TRANSGLUTAMINASE 2 LEVELS AND RANKL/OSTEOPROTEGERIN RATIO IN PERIODONTAL LIGAMENT OF PATIENTS WITH CHRONIC PERIODONTITIS

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Aim. A possible useful clinical model for monitoring cell response in inflammatory microenvironments including periodontitis-dependent tissue response is osteoprotegerin (OPG) and the receptor activator of nuclear factor (NF)-kappa B ligand (RANKL) that are secreted by periodontal ligament cells.
Several study highlighted the role of transglutaminase 2 (TG2), a calcium-dependent enzyme which catalyzes post-translational protein modifications in the initial phase of inflammation, we evaluated TG2 involvement in PDL inflammatory response and the alterations in RANKL/OPG ratio occurring in periodontitis.

Materials and methods. A cross-sectional and analytic study was conducted in 21 patients with Chronic Periodontitis (CP) and 21 healthy subjects. A baseline visit was conducted by a blind calibrated examiner who collected a complete medical history and a standard clinical periodontal parameters. Biopsies were carried out during extraction for advanced caries and orthodontic indications for the healthy control group and for the CP group from the site with severe periodontal destruction and inflammation during extraction of teeth attributable to CP.

Results. There was an up-regulation of different inflammation markers, such as IL-6, TNF-a and HMGB-1, and at the same time an increase of TG2 mRNA levels in human periodontal ligament (HPDL) cells from CP patients compared with healthy subjects. A marked increase in RANKL expression, that was 2.6-fold higher compared with normal subjects, was also observed in HPDL cells from patients with periodontal disease, while no significant changes were observed for OPG gene transcription. We found also a positive correlation existing between RANKL/OPG ratio and TG2 mRNA levels in HPDL cells from periodontal disease patients. Furthermore in macrophage cell line THP-1 we demonstrated that inhibition of TG2 reduced RANKL expression.

Conclusions. Our data suggest the TG2 involvement in molecular mechanism of inflammatory response and bone resorption induced by periodontal disease given the RANKL key role in bone remodeling and the high expression levels of pro-inflammatory cytokines. In particular, we show clear evidence for a positive correlation between TG2 and RANKL/OPG ratio mRNA transcripts, suggesting that the increase in TG2 expression may be considered an early event in tissue changes induced by periodontal disease. Collectively our results demonstrate that increases in TG2 expression in PDL could be associated with high levels of pro-inflammatory markers promoting the interaction between molecular mechanisms involved in tissue repair and bone resorption.