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Title: Involvement of MT1-MMP and TIMP-2 in human periodontal disease

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Overview:

Gingival tissue contains densely packed collagen fibers which provide structural support. When periodontitis occurs, the gingival tissue is broken down by the enzyme collagenase. MT1-MMP is one type of collagenase, there are others. The activity of all collagenases is controlled by TIMP, such that when the level of TIMP rises sufficiently, the collagenase is turned off. If something interferes with the TIMP “off” switch, collagenase keeps degrading tissue. Perio pathogens have been shown to interfere with the collagenase off switch, perpetuating enzyme activity, leading to perio tissue destruction. This study examined the levels of MMP and TIMP in periodontitis patients.

Summary of research:

- Determine the role of collagenase and its inhibitor in periodontitis.
- The levels of MT1-MMP collagenase and its inhibitor, TIMP-2 were examined in gingival tissue samples from 10 healthy and 12 periodontitis patients

Results and conclusions:

- Both MT1-MMP collagenase and its inhibitor TIMP-2 were significantly elevated in periodontitis patients compared to healthy controls
- The balance between collagenase and its inhibitor was altered in periodontitis-affected tissue.
- MT1-MMP collagenase was detected in cells in close proximity to the densely packed gingival collagen matrix
- The altered balance between collagenase and its inhibitor, suggests their involvement in periodontal disease

Key take-aways:

This study demonstrated the mechanism of periodontal tissue destruction. The collagen matrix in gingival tissue is the framework that supports the epithelial and connective tissue cells. In periodontitis, the body releases collagenase as part of the inflammatory response to the invasion by the perio pathogens. The periodontal bacteria, in turn, interfere with the enzyme’s off switch, perpetuating its tissue degrading activity. This study demonstrated an imbalance between collagenase and its inhibitor. The TIMP inhibitor was not sufficiently elevated to turn off the MT1-MMP collagenase, which continued the degradation of the periodontal tissues.



Implementation Strategies:

In cases like this, where the TIMP inhibitor is not sufficiently elevated to turn off the MT1-MMP collagenase activity periodontal disease will progress even though you have provided treatment. It is in the best interest of your patient to provide a Periodontal Sensitivity Test (PST). If the patient is positive they would likely benefit from the use of Periostat, 20mg of doxycycline twice per day. Periostat captures about 75% of the collagenase and disables it through mutation, effectively switching the destructive activity off. The sub-antibiotic dose of Periostat is safe to use for up to 12 months without interruption and should be considered as part of a periodontal therapy and maintenance treatment plan.

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