show the possibility that the iontophoretical application ofNK1 receptor antagonists can control the neurogenic inflammation in the [redacted]

The effects of proinflammatory cytokines on mineralization and HO-1 expression in human pulp cells

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I. Objectives

IL-1α and TNF-α play an important role in initiating and coordinating the cellular events that make up the immune response to infection. The purpose of this study was to examine the effects of proinflammatory cytokines on mineralization and HO-1 protein expression in the human pulp cells.

II. Materials and Methods

Human pulp cell cultures between the fifth and sixth passage were used in this study. Alkaline phosphatase and osteonectin were selected as markers for mineralization that is, odontoblast-like differentiation. The final concentration of IL-1α and TNF-α used on this study was 10ng/ml. To examine the effects of proinflammatory cytokines on ALP activity in human pulp cells, human pulp cells were treated with IL-1α, TNF-α, IL-1α+TNF-α, respectively, for 3, 7 and 14 days. Cultures with 10^{-7} M dexamethasone were used as a positive control. ALP activity in the supernatant was determined by the method of Lowry et.al. with p-nitrophenyl phosphate as a substrate. To examine the effects of these cytokines on osteonectin expression, human pulp cells were treated with IL-1α, TNF-α, IL-1α+TNF-α, respectively, for 14 days and on HO-1 expression for 1, 3 and 7 days. Osteonectin and HO-1 were identified by western blot analysis with each polyclonal antibody in the pulp cells.

III. Results

1. After exposure to cytokines for 3 days, ALP activity was increased in IL-1α-treated pulp cells and mixtured samples(IL-1α +TNF-α) by compared with controls, whereas TNF-α produced no such increase for 3days. ALP activity was most increased in dexamethasone treated pulp cells. However, as time goes by, ALP activity was decreased when pulp cells are exposed to IL-1α and TNF-α.
2. Osteonectin expression was decreased when pulp cells were treated with proinflammatory cytokines. Especially, the inhibitory effects of TNF-α was more than IL-1α.
3. Both IL-1α and TNF-α induced HO-1 expression by compared with controls for 1 and 3 days. The effects of IL-1α was more than TNF-α for 1 and 3 days. In particular, IL-1α enhanced HO-1 expression by compared with controls for 7 days.

IV. Conclusions

IL-1α and TNF-α, proinflammatory cytokines may have an different functions in human pulp cells. IL-1α plays an important role in cytoprotection against early pulpal inflammation that is induction ALP activity and HO-1 protein expression. But, IL-1 and TNF-α may be potent stimulators of mineralized tissue resorption during long term culture. Especially, TNF-α may suppress differntiation of human pulp cells into odontoblasts in vitro.