Silver diamine fluoride: a caries "silver-fluoride bullet"

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CRD summary
The authors concluded that silver diamine fluoride (SDF) was more effective than fluoride varnish and could be valuable in preventing caries. Much of the review was well conducted, but the conclusion was overstated, as it was based on one randomised controlled trial and the results comparing SDF with fluoride were not presented.

Authors' objectives
To evaluate the effects of silver diamine fluoride (SDF) on the arrest and prevention of dental caries.

Searching
MEDLINE, LILACS, EMBASE, the Cochrane Library, and the Brazilian Bibliography of Odontology (BBO) databases were searched from 1966 to December 2006 for studies published in English, Spanish or Portuguese. Search terms were reported and reference lists were screened for additional articles.

Study selection
Randomised controlled trials (RCTs), cohort studies, and case control studies that evaluated the effects of SDF for caries were eligible for inclusion. Studies had to use the patient as the unit of observation and report the variance.

The included studies were on 38% SDF (applied once or twice per year) with or without excavation compared with 5% fluoride (four times per year) with or without excavation, or compared with water or examination (twice per year). Both included studies were in children. They involved carious primary maxillary anterior teeth or carious primary teeth, carious permanent molars, or both. The review assessed caries arrest, caries prevention, and adverse events. The duration of follow-up was 2.5 or three years.

Two reviewers independently selected studies and disagreements were resolved by a third reviewer.

Assessment of study quality
Validity was assessed using Jadad criteria for randomisation, blinding, and reporting of withdrawals. The maximum possible score was five.

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Data extraction
For each treatment arm the preventative fraction (relative risk reduction) and number needed to treat (NNT) were calculated for SDF compared with water, fluoride compared with water, and SDF compared with examination (one study had five treatment arms and the other had two).

Two reviewers independently extracted data. Disagreements were resolved by a third reviewer.

Methods of synthesis
The studies were combined in a narrative synthesis.

Results of the review
One RCT (n was unclear, but appeared to be 452 patients) and one prospective controlled study (n=375) were included. The RCT was blinded for randomisation and evaluation and scored four out of five points on the Jadad scale; the non-randomised study scored two points.

The RCT on decayed primary teeth, permanent molars, or both: For SDF compared with examination, the lowest
preventable fractions, for primary teeth, were 55.6% with NNT 1 (95% CI 0.4 to 1.3) for caries arrest and 78.6% with NNT 0.9 (95% CI 0.4 to 1.3) for caries prevention. The highest preventable fractions, for permanent teeth, were 100% with NNT 10 (95% CI 8.4 to 11.2) for caries arrest and 63.6% with NNT 1.4 (95% CI 0.3 to 1.9) for caries prevention. The authors stated that the RCT reported a significant difference between SDF and examination.

The non-randomised study on carious maxillary anterior primary teeth: For SDF compared with water, the lowest preventable fractions were 96.1% with NNT 0.8 (95% CI 0.5 to 1.0) for caries arrest and 70.3% with NNT 0.9 (95% CI 0.4 to 1.1) for caries prevention. For fluoride compared with water, the highest preventable fractions were 21.3% with NNT 3.7 (95% CI 3.4 to 3.9) for caries arrest and 55.7% with NNT 1.1 (95% CI 0.7 to 1.4) for caries prevention. The authors stated that the study reported a significant difference between SDF and fluoride varnishes.

Adverse events: Neither study reported any significant difference between treatment and control groups in pulpal irritation. One study reported a similar incidence of staining in treatment groups and 24-hour tissue sensitivity in three out of 153 patients with SDF.

Authors’ conclusions
Findings suggested that SDF was more effective than fluoride varnish and could be a valuable intervention in the prevention of caries.

CRD commentary
The review question was clearly stated and the inclusion criteria were defined for the intervention, outcomes, and study design. Several relevant sources were searched and some attempts were made to minimise language bias. No attempts to minimise publication bias were reported. Appropriate methods were used to minimise reviewer error and bias during the review process. Study validity was assessed using a tool designed for RCTs, but only the aggregate scores were presented and this made it difficult to independently assess the study quality. In view of the diversity between the two included studies, a narrative synthesis was appropriate.

Much of the review was well conducted, but the conclusion was overstated, as it was based on one RCT and the results comparing SDF with fluoride were not presented.

Implications of the review for practice and research
**Practice:** The authors stated that caution was required in the use of silver nitrate in a busy clinical environment.

**Research:** The authors stated that further research was required to evaluate SDF using different protocols, delivery systems, in different age and risk groups, in occlusal, proximal, and root caries, and for the treatment of tooth sensitivity and pulpal infections. Future studies could consider stratified RCTs to take account of these different variables.

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