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The effect of substance P on the secretion of interleukin-8 and MCP (Monocyte Chemoattractant Protein)-1 from human dental pulp tissues

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I. Objectives

Recent study reported whether the cultured human pulp cells increase IL-8 secretion in response to SP stimulation22). In the present study, whether induction of IL-8 or MCP-1 in pulp tissue can be detected using enzyme-linked immunosorbent assay(ELISA) with *ex vivo* pulpal explants exposed to neuropeptides in culture and the IL-8 expression using immunohistochemical analysis with the *ex vivo* pulpal explants exposed to neuropeptides was evaluated.

To investigate further mechanisms that may contribute to leukocyte recruitment in lesions of endodontic origin, the differential expression of IL-8 and MCP-1 by human dental pulp tissues stimulated in vitro by the Substance P was examined.

II. Materials and Methods

The purpose of the present study was to examine the coordinate activity between neuropeptide and cytokine, and their important role in sensing and eliciting rapid immune response to the external irritations to the dental pulp. For the purpose, the induction of the IL-8 and MCP-1 by the stimulation of Substance P and TNF-α(IL-8 agonist) and the specificity for SP in the dental pulp tissues was measured using Spantide(SP antagonist) quantitatively. In addition, the secretion of the IL-8 in the human dental pulp tissue 36 hrs after the stimulation of SP was observed after the stimulation of SP qualitatively.

III. Results

1. There was the significant IL-8 induction at 36 h after SP(10^{-6}M) stimulation of the pulp tissue comparing with dental pulp tissues.($p<0.05$)
2. The secretion of MCP-1 from the dental pulp tissues comparing with Mock stimulation was induced at 36 hrs after TNF-α (40ng/ml) stimulation, but no induction with SP(10^{-6}M).
3. Spantide(10^{-5}M) inhibited IL-8 induction from the pulp tissues 36 h after SP(10^{-6}M) stimulation.
4. IL-8 immunostaining was detected only around the inflammed area in the pulp tissue 36 h after Mock stimulation.
5. 36h After SP(10^{-6}M) stimulation, IL-8 immunostaining was detected the areas without any inflammatory cells.
6. TNF-α(40ng/ml) did not induce the IL-8 secretion from the pulp tissue, no IL-8 immunostaining was detected in the pulp tissue.

IV. Conclusions

These results suggest that SP significantly induces IL-8 expression in human dental pulp suggesting an important role of SP in recruiting neutrophils in localized pulp tissue. MCP-1 appears to be less involved in the early establishment of pulpal inflammation in response to irritation such as mechanical insult of dentin. SP may have positive relation with the inflammation of the human dental pulp tissues.