

## Apoptosis activation in human carious dentin. An immunohistochemical study

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The exact mechanisms and enzymes involved in caries progression are largely unclear (1). Apoptosis plays a key role in dentin remodelling related to damage repair; however, it is unclear whether apoptosis in decayed teeth is activated through the extrinsic or the intrinsic pathway (2-5). This *in vivo* immunohistochemical study explored the localization of TRAIL, DR5, Bcl-2 and Bax, the main proteins involved in apoptosis, in teeth with advanced caries. To evaluate TRAIL, DR5, Bcl-2 and Bax immunoeexpressions twelve permanent carious premolars were included in paraffin and processed for immunohistochemistry. The results showed that TRAIL and DR5 were overexpressed in dentin and in pulp vessels and mononuclear cells; strong Bax immunostaining was detected in dilated dentinal tubules close to the lesion, and Bcl-2 staining was weak in some dentin areas under the cavity or altogether absent. These findings suggest that both apoptosis pathways are activated in dental caries. Further studies are required to gain insights into its biomolecular mechanisms and provide a contribution to therapeutic strategies.

### References

- [1] Nyvad B, Fejerskov O. An ultrastructural study of bacterial invasion and tissue breakdown in human experimental root-surface caries. *J Dent Res* 1990;69:1118-25.
- [2] Zhang W, Ju J. Odontoblast-targeted Bcl-2 overexpression promotes dentin damage repair. *Arch Oral Biol* 2012;57:285-92.
- [3] Chen B, Ma B, Yang S, Xing X, Gu R, Hu Y. DR5 and DcR2 are expressed in human lumbar intervertebral discs. *Spine (Phila Pa 1976)* 2009;34:E677-81.
- [4] Mitsiadis TA, De Bari Cm About I. Apoptosis in developmental and repair-related human tooth remodelling: a view from the inside. *Exp Cell Res* 2008;314(4):869-77
- [5] Kitamura C, Kimura K, Nakayama T, Toyoshima K, Terashita M. Primary and secondary induction of apoptosis in odontoblasts after cavity preparation of rat molars. *J Dent Res* 2001;80(6):1530-34.

### Keywords

Apoptosis; TRAIL; DR5; Bax; Bcl-2; carious teeth.