

Periodontal health and nutrition: what to serve for dinner?

Cooking dinner has again become a serious undertaking. Besides all sorts of food and ingredients from all over the world, food can be enriched with anti-oxidants, probiotics, micronutrients and a plethora of other natural compounds, all of which have come into focus to strengthen the healing abilities of the body.

In the 18th century, James Lind experimentally showed that oranges and lemons were a cure for scurvy, a disease of vitamin C deficiency, which shows its early symptoms in the periodontium. When James Cook later set sail for his 3-year expedition, he recognised the importance of nutrition and supplied the crew with sauerkraut, a rich source of vitamin C. And yet, it took another 150 years until the role of vitamin C in the human body was finally discovered. Even today, the molecular mechanisms of nutrients as therapeutic or health-promoting agents have not been fully clarified. The Mediterranean diet for example, characterised by a high consumption of olive oil, vegetables, and fruits rich in anti-oxidants and vitamins, has been correlated with a lower risk of inflammatory disease. Periodontal disease is also inflammatory in nature, and is one of the most prevalent diseases, affecting about 732 million people worldwide.² It is caused by a dysbiotic plaque biofilm and an exaggerated host immune response, resulting in tissue destruction and finally tooth loss. In this context, nutrient deficiency or diet in general may contribute to the causal pathway of periodontal disease, at least in some patients. In the course of inflammatory diseases, so-called reactive-oxidative species (ROS), which are highly reactive molecules lacking an outermost electron, are formed. The accumulation of ROS and oxidative stress is being discussed in the pathogenesis of many diseases. Anti-oxidants contained in vitamins or vegetables, e.g. broccoli, can counteract oxidative stress by delivering electrons or boosting enzymes that break down ROS. The effect of a 4-week-diet rich in omega-3 fatty acids, vitamin C, vitamin D, anti-oxidants, plants and fibers has been recently investigated in a randomised controlled clinical trial. The diet significantly reduced gingival inflammation.⁵ A similar benefit for periodontal health was discovered in participants of the Swiss TV show 'Stone Age Life' (Steinzeit – Das Experiment – Leben wie vor 5000 Jahren) who followed a Stone-Age diet with no toothbrushing for 4 weeks.¹ In this context, several studies indicate that a dysbiotic plaque biofilm and gingival inflammation might be

favoured by the Western diet with high a content of processed high-glycemic carbohydrates such as sugar, saturated fatty acids and low fiber content. Besides cariogenic and plaque-promoting effects, these dietary components are the major cause of overweight and obesity, both of which have increased dramatically in recent decades. Indeed, it is well established that fat tissue performs endocrine-like functions and secretes several bioactive substances, known as adipocytokines, which have an impact on other proinflammatory cytokines, such as tumour necrosis factor α . Overweight and obesity are often associated with increased blood pressure, increased blood sugar and serum triglycerides, insulin resistance and an altered inflammatory state, altogether referred to as metabolic syndrome. An altered inflammatory state itself also has implications for the periodontium. The first paper on the relationship between obesity and periodontal disease was published in 1977, and showed that obese-hypertensive rats were more likely to develop periodontal tissue destruction than normal rats.⁴ Recently, it has been shown that obesity might be a predictor of a poorer treatment outcome of non-surgical periodontal therapy; obese patients set on a diet showed better treatment outcomes.³

Given increasing antibiotic resistance, alternative treatment strategies are urgently needed. In this regard, many natural compounds such as curcumin from *Curcuma longa* plants, for example, might be of therapeutic value, as they possess anti-inflammatory and anti-oxidative properties. Vitamin D is another substance whose molecular properties are beginning to be better understood. Besides its effects in bone metabolism, vitamin D has a periodontitis-antagonising influence, as it promotes the anti-inflammatory differentiation of macrophages and T-cells. Especially people in northern countries or over 65 years of age are likely to suffer from vitamin D deficiency, and supplementation should be taken into consideration.

Our role as dentists is perhaps not to give recommendations for dinner, but we should definitely be aware of the potential influence of nutrition on oral health and place more emphasis on a balanced diet in the treatment of periodontal disease. Together with general physicians, we should treat our patients in a more comprehensive way to increase oral health by strengthening the general defense mechanisms of the body.

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