

Increased levels of the T-helper 22-associated cytokine (interleukin-22) and transcription factor (aryl hydrocarbon receptor) in patients with periodontitis are associated with osteoclast resorptive activity and severity of the disease

Díaz-Zúñiga J.

Melgar-Rodríguez S.

Rojas L.

Alvarez C.

Monasterio G.

Carvajal P.

Vernal R.

Background and Objective: Two new T-helper (Th) phenotypes have been recently described and named Th9 and Th22 lymphocytes; however, their role in the pathogenesis of periodontitis remains unclear. This study was aimed to assess whether Th9 and Th22 lymphocytes, through interleukin (IL)-9 and IL-22 production, respectively, are associated with the severity of periodontitis and bone resorption. **Material and Methods:** Gingival crevicular fluid samples and biopsies were obtained from patients with moderate-to-advanced chronic periodontitis and gingivitis, and healthy controls. The levels for the Th9 and Th22-associated cytokines and master-switch transcription factors Spi-B and aryl hydrocarbon receptor (AhR) were quantified by enzyme-linked immunosorbent assay, real-time reverse-transcription quantitative polymerase chain reaction and flow cytometry. In addition, the osteoclast activity in response to tissue homogenates from periodontitis and healthy samples was analyzed quantifying the number of TRAP-positive cells and areas of bone resorption pits produced, in the presence or absence of recombinant human IL-22 and anti-IL-22 neutralization antibody.

Results: Higher levels of IL-22 and AhR were detected in patients with periodontitis compared with gingivitis and healthy individuals. In addition, higher levels of IL-9 and Spi-B were detected in gingivitis patients compared with periodontitis and healthy individuals. In patients with periodontitis, a significant positive correlation was detected between secreted levels of IL-22 and clinical

attachment level of the sampled periodontal pockets. When osteoclasts were exposed to tissue homogenates obtained from patients with periodontitis, higher levels of resorptive activity were observed as compared with the same cells exposed to tissue homogenates obtained from healthy individuals, and this increment was dependent on the presence and neutralization of IL-22.

Conclusion: Increased levels of IL-22 produced by Th22 lymphocytes are associated with the pathogenesis of periodontitis, in particular, with osteoclast resorptive activity and severity of disease.

© 2017 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd

AhR, transcription factor aryl hydrocarbon receptor

bone resorption

interleukin-22

periodontitis

Th22 lymphocytes

aromatic hydrocarbon receptor

cytokine

DNA binding protein

interleukin 9

interleukin derivative

interleukin-22

RNA

RNA 18S

SPIB protein, human

transcription factor

adult

chemistry

chronic periodontitis

female

gene expression

genetics

gingivitis

human

immunology

isolation and purification

male

metabolism

osteoclast

pathology

periodontal disease

periodontal pocket

secretion (process)

Adult

Chronic Periodontitis

Cytokines

DNA-Binding Proteins

Female

Gene Expression

Gingival Crevicular Fluid

Gingivitis

Humans

Interleukin-9

Interleukins

Male

Osteoclasts

Periodontal Attachment Loss

Periodontal Pocket

Receptors, Aryl Hydrocarbon

RNA

RNA, Ribosomal, 18S

Transcription Factors