Emerging methods used in the prevention and repair of carious tissues

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Authors' objectives
To investigate four emerging technologies that might be used in the prevention of caries and/or repair of carious tissues.

Searching
MEDLINE and EMBASE were searched from 1976 (end date for searches was not specified) for studies reported in the English language. The reference lists of relevant studies and review papers were also checked.

Study selection
Study designs of evaluations included in the review
Descriptive studies of BMP were eligible for inclusion, whereas studies of the other therapies were required to have a control group. Descriptive studies which should have conducted a statistical analysis but did not were excluded. Studies were also excluded if the conclusions were deemed to be based on inappropriate statistics.

Specific interventions included in the review
Studies of partitioned toothpaste, laser treatment, fluoride-releasing dental materials and bone morphogenic protein (BMP) therapy were eligible for inclusion. Only fluoride-releasing dental materials that had gained some acceptance by the dental profession were eligible for inclusion.

Participants included in the review
Studies of humans, animals and laboratory studies were eligible for inclusion. Only the clinical studies involving human participants are summarised here.

Outcomes assessed in the review
The outcomes of interest were the remineralisation of dentin or enamel and increased resistance to demineralisation for partitioned dentifrice, laser therapy and fluoride-releasing dental materials, and tubular dentin formation for BMP therapy. The clinical studies detected caries using visual examination, microradiography, staining with erythrocin, by assessing the colour and consistency of dentin, and by using Pitts diagnostic criteria.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed studies for relevance (except for studies of BMP therapy, which were assessed by one reviewer) and any disagreements were resolved by consensus.

Assessment of study quality
The authors reported that validity was assessed. However, the web address provided for further details was not accessible and the information could not be found following a search of the website. Two reviewers independently assessed study validity and any disagreements were resolved by consensus.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Individual study outcomes were briefly summarised.

Methods of synthesis
How were the studies combined?
The studies were discussed in a narrative synthesis.
How were differences between studies investigated?
Differences between the studies were reported in the tables and discussed in the narrative.

Results of the review
Seven clinical studies (n=191) were included. These were controlled studies.
Partitioned toothpaste (1 clinical study): twice daily application of partitioned toothpaste was associated with reduced root caries, but not coronal caries, compared with nonpartitioned toothpaste.
Laser therapy: no clinical studies were found.
Fluoride-releasing materials (6 clinical trials): 4 of 5 trials reporting enamel outcomes reported increased enamel resistance to demineralisation with fluoride-enhancing materials compared with the control. The one study reporting dentin outcomes reported no difference in remineralisation of dentinal lesions with fluoride-releasing materials compared with the control.
BMP therapy: no clinical studies were found.

Authors' conclusions
Although the laboratory, animal and the few clinical trials available reported encouraging results, independent randomised controlled clinical trials are required before recommendations can be made about the use of these technologies in general practice.

CRD commentary
The review was clear in terms of the interventions of interest. The inclusion criteria for the participants were very broad and encompassed laboratory and animal studies as well as clinical studies. Although there were stated inclusion criteria for study design, it was unclear how the studies were assessed for appropriateness of statistical analysis. Two relevant databases were searched for studies, but the search terms were not reported. Only English-language studies were included and there were no specific attempts to identify unpublished studies, thereby introducing the risk of publication and language bias. From the information available, it was not possible to assess the adequacy of the validity assessment. Appropriate measures were taken to reduce error and bias in the study selection and validity assessment processes, but not the data extraction.
Relevant details of the individual studies were provided. However, the comparator used was not always clear and only a brief summary of the study results were provided, making it difficult to fully assess the adequacy of the authors' conclusions. The narrative synthesis was appropriate. Overall, the authors' conclusions are appropriate and are likely to be reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.
Research: Clinical randomised controlled trials are required to investigate the effectiveness of partitioned toothpastes and fluoride-releasing dental materials. Further in vitro studies of laser therapy are required, as are further animal studies of BMP prior to the clinical trials.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.