

1 Terminology of Erosive tooth wear: Consensus Report of a Workshop Organized by ORCA
2 and Cariology Research Group of IADR

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60 **Abstract**

61 Our understanding of erosive tooth wear and its contributing factors has evolved considerably
62 over the last decades. New terms have been introduced continuously to describe often the
63 same aspects of this condition, whereas others are being used inappropriately. This has led to
64 unnecessary confusion and miscommunication between patients, professionals and
65 researchers. A group of 15 experts, selected by the European Organization for Caries
66 Research and the Cariology Research Group of the International Association for Dental
67 Research, participated in a two-day workshop to define the most commonly used terms in
68 erosive tooth wear. A modified Delphi method was utilized to reach consensus. At least 80%
69 agreement was achieved for all terms discussed and their definitions related to clinical
70 conditions and processes, basic concepts, diagnosis, risk, prevention and management of
71 erosive tooth wear. Use of the agreed terms will provide a better understanding of erosive tooth
72 wear and intends to enable improved communication on this topic.

73

74 **Introduction**

75 Over the last decades, the topic of acid-related tooth destruction has been increasingly
76 researched and reported more frequently in the literature. A simple PubMed search with the
77 terms “dental erosion OR erosive tooth wear OR tooth erosion” revealed nearly 4000 hits,
78 showing the general interest in this area. The major problem in this literature is that the
79 terminology has evolved with variations in the meaning of a single term and sometimes
80 different terms are used to describe the same condition. Therefore, this paper defines the most
81 commonly used terms related to erosive tooth wear and its management. Use of a common
82 terminology will facilitate less ambiguous communication between researchers, clinicians and
83 their patients. It will also enable better documentation and interpretation of research findings
84 and clinical observations.

85

86 **Methods**

87 The European Organization for Caries Research (ORCA) and the Cariology Research Group
88 of the International Association for Dental Research (CRG-IADR) organized a consensus
89 workshop on terminology related to erosive tooth wear and dental caries that was held in
90 Frankfurt, Germany from 06-07 February in 2019. Two groups of experts were selected, one
91 for caries and one for erosive tooth wear. This manuscript refers only to the results from the
92 erosive tooth wear group.

93 Fifteen experts were selected by the executive boards of both organizations to participate in
94 the erosive tooth wear section of the workshop, with NS and FL appointed as chairs. A draft
95 document containing the most commonly used terms and their proposed definitions was
96 prepared by NS and FL. Prior to the workshop, this document was circulated to the experts
97 who independently decided on the appropriateness and accuracy of the provided statements.
98 All individual feedback was collected and combined into one document by NS and FL, which
99 was then shared among workshop participants. New terms and their definitions brought
100 forward by the experts were also included in this document.

101 A modified Delphi process was used to establish the most commonly used terms and their
102 definitions. The nominal group method was then used to reach consensus on each definition.
103 Consensus with the final definitions or statements was ascertained by anonymous voting. Each
104 term and its definition were voted on separately. An agreement of at least 80% was needed to
105 confirm the definition and/or statement for each term. The reached agreement in percent is
106 given after each term in parentheses.

107 The terms and their definitions are presented in the following categories: clinical conditions
108 and processes, basic concepts, diagnosis, risk, and prevention and management of erosive
109 tooth wear. In addition to some of the definitions, further explanations are given in *italics*. In

110 these cases, the percentage of agreement also refers to these additional explanations. For this
111 paper, the term 'mineralized tooth substance' refers to dental enamel, dentine and cementum.

112

113 **Terms and definitions**

114 **1. Clinical conditions and processes**

115 a) Conditions

116 Tooth wear (100%)

117 The cumulative surface loss of mineralized tooth substance due to physical or chemo-physical
118 processes (dental erosion, attrition, abrasion).

119 *Tooth wear is not considered to be the result of dental caries, resorption or trauma.*

120

121 Erosive tooth wear (100%)

122 Erosive tooth wear is tooth wear with dental erosion as the primary aetiological factor.

123

124 b) Processes

125 Dental Erosion (100%)

126 Dental erosion is the chemical loss of mineralized tooth substance caused by the exposure to
127 acids not derived from oral bacteria.

128

129 Dental Attrition (100%)

130 Dental attrition is the physical loss of mineralized tooth substance caused by tooth-to-tooth
131 contact.

132

133 Dental Abrasion (100%)

134 Dental abrasion is the physical loss of mineralized tooth substance caused by objects other
135 than teeth.

136

137 c) Discouraged terms

138 Demastication (100%)

139 The term demastication is discouraged and will not be defined in this publication.

140

141 Abfraction (100%)

142 The term abfraction is discouraged and will not be defined in this publication. The level of
143 evidence currently available is too weak to justify it as a separate process.

144

145 Acid erosion/acidic erosion (93%)

146 The terms acid erosion and acidic erosion have the same meaning as dental erosion, are
147 discouraged and will not be defined in this publication.

148

149 Tooth surface loss (100%)

150 The term tooth surface loss has been used to describe tooth wear. Its use is discouraged in
151 the clinical situation and will be defined in the context of research outcome measures.

152

153 **2. Basic concepts**

154 Erosive challenge (100%)

155 Exposure to an acid, which may lead to an erosive demineralization.

156

157 Erosive demineralization (100%)

158 Loss of tooth mineral caused by exposure to acids resulting in an erosive lesion.

159

160 Resistance to dental erosion (100%)

161 The capability of the mineralized tooth substance to withstand an erosive challenge.

162

163 Protection against dental erosion (100%)

164 Any measure, which increases the resistance of the mineralized tooth substance to dental
165 erosion, prevents exposure to or limits the effect of an erosive challenge.

166

167 Remineralization (87%)

168 Recovery of the original mineral phase of the tooth substance after demineralization

169 *There is insufficient evidence that remineralization in dental erosion occurs; however, surface*
170 *deposition of mineral may be possible.*

171

172 Erosive potential/erosivity (100%)

173 The capability to cause dental erosion.

174 *The erosive potential of a substance depends on several factors such as its pH and buffering*
175 *properties, calcium and phosphate contents (degree of saturation), fluoride content, and*
176 *temperature. Whether the erosive potential translates into dental erosion depends on host*
177 *factors and exposure conditions.*

178

179 Buffering properties (100%)

180 Buffering properties of an aqueous solution are a measure of resistance to pH change, and
181 can be represented by:

- 182 - Titratable acidity: the amount of base, given in mmol/l, needed to raise the pH to a
183 defined level (normally 7.0).
- 184 - Buffering capacity: the buffering at the pH of the investigated solution. It can be
185 assessed from the slope of the titration curve at the solution pH.

186

187 Abrasive potential/abrasivity (100%)

188 The capability to cause dental abrasion.

189

190 Endogenous/intrinsic acids (87%)

191 Acids from the gastric juice.

192

193 Exogenous/extrinsic acids (93%)

194 Acids from external sources, such as the diet, environment and/or drugs.

195

196 Laboratory terms (93%)

- 197 - Sound tooth surface

198 A tooth surface without any recognizable defect.

- 199 - Initial (early) erosive lesion

200 A lesion with mineral loss without surface loss.

- 201 - Advanced erosive lesion

202 A lesion with mineral loss together with surface loss.

203

204 Discouraged terms

205 Corrosive wear, bio-corrosion (100%)

206 The terms corrosive wear and bio-corrosion are discouraged and will not be defined in this
207 publication.

208

209 **3. Diagnosis**

210 Diagnosis of erosive tooth wear integrates findings from the patient history, assessment of risk
211 factors and an oral examination. (100%)

212 Typical early signs of erosive tooth wear include defects that are shallow; they mostly affect
213 the smooth surfaces and the area coronal to the cemento-enamel junction with an intact band
214 at the gingival margin. On the occlusal surfaces, cupping and flattening of the surface can be
215 found. As erosive tooth wear progresses, the dentine colour becomes more visible and
216 restorations may protrude from the surrounding dental hard tissue. Finally, the teeth can have
217 a melted appearance losing the morphology of sound teeth. (93%)

218

219 Physiological tooth wear (87%)
220 Some degree of tooth wear expected over a lifetime.
221 The rate of progression varies between individuals and not all tooth wear needs treatment.
222
223 Pathological tooth wear (93%)
224 Tooth wear can be defined as pathological if it is beyond the physiological level relative to the
225 individual's age and interferes with the self-perception of well-being.
226
227 Classification (100%)
228 - Mild erosive tooth wear (BEWE 1)
229 Initial loss of surface texture
230 - Moderate erosive tooth wear (BEWE 2)
231 Distinct defect: hard tissue loss involving less than 50% of the surface area
232 - Severe erosive tooth wear (BEWE 3)
233 Hard tissue loss involving more than 50% of the surface area
234 Moderate and severe levels may involve dentine exposure.
235
236 Distribution of erosive tooth wear (87%)
237 Localized erosive tooth wear is restricted to a few teeth.
238 Generalized erosive tooth wear involves most of the teeth.
239
240 Discouraged term
241 Activity of erosive tooth wear (100%)
242 As activity refers to disease, this term is discouraged and will not be defined in this publication.
243
244 **4. Risk**
245 Erosive tooth wear risk (87%)
246 The probability that erosive tooth wear will occur within a defined period of time or at a certain
247 age.
248
249 Risk factor/predisposing factor for erosive tooth wear (100%)
250 A risk factor or predisposing factor is any aspect of personal life-style, habit, or behaviour,
251 medical condition, environmental exposure or an inborn or inherited characteristic, which is
252 evidentially associated with an increased probability to develop erosive tooth wear. Risk factors
253 are a part of the causal chain or expose the individual to the causal chain.
254
255 Variable/modifiable risk factor (93%)

256 The risk factor can be modified by an intervention, which in turn can reduce the likelihood to
257 develop erosive tooth wear.

258

259 Risk marker/risk indicator (100%)

260 An attribute or exposure that is associated with an increased probability of developing erosive
261 tooth wear, but not thought to be a part of the causal chain (e.g. some evidence showing that
262 erosive tooth wear in the primary dentition is a risk marker for erosive tooth wear in the
263 permanent dentition).

264

265 Risk assessment for erosive tooth wear (100%)

266 Risk assessment comprises the qualitative and quantitative estimation of the likelihood of
267 developing erosive tooth wear. It uses clinical, epidemiologic, environmental, and other
268 relevant data.

269 Screening for erosive tooth wear is the first step of risk assessment – if indicated next steps
270 would be:

- 271 - Risk factor identification and characterization
- 272 - Exposure assessment
- 273 - Risk estimation (combining the above to quantify risk level)

274

275 Risk management of erosive tooth wear (100%)

276 Risk management includes various steps to reduce the level of risk, which are a) risk
277 evaluation; b) exposure control, c) risk monitoring. In case of erosive tooth wear, it comprises
278 the analysis of which type of wear leads to the hard tissue loss, reduction of acid exposure and
279 exposure to physical forces and the check, whether recommendations are sustainably realized
280 in the daily practice.

281

282 **5. Prevention and management of erosive tooth wear**

283 Management is the complete scope of care and self-care including diagnosis, risk assessment,
284 prevention (primary, secondary, tertiary) and monitoring of erosive tooth wear. (100%)

285

286 Prevention of erosive tooth wear

- 287 - Primary Prevention (93%)

288 Primary prevention involves general/non-personalized advice about risk factors and
289 can include population-based measures to prevent erosive tooth wear.

- 290 - Secondary Prevention (100%)

291 Following diagnosis, secondary prevention involves non-restorative treatment of
292 erosive tooth wear, including personalized advice, and when appropriate liaison with
293 other healthcare professionals.

294 - Tertiary Prevention (80%)

295 In addition to secondary prevention, restorative treatment strategies may be considered
296 in tertiary prevention.

297

298 Erosive tooth wear monitoring (100%)

299 Regular assessment of erosive tooth wear status tailored to the patient's needs.

300

301 The consensus workshop participants recommend to continuously review the discussed
302 terminology every five years or sooner if new terms arise that require clarification.

303

304 The attached references were considered by the workshop participants in the selections of the
305 discussed terms and their definitions.

306

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312

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