

Rapid Quantitative Chairside Test for Active MMP-8 in Gingival Crevicular Fluid

First Clinical Data

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ABSTRACT: In a first pilot field study 64 gingival crevicular fluid (GCF) samples were collected from patients of dental practitioners. The dentists (one orthodontist one periodontist, and one general practitioner) were asked to monitor the respective clinical status of the sites of sampling and to collect, if possible, sulcus fluid samples from healthy as well as affected sites from the same patient. The concentration of activated matrix metalloproteinase-8 (aMMP-8) in the GCF was recorded using a set of monoclonal antibodies and a novel *DentoAnalyzer*. From all three dental offices the distribution of the aMMP-8 values in GCF showed a congruent pattern, where healthy and periodontitis-affected inflamed sites were clearly disparate.

KEYWORDS: chairside; *DentoAnalyzer*; immunoassay; MMP8; periodontitis; point-of-care

In the last decade it became a textbook knowledge that matrix metalloproteinases (MMPs) are responsible for tissue degradation and bone resorption.^{1,2} Of these, MMP-8 in GCF³ is the most prominent collagenase (collagenase 2) associated with periodontitis.⁴⁻⁶

It was the aim of this pilot study (1) to collect GCF samples in different dental offices, from healthy, doubtful (e.g., gingivitis), and inflamed (e.g., periodontitis-affected) sites; (2) to assess the concentration of activated

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TABLE 1. Values (ng) of activated matrix metalloproteinase-8 (aMMP-8) per milliliter eluate of GCF

Status	Healthy	Doubtful	Periodontitis
<i>n</i>	21	18	25
Median	1.0	6.3	14.3
25%–75% quartile	0.2–2.9	3.5–14.2	10.9–33.7
10–90%	0.0–6.7	2.2–18.2	8.4–51.7
Range	0.0–7.4	0.0–27.1	5.7–64.6

matrix metalloproteinase-8 (aMMP-8) in the GCF with the aid of monoclonal antibodies and a novel *DentoAnalyzer*^{7,8}; (3) to compare the concentrations of aMMP-8 with the clinical status; and (4) to compare our data with reports in the literature.

GCF was collected with a standard technique using MMP-8 collection strips.^{9,10} Concomitantly, the pocket depth was assessed and clinical status was recorded by the attending dentist. The aMMP-8 was immediately eluted from the strips and, after appropriate dilution, quantitatively assessed with the *DentoAnalyzer*.^{7,8} By this assay the concentration of aMMP-8 was calculated as nanogram of aMMP-8 per milliliter of eluate.

A total of 64 samples were collected, 23 by orthodontists, 18 by periodontists, and 23 in the practice of a general dentist. According to the dentists' judgment, 21 sites were estimated as healthy, 18 as doubtful (e.g., gingivitis; adjacent to brackets, etc.), and 25 as periodontically affected. In all three offices a congruent pattern of aMMP-8 values was recorded: Low values were concerned with healthy periodontium, high values reflected periodontitis-affected sites, and the doubtful cases lay in between. The summarized outcome is presented in TABLE 1.

Healthy sites (median 1.0, range 0.0–7.4 ng aMMP-8/mL eluate) were clearly different from inflammatory sites (median 14.3, range 5.7–64.6). Low values of aMMP-8 in periodontitis cases represented in *all* cases treated, nonactive disease. Whenever healthy and periodontitis sites could be compared in the same patient ($n = 30$, i.e., 15 pairs), without exception the affected sites showed higher aMMP-8 values than the healthy control sites. The aMMP-8 values assessed with the *DentoAnalyzer* were found to be similar to results described previously.^{9,11,12}

CONCLUSIONS

We conclude that the assessment of aMMP-8 in GCF is a noninvasive method to assess and monitor the pathophysiological status of the periodontium. The determination of aMMP-8 with the *DentoAnalyzer* enables the dentist to distinguish between the healthy and the periodontitis-affected sites within 20 min.

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