

## Influence of TGF- $\beta$ 1 on the expression of BSP, DSP, TGF- $\beta$ receptor I and Smad proteins during reparative dentinogenesis

Yun-Chan Hwang\*, In-Nam Hwang, Won-Mann Oh,  
Joo-Cheol Park, Dong-Seol Lee, Ho-Hyun Son

*Department of Conservative Dentistry, School of Dentistry, Chonnam National University, Gwang-Ju, Korea*

*Department of Oral Histology, School of dentistry, Chosun University, Gwang-Ju, Korea*

*Department of Conservative Dentistry, School of dentistry, Seoul National University, Seoul, Korea*

### I. Object

Reparative dentin has a wide variety of manifestations ranging from a regular, tubular form to an irregular, atubular form. However, the characteristics of reparative dentin have not been clarified. This study hypothesized that the level of bone sialoprotein (BSP) expression will increase if the newly formed reparative dentin is bone-like but the dentin sialophosphoprotein (DSPP) level will decrease. In order to test this hypothesis, the expression of BSP and DSP was examined. In addition, in order to understand the role of transforming growth factor-beta 1 (TGF- $\beta$ 1) during reparative dentinogenesis, the expression of BSP and DSPP was analyzed and the transforming growth factor-beta 1 receptors (T $\beta$ R1) and Smad 2/3 were examined.

### II. Material & Methods

The pulps of 12 maxillary right first molars from twelve male rats were exposed and capped with MTA. The expression of BSP and DSP was examined by immunohistochemistry and the expression of BSP mRNA was measured by in-situ hybridization. The transforming growth factor-beta 1 receptors (T $\beta$ R1) and Smad 2/3 were examined by immunofluorescence.

The expression of BSP and DSPP mRNA was analyzed by RT-PCR in a human dental pulp cell culture

### III. Results

DSP was expressed in the normal odontoblasts and odontoblast-like cells of the reparative dentin. Interestingly, BSP was strongly expressed in the odontoblast-like cells of reparative dentin. The level of the T $\beta$ R1 and Smad 2/3 proteins was higher in the reparative dentin than in the normal dentin. TGF- $\beta$ 1 up-regulated BSP in the human pulp cell cultures.

### IV. Conclusion

This suggests that reparative dentin has both dentinogenic and osteogenic characteristics that are mediated by TGF- $\beta$ .