Regulation of Epithelial Adhesion Molecules in Periodontitis

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INTRODUCTION

- Human gingival epithelium forms the initial line of defense against bacteria and their by-products-
- Cell-to-cell connections between epithelial cells bring mechanical strength to gingiva-
- During inflammatory processes, variations in gene expression and epithelial adhesion molecules are observed
- No studies comparing the differences in gene expression and protein secretion levels of epithelium have been performed to date

Aims & Methods

1. To develop a network model (AMONET) to visualize and compare differences in gene expression of epithelial adhesion molecules in diseased gingival tissues when compared to healthy tissues by using the STRING and ViaComplex systems biology tools.
2. To perform an immunohistochemical analysis on clinical samples collected from healthy and diseased gingival tissues in vivo.
3. To determine whether human neutrophil peptide-1 (HNP-1) affects the secretion of epithelial adhesion molecules by culturing HMK-cells with increasing concentrations of HNP-1 (0, 1, 5, and 10 μg/ml) and then, to perform an immunohistochemical analysis in vitro.

RESULTS

1. 46 out of 85 genes of the AMONET model were differentially expressed in periodontitis vs. healthy tissues. Up-regulated genes were mainly related to neutrophilic transmigration. Down-regulated genes were mainly associated with cell-cell junctions.
2. Immunohistochemical analysis showed increased secretions of occludin and desmoglein-1 in diseased tissue samples (periodontitis) when compared to healthy ones.
3. When the same molecules were analyzed in the in vitro HNP-1 model, secretions of desmocollin-2 and occludin were decreased in the presence of increasing concentrations of HNP-1.

CONCLUSIONS

1. Up- and down-regulation in the gene expression of adhesion molecules may represent changes related to leukocyte transmigration in the gingival epithelium of periodontitis patients.
2. Our results suggest that the transmigration of neutrophils in gingival tissues represents an important regulatory event of cell adhesion-related gene expressions.
3. Here we show preliminary evidence for neutrophilic antimicrobial peptide HNP-1-dependent regulation of the secretion of epithelial adhesion molecules.

ACKNOWLEDGEMENTS: The Finnish Dental Society Apollonia, Hacettepe University Foundation, University of Turku Foundation, PNPD-CAPES

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