

**Histologic and Immunohistochemical study of
TGFB1 in pulp tissue of permanent and primary
teeth capped by Biodentine™**

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Abstract

Background: Biodentine™, a novel bioactive tricalcium silicate cement, recently introduced into dentistry. It has been claimed to be biocompatible, having optimal working and setting time, excellent workability with superior adhesion to tooth structure. Biodentine™ proved to maintain pulp vitality and enhance dentinal bridging, a new alternative to Mineral trioxide aggregate can be provided with a better handling characteristics and shorter working time, and providing single visit procedure which is cost effective. Trance takes part in dental pulp tissue repair. Moreover, dental pulp cells have the potential to differentiate into odontoblast-like cells and produce reparative dentine.

Aims of the study: This study aimed to

- 1- Assess the ability of tricalcium silicate-based cement (Biodentine™) to modulate Transforming growth factor beta1 expression by pulp cells of permanent and primary teeth.
- 2- Determine pulp response for application of Biodentine™ to induce the reparative dentine synthesis of permanent and primary teeth in pulp capping situation on entire human teeth culture.

Materials and Methods: Biodentine™ was directly applied onto the dental pulp of (36) human maxillary first premolars and (36) human maxillary first primary molar (teeth were extracted for orthodontic purpose) in an entire human tooth culture model. After various culture periods (2,14 and 28) days, the interaction of the material with dental pulp tissue was analyzed on tissue cultures. The effect of this material on TGFB1 secretion was investigated on pulp tissue of permanent and primary teeth.

Results:

- 1- A significant differences were found in intensity of inflammatory response of permanent teeth that treated and untreated with Biodentine™ at 2 days and 28 days duration ($P < 0.05$), and a high significant difference was found in 14 days at $P < 0.01$.
- 2- No significant difference was found in intensity of inflammatory response of primary teeth treated and untreated with Biodentine™ in 2 days duration ($P > 0.05$). In 14 days duration showed significant difference at ($P < 0.05$), and high significant difference ($P < 0.01$) in 28 days duration.
- 3- No significant differences were found at different time intervals between permanent and primary teeth that treated with Biodentine™ in intensity of inflammatory response ($P > 0.05$).
- 4- The Transforming growth factor beta 1 expression in 2 days studied groups reported: no significant differences were found in permanent and primary teeth treated with Biodentine™ to odontoblast cells, stromal cells and blood vessels.
- 5- The TGFB1 expression in 28 days duration of studied groups reported: TGFB1 expression of permanent and primary teeth treated with Biodentine™ represented a high significant difference to odontoblast cells ($P < 0.01$) and no significant differences to stromal cells and blood vessels ($P > 0.05$).

Conclusions:

Biodentine™ induced mineralized foci formation early after its application and expressed markers of odontoblasts in both permanent and primary teeth. Biodentine™ significantly increased TGFB1 secretion from pulp cells ($P < 0.05$) in both permanent and primary teeth.