still lead to unnecessary loss of tooth structure and damage to the soft tissues. Today, in addition to efficient biofilm management, the focus is on substance preservation and patient and clinician comfort.

The Guided Biofilm Therapy GBT (EMS Nyon, Switzerland)

makes it possible to meet today’s – aforementioned – requirements with a clearly defined procedure and the appropriate instruments. It is important to follow this systematic procedure, as it facilitates the prophylaxis session for both the patient and the clinician [2]. The objective of this article is to answer frequently asked questions and thus enable efficient treatment which is gentle on both teeth and soft tissue (**Fig. 1**).

1. Marsh PD: Are dental diseases examples of ecological catastrophes? *Microbiology* 2003; 149: 279-294. *Clin Periodont* 2004;31: 749-757
2. Strafela-Bastendorf N, Bastendorf KD: PZR-neu gedacht! *zm* 106, Nr. 11A, 1.6.2016, 26-30



1) Guided Biofilm Therapy (GBT) facilitates everyday routines with a clearly defined procedure.

## GBT step 1: Assessment and infection control

### Infection control

#### WHY?

For the protection and safety of the dentist, the team and the patients from the risk of transmitting infections. Virtually all dental treatments generate aerosols. This also applies to modern aids such as PIEZON®/PS and AIRFLOW®/AIRFLOW® PLUS Powder.

#### WHAT? HOW?

Rinsing with an antimicrobial agent prior to treatment reduces the number of microorganisms released by a patient in the form of aerosols, which can subsequently contaminate equipment, surgical surfaces and dental staff. A 60-second rinse with CHX leads to a significant reduction of bacteria. Recent as yet unpublished

studies show that BacterX Pro also largely eliminates SARS-CoV-2 efficiently in vitro due to the addition of cetylpyridine chloride.

Due to the current situation with the SARS-CoV-2 virus we therefore recommend the following procedure: rinse with BacterX Pro for 60 seconds. The mouth rinse solution consists of 0.1% chlorhexidine, 0.05% cetylpyridine chloride, 0.005% fluoride and shows that SARS-CoV-2 particles are completely eliminated after 1 minute. Other mouth rinses are also possible.

In connection with the reduction of contaminated aerosols, the evacuation system (high-vacuum evacuation system) and the evacuation technique also play a very important role. With an antimicrobial mouth rinse before treatment and a good evacuation technique, the bacterial load of the aerosol can be reduced to less than 5% [3]. A recent study could show that there are no changes in the ambient air during AIRFLOW® or PIEZON® treatment, if an antimicrobial rinsing solution is used before the treatment and then followed by correct evacuation [4].

Photos: Dr. Bastendorf / Prof. Lussi / E.M.S. Electro Medical Systems S.A.





2) Caries risk for children, adolescents and adults.

In addition to rinsing before treatment and evacuation, personal protective measures must of course be observed:

- Obligatory for clinicians: mouth mask with a BFE of at least 95%, gloves, goggles
- Obligatory for the patient: goggles
- Optional for treatments: Optragate, lip protection with vaseline, cotton rolls.

**NOTE:** Before all dental treatments, the patient must rinse with an antimicrobial rinsing solution. Equally important is perfect evacuation (high-vacuum evacuation system, coordinated suction cannula, good evacuation technique) and compliance with personal safety measures.

3. Sawhney A, Venugopol S, Babu G, Garg A, Mathew M, Yadav M, Gupta B, Tripathi S: Aerosols how dangerous they are in clinical practice. DOI: 10.7860/JCDR/2015/12038.5835
4. Donnet M, Mensi M, Bastendorf KD, Lussi A: Die bakterielle Kontamination der Raumluft während einer AIRFLOW®-Behandlung. zm 2020;110 (12): 24-2

Assessment

WHY?

The diagnostic findings are necessary to enable exact diagnosis and to perform targeted (“guided”) substance-sparing treatment. The findings provide information about

the current individual risk of dental diseases for the patient (caries, gingivitis, periodontitis, peri-implant mucositis, peri-implantitis, erosion, etc.) [5].

WHAT? HOW?

Today, modern digital aids such as “periodontitis concepts” are available. These concepts not only allow identifying the current individual risk factors, but also enable monitoring and determining the individual recall intervals. The weak point of almost all digital aids for the collection of findings is the neglected determining of the individual erosion and caries risk [6]. The finding forms given in **Figure 2**, which



3) Biofilm Discloser and application.



are available for three age groups, have proven themselves for determining the caries risk.

**NOTE:** It is only on the basis of the collected findings and the resulting diagnosis that patient-specific risk profiles can be created and appropriate therapies initiated.

5. Lang N P, Tonetti M S: Periodontal risk assessment (PRA) for patients in supportive periodontal therapy (SPT). *Oral Health Prev Dent* 1: 7-16 (2003)
6. Chetrus V, Ion IR. Dental Plaque-Classification, Formation and Identification. *IJMD* 2013; 3: 139-143

## GBT step 2: Disclose

### WHY?

Only disclosure enables complete removal (95–100%) of the supragingival biofilm [7]. This is also confirmed in a study conducted by the Stiftung Warentest (consumer organization and foundation) on the quality of professional tooth cleaning (PTC) in 10 dental practices. Only approx. 50% of the biofilm had been removed without disclosing. In particular, biofilm removal proved inadequate at the critical points (sulcular and interdental). Biofilm is the cause of the most important dental disease. Biofilm must be disclosed for the following reasons:

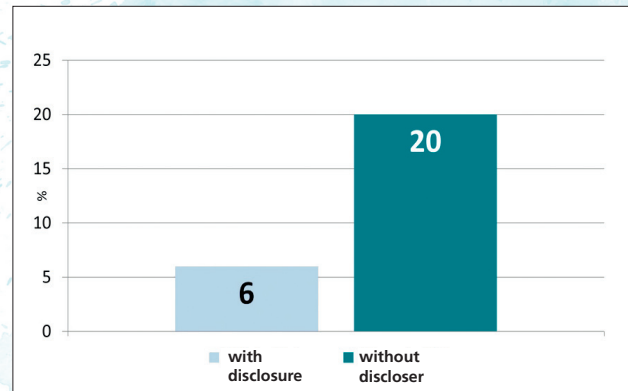
- To create an exact plaque index
- For targeted oral hygiene instructions and motivation at home ("Guided Oral Home Care")
- For targeted, perfect management of biofilm removal ("Guided Professional Oral Care"/PTC)

### WHAT? HOW?

Biofilm is stained with special agents such as the EMS Biofilm Discloser (**Fig. 3**).

**NOTE:** Even a highly trained professional misses three times more supragingival biofilm without disclosure (Fig. 4) [8]. This has also been demonstrated in the above-mentioned study conducted by the Stiftung Warentest. Furthermore, it is only possible to work in a minimally invasive manner by applying disclosure, i.e. only removing supragingival biofilm without cleaning enamel and dentin.

7. Botti RH, Bossu M, Zallocco A et al. Effectiveness of plaque indicators and air polishing for the sealing of pits and fissures. *Eur J Paediatr Dent* 2010; 11: 15-18



**4) Supragingival removal of biofilm with and without disclosure (measured with the Plaque Control Record according to O'Leary et al. 1972).**

8. Bastendorf-Strafela N, Bastendorf KD, Mann P. Kann die Qualität der Professionellen Zahnreinigung durch ein strenges Ablaufprotokoll (Guided Biofilm Therapy) mit Sichtbarmachen (Anfärben) des Biofilms verbessert werden? *PlaqueNcare* 2016; 2: 91-93

## GBT step 3: Motivate

### WHY?

Successful prophylaxis always stands on two pillars: domestic and professional oral hygiene. Without proper oral hygiene there is no long-term success in prophylaxis [9] – in other words: there is no absence of inflammation!

### WHAT? HOW?

Find out what the patient is already doing and how he/she is doing it. Individual education according to the risk of disease [10]. Accessories such as face mirror, dental models, oral hygiene aids, intraoral camera, comparison in own mouth, photographs, etc.

**NOTE:** Oral hygiene at home is often neglected. A re-evaluation and correction of the oral hygiene measures taken at home must be performed regularly. Here too, disclosure makes a significant contribution to improving information, instruction and motivation. In addition, nutritional guidance and/or the recommendation of suitable chemical oral hygiene products may be indicated.

9. Lussi A: Patientenaufklärung: Das ABC der täglichen Kariesprophylaxe. *ZWP Zahnarzt Wirtschaft Praxis* – 3/201





5) Airflow® MAX in use for the removal of biofilm.

10. Winterfeld T, Schlueter N, Harnacke D, Illig J, Margraf-Stiksrud J, Deinzer R, Ganss C: Toothbrushing and flossing behaviour in young adults-a video observation. Clin Oral Invest DOI 10.1007/s00784-014-1306-2

**NOTE:** To achieve the optimal success of supra- and subgingival biofilm management while reducing dust and aerosol formation, the guidelines for the correct application of the AIRFLOW® and evacuation technique must be learned and observed. The newly developed AIRFLOW® Max with its laminar flow generates even fewer aerosols.

## GBT steps 4 and 5: AIRFLOW®/PERIOFLOW®

### WHY?

Biofilm is the cause of the most important dental disease (exception erosions). Therefore the biofilm, the cause are removed first and only then the hard deposits (these are mineralized/calcified biofilms).

### WHAT? HOW?

Perfect removal of supra- and subgingival biofilm from all tooth surfaces is only possible with AIRFLOW®/PERIOFLOW® technology and AIRFLOW® PLUS POWDER (**Fig. 5**).

The advantages versus classical polishing (Rubber Cup Polishing/RCP) include [11]: complete removal of biofilm in fissures, cavities, on implants, in the interdental space, in crowded areas, in the sulcus, in fixed orthodontic treatments, all without damaging the natural tooth structure. Far less aggressive when cleaning exposed tooth necks. Approximately three times more biofilm can be removed subgingivally than with manual instruments [12]. Further benefits include reduced treatment time, maximum clinician and patient comfort, resulting in improved compliance and a higher recall adherence rate.

11. Haas M, Koller M, Arefnia B. Rauheit und Substanzverlust von Zahnoberflächen nach Biofilmentfernung mit unterschiedlichen Bearbeitungsverfahren. dental journal 2018; 4: 62–68

12. Flemmig TF, Hetzel M, Topoll H, Gerss J, Häberlein I, Petersilka GF: Subgingival debridement efficacy of glycine powder air-polishing. Journal of Periodontology 2007; 78: 1002-1010.

## GBT step 6: PIEZON® PS

### WHY?

Calculus is neither the cause of caries nor of periodontitis. Due to its porous surface, calculus facilitates good adhesion of the biofilm and thus also of the metabolic products of bacteria. Calculus also prevents the formation of niches, thus preventing optimal oral hygiene at home. Perfect, targeted removal of calculus from all tooth surfaces is an essential part of GBT.

### WHAT? HOW?

Piezoceramic technologies have proven themselves in the mechanical removal of deposits. The PIEZON®-NO-PAIN technology with the PS® instrument removes 95% of calculus from all regions (**Fig. 6**) [13].



Further advantages versus hand instruments include [14]:

- They can be used universally (supra- and subgingivally up to 10 mm) to remove mineralized deposits and bacterial biofilm.
- They are tissue-friendly.
- They enable shortened treatment times (economy).
- They are less painful due to dynamic power control with linear movements (patient comfort).
- They can be used after a short familiarization period.

**NOTE:** To achieve optimal success in supra- and subgingival calculus removal, the guidelines for the correct application of the PIEZON® technique must be learned and observed (Fig. 4).

13. Barendregt DS, van der Velden U, Timmerman MF, van der Wijden F: Penetration depths with an ultrasonic mini insert compared with a conventional curette in patients with periodontitis and in periodontal maintenance. *J Clin Periodontol.* 2008; 35: 31-36.
14. Sculean A, Bastendorf K.-D. et al: A paradigm shift in mechanical biofilm management? Subgingival air polishing: a new way to improve mechanical biofilm management in the dental practice. *Quintessence International* Volume 44, Number 7, July/August 2013

#### WHAT? HOW?

Self-monitoring of prophylaxis staff with regard to the degree of perfection of the treatment performed. Magnifying glasses, dental floss, explorers etc. serve as aids. During the learning phase, biofilm control disclosure should be performed in particular. This is followed by the checkup and the caries diagnose by the dentist. He/she also evaluates the individual risk of disease, makes the final diagnosis and plans any further necessary therapies. At the end of treatment step 7, once the tooth surfaces are perfectly clean, fluoridation is performed.

**NOTE:** GBT has made it possible to achieve a high standard of quality in prevention and prophylaxis [16], which goes hand in hand with a high level of comfort for both clinicians and patients. The systematic treatment can be performed almost completely painlessly.

15. Maag A: Delegation in der Zahnarztpraxis aus rechtlicher Sicht. *Parodontologie* 2017;28(1):59-64
16. Schweizerische Zahnärztliche-Gesellschaft: Qualitätsrichtlinien für zahnmedizinische Arbeiten. *Handbuch der SSO, Stämpfli AG, Bern* (10.99)

## GBT step 7: Check

#### WHY?

To check their own performance and thus meet the patients' demand for perfect biofilm and calculus management. In addition, supervision of the dentist is also indispensable for proper delegation from the legislative side (in Germany) [15].



6) Piezon® PS in use for removing calculus.

## GBT step 8: Recall

#### WHY?

The importance of maintenance therapy for oral health has long been recognized. The German Oral Hygiene Study (DMS-V Study) of August 2016 confirms this yet again: adults who attended recall appointments regularly within the last 5 years have a lower history of caries than those





## THERAPY

without regular recalls. This difference is also evident in periodontal diseases.

### WHAT? HOW?

The patient arranges for a new recall appointment immediately after treatment. The recall intervals are determined individually based on the findings and the resulting diagnosis [17].

The great professional importance of regular recalls for oral health is contrasted by figures on a high “drop-out rate” in the adherence to appointments. On the one hand, recalls require rigorous management by the dental practice [18] and on the other hand, patient compliance must be improved through painless treatment. GBT correlates with better patient compliance as patient comfort is very high. This is also reflected in the latest patient surveys on satisfaction with GBT.

**NOTE:** Achieving lasting success in prophylaxis is only possible with a well-organized system of recalls, which need to be patient-specific.

17. Bastendorf KD: Recall in der Prophylaxe Praxis. Aktueller Stand der Parodontologie. Balingen, Spitta 2000

18. Fardal O, Johannessen A, Linden G: Compliance in a Norwegian periodontal practice. Oral Health Prev Dent 2003; 1:93

technique) can be learned.

A very important factor in converting the workflow protocol of the prophylaxis session to the Guided Biofilm Therapy (GBT) described above, is achieving high structural and process quality. In addition to structural and process quality, patient satisfaction (quality of results) plays a major role in the success of prophylaxis [19]. Success correlates strongly with long-term patient loyalty. This, in turn, depends on the quality of the treatment performed and the pain/well-being experienced. Here the advantages of GBT have been particularly impressive. For the patient loyalty rate, it is important that the patient is treated painlessly, which increases compliance [20].

### Only satisfied patients like coming back!

19. Harr R.: Management-Systeme in der Zahnmedizin. Schweiz Monatsschr Zahnmed, Vol 111: 7/2001

20. Strafela-Bastendorf N, Bastendorf KD: Die Patientenzufriedenheit in der Prophylaxe. Dental Forum 2020; 36 (7,8): 452-456

**A complete literature overview with more than 120 citations summarized by sections can be requested from the publisher.**

## Abstract

GBT has succeeded in integrating the latest scientific findings and technical progress into a modern recall procedure protocol. The major changes versus the old protocols include:

1. Infection control by rinsing before treatment.
2. Making the biofilm visible by disclosure.
3. First removing the biofilm with AIRFLOW®/PLUS Powder (minimally invasive).
4. Then followed by targeted removal of calculus with the PIEZON® PS (minimally invasive).

In addition, EMS has established the Swiss Dental Academy (SDA), a training organization where not only the GBT system but also the correct use of the devices (AIRFLOW®, PERIOFLOW® Nozzle, PIEZON® PS, two-hand evacuation



### Contact

Dr. Klaus-Dieter Bastendorf  
Logauweg 7  
DE-73054 Eisligen  
info@bastendorf.de

Prof. em. Dr. Adrian Lussi  
Gastprofessor Universität Freiburg  
Zahnmedizinische Kliniken der Universität Bern  
adrian.lussi@zmk.unibe.ch