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Rheumatoid Arthritis, Periodontitis and the Subgingival Microbiome: A Circular Relationship

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Abstract : Objective: We aimed to explicate the role of the subgingival microbiome in the causal link between rheumatoid arthritis (RA) and periodontitis (PD). Methods: Subjects with/without RA and with/without PD were randomized for treatment with scaling and root planing (SRP) or oral hygiene instructions. Subgingival biofilm, gingival crevicular fluid, and serum were collected at baseline and at 3- and 6-months post-operatively. Correlations were generated between 72 million 16S rDNA sequences, immuno-inflammatory mediators, circulating antibodies to oral microbial antigens, serum inflammatory molecules, and clinical metrics of RA. The dynamics of inter-microbial and host-microbial interactions were modeled using differential network analysis. Results: RA superseded periodontitis as a determinant of microbial composition, and DAS28 score superseded the severity of periodontitis as a driver of microbial assemblages (p=0.001, ANOSIM). RA subjects evidenced higher serum anti-PPAD (p=0.0013), anti-Pg-enolase (p=0.0031), anti-RPP3, anti- Pg-OMP and anti- Pi-OMP (p=0.001) antibodies than non-RA controls (with and without periodontitis). Following SRP, bacterial networks anchored by IL-1b, IL-4, IL-6, IL-10, IL-13, MIP-1b, and PDGF-b underwent ≥5-fold higher rewiring; and serum antibodies to microbial antigens decreased significantly. Conclusions: Our data suggest a circular relationship between RA and PD, beginning with an RA-influenced dysbiosis within the healthy subgingival microbiome that leads to exaggerated local inflammation in periodontitis and circulating antibodies to periodontal pathogens and positive correlation between severity of periodontitis and RA activity. Periodontal therapy restores host-microbial homeostasis, reduces local inflammation, and decreases circulating microbial antigens. Our data highlights the importance of integrating periodontal care into the management of RA patients.

Keywords : rheumatoid arthritis, periodontal, subgingival, DNA sequence analysis, oral microbiome
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