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# Dental Erosion

## Diagnosis, Risk Assessment, Prevention, Treatment

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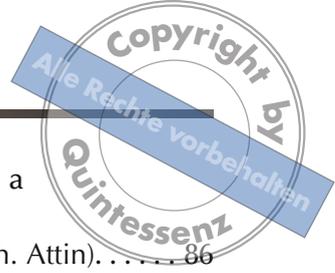
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## Foreword

In the last several decades, there has been a remarkable caries decline in developed countries. This is mainly due to improved oral hygiene and fluorides. However, in the last 25 years in particular, in groups with a higher socioeconomic level, health awareness has increased and diet has changed. More and more people are consuming more acidic drinks and juices, and eating fruits or salads with vinegar dressing. These behavior changes and additional factors cause increasing loss of hard tooth tissues by erosion. One problem is that not only the patients but also many dentists do not have sufficient knowledge about this topic and how to prevent and treat this disease.

This book captures the prevalence and multifactorial reasons for erosive tooth substance loss, including the diagnosis, severity index and incidence, progression, and risk factors. Prevention of erosion and therapy adjusted to risk and age, including deciduous teeth, are also

covered. This book is illustrated with excellent clinical pictures and step-by-step instructions for the daily practice.

The task of bringing together the current knowledge and understanding of erosion requires exceptional authors with wide-ranging expertise, and an acknowledged and formidable reputation in the field of erosion. Adrian Lussi fits this profile perfectly and he is to be congratulated on having conceived, planned, and edited this book.

The book can be recommended to all practitioners, students, and teachers as a valuable guide for diagnosis, treatment, and prevention of erosion. All those who read and digest the contents of this book will be enlightened and encouraged to widen the scope of their clinical practice and to treat this disease more efficiently with the aim of serving the needs and expectations of patients to the best possible advantage.

*Prof. Dr. Reinhard Hickel, Munich*

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# Introduction

*Adrian Lussi and Thomas Jaeggi*

The relevance of dental erosion – tooth demineralization without the involvement of bacteria – has increased substantially over recent years. This fact is supported not only by daily observation in dental practice, but also by the large number of academic publications on the subject. In the 1970s, fewer than five publications per year addressed dental erosion, whereas this had doubled to approximately 10 a year in the 1980s. In the late 2000s, there were more than 100 publications on the topic every year. This striking number reflects several factors, including the declining occurrence of caries in recent decades, which has allowed erosion to gain prominence, and altered dietary habits, which have had a marked effect. The consumption of soft drinks has tripled since the late 1980s. Additionally, the manner of consumption has changed, particularly by

children and young adults (sipping, sucking on bottles, and through teeth). The increasing occurrence of erosion can be considered a direct consequence of those factors.

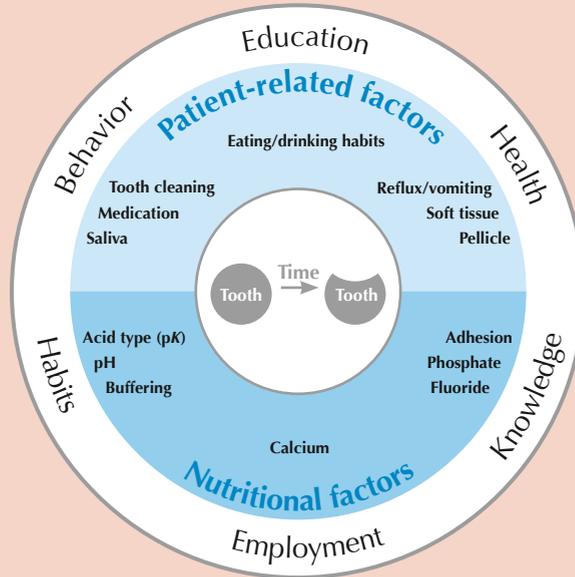
The pH of foods and beverages is also of importance; however, it would be wrong to attribute the etiology of erosions to one single factor, where it is clearly a multifaceted process. This book discusses all these aspects with an audience of both students and practitioners in mind. The checklist printed on the next page presents a tool for a systematic approach in examination for dental erosion and its prevention. One chapter collecting contributions by researchers in various university clinics on therapeutic measures shows the full breadth of options and resources currently available for the treatment of dental erosion.

## Checklist for dental erosions

**Diagnosis**

BEWE (basic erosive wear examination)

**Etiology**



**Risk assessment**

- Dietary habits
- Frequency and amount of consumption
- Sports and occupational exposure
- Salivary flow rate
- Gastroesophageal reflux
- Bulimia and anorexia

**Preventive measures**

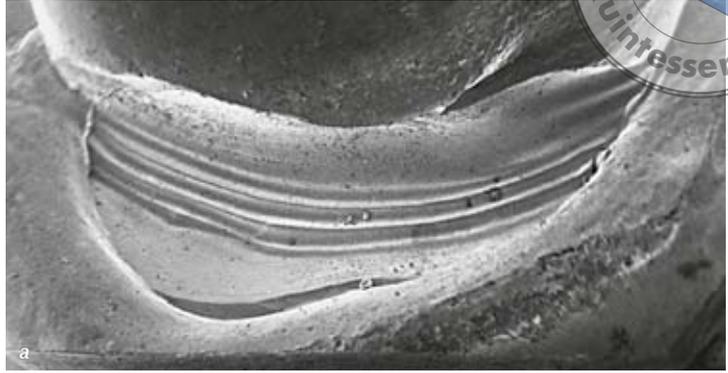
- Calcium content in foods and beverages
- Products containing (stannous) fluoride
- Changing traumatic tooth-cleaning habits
- Gastroenterological treatment
- Psychological treatment

**Treatment**

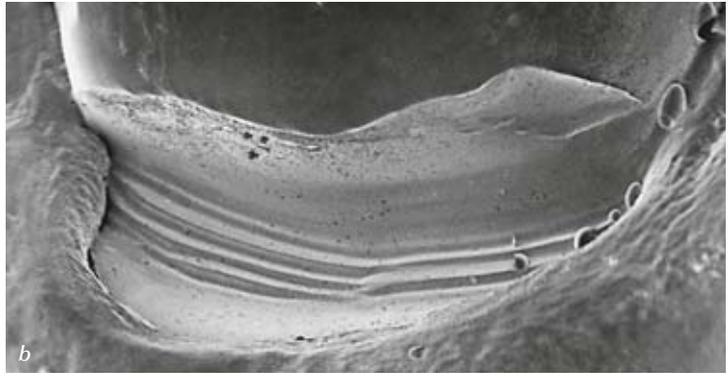
- Protection with bonding systems
- Resin composite
- Ceramic

**Follow-up**

**Fig 2-16a** Scanning electron microscope image of a wedge-shaped defect. The sharp edges and striation caused by toothbrush bristles are clearly visible.



**Fig 2-16b** Same patient, 4 years later. Because of inadequate brushing techniques, the tooth substance has further deteriorated.



## Basic erosive wear examination

When erosions are clinically observable or if an increased risk is indicated, the patient should be thoroughly examined. The BEWE is a short examination that efficiently allows erosions to be quantified (Tables 2-1 and 2-2).<sup>1</sup> BEWE allows the rapid detection and evaluation of acid defects. It is easy to use and offers recommendations regarding preventive

and restorative measures (Table 2-3). With the exception of the third molars, teeth are being tested for acid damage vestibularly and occlusally, as well as orally.

The recommendations for ensuing treatment measures are only guidelines, as opinions differ considerably among experts, and social factors can play a role. Examples of patient treatments are given in Chapter 7. BEWE takes into account the entire loss of

ly orally on the maxillary incisors.<sup>17</sup> Figure 6-2 summarizes the distribution of erosions in adolescents between 8 and 17 years of age in various studies.<sup>6-8,10-14,17,18,20,23,27-29,37,38,40</sup>

## Clinical appearance

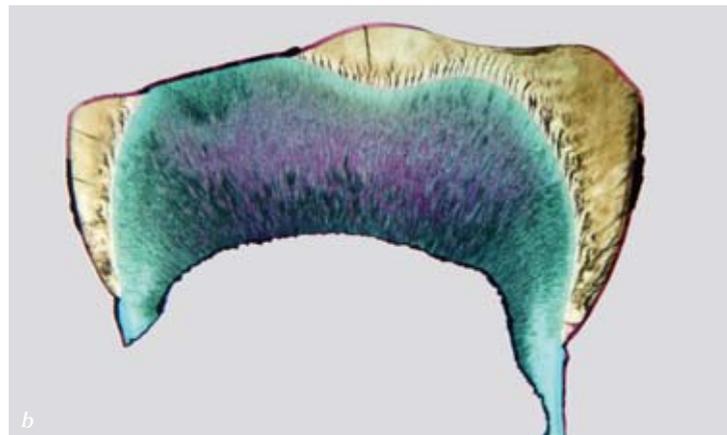
The initial stages of dental erosion are difficult to diagnose for both primary and permanent teeth because surface demineralization of enamel does not

result in discernible surface softening. Vestibular erosions have a silky or dull surface appearance initially, progressing into indentations and ridges in the enamel. Affected dentin often has a persisting marginal enamel ridge. As on permanent teeth, occlusally, rounded cusps are formed with bowl-shaped defects into the dentin. At a later stage, the surface morphology completely disappears. Oral erosions mainly occur in the maxillary incisors (Figs 6-3 and 6-4).<sup>49,68</sup>

*Fig 6-3a Exfoliated primary molar, vestibular view. A typical advanced stage erosion is visible occlusally, with complete disappearance of surface morphology and extensive dentin exposure. There are pronounced indentations, a rounded enamel surface, and no sharp edges.*



*Fig 6-3b The molar in histologic cross-section. The morphology of the crown is rounded and presents no sharp edges. Affected dentin is clearly visible.*





*Fig 6-4a Frontal view of mixed dentition. Deciduous teeth show considerable erosive substance loss.*



*Fig 6-4b In the 1st quadrant for the same patient, there is severe loss of substance affecting teeth 53 and 54 incisally and occlusally; tooth 55 is less affected, merely showing initial loss of surface structure. The basic erosive wear examination (BEWE; see Chapter 2) for the 1st and 2nd sextants is grade 3.*



*Fig 6-4c A similar clinical image is seen in the 2nd quadrant in this patient. The 2nd and 3rd sextants both are BEWE grade 3.*

**Fig 6-4d** The situation is practically identical in the 3rd quadrant. Again, teeth 3 to 5 are affected. Another typical feature of erosion is the overlapping edges of the resin composite filling, which occurs because it has greater acid resistance than enamel (Chapter 7).



**Fig 6-4e** The 4th quadrant shows similar features, with clearly visible advanced erosions in teeth 83, 84, and 85. There is characteristic cupping and loss of surface morphology with affected dentin in all three teeth.





*Fig 7-125 Initial frontal view with vestibular erosions in maxillary teeth and gingiva recession in mandible.*



*Fig 7-126 Initial view of the maxilla, with generalized erosions and localized attrition in anterior teeth.*



*Fig 7-127 Initial view of the mandible, with generalized erosions and localized attrition in anterior teeth.*



*Fig 7-128 Initial right lateral view with erosions.*



*Fig 7-129 Initial left lateral view with erosions.*



*Fig 7-130 Frontal view with full ceramic crowns in teeth 13 to 23 and direct resin composite filling buccally in tooth 33.*



*Fig 7-131 Maxilla after direct resin composite reconstructions of lateral teeth.*



*Fig 7-132 Mandible after treatment of teeth 37, 36, 46, and 47 with resin composite overlays and direct resin composite reconstructions in teeth 35 to 45.*



*Fig 7-133 Right lateral view with resin composite overlays in teeth 46 and 47 as well as direct resin composite reconstructions in remaining lateral teeth.*



*Fig 7-134 Left lateral view with resin composite overlays in teeth 36 and 37 and direct resin composite reconstructions in remaining lateral teeth. Teeth 37 to 33 included resin composite fillings buccally.*

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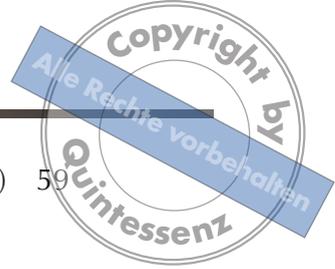
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