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Could your patients'  
enamel wear end up  
**ageing them?**



# Could your patients' enamel wear end up **ageing them?**

**Nobody wants to look old before their time, yet when it comes to the signs of ageing we worry about most, teeth are often lower on the list. Twice as many people fear their skin becoming wrinkly or losing elasticity versus those concerned about tooth wear<sup>1</sup>. The numbers reflect our behaviours; we routinely take steps to protect our skin from sun damage but fewer actively look to prevent enamel wear. It's surprising. Although there's no causal link between age and tooth wear, the most visible symptoms of wear - surface changes (smoothing), translucency, yellowing, loss of structural features (such as rounding), - can create the appearance of ageing, making us look or feel older than we actually are.**

But it's not just about aesthetics. Tooth wear can negatively impact self-esteem, body image and quality of life<sup>2,3,4,5</sup>. It can also lead to dentine hypersensitivity<sup>6</sup> and, in extreme cases, complete loss of the crown<sup>7</sup>. Progression isn't inevitable - but steps can be taken to help prevent it.

Dental healthcare professionals (DHCPs) can help patients prevent erosive tooth wear (ETW); they're the only people who can spot the early signs. When patients are alerted to the problem, they can be motivated to act.

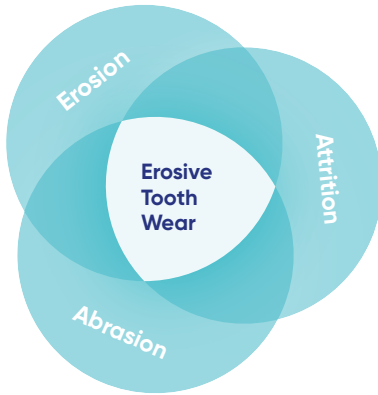
Management hinges on at-home behaviours: diet, lifestyle and oral hygiene. However, prevention begins in clinical practice, with DHCPs routinely checking for symptoms and tailoring advice.

In a world where appearance matters more than ever<sup>8,9</sup>, DHCPs can help patients avoid the ramifications of ETW. If they protect their enamel like they protect their skin, the risk of tooth wear can be reduced.

## PART 1:

# What is Erosive Tooth Wear (ETW)?

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ETW is the cumulative loss of mineralised tooth substance with dental erosion being the primary cause<sup>10</sup>. The term recognises that although severe tooth wear rarely occurs without erosion, erosion almost always has a partner in crime.

“ ETW is erosion combined with other forms of physical wear such as abrasion and attrition, ”

says Professor David Bartlett, Head of the Centre for Oral, Clinical & Translational Science and Prosthodontics, King’s College London.

“ The term is an acknowledgement that with ETW, in most instances, you have a combined effect: chemical loss (erosion), and mechanical loss (wear). ”

Scientists believe frequent acid exposure of enamel overwhelms protection from the pellicle (the protective film over enamel that comes from saliva) and saliva, leaving teeth vulnerable<sup>11</sup>. “The enamel, we believe, demineralises: the outer surface of it, and some inner surface, lose the ions into the saliva,” says David. “If you help stop that process, then that mineral bit can re-calcify, reharden. If the acid effects on enamel are not repaired by saliva or toothpaste the surface remains porous and weak. If a mechanical process such as abrasion or attrition acts on that surface it can be worn away. And once that surface is lost, it is lost forever.”

Tooth wear is sometimes described as erosion, but erosion is just the opening act. Dr Jonathan Creeth, Principal Medical Affairs Scientist, Haleon, explains:

“Dietary acids soften enamel and can lead to erosion, but that really only sets teeth up for being vulnerable to wear through surface-to-surface contact.”<sup>12,13</sup> When enamel is over-exposed to dietary acids, even toothbrushing can damage it.<sup>12,13</sup> Jon explains that in addition to avoiding toothbrushing directly after consuming acidic food or drink, a toothpaste with a mild abrasive can help minimise the risk<sup>14,15</sup>.

## PART 2:

# Prevalence & Awareness

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## Prevalence

Global prevalence of erosive tooth wear (ETW) ranges between 20-45%<sup>16,17</sup>, with 2-10% of adults and children showing severe signs of wear that might need treatment<sup>16,18</sup>. Prevalence and severity are reported to increase with age<sup>17,19,20</sup>, with the cumulative effects of dietary acids, chewing and bruxism invariably leading to wear. Risk of severe wear increases from 3% at 20 years old to 17% at 70<sup>21</sup>.

However, there are signs that tooth wear is becoming more common in younger people. 29% of young adults in a European study had distinct ETW<sup>22</sup>, while severe wear is increasing in adolescents too<sup>19,20</sup>. The trends are largely attributed to modern diets and lifestyles. Consumption of acidic soft drinks<sup>23</sup> and

fruit has rocketed, while the pursuit of the 'perfect smile' - a Gen-Z priority<sup>24</sup> - can lead to excessive or more vigorous brushing known to increase the risk of enamel wear<sup>12,13</sup>.

Ms Ester Hoekstra, M. Sc., a teaching and practicing dental hygienist in Germany, says the effects are showing up in the waiting room.

“ I can remember that erosion patients were rare. Nowadays I see multiple patients a week with early signs of erosion. You see [it] with children, but also in teenagers, and yes with 20-30 years old. You see a lot more erosion....They have more erosion from dietary acids. ”

And for late stage erosion,

“ most of the time, these patients who have sensitive teeth, they develop an anxiety because it hurts all the time. ”

However, Professor Nicola West, Professor of Periodontology and Head of the Clinical Trials Unit at the School of Oral and Dental Sciences, University of Bristol, UK reports that as expectations

of a pleasing dentition grow, attitudes to tooth wear are crystallising among young adults - the majority think it's unacceptable to have noticeable wear under the age of 30, many believe it's only palatable at 60.

The growth of aesthetic dentistry<sup>24</sup> suggests people are open to invasive procedures to achieve the perfect smile. However, young adults shouldn't have to wait until restorative treatment is the only option. They're a willing audience for tooth wear prevention.

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## Awareness

Public understanding of ETW is patchy. Patients rarely detect changes in tooth shape and structure until they're severe<sup>25</sup>, but they're often only given preventive advice when they present with hypersensitivity or severe tooth wear<sup>26</sup>.

“ I don't think patients are aware of erosion,” says Ester. “Most are surprised when I explain it. They'll say: 'but I'm eating so healthy' or 'I didn't realise cola is acidic'. The role a dental healthcare professional [DHCP] can play, is to educate the patient, to increase the awareness of erosion. ”

Awareness among DHCPs is also variable, with research indicating some may not have the confidence to diagnose mild tooth wear<sup>27,28,29</sup>. A 2020 study found many dentists in the US struggled to detect ETW until severe. They were also much less confident judging teeth with ETW and less able to determine if those teeth required management compared to teeth with decay<sup>30</sup>.

ETW is standard training in dental schools but, says Ester, there's room for improvement.

“ It definitely needs more focus because we see it in a lot of patients....Some dental healthcare professionals may not know what to look for. ”

## PART 3:

# Assessment

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Early diagnosis of erosive tooth wear (ETW) is vital. Patients often only notice wear when their teeth look thinner or more yellow<sup>31</sup>. It's harder to treat at this stage. DHCPs are the only ones who can see the early signs - but only if they're actively looking for them. Unfortunately, dental examinations rarely include routine assessment of ETW.

“ We shouldn't be waiting until patients have got it so bad that they've got to do something about it. We should get into the routine of looking for it, identifying if it's there, and therefore giving preventive advice as and when it's needed, ”

says Professor David Bartlett, Head of the Centre for Oral, Clinical & Translational Science and Prosthodontics, King's College London.

“We can't tell if a person with wear at 20 will inevitably get worse as they get older - because we don't know, on an individual basis, what their story is. However, we do know that if they continue with risk factors it's likely to get worse.”

“The idea is to check everybody. So we pick up those people who've got more severe tooth wear at the earliest stage that we can....to try and reduce the risk of [it getting so bad]....So, regularly and routinely look for it. And once we've found it, to react with prevention.”

According to David, there's currently no data available to determine a 'normal' rate of wear. The most likely scenario, he says, is that there are periods when the

rate of wear increases - and that usually coincides with active risk factors. When risks are controlled, the rate of wear reduces<sup>32</sup>.



A standardised format to record tooth wear as part of routine dental examinations was devised in 2008. The Basic Erosive Tooth Wear index (BEWE) helps dentists score changes to the surface of teeth regardless of aetiology<sup>27</sup>, enabling them to evaluate the severity of tooth wear systematically. The buccal, occlusal and/or incisal and lingual/palatal surfaces are assessed in each sextant<sup>33</sup>, with dentists looking for subtle changes in enamel and scoring each sextant according to the worst-affected surface.

**BEWE uses a 4-point scale to assess wear:**

- 0:** No sign of wear;
- 1:** First signs of wear with rounding of cups and grooves;
- 2:** Distinct wear <50% of the surface area;
- 3:** Hard tissue loss >50% of the surface area<sup>33</sup>.

BEWE was designed to be simple and prevention-focused - to make it easier for dentists to look for signs of ETW regularly and routinely.

“ It's designed to actually reduce the amount of time and therefore cost to the dentist, ”

says David.

“ You go methodically, in each sextant....and you go round in a routine, so you don't miss anything. You do that for gums, and we're recommending you do it for erosive tooth wear at the same time. And then you record it in the notes. ”

Adoption of the BEWE is growing as policymakers push to make examining and recording tooth wear a requirement of clinical practice<sup>34</sup>. The potential benefits, for both patient and DHCP, are significant. If ETW is not picked up early through preventive dentistry, it may have ramifications further down the line when patients experience more severe wear and may question why it wasn't detected sooner.



## PART 4:

# Prevention & Solution

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## Prevention: Risk factors

Prevention of erosive tooth wear (ETW) is primarily about reducing risk factors. Strategies work at every stage of progression; even teeth with severe wear can benefit from changes in behaviour<sup>32</sup>. However, in young adults, early intervention is key. Dental healthcare professionals can play a crucial role in guiding them to the right approach.

"The more we educate our patients the better we can help them," says Ms Ester Hoekstra, M.Sc., a teaching and practicing dental hygienist in Germany. "To educate about healthy food for body AND teeth. To give tips on how to clean their teeth at home, to educate about fluoride and the difference between toothpastes. As dental hygienists, we have and take time for that."

But, says Ester, prevention is a team sport and all DHCPs have a role to play. "It's important that they explain what erosion is and why it's bad for teeth. We have to tell patients something! We need to move to Talking Dentistry!"

Risk factors include acid reflux, bulimia, and excessive oral hygiene. But the most common driver is dietary acids.

Reducing the frequency of acidic foods and drinks, particularly outside mealtimes, is key<sup>32</sup>. That's tough for teenagers - the

core market for a carbonated soft drinks industry that is growing considerably<sup>35</sup>. Duration of consumption is a bigger risk than volume; sipping lemonade throughout the day is more damaging than downing it at mealtime.

Acidic foods are equally challenging. Most patients think fruit are healthy - which they are - but don't recognise that some carry an acidic risk. Advising patients to have acidic foods and drinks at mealtimes and ideally to neutralise their mouths with milk or cheese after acidic foods is good practice<sup>31</sup>.

The best approach is to talk to patients. Through conversation, it's often possible to uncover a dietary habit - like 'swishing' or snacking - and respond with prevention<sup>32</sup>.

Asking patients to keep a diary of what they eat isn't always effective, "Automatically, they think about it and adjust their diet....It's never an honest diary", says Ester. "I prefer to ask: 'what did you eat today?' I can get more out of it. Once I had a patient, who ate perfectly fine. Drunk 1 or 2 glasses of cola every day, but nothing else was out of the ordinary. After 2 appointments and treatments, I found out through chatting with him during the treatment, he was playing with his cola when he drank it. He was pulling it between his teeth before swallowing it - swishing. We have to talk to our patients.



That's very important. That way, we know how they tick and how we can help them adjust their behaviour."

Sustaining behaviour change is difficult; our habits and attitudes are hardwired. One approach that's proven successful with some DHCPs is to adopt the COM-B model of behaviour change when interacting with patients. The COM-B

model argues that there are three components to any behaviour - Capability, Opportunity and Motivation - and that positive dialogue around each of these can help identify barriers to change and design interventions to help overcome them<sup>36</sup>.

One behaviour that's easier to change is our choice of toothpaste.

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## Prevention: Solution

### Fluoride toothpaste

Epidemiological studies show that fluoridation of water and regular use of fluoridated toothpaste provide added protection from dental erosion<sup>37</sup>. However, while the protective benefits of fluoride are widely understood, its reparative benefits are less well known. They're key to halting progression. Dr Jon Creeth, Principal Medical Affairs Scientist, GSK Consumer Healthcare, explains: "Fluoride goes into the surface of enamel, it protects it; it slows acids from dissolving your teeth. But the way it does that is by repairing the first stages of acid attack. When the surface of enamel loses mineral, fluoride helps put it back. Fluoride helps the calcium and phosphate in the saliva go down to the surface [of the enamel] and repair any damage. It's not just about helping stop things getting worse - if you catch wear early enough, it can help make things better."<sup>38</sup>

Longitudinal studies show that twice-daily brushing with a fluoride toothpaste results in less tooth wear than in those who brush less frequently<sup>37,39</sup>. As such, twice -daily

brushing is gold-standard advice for tooth wear prevention. However, the formulation of a toothpaste can significantly influence the delivery of active fluoride into the enamel. Many ingredients used in toothpastes can reduce fluoride's benefits.

"Lots of abrasives react with fluoride... detergents that you put into a toothpaste to make it foam can interfere with fluoride binding to enamel," says Jon. "Polyphosphates - for stain removal - can also stop the fluoride sticking to the tooth surface, and interfere with that re-mineralising process."

"Pronamel's optimised technology has been shown to be highly effective at delivering fluoride to enamel after dietary acid attack," says Jon. "It uses a specially chosen detergent to minimise interference with fluoride binding to enamel. And a high purity abrasive that doesn't interfere with fluoride's benefits - giving patients high fluoride delivery and good mineralization to help repair any early signs of damage."

# Superheroes for smiles

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**The associations between ageing and tooth wear continue to be explored. Scientifically, studies have shown that enamel wear generally increases with age<sup>17,19,20</sup> and can affect anyone - but the evidence-base to date isn't substantial. Nevertheless, patients' perceptions matter.**

“ There isn't an awful lot of evidence to say as you get older you inevitably get more tooth wear, ”

says Professor David Bartlett.

“ But one of the signs of ageing - according to patients - is that their teeth get shorter and become yellower and more translucent.

That, in their perception, is understood as ageing.

The weight of clinical evidence to support age and progression is insufficient at a clinical level. There is evidence for a slow and progressive increase and wear over time, but the main factor in creating a situation where a dentist can recognise wear is the risk factors. ”

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**By routinely assessing tooth wear and communicating the risk factors, dental healthcare professionals can play a major part in educating patients and helping them prevent tooth wear. So patients can think about caring for their teeth like they think about caring for their skin.**

**It's the chance to be a superhero for smiles - and help stop patients feeling old before their time.**

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