



## Silver Diamine

### Full Summary

#### Description:

Silver Diamine Fluoride (SDF) is a clinically applied treatment that controls active dental caries and aids in preventing further progression of the disease. SDF has a dual mechanism of action resulting from the combination of its ingredients.<sup>1,2</sup> The silver component acts as an anti-microbial agent killing bacteria and preventing the formation of new biofilm, while the fluoride acts to prevent further demineralization of tooth structure. Application of SDF is simple and noninvasive. Initially, the teeth are brushed without paste and rinsed. The carious teeth are isolated, kept dry, and all excess debris is removed. A microbrush is dipped in a drop of SDF and placed on the lesion(s) for two minutes. Then, excess SDF is removed and patients are instructed to not eat or drink for one hour. The only reported side effect has been reversible staining of the tooth at the site of SDF application which is a common occurrence.

#### Effectiveness:

Numerous international studies have reported on the effectiveness of silver diamine fluoride in preventing and arresting dental caries. There is also limited information available on its effect on decreasing dental sensitivity. These studies demonstrated that application of 38% SDF can both prevent and arrest caries including caries that has progressed into the dentin.<sup>1-7</sup> A prospective randomized clinical trial<sup>1</sup>, conducted in a low fluoride (0.3ppm) community in Nepal, included 976 schoolchildren; 545 males (56%) and 431 females (44%), ages 3-9 years with a mean age of 5.2 years at the time of enrollment. Children were randomized into one of four groups and examined by a blinded examiner at baseline, 6, 12, and 24 months. The treatment groups were:

- 1) One application of 38% SDF for 2 minutes without a reducing agent;
- 2) One application of 38% SDF for 2 minutes with tea as a reducing agent;
- 3) One application of 12% SDF for 2 minutes without a reducing agent; and
- 4) Control – No treatment for carious teeth

The study groups were reasonably balanced on age, gender, prior DMF and the remaining study variables. Children in the two groups receiving 38% SDF had significantly higher average arrested caries than either the group treated with 12% SDF or the control group at all follow up times. The magnitude of the difference decreased at the two year follow up time but remained statistically significant. The



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author conclude that Arresting Caries Treatment (ACT) with single spot application of 38% SDF provides an alternative where restorative treatment by a dental care provider for primary teeth is not an option. <sup>1</sup>

Another study conducted in China examined 375 children with dentin caries on the maxillary anterior teeth. The children were assigned to five groups<sup>2</sup>:

- 1) Caries were removed prior to application 38% SDF once per year;
- 2) 38% SDF was applied once per year without lesion excavation;
- 3) 5% NaF every three months with the excavation of caries prior to treatment;
- 4) 5% NaF every three months without the excavation of caries prior to treatment; and
- 5) A control, in which no fluoride treatment was given

The results demonstrated that patients receiving no fluoride treatment developed more carious lesions than those who had received either NaF or SDF. The children who received the 38% SDF once a year had more arrested caries and fewer new caries than children who received the 5% NaF every 3 months. Importantly, the study found the removal of caries prior to SDF application had no significant benefit when compared to SDF placed directly on the lesion. The side effect of caries being stained black due to SDF application was observed and authors noted that it can be reduced with potassium iodide application. <sup>2</sup>

## **Cost:**

The application of SDF is considered to be a low cost and effective measure that prevents caries initiation and arrests disease progression in primary and permanent teeth. The cost of delivering this preventive clinical treatment will depend largely on the fee schedule or salary level of the dental care provider. The use of various allied dental care providers frequently used in many countries can reduce the costs and result in greater cost-effectiveness.

If 4 drops of SDF are required per person, 100 drops will treat 25 people. 100 drops is approximately 5 ml. If a 5 ml solution of SDF costs \$10 USD, the cost per person will be approximately \$0.40 USD + supplies (eg: microbrush, napkins, gloves, etc) + and require less than 10 minutes of salary time. With reported effectiveness of nearly 75% in both caries prevention and progression, this treatment can certainly be considered very cost effective.



### References:

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4. Craig GG, Powell KR, Cooper MH (1981). Caries progression in primary molars: 24-month results from a minimal treatment programme. *Community Dent Oral Epidemiol* 9:260-265.
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