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Jan H. Koch

Prevention and therapy of oral dysbiosis

Part 2 – Methods and concepts

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Quintessence for the practice team

Periodontitis is the result of subgingival dysbiosis, a disruption of the equilibrium in the biofilm. In patients at moderate risk, this can be prevented through effective oral hygiene and regular professional removal of hard and soft plaque as part of professional mechanical plaque removal (PMPR). In other patients, it may prove necessary to control additional relevant risk factors and work on an interdisciplinary basis with doctors and healthcare professionals from other specialist areas, such as internal medicine, smoking cessation, and nutritional counseling. Clinicians have worked closely with a product manufacturer to develop a modular protocol for the professional prevention and therapy of periodontitis and peri-implantitis (Guided Biofilm Therapy). This can be implemented in daily practice in a risk-adapted and patient-specific manner as part of a broader dysbiosis management approach.

Abstract

Dysbiosis can be described as a pathological interaction between the microbiome and host tissue. The associated oral diseases – primarily caries and periodontitis – can be prevented in many cases through effective oral hygiene and professional removal of hard and soft deposits. In the case of existing general illnesses or an unfavorable lifestyle, the increased individual risk must also be controlled. This is achieved through an integrated oral medicine prevention and therapy concept, involving an interprofessional dialog with other specialist disciplines where necessary. And finally, the basic structure of a modular, individually adaptable, and scientifically documented concept developed for the prevention and management of dysbiosis-related oral diseases is explained.

Integrated clinical concept

Dental and oral medicine have long focused on biofilm as a risk factor, which represents a key etiologic factor in dysbiosis. Consequently, the current recommendations from periodontal and cariology professional associations emphasize that appropriate oral hygiene is necessary for personal biofilm management (1, 2). In addition, professional prevention is a combination of measures that can be used to control the individual risk of healthy patients or those who have already undergone treatment. Here, the supra- and, if necessary, subgingival removal of hard and soft deposits and the treatment of plaque-retaining areas play a central role. (1). Finally, informing, instructing, and motivating patients about oral hygiene and the management of risk factors are integral parts of a comprehensive and therefore professional concept (see Part 1 of this paper, *Prophylaxe Impuls* No. 1/2025). The relative importance of the measures mentioned with regard to oral and systemic health is outlined in the following.

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Oral hygiene

There is only limited evidence for the success of professionally implemented individual motivational measures – both in terms of caries and periodontitis (3). A relatively new approach in this area is motivational counseling (4). On the one hand, the shortcomings in personal biofilm management are due to motivational problems and, on the other hand, to the insufficient oral hygiene skills of most patients (5). In addition, a significant proportion of hard and soft deposits are located in interdental spaces and in the sulcus and can only be removed with suitable aids, for example with interdental brushes, dental floss or, if appropriate, oral irrigators (water flossers) (5-8). When applied correctly, these measures reduce the mass of the biofilm and its inflammation-promoting properties and help to prevent probing bleeds.

Good oral hygiene must therefore be regarded as a necessary daily measure that enables an important risk factor for oral and systemic diseases to be controlled (9-12). However, depending on the existing risk factors, it is often not sufficient for ensuring primary and secondary prevention. Further measures in the form of a lifelong personalized risk management are necessary (13-15).

Conclusion: *Oral hygiene is a necessary but often insufficient measure for preventing dysbiotic biofilm as a risk factor for oral and systemic diseases.*

Professional prevention – primary prevention

Preventing dysbiosis is also an important objective of professional measures. The preventive effectiveness of professional prevention, including professional mechanical plaque removal (PMPR), in healthy patients is controversial, and there are no meaningful controlled studies available for this measure (16). Nonetheless, based on long-term studies involving large patient groups, a significant effect can be assumed (17, 18). This was particularly evident for systematic and personalized care as a part of comprehensive oral risk management (19, 20). Clean oral conditions are also necessary so that initial carious lesions or erosions can be diagnosed and patients can practice good oral hygiene (21).

Photo:

Fig. 1: Patients benefit from detailed individual counseling with regard to risk factors for oral and systemic diseases. These also include lifestyle risk factors such as poor diet and lack of exercise.

Numerous risk factors, including poor diet, smoking, alcohol consumption, lack of exercise, and stress, are associated with both oral and other noncommunicable diseases (19, 22-24). Appropriate measures within the scope of professional dental prevention, such as nutritional counseling and smoking cessation (Fig. 1), have not yet been sufficiently investigated scientifically. Unlike secondary prevention in periodontology, detailed recommendations for professional measures in primary prevention are only available for select areas such as caries prevention with fluorides (2). Due to limited risk diagnostic options, this also applies to the determination of appropriate recall intervals (19, 25, 26).

In terms of methods for supragingival biofilm management, special air-water-powder systems (Airflowing) have been shown to produce equivalent or better clinical results than conventional methods using rotating brushes and pastes (polishing) (27-29). With a systematic, modular protocol for primary (PMPR) and secondary (AIT, SPT) professional prevention, after rinsing with an anti-infective solution and recording the findings (Step 1), mandatory disclosure and patient instruction (Step 2, Fig. 2), the biofilm is first removed with special air-water-powder systems and then any remaining dental calculus is removed with piezoceramic ultrasound (Steps 4 to 6, Figs. 3-5). The clean tooth surfaces can then be examined perfectly and a risk-adapted recall interval can be determined (Steps 7 and 8 of the Guided Biofilm Therapy GBT, Fig. 6) (27).

According to controlled studies, the method saves time and is clearly preferred by the majority of patients and users over the conventional method (27, 29-31). Furthermore, Airflowing with minimally abrasive powders, e.g. based on glycine or erythritol, is gentler in comparison to other powder products or polishes on both tooth structure, including exposed dentine, as well as restoration surfaces (32, 33). When applied correctly, the powder penetrates up to 4 mm into the sulcus and, unlike conventional polishing, has beneficial effects on the microbiome (34).

Fig. 2: Oral hygiene instruction and motivation are also key elements of professional prevention.

Fig. 3: Specially developed air-water-powder devices (supra- and equigingival Airflowing) are suitable for professional biofilm management following mandatory disclosure. It can be used to effectively and gently clean tooth enamel and soft tissue, as well as fixed orthodontic appliances and prosthetic restorations.

Fig. 4: Special handpieces and instruments can be used to remove biofilm in deeper pockets around teeth and implants (subgingival Airflowing).

Fig. 5: After Airflowing, any residual hard deposits are removed using a piezoceramic ultrasonic system.

(all photos: EMS)

Conclusion: *As part of primary preventive professional prevention, risk factors should be monitored in addition to biofilm management. Airflowing is an effective, gentle, and patient-friendly method for cleaning teeth.*

Periodontitis therapy and secondary prevention

The treatment of periodontitis is primarily based on the effective removal of soft (biofilm) and hard (dental calculus) deposits from oral surfaces (35). Here, biofilm should be the primary focus as an etiological factor (1, 36). In most patients, the measures lead to temporary microbial and immunological changes that are compatible with health, both in the initial treatment and in the subsequent supportive periodontal therapy (SPT) (36-39). Here too, exact time frames are variable and depend on individual risk factors (40). As in primary prevention, biofilm management in periodontitis therapy must be accompanied by a systematic professional concept and is also successful in patients with pre-existing conditions (Figs. 7a+b, 8a+b) (35, 39, 41). And as in primary prevention, only limited data are available on risk factor management measures in periodontitis therapy (19). Hand instruments, ultrasonic instruments, and sonic instruments are considered to be the standard methods for biofilm management and dental calculus removal in periodontal therapy. According to current standards of evidence-based medicine, no superior method has been identified in terms of effectiveness or patient acceptance, and therefore no recommendation has been issued (19, 42). For the alternative or additional (adjuvant) use of subgingival Airflowing with low-abrasive powders – alone or in combination with special piezoceramic ultrasonic instruments – clinical results have been demonstrated in initial or supportive periodontal therapy (SPT) which are comparable to conventional methods overall (43-50).

In addition, the above-mentioned instruments generally offer better patient acceptance, shorter treatment times, and better biocompatibility in terms of hard tissue loss (39, 44, 47, 48, 51-54). This method also achieves favorable results comparable to conventional methods with regard to the subgingival microbiome (38, 55). Furthermore, it has been shown that supportive subgingival Airflowing reduces bacteremia generated during scaling and that the minimally abrasive erythritol powder used for this purpose influences the microbiome in favor of eubiosis (55, 56). Further therapeutic options include systemic and local antibiosis and a variety of adjuvant methods. These are evaluated in the current guideline for the treatment of periodontitis stages I-III and cannot be discussed here due to space limitations (19).

Conclusion: Subgingival plaque removal has a beneficial effect on the microbiome and immunological parameters. The clinical effectiveness of available methods is comparable – with differences in patient acceptance, tissue preservation, and efficiency.

Conclusions

A well-coordinated preventive approach enables motivated and well-informed patients to maintain a symbiotic microbiome or convert existing dysbiosis into symbiosis. Oral and systemic inflammation and numerous associated diseases can thus generally be avoided. Oral medicine has developed effective concepts for this purpose at the level of professional prevention and, in particular, for biofilm management. In this context, Guided Biofilm Therapy is the only protocol that encompasses both the primary as well as secondary prevention of oral diseases, including peri-implantitis, as well as their treatment, and which at the same time is also substantiated by numerous studies on the methods and instrument systems used (21, 57, 58).

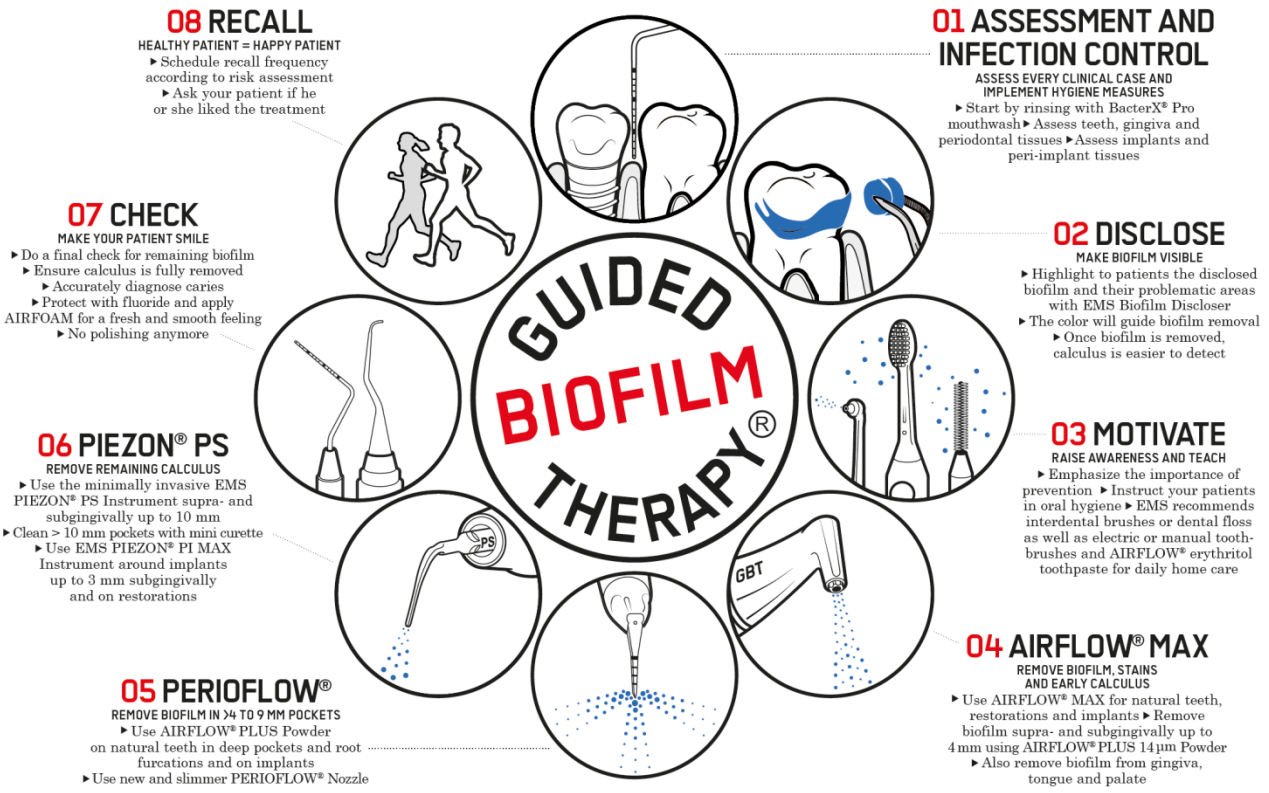
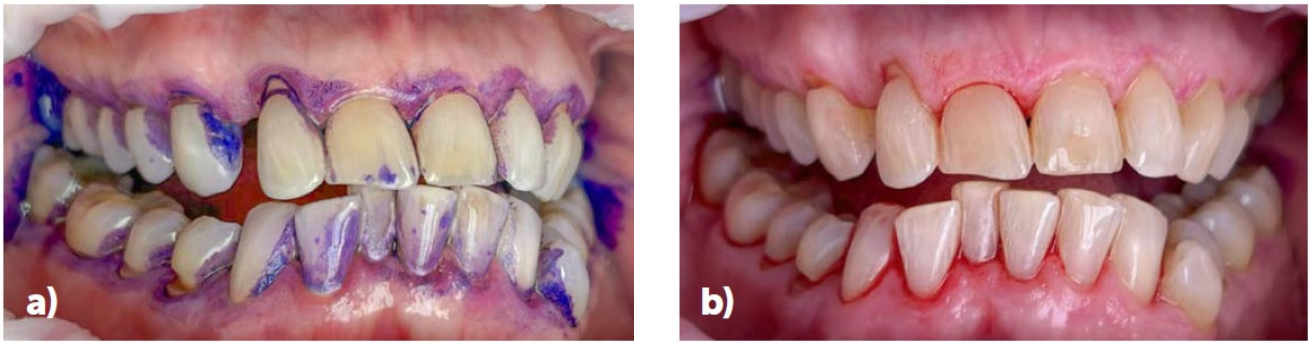
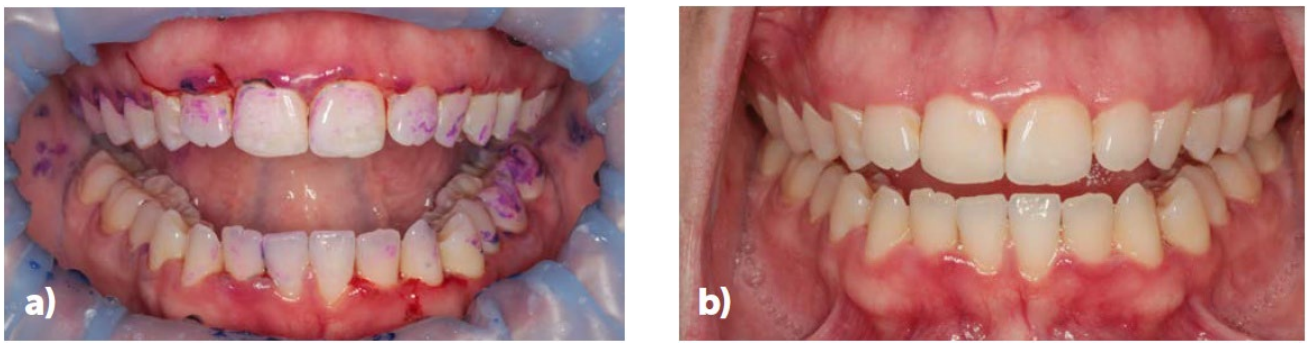


Fig. 6: Being a systematic and risk-oriented clinical concept, Guided Biofilm Therapy covers all primary and secondary preventive measures as well as various therapeutic indications, including the treatment of peri-implant inflammation. (Graphic: EMS)



Figs. 7a and b: Clinical case no. 1: Following a stay in hospital, a 73-year-old female patient presents for a recall while on medication for high blood pressure and undergoing treatment for Stage 2, Grade B periodontitis. Oral hygiene had not been properly monitored in the hospital. The patient is instructed and motivated again (Steps 2+3 of the Guided Biofilm Therapy, see Fig. 6). The disclosed biofilm (Fig. 7a) is then first removed with an air-water-powder system and any remaining dental calculus is removed with piezoelectric ultrasound (GBT Steps 4 and 6) (Fig. 7b). When asked, the patient emphasizes that she is not afraid of her next recall because the treatment was painless. (Clinical case: Marcela Žandová, dental hygienist, Czech Republic)



Figs. 8a and b: Clinical case no. 2: A 24-year-old female patient with a history of depression and currently elevated stress levels presents with a sudden onset of generalized gingivitis with localized papillary loss. The suspected diagnosis is "acute necrotizing ulcerative gingivitis" (ANUG) (Fig. 8a). In the first session, supragingival hard and soft deposits are gently removed using piezoelectric ultrasound, and pseudomembranous gingival deposits are gently removed with cotton pellets and hydrogen peroxide. In addition, the patient rinses twice daily with chlorhexidine until the wound has largely healed. On the next day, the situation in the area around the papillae has already improved (Fig. 8b) and a first GBT session including air-water-powder application (Airflowing) can be performed (Steps 1-4, 7+8). This patient, who suffers from dental phobia, also highlights the gentle treatment provided using this method. (Clinical case: Dr. Eric B. Oxley, USA)

The clinical concept was already presented in a consensus paper by a high-ranking panel of experts in 2019 (59). It can be tailored on a risk-oriented basis to individual clinical findings. When selecting instruments and aids for removing hard and soft deposits, the recommendations of the German Society of Periodontology (DGParo) state that the wishes and preferences of patients should also be taken into account in addition to the clinical endpoints (19).

Health economic considerations

On the one hand, oral and interdisciplinary organized prevention, including risk factor management, can reduce the risk of disease and, on the other hand, improve the relative chances of longer life expectancy and better quality of life (60-62). At the same time, significant costs are saved at both the individual as well as the overall societal level (60, 62, 63). To better control the common risk factors of periodontitis, for example, diabetes and cardiovascular disease, in the future, it makes sense to collaborate with colleagues working in internal medicine. Nutritional problems and smoking cessation can be tackled in collaboration with experts or can be managed by specially trained prevention staff. They are therefore actively involved in oral medicine in the best sense of the word and make an important contribution to overall health.

Based on health insurance data and health economic calculations, oral prevention can also significantly reduce the costs of treating conditions such as diabetes (63-65). However, interdisciplinary exchange in Germany is impeded not only due to caps on fees, but also because there is no referral system between oral (dental) and other medical professionals within the statutory health insurance system. In addition, the necessary expertise is often lacking to provide professional advice on risk factors.

And finally, it seems necessary to prevent the occurrence of both oral and systemic noncommunicable diseases at an early stage through population-based measures such as promoting healthy nutrition (behavioral prevention) (66, 67). In combination with medical prevention concepts, it should be possible to reduce the prevalence of widespread inflammatory systemic diseases in the mouth and throughout the body in the medium and long term (15, 68, 69). ***pi***

Conflict of interest: The author contributes articles and consultation services to EMS and Philips on a regular basis.

Dr. med. dent. Jan H. Koch
Dental Text & Consultancy Services
Parkstr. 14
85356 Freising
Tel.: +49-8161-42510
Email: janh.koch@dental-journalist.de
www.dental-journalist.com

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