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Indian Hedgehog induces hypertrophy and differentiation of chondrocytes and may be concerned with progression of human cervical OPLL

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Abstract

Introduction: Ossification of the posterior longitudinal ligament (OPLL) is characterized by progressive ossification of spinal ligaments, in a similar style to enchondral ossification, as reported in recent studies. IndianHedgehog (Ihh) is considered an important transcriptional factor for enchondral ossification in normal bone development, but its contribution to OPLL remains unclear. The purpose of this study is to clarify the contribution of Ihh for OPLL, assessing cultured cells derived from cervical OPLL patients.

Methods: We harvested ossified ligament samples from 45 patients who underwent anterior cervical decompression surgery for symptomatic OPLL, and 6 control samples from patients without OPLL. The harvested sections were examined with hematoxylin-eosin, toluidine blue, and immunohistochemistry for Ihh, PTHrP, Sox9. Immunoblot analysis for the same factors was performed using cultured cells derived from the posterior longitudinal ligaments vicinity of the ossified plaque.

RESULTS: Ossification front in OPLL shows various cartilage differentiations, including proliferative and hypertrophic chondrocytes in the histological examination. The immunoreactivity for Ihh and Sox9 was evident in proliferative chondrocytes, and PTHrP was positive at hypertrophic chondrocytes. In immunoblot analysis, the expression levels of Ihh, PTHrP, and Sox9 in cultured OPLL cells were significantly higher than control.

Conclusions: The expression of Ihh was seen in ossification front in OPLL, and its expression level was higher in the cells derived from OPLL. Our results indicated that overexpression of Ihh signaling promotes abnormal chondrocyte differentiation and may contribute to progression of ossification front in OPLL patients.

Biography: Dr. Daisuke Sugita, resident in the Department of Orthopaedics and Rehabilitation of the Faculty of Medical Sciences as well as PhD student in the Graduate School of Medical Sciences in the University of Fukui. His research has been focused on sport injuries, OPLL and OLF.