Preventive Dentistry

1. Principles for the Evaluation Criteria

The following chapter deals with the diagnostics, the analysis of the risk of disease, and the possibilities of prevention of periodontal diseases and irreversible damages of the dental hard tissues, in particular of primary and secondary caries as well as of erosions.

Oral health is an essential aspect of human wellbeing and the quality of life.

It is scientifically established that dental caries and periodontal diseases largely can be avoided or at least kept under control. Patients qualify for optimized care in preventive aspects just as in reconstructive treatments.

All aspects of oral health have to be promoted and made available to the entire population.

The principles of preventive dentistry apply to all age groups.

Objectives of Prevention

- Prevention of primary dental caries on tooth crowns and root surfaces
- Prevention of secondary caries along margins of fillings and crowns
- Recognition and prevention of non-carious loss of dental hard tissues (comprises loss of dental hard tissues due to erosive-abrasive processes, attrition, hypoplasias, and dental trauma)
- Prevention of diseases of the gingiva and the periodontium as well as of mucositis and periimplantitis
- Recognition of individual risks of disease

Basic Elements of Prevention

The causes of diseases of the dental hard tissues and periodontium are largely known. They are multifactorial diseases. Already at birth, bacteria start colonizing the oral cavity of the child; the temporal sequence of appearance of further microbial species is affected by external and internal conditions, in particular tooth eruption. The microorganisms colonize the tooth surfaces where they can proliferate; the dental plaque, a biofilm, forms. This is the most important prerequisite for both caries and periodontal diseases. Due to the degradation of fermentable carbohydrates, acids are released and the dental hard tissues are demineralized. Numerous single factors in the area of the teeth and oral cavity as a habitat as well as of the microorganisms and the substrates supplied can exert a cariogenic or caries-inhibiting influence. Additional factors for irreversible damages of the dental hard tissues are effects of acids, in particular of sour-sweet beverages, as well as mechanical abrasion resulting from traumatizing methods of toothbrushing.

A target-oriented prevention tries to recognize and eliminate preferably all disease-causing factors as well as, if possible, to improve the defense situation of the host and the teeth in their oral environment.

The most important measure for the prophylaxis of caries and periodontal diseases is an optimal oral hygiene. Different, but significant contributions are also provided by the application of fluoride compounds, a proper diet, chemical plaque control, addiction counseling (smoking) as well as fissure sealing. The simultaneous intake of various medications and the associated side effects require special attention and appropriate measures, particularly in elderly patients.

The following elements serve to accomplish the objectives of prophylaxis:

- Instruction and control of specific individual prophylactic measures
- Precise diagnostics for the early assessment of caries, erosion, and periodontal diseases; decision regarding prevention or invasive therapy
- Accompaniment of an invasive therapy by professional prevention
- Promotion and support of collective measures for the prevention of caries and periodontal diseases

For this purpose, the entire dental team is used; responsible for planning and control is the dentist.

The Responsibility of the Dentist

In the context of individual prophylaxis, diagnostics, assessment of the risk of disease, determination of the prevention concept, supervision, and success control belong to the duties of the dentist.

Semicollective prophylactic activities, for instance school dental service and prophylaxis, are to be promoted and supported. Authorities and dental assistants have to be advised regarding the theoretical and practical implementation of prophylaxis efforts. Further activities such as advice to mothers, information of the teachers in kindergartens and schools as well as of the caregivers in hospitals and homes etc. are to be promoted.

Follow-up Checks

Only the most comprehensive possible and appropriate documentation of the clinical situation (dental status, treatment status, plaque, gingivitis etc.) prior to and during prophylaxis efforts undertaken by the patient and the dental team allows to record the success or to obtain the necessary information for changes of the care concept. Of course, the recommended prophylaxis auxiliaries, methods etc. are to be appropriately documented as well. The documentation also corroborates the efforts of the dental team in patients with apparently little interest in the maintenance of dental health.

2. Evaluation Criteria for the Quality Levels A+ to C

	DESCRIPTION	DIAGNOSTICS / DOCUMENTATION
A+	▪ Prevention on the part of the patient very good as well as also optimal professional care ▪ Risk of oral disease very low ▪ Good cooperation with authorities and other interested groups/persons regarding oral prevention ▪ Prognosis very good	▪ Comprehensive and correct diagnostics of oral diseases, their causes, risks etc. ▪ Comprehensive documentation ▪ Recommendations for individual prophylaxis formulated
A	▪ Oral hygiene of the patient and professional care sufficient to largely reduce oral diseases ▪ Collaboration in semicollective prophylaxis programs ensured ▪ Prognosis with optimized prophylaxis good	▪ Diagnostics of oral diseases as well as evaluation of their cause correctly performed ▪ Documentation regarding diseases with few details ▪ Risks of disease recorded, conclusions not formulated in detail ▪ General recommendations for prophylaxis stated ▪ Adequate X-ray diagnostics
B	▪ Incomplete diagnostics, insufficient professional care, collaboration of the patient inadequate ▪ Risk of oral disease too high ▪ Improvement in all aspects advisable ▪ Collaboration in semicollective prophylaxis programs has to be intensified ▪ Prognosis without substantial improvements of the prophylactic efforts bad	▪ Incomplete diagnostics regarding caries, other defects of dental hard tissues, and periodontitis ▪ Incomplete documentation, actual situation regarding oral diseases and risks not evident ▪ Radiographic evaluations inappropriate ▪ No indications of recommendations for prophylaxis
C	▪ Several aspects of diagnostics and prophylactic efforts incorrect or missing ▪ Risk of oral disease high ▪ Merely invasive-therapeutic dentistry ▪ Prognosis very bad	▪ No or incorrect clinical diagnostics of oral diseases ▪ Documentation missing ▪ No assessment of the risks of disease ▪ No X-ray diagnostics, although indicated

	INDIVIDUAL PROPHYLAXIS	COLLABORATION OF PATIENT	SEMICOLLECTIVE PROPHYLAXIS (E.G. SCHOOL DENTAL SERVICE)
A+	▪ Prophylaxis program optimal and individually adapted ▪ Recall individually organized	▪ Great interest in oral health ▪ Good oral hygiene ▪ Follows all advice for prophylaxis	▪ Structured collaboration with schools, authorities, and homes for the implementation of prophylaxis
A	▪ Information on, motivation for, instruction of prophylaxis and oral hygiene, fluoride prophylaxis, nutritional guidance, chemical plaque control, problem-oriented application of fluoride varnish and fissure sealing ▪ Individual problems incompletely considered ▪ Recall organized	▪ Interest in oral health ▪ Suggestions regarding oral hygiene/prophylaxis largely followed ▪ Minor residual plaque ▪ Regularly participates in recall	▪ Annual dental examination ▪ Cooperation with schools, authorities, and homes for the implementation of prophylaxis
B	▪ Incomplete clarification, special problems of the patient not considered ▪ No special efforts for prophylaxis of the dental team ▪ Recall only offered	▪ Little interest in oral health ▪ Follows advice insufficiently ▪ Skepticism towards recommendations (fluoride prophylaxis) ▪ Little interest in recall	▪ Annual caries diagnostics ▪ General recommendations for prophylaxis ▪ No collaboration with schools, authorities, and homes for the implementation of prophylaxis
C	▪ No information of the patient about the disease situation of dental hard tissues, periodontium etc. ▪ No efforts for prophylaxis of the dental team ▪ No recall	▪ No interest in oral health despite information, instruction, motivation ▪ Lots of plaque ▪ Renounces recall	▪ Only treatment of open carious lesions ▪ No efforts for prophylaxis on the semicollective level

3. Explanatory Notes Concerning the Evaluation Criteria

Medical History, Collection of Findings

Prior to every dental treatment, the general state of health of the individual is assessed. All diseases potentially affecting the health of the teeth and oral cavity are crucial. Many medications exert a reducing influence on salivary secretion.

A comprehensive collection of findings comprises:

- Oral hygiene
- Caries: clinically and radiographically
- Non-carious alterations of the dental hard tissues
- Gingiva/periodontium/dental prostheses/mucosa
- Condition of existing restorations, secondary caries
- Previous prophylactic measures (auxiliaries for oral hygiene, fluoride application, professional dental care, other measures)
- Dietary history
- Saliva/oral fluid
- General health, medications
- Attitude and wishes of the patient regarding prophylaxis and dental health
- Tooth vitality, hypersensitivity, cervical hyperesthesia (primarily anamnestically)

The extent of the collection of findings/diagnostics varies on an individual basis. In an individual who for a long period of time is caries-inactive or low in caries and makes acceptable prophylaxis efforts, the evaluation regarding oral hygiene, periodontium, caries, and condition of the restorations is sufficient. On the other hand, if new lesions appear, their causes have to be evaluated meticulously in order to adequately conceptualize the preventive measures.

The efficiency of oral hygiene is recorded by means of a simple suitable index.

With the help of an inquiry, information on the dietary habits of the patient often can be obtained only to an insufficient extent. In special cases, it is better to ask the patient to write down all beverages, snacks, and articles of food taken over about four days, including the exact point in time, ingredients (sugar!), quantity and so on.

The stimulated flow rate of saliva can be determined very easily by asking the patient to chew a sugar-free bubble gum for five minutes and to completely spit out the oral fluid. On the market, "sets" are available which not only allow determining the flow rate but also the buffer capacity of the saliva.

Diagnostics

An early diagnosis of periodontal diseases and defects of the dental hard tissues is extremely important to either initiate adequate prophylactic measures or avoid major damages.

For the diagnosis, all tooth surfaces have to be cleaned and thoroughly dried. X-rays of good quality are important for the examination regarding occlusal and interproximal caries. The frequency of radiographs is determined according to the risk of disease of the individual (see chapter "Radiology").

Concerning the diagnostics of periodontal diseases see chapter "Periodontology", concerning the diagnostics of dental hard tissue lesions see also chapter "Restorative Dentistry".

Smooth-Surface Caries

Apart from the "open" carious lesions, particularly carious initial lesions lacking a disruption of the surface have to be assessed. Their monitoring together with other aspects yields important indications of the caries activity and substantially affects the prophylaxis concept.

Occlusal Caries

By means of inspection, the fissures are evaluated regarding demineralization and substance defects. Disruptions of the surface mostly point to a lesion with significant dentin involvement. Discoloration alone does not constitute a safe criterion for caries, especially in adults, it can also be of exogeneous nature. In the case of greatly extended chalky alterations of the fissure entrance, further evaluations are necessary. Bitewing radiographs allow recognizing caries on the occlusal surface, which has penetrated in the dentin, and thus improve the diagnostics particularly in teeth lacking a visible surface defect. Newer methods such as light systems which assess the distinct scattering and/or fluorescence of healthy and demineralized dental hard tissues can complement and improve diagnostics.

Interproximal Caries

Since the clinical examination of interproximal tooth surfaces is hampered, the radiographic evaluation cannot be refrained from. Existing lesions have to be assessed regarding their extension – only visible in enamel or already visible in dentin. Lesions visible only in enamel mostly still exhibit an intact surface and therefore are amenable to prophylaxis. Fiber-optic transillumination can indicate demineralization, although its extension is difficult to estimate. Modern procedures, e.g. digital systems, can complement the diagnostics of interproximal caries.

Secondary Caries

Secondary caries along restoration margins is recorded primarily using visual examination and probing. X-rays can verify and complement the finding. Clinically, secondary caries is characterized by discoloration and defects on the margin of a filling/crown as well as by penetration of the probe into softened dental hard tissue. Restorations of unacceptable quality, hazards to the pulp and periodontium, as well as deficient function have to be recorded as well.

Root Caries

Root caries develops below the cementoenamel junction in teeth affected by gingival retraction. It is characterized by a yellowish to black discoloration of the diseased dental hard tissues. For planning of prophylaxis and treatment, active and inactive lesions of the root surface stringently have to be distinguished. Inactive lesions exhibit a hard surface and are often found in vestibular areas. They are easily amenable to prophylaxis and do not require invasive therapy if there are no esthetic reasons to decide otherwise. Superficial active lesions should, if possible, be converted into inactive ones using appropriate prophylactic measures.

Erosions

Non-carious defects of the dental hard tissues have increased in recent years. The causes of this are multifactorial; changed dietary habits and frequent cleaning of teeth using partly abrasive toothpaste play an important role.

Among the diet-related tooth damages, erosions are at the forefront. Erosion is defined as superficial loss of dental hard tissues caused by acids without the involvement of microorganisms. They can arise due to exogenous or endogenous factors. Exogenous causes are the massive consumption of acidic food products as well as occupational exposure to acids. Among the endogenous causes are chronic gastrointestinal disorders as well as anorexia and bulimia nervosa accompanied by frequent vomiting.

Suggestions for prophylaxis are to be found in Table I.

Wedge-Shaped Lesions

Abrasion resulting from toothbrushes and dentifrices is observed predominantly on the vestibular smooth surfaces of the teeth, typically below the cementoenamel junction. They mostly point to an inappropriate technique of tooth cleaning. Major dish- or wedge-shaped defects often arise due to an impact of acid combined with mechanical abrasion. Occlusal parafunction (bruxism) additionally can promote the formation and progression.

Cervical Hyperesthesia

Precondition is gingival recession (see "Prophylaxis of gingivitis and periodontitis"). Exposed dentin can react predominantly to thermal, mechanical, or chemical stimuli with sharp and violent pain. The degree of severity is determined either by provocation using a short blast of air (Schiff score 0–3; covering of neighboring teeth required) or using a sharp probe. Results are documented. Importantly provocation tests to "find" sensitive tooth necks do not make sense unless the patient themselve (possibly after having been inquired) reports about the problems (firstly, the treatment is not uncomplicated and, secondly, no "neurotization" of the problem should occur).

The typical cervical hyperesthesia has to be distinguished with differential diagnosis from other pathologic conditions (e.g. insufficient restoration, secondary caries, cracked tooth syndrome etc.). In the context of prophylaxis (and therapy) the control of the etiologic cofactors plays an important role (oral hygiene and dietary habits, reflux; see also "Erosions").

Risk of Disease

A major part of our population develops no or only few carious lesions, whereas in a minority, caries still constitutes a major problem. Unfortunately, no simple test exists to date, which allows determining the risk of disease of an individual regarding caries. Important are a careful medical history and systematic diagnosis of all responsible factors related to the development of carious lesions.

In order to be able to fairly assess the risk of disease, the collected findings have to be considered and rated in their entirety. Thus, for example, a low risk of disease can be attested to a patient who exhibits acceptable oral hygiene and optimally adapted restorations, and who has not developed primary or secondary carious lesions in the past three years. Similarly, in a child exhibiting a caries-free deciduous dentition hardly any imminent problems regarding caries in the permanent teeth are to be expected either. However, this can change if the oral hygiene habits, the diet, or salivary secretion etc. alter.

Table I: Suggestions for prophylaxis in the case of erosions

GUIDANCE OF ACID CONSUMPTION	▪ If possible, reduce the consumption of acid-containing food products and limit it to as few as possible (main) meals.
REDUCTION OF THE ACID-RELATED IMPACT	▪ Avoid drinking in sips, drink beverages rapidly; do not suck across the teeth. ▪ Use sports drinks/food products enriched with calcium, complete meals with cheese. ▪ After the consumption of acid rinse with water or (tin- and) fluoride-containing rinsing solution. ▪ Chew tooth-friendly bubble gum for the stimulation of the salivary flow rate.
ENDOGENOUS ACID BURDEN	▪ Suspicion of reflux: refer to a gastro-enterologist. ▪ Anorexia/bulimia patients: initiate psychologic or psychiatric care. ▪ Avoid food promoting reflux, e.g. wine, citrus products, pickle, extremely fatty dishes (full-fat, roasted food etc.), tomatoes, peppermint, coffee, black tea, carbonated beverages, chocolate. ▪ Do not eat big meals before going to bed. ▪ Chew tooth-friendly chewing gum after eating in the case of postprandial reflux. ▪ Antacids: proton pump inhibitors ▪ In the case of marked reflux, an operative intervention by the gastro-enterologist may be necessary.
GUIDANCE OF ORAL HYGIENE	▪ Avoid tooth cleaning immediately after vomiting (rinse!). ▪ Use a soft toothbrush. ▪ Weakly abrasive dentifrices ▪ Fluoride-containing dentifrices ▪ Use brushing technique harmless to teeth. ▪ Apply (tin- and) fluoride-containing rinsing solution and/or concentrated fluoride gel regularly.

On the other hand, patients with existent lesions, conceivably accompanied by insufficient oral hygiene, poorly adapted restoration margins, frequent supply of sugar, or possible health problems impairing salivary secretion are to be classified as individuals exhibiting a high caries risk. In order to specifically design prophylaxis – an indispensable prerequisite for its success –, detailed knowledge regarding oral hygiene habits, diet, salivary secretion, previous prophylaxis efforts, general health, and consumption of medication is necessary.

Criteria for the assessment of the caries risk are compiled in Table II. Of course, not all the respective criteria have to be

Table II: Assessment of the caries risk

CRITERIA FOR THE CARIES RISK	CHILDREN / ADOLESCENTS	ADULTS
Minor		
No new carious lesion in the past year	X	
No new carious lesion in the past three years		X
Flat occlusal-surface relief, fissure sealing	X	
Good oral hygiene, scarce gingivitis	X	X
Adequate fluoride prophylaxis	X	X
Regular dental check-ups	X	X
Adequately treated teeth		X
Medium		
1 carious lesion in the past year	X	
1 carious lesion in the past three years		X
Deep fissures and pits	X	
Oral hygiene moderate, little gingivitis	X	X
Irregular fluoride prophylaxis	X	X
Initial lesions on smooth surfaces	X	
Interproximal radiolucencies (enamel)	X	X
Exposed root surfaces		X
Irregular dental check-ups	X	X
Orthodontic treatment	X	X
High		
≥2 new carious lesions in the past year	X	
≥2 new carious lesions in the past three years		X
Smooth-surface caries	X	X
Poor oral hygiene, gingivitis, periodontitis	X	X
Deep fissures and pits	X	
Mutans streptococci elevated	X	X
Inadequate dental treatment	X	X
Frequent consumption of sweets	X	X
Irregular dental check-ups	X	X
Low salivary flow	X	X
Baby bottle containing drink and sugar	X	
Exposed root surfaces, previous root caries		X
General disease accompanied by reduced salivary secretion, impaired immune system	X	X

fulfilled to assign an individual to a risk category. Primarily decisive for the assignment are the clinical findings concerning presence/absence of disease, attitude of the individual towards prevention (quality of oral hygiene, fluoridation, diet, dental check-ups etc.) and in addition serious diseases. Saliva tests also serve for assessing the causes of disease, bacterial tests can be used for the long-term monitoring of the specific caries prophylaxis.

As a further simple method for assessing the caries situation in children starting school the Dentoprog-method (Box 1) or the Cariogram (Box 2) can be recommended.

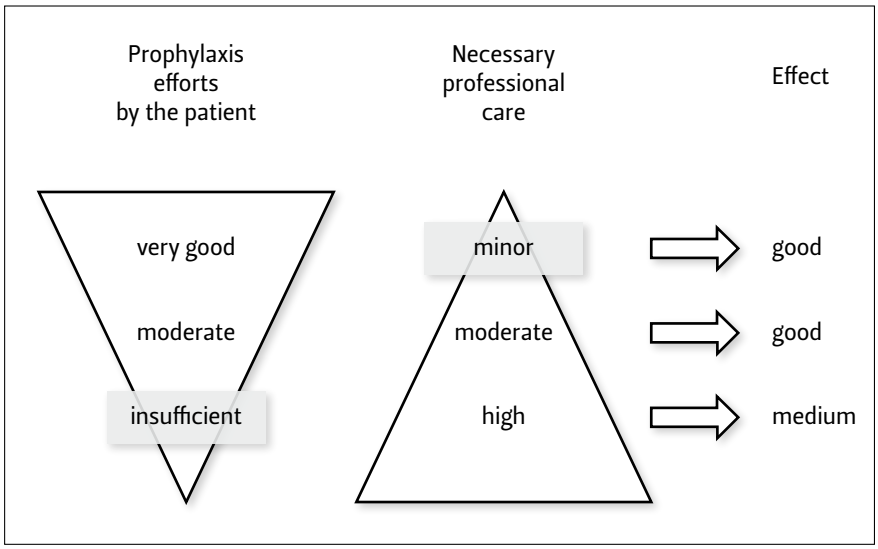

Fig. 1: Prophylaxis concept patient/dental team

Individual Prophylaxis

Based on the dental and possibly also the medical evaluations as well as on the ensuing risk analysis, a prophylaxis program tailored to the respective individual has to be designed and proposed. The patient has to be informed about all aspects as well as about the possibilities and goals of the individual prophylaxis efforts. Correspondingly, directives and recommendations of auxiliaries have to comply with the capabilities of the individual, such as for example the manual skill. Furthermore, it has to be assessed to what extent the patient themselves are able to optimally perform the prophylaxis or else whether professional support and help within the recall program is necessary. Individual prophylaxis efforts (oral hygiene, fluoridation etc.) and professional care meaningfully complement each other (Fig. 1).

Box 1: Determination of the caries risk in children using the Dentoprog method

The Dentoprog method relies on the number of clinically healthy deciduous molars and on initial signs of caries activity in first permanent molars (Marthaler et al. 1997). This method allows a cost-effective triage of children exhibiting a high/low caries risk and in the border area should/can be complemented by other parameters (microbiological, salivary buffer capacity, degree of gingivitis, family history).
In the canton of Zurich, the method is used by the school dental service as part of the mandatory annual check to determine the caries risk of children starting school as follows:

1. Determine (a) the number of healthy deciduous teeth (i.e. without fillings or open carious lesions; range 0–8) and (b) the number of discolored fissures and pits in the first permanent molars (chalky-white, yellow, brown to black; range 0–8).
2. Calculate the Dentoprog-S® value according to the formula DPW-S® = 2× (a) – 1× (b).
3. Risk determination: children having a DPW-S® below 8 are regarded as being at risk of caries and require further prophylactic measures.

Box 2: Determination of the caries risk using Cariogram

A further clinically validated method to determine the caries risk is the software *Cariogram*. This software has been developed by the University of Malmö, can be downloaded free of charge, and is also available in German, French, and Italian. Taking account of various risk factors, an individual caries risk profile is depicted in the form of a pie chart. The caries risk proper is indicated as "susceptibility to caries". Other factors such as the diet or individual oral hygiene habits are weighted as well. Owing to the easy visualization, the software serves both for patient motivation and the determination of indicated prophylactic measures. The software can be downloaded using the following link: www.mah.se/fakulteter-och-omraden/Odontologiska-fakulteten/Avdelning-och-kansli/Cariologi/Cariogram/ (Link checked July 30, 2017).

General Remarks

The individual prophylaxis comprises the supply and usage of preventive measures, tailored to the individual needs and capabilities of the patient. The dentist is responsible for the concept and the use of the dental team. Prerequisite for an effective individual prophylaxis is an exact medical history, collection of findings, diagnosis, and analysis of the risk of disease. The patient has to be informed about the clinical situation; possibilities, concept, and goals of the prophylaxis have to be explained. Motivation and instruction take place at the same time, subsequently, check-ups and re-motivation have to optimize the prophylaxis efforts. In the case of children, the inclusion and collaboration of the parents is indispensable, in the case of disabled persons, caregivers must be won over to cooperate.

The success of prophylaxis most easily can be ensured if all intervention possibilities are utilized (Fig. 2).

Pretreatment

Primarily, the prerequisites on the part of the patient have to be created in order that their own prophylaxis efforts can bring about an optimal effect. This includes, for example, the removal of teeth unworthy of preservation, the elimination of open carious lesions, the removal of excess material from fillings and crowns as well as of supra- and subgingival calculus.

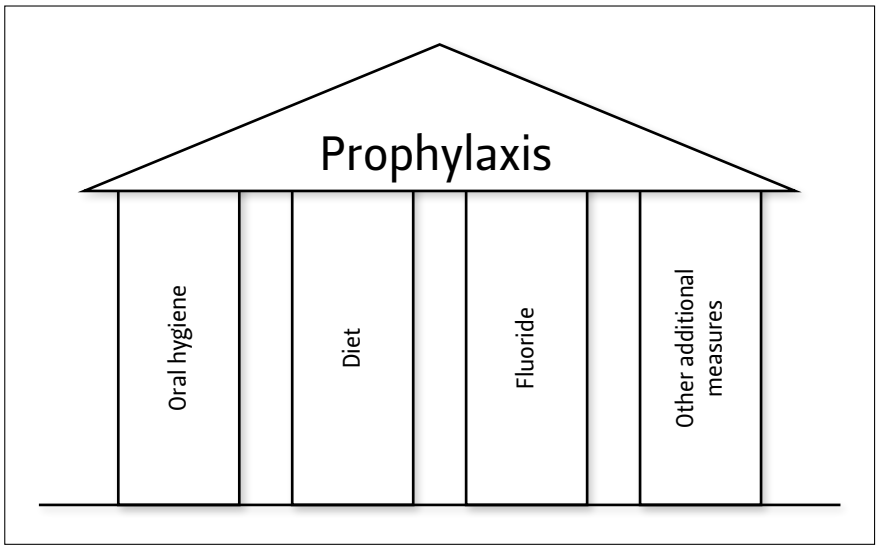

Fig. 2: The "pillars" of caries prophylaxis

Oral Hygiene

The objective of oral hygiene measures is to prevent the formation of bacterial plaque or to remove it as early as possible. Patients have to be instructed regarding the optimized use of all auxiliaries for the mechanical removal of plaque – tailored to the individual needs and capabilities. It has to be kept in mind that only good oral hygiene protects against periodontal disease and caries, and that even small accumulations of plaque can be pathogenic. From experience, particular attention has to be paid to cleaning of the interproximal surfaces. Every single instrument suitable for the patient has to be accurately instructed, and subsequently the correct usage has to be checked. Ultimate criteria for the efficiency of prophylaxis are not the number of instruments used, the frequency of oral hygiene, or the utilization of most modern and most expensive auxiliaries, but rather that tooth surfaces are free from plaque.

In addition, it has to be ensured that no damage of the dental hard tissues (wedge-shaped defects) or the gingiva (injuries) are caused by an inadequate technique of tooth cleaning and/or inappropriate auxiliaries. Toothbrush, toothpaste, and cleaning technique have to be adjusted in such a way that an optimal cleaning efficiency is attained, yet unwanted side effects are largely avoided.

Chemical Plaque Control

In the context of an intensified prophylaxis, the application of antibacterial substances for the reduction of periodontal pathogens and cariogenic microorganisms over a limited period of time can make sense. The efficacy of a treatment depends on the substance applied as well as on the optimization of the contact and retention time of the preparation at the point of action. Attention has to be paid to possible side effects.

To date an application using individually adapted medication carriers has proven efficient. Varnishes, the local application using a brush, or rinsing solutions can also be useful.

Diet

Patients have to be informed regarding all relationships between the diet and caries or erosion. Not only the commonly known "sugar" is problematic for dental health, all readily soluble mono- and disaccharides can be incorporated by the plaque bacteria and glycolytically degraded to acids. Therefore, they also have to be regarded as cariogenic. However, the cariogenicity of carbohydrates is not determined primarily by their absolute quantity, but rather by the frequency of the supply. In terms of a practical consequence it ensues that the frequency of sugar-containing meals and snacks should be reduced. As sweet "semiluxury food" in between times the tooth-friendly (i.e. harmless to teeth) products characterized by the well-known logo (Fig. 3) can be recommended.

It is often difficult to ascertain the detailed dietary habits of a patient and in particular to identify the aspects responsible for an elevated caries activity. Even a time-consuming detailed inquiry is often uninformative. It is therefore advisable to take a written dietary history. The form shown in the appendix serves as an example. The patient is asked to write down all food articles and beverages consumed over four days and to specify in detail the point in time, the quantity, and possible supplements (sugar!). It makes sense that at least one of the recorded days coincides with a weekend. In addition, information concerning any possibly taken medication has to be supplemented. Also, it has proven suitable to hand out preprinted forms to the patient. As an example, these contain an entire day's program as well as suggestions regarding indications of quantity. This helps the patient to make the list as accurate as possible (see appendices 1 and 2). The completed history forms are analyzed together with the patient; the dental team is then able to point to problem situations in the individual dietary habits and to make specific recommendations.

Due to the multifactorial etiology of dental caries, it is not possible to state in detail at what frequency of the supply of fermentable carbohydrates the caries risk is still low or else significantly elevated. It can be assumed that more than two sugar-containing snacks or a total of five or more "sugar contacts" per day can increase the caries risk.

In the case of (at least partly) diet-related erosive tooth damages, the history has to be examined with respect to the consumption of acidic beverages and food products, and appropriate recommendations should be made.

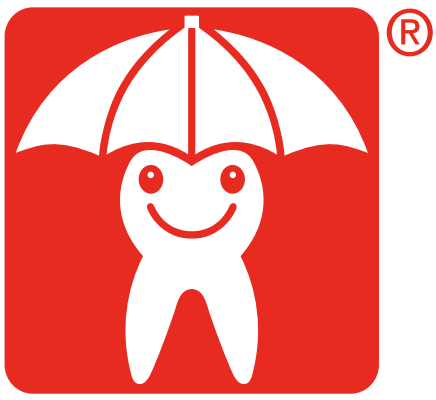

Fig. 3: Logo of the Toothfriendly initiative

Fluoride Prophylaxis

The caries-protective effect of the fluorides is known and undisputed from the scientific and clinical side. It is substantially co-responsible for the caries decline observed in the last decades, at least in children and adolescents. Most important is the local application of fluoride compounds on emerging and erupted teeth. A pre-eruptive systemic effect, although demonstrable, is of minor importance. In the present day, generally caries-poor generation of children and adolescents as well as in all adults, major importance has to be ascribed to the post-eruptive effect of all fluoridation procedures acting on the tooth surfaces.

It is undisputed that the fluoride prophylaxis has to be continued throughout one's life to ensure the success. Methods used and the intensity of the fluoride application are determined by the needs, i.e. by the caries risk of the single individual. For all individuals exhibiting a low risk of disease, a basal fluoride prophylaxis is sufficient. Otherwise, additional measures have to be recommended as part of an intensive prophylaxis (Tab. III). It has to be decided on a case-by-case basis, what procedure or what combination of procedures appears best suited for the respective individual.

Of course, the fluoridation concept also has to consider local aspects such as an increased natural fluoride concentration in the drinking water. Furthermore, mineral water with a high fluoride content is available on the market as well.

In order to minimize the risk of enamel fluorosis, attention has to be paid to the quantity of potentially swallowed fluoride in children under five to six years of age. Use of fluoride-containing children's toothpaste up to the eruption of the permanent first molars is advisable. The local application of highly concentrated fluoride preparations such as varnishes and gels in infants exhibiting a high caries risk should only take place under careful supervision.

The combination of various methods of fluoridation is appropriate in individuals exhibiting an elevated caries activity or increased caries risk.

Fissure Sealing

Most primary carious lesions in children and adolescents are found in the fissures. The morphology of the occlusal surface and the reduced efficacy of fluorides in fissures filled with plaque can be seen as reasons. Correspondingly, these surfaces, in particular those of the permanent molars, deserve special attention and preventive care.

As has been proven, fissure sealing is a very suitable measure for the prevention of caries in these locations. However, it only makes sense in patients exhibiting an increased caries risk and in combination with preventive measures for all other tooth surfaces.

Sealed teeth have to be checked regularly, lost or partly lost sealing material has to be replaced as appropriate. In order to optimize the cost-benefit ratio, the indications have to be kept in mind (Tab. IV).

Documentation

In the context of an individual prophylaxis the following aspects have to be documented:

- Medical history
- Diagnosis
- Recommended measures, instructed auxiliaries
- Follow-up checks

Anamnestically, the causes responsible for the occurrence of the disease have to be registered. Special factors affecting the caries risk as well as the quality and problems of previous prophylaxis efforts have to be written down. Apart from primary and secondary caries, the diagnosis comprises the condition of existing restorations, oral hygiene, as well as the state of health of the gingiva and periodontium. Plaque, calculus, and gingival health are recorded using appropriate indices. General unspecific descriptions at most are acceptable in patients with good oral hygiene and a low risk of disease.

Auxiliaries (brushes, dentifrices etc.) recommended individually for optimized oral hygiene and fluoridation measures have to be registered.

The effects of prophylactic measures have to be checked. Apart from a description of the clinical situation, the repeated assessment of the state of hygiene as well as of the health of the gingiva and periodontium give some indication of the treatment success. Insufficient interest and cooperation of the patient, specific newly occurring problems etc. become evident.

Table III: Fluoride in prophylaxis

LOW CARIES RISK	Basal prophylaxis ■ Fluoride toothpaste ■ Fluoride salt ■ Fluoride gel 6×/year in schools
INCREASED CARIES RISK	Intensive prophylaxis ■ Fluoride toothpaste ■ Fluoride salt + depending on indication: ■ Brushing with fluoride gel ■ Fluoride rinsing solution ■ Fluoride varnish ■ Fluoride toothpaste on prescription

Table IV: Indications and contraindications related to fissure sealing

FISSURE SEALING	Indications: ■ Molars in patients exhibiting an increased caries risk (often children and adolescents) ■ Unfavorable morphology ■ Drying possible ■ Check-up warranted
	Contraindications: ■ Patients exhibiting a low caries risk ■ Flat relief of occlusal surfaces ■ Drying impossible (→ use of fluoride varnish and specific oral hygiene)

Semicollective Prophylaxis

The prophylactic measures organized in nurseries, kindergartens, schools, and nursing/retirement homes have substantially contributed to the decline of caries in the past decades. These measures were initiated and promoted by the dental profession. Cooperation with public authorities and teaching staff as well as the employment of specially trained assistants led to success. In order to secure this success, the active commitment of all dentists is necessary in terms of:

- Collaboration with authorities
- Information of parents and teachers
- Control of the consequent implementation of appropriate measures (oral hygiene, fluoridation, nutritional information)
- Support of the assistants (school dental service helpers, home personnel)
- At least annual clinical examination of all children

4. References

Core Literature

Fejerskov O, Kidd E: Dental Caries – The disease and its clinical management. Blackwell Munksgaard, Oxford (2009).

Hellwig E, Klimek J, Attin T: Einführung in die Zahnerhaltung – Prüfungswissen Kariologie, Endodontologie und Parodontologie. Deutscher Zahnärzte Verlag, Köln, 15–154 (2009).

Lussi A, Schaffner M: Fortschritte der Zahnerhaltung. Quintessenz Verlag, Berlin, 17–84 (2010).
(English: Advances in Restorative Dentistry, Quintessenz Verlag, Berlin, 2012).

Lussi A, Jäggi T: Dentale Erosionen – Von der Diagnose zur Therapie. Quintessenz Verlag, Berlin (2009).

Lussi A, Hellwig E, Klimek J: Fluoride – Wirkungsmechanismen und Empfehlungen für deren Gebrauch. Schweiz Monatsschr Zahnmed 122: 1037–1042 (2012).

Marthaler Th M, Steiner M, Helfenstein U: Praktischer Gebrauch der Dentoprog-Methode zum Auffinden der Kinder mit hohem Kariesrisiko. Oralprophylaxe 19: 40–47 (1997).

Schmidlin P R, Sahrmann P: Current management of dentin hypersensitivity. Clin Oral Investig 17 Suppl 1: S55–59 (2013).

Additional References

Lussi A, Hellwig E, Jaeggi T: Prevention of erosion. Dental Erosion. Diagnosis, Risk Assessment, Prevention, Treatment. Quintessence, London, 55–60 (2011).

Meyer-Lückel H, Paris S, Ekstrand K: Karies. Thieme Verlag, Stuttgart (2012).

Müller F, Nitschke I: Der alte Patient in der zahnärztlichen Praxis. Quintessenz Verlag, Berlin (2010).

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Appendix 1

Dietary history

Examiner: _____

Patient: Name/First name: _____ Date of birth: _____

Adress: _____ Telephone: _____

Do you use table salt in the green package? (containing fluorine and iodine) ☐ Yes ☐ No

1. Within the next four days (among these at least one weekend day), please write down the time and exact specification of all food articles and beverages consumed (including snacks, candies, chewing gum etc.). Every food product and beverage is important, regardless of how much was taken and at what time this took place

   Tips for the indication of quantity of your food:

Beverages/fluids	spoons, cups, glasses
Sugar	tea/table spoons, cubes
Bread	slices
Biscuits, cake	piece, number, type
Sweets, chocolate	size, number

2. If you take medication, please also write this down on the list.

3. Indicate kind, time, and duration of oral hygiene (e.g. toothbrush 2 min., dental floss, fluoride rinse). What toothpaste/ fluoride rinse etc. do you use?

Example of a dietary history

Weekday/date: Friday, February 27, 2015

Time	Food product/beverage	Time	Oral hygiene	
07.00	½ cup of cornflakes, milk 1 cup of coffee, 2 sugar cubes 1 glass of orange juice 1 tablet of Aspirin 500 mg	07.30	Toothbrush (TB) Toothpaste (TP) Dental floss (DF)	2 min. Elmex 3 min.
10.15	1 cup of coffee, 2 sugar cubes, 1 bread roll 1 V6-chewing gum			
12.00	1 plate of pasta, 1 bratwurst 1 glass of mineral water	12.45	TB TP	2 min. Colgate
15.15	1 apple, 1 cup of black tea			
18.00	2 pieces of white bread, 4 slices of cheese 1 glass of coke (in sips)			
19.30	2 pieces of biscuits			
21.00	1 bar of chocolate 2 glasses of orange juice			
23.05	1 tablet of Aspirin 500 mg	23.15	TB TP Rinsing solution	2 min. Candida Sensitive 1 min. ACT

Appendix 2

Dietary history

Time	Food product/beverage	Time	Oral hygiene