

Relationship between periodontal and endodontic diseases and systemic health: correlation does not imply causation.

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For over three decades there have been many epidemiological clinical studies that found a statistically significant association between periodontal disease (PD) and different systemic pathologies.^{1,2,3}

On the other hand, in recent years there have also been numerous epidemiological prevalence and case-control studies in which an association between different systemic conditions, such as diabetes,⁴ coronary heart disease⁵ and smoking,⁶ and apical periodontitis has been found. These research efforts have formed the basis of the development of "periodontal medicine" and "endodontic medicine", both understood as the study of the possible repercussions of periodontal or endodontic diseases on systemic health and, vice versa, as the analysis of the repercussion of systemic pathologies on periodontal disease or treatment, or on endodontic disease and treatment.⁷ There is no doubt that scientific evidence of association between periodontal or endodontic diseases and various systemic pathologies has led to greater attention being paid to the diagnosis and treatment of both diseases in patients with diabetes or cardiovascular diseases, in pregnant women, and in other clinical situations, resulting in an improvement in the patients' oral and systemic health.

Most of the research done in this field has been cross-sectional epidemiological clinical studies, case-control studies, a few cohort studies and very few randomized clinical trials. In cross-sectional and case-control studies, the odds ratios (OR, ratio of probabilities) inform us about the strength of the association, and the greater the OR, the greater the association. In cohort and prospective studies, the relative risk also indicates the strength of the association. But the strength of the association is only the first criterion of causality, according to Bradford-Hill.⁸

In order to consider an association as causal, many more criteria must be evaluated: a dose-response gradient, the temporal relationship in which the cause must always precede the effect, biological plausibility, scientific coherence, ...and the experimental evidence. As such, at present we can only conclude that there is an association between periodontal or periapical inflammatory diseases and some systemic pathologies, without being able to assert definitively, based on scientific evidence, that there is a causal link between them. For example, the observed association between periodontal disease and coronary heart

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disease could be explained not because one causes the other, but because both are related to certain genetic profiles, lifestyles and, ultimately, have a common etiopathogenesis. Likewise, the association between diabetes and a failure in the endodontic treatment, recently highlighted in a systematic review and meta-analysis,⁹ does not necessarily imply causality one way or another, but it should prompt us to investigate a possible case of undiagnosed diabetes in a patient in whom several correctly performed endodontic treatments, have not achieved the resolution of a periapical inflammatory

process. In these cases, the request for a blood glucose curve can reveal that the patient is diabetic.

We, as scientists and health professionals, must be especially careful in the assessment of research results, and transmit to society only what is actually supported by scientific evidence. The results of the studies carried out so far in the field of periodontal and endodontic medicine are not conclusive regarding causality, but they do indicate that the periodontal and/or periapical health status of a patient is associated with their systemic health status. But there still remains much to investigate.

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