

Short Communication

“Bioactive primers”- macroshield against micro-leakage in restorative dentistry?**Ishwarya Gurucharan¹, Saravanakarthykeyan Balasubramanian², Mahalaxmi Sekar³**

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ABSTRACT

In today's dental era, minimal intervention dentistry is widely recommended to conserve maximal sound tooth structure by careful removal of only caries infected dentin. However, residual bacteria which remain in dentinal tubules of relatively healthy part of dentin make it impossible to achieve a complete caries free environment. This brief commentary will highlight on the recent advancements in adhesive resin composites with significant antibacterial effects which may aid in effective restoration of such cavities.

Key words: Antibacterial, bioactive primers, bonding, microleakage, minimal intervention dentistry

Dental caries is the most common oral disease which is characterized by destruction of organic and inorganic components of the tooth structure primarily caused by acidic products from bacterial fermentation of dietary carbohydrates. In today's dental era, minimal intervention dentistry is widely recommended to conserve maximal sound tooth structure by careful removal of only caries infected dentin. Further, advancements in adhesive resin based composites have resulted in improved, physical, chemical and mechanical properties, thereby restoring effectively these minimally prepared cavities. However, residual bacteria which remain in dentinal tubules of relatively healthy part of dentin make it impossible to achieve a complete caries free environment [1]. In addition, new bacteria can invade the tooth-restoration interface resulting in secondary caries. It has been reported in literature that half of all the tooth restorations fail in less than ten years, with secondary caries as one of the primary concerns which often necessitates re-restoration. Every time a replacement is

made, more tooth structure is lost, and hence, repeated failure and replacement of restorations can eventually lead to premature loss of the concerned tooth. Hence, it would be highly desirable to improve the restorative materials with significant antibacterial properties to reduce secondary caries and restoration failure [1].

Recent studies are focussed in the development of bio active primers by incorporation of antibacterial agents which could help inhibit the growth of residual as well as invading bacteria. One such earlier advancement was incorporation of quaternary ammonium methacrylates (QAMS) into composite resins which imparts antibacterial property to inhibit biofilm growth [2]. Novel bonding agents containing 12-methacryloxydodecyl-pyridinium bromide (MDPB) were later developed which exhibited a strong antibacterial effect [2]. Yet another bioactive primer named methacryloyl ethyl cetyl dimethyl ammonium chloride (DMAE-CB) was also synthesized and incorporated into resins [3]. A recent study investigated the incorporation of a quaternary ammonium

dimethacrylate (QADM) based primer into resin composites and concluded that this bio primer is quite effective in inhibition of dental plaque microbial biofilm growth [4]. It has also been demonstrated that QADM based primers kill effectively Streptococcus mutans when impregnated into human dentin blocks. More recently, a new quaternary ammonium monomer dimethylaminododecyl methacrylate (DMADDM) was synthesized and shown to possess a highly potent antibacterial activity [5]. Chen et al. compared the antibacterial efficacy of DMADDM and QADM against Streptococcus mutans impregnated in human dentin blocks and proved that DMADDM was shown to possess better and strong antibacterial effect [5]. In a recent study, it was reported that enriched fraction of grape seed extract (e-GSE), a naturally derived proanthocyanidin based primer significantly inhibited secondary caries development within 25µm of restoration margin in dentin [6]. Three possible mechanisms of actions was proposed for e-GSE to inhibit secondary caries in dentin include, tissue stabilization, a tighter interfacial seal, and antimicrobial activity (a well-known property of proanthocyanidins) [6].

CONCLUSION

Incorporation of either one of the above mentioned bioactive agents in adhesive resins is quite mandatory to confer bacterial protection against the development of secondary caries around enamel and dentin margins, thereby improving longevity of a restoration. It holds true that these bioprimers act as an effective macroshield against microleakage in restorative dentistry.

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