Silver Diamine Fluoride

Chemo-Therapy for Teeth

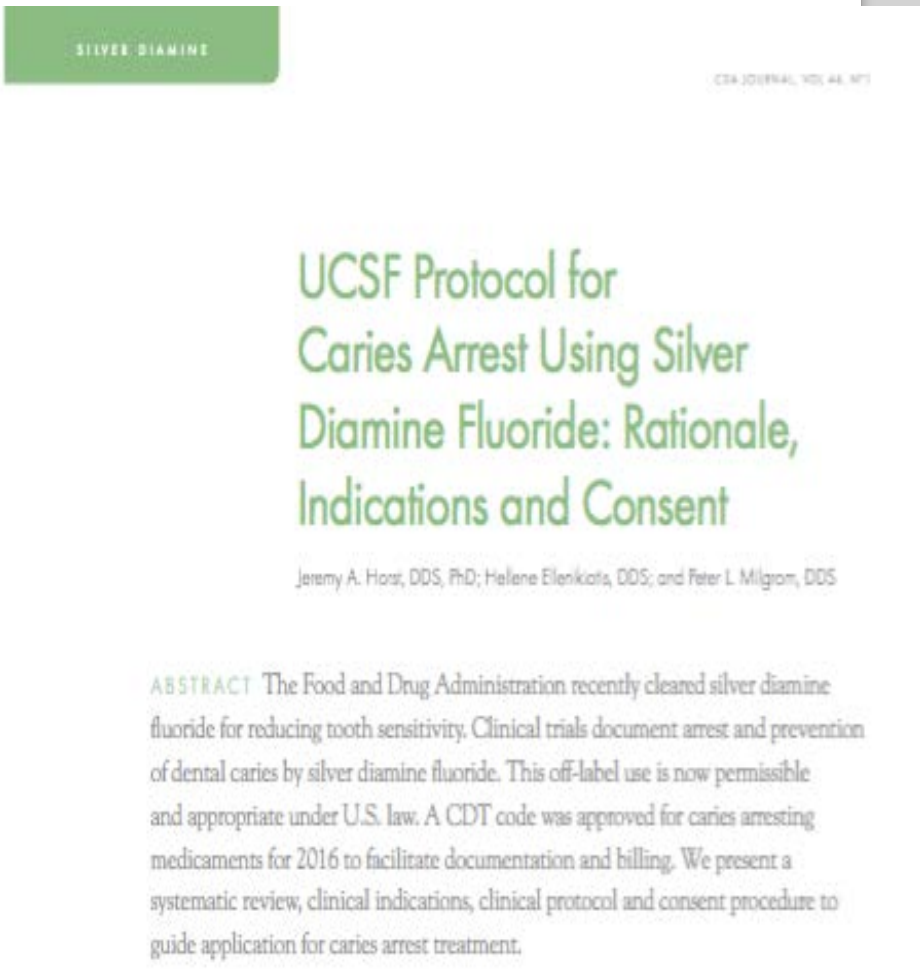
Craig S. Hollander DDS, MS
Diplomate American Board of Pediatric Dentistry

PEDIATRIC DENTISTRY
OF SUNSET HILLS

Silver Diamine Fluoride

The first drug to treat dental decay.

Journal of the California Dental Association January 2016



- Recent FDA approval for reducing tooth sensitivity
- Used in Japan for past 80 years
- Strong evidence it can arrest and prevent decay

- Recent FDA approval for reducing tooth sensitivity
- Used in Japan for past 80 years
- Strong evidence it can arrest and prevent decay
- SDF is both a *treatment* and *preventive* material.

- An abundance of clinical research shows that SDF stops 81% of active caries lesions and prevents 61% of new lesions from forming.

- May be used off-label for treatment of carious lesions
- May be used on all ages of patients

For Those That Need Chemistry

Colorless, topical agent

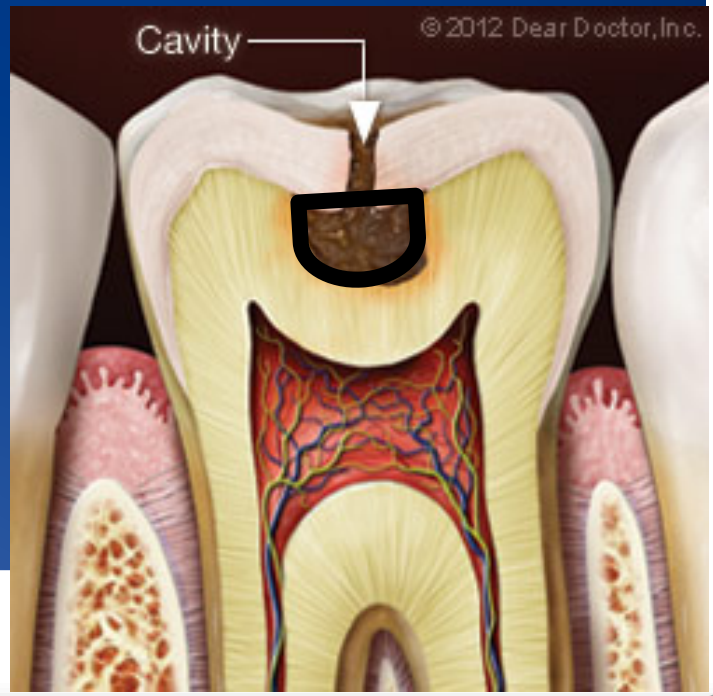
38% AgF_2

25% silver, 5% fluoride, 8% ammonia

pH 10

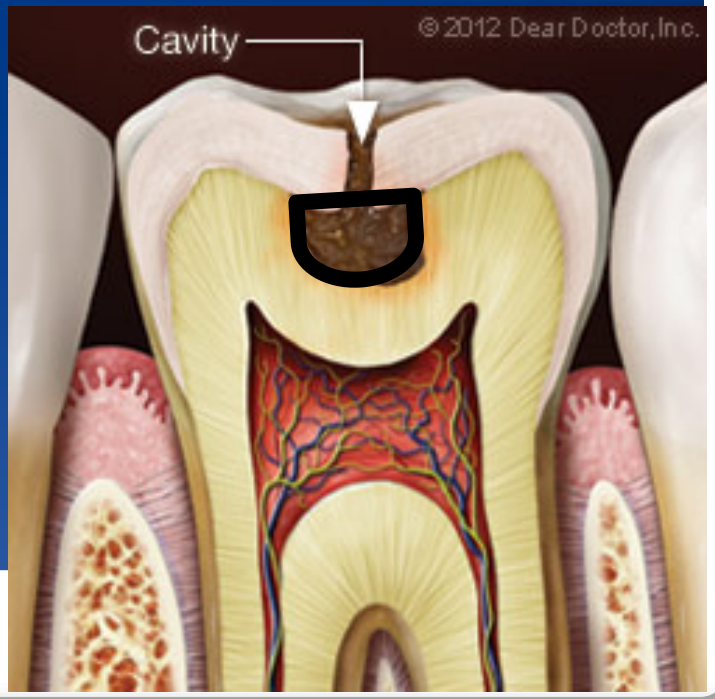
How Does it Work?

- Sensitivity is decreased when silver proteins block affected dentin.



How Does it Work?

- The antimicrobial action continues when silver from killed bacteria gets reactivated when introduced to live bacteria.

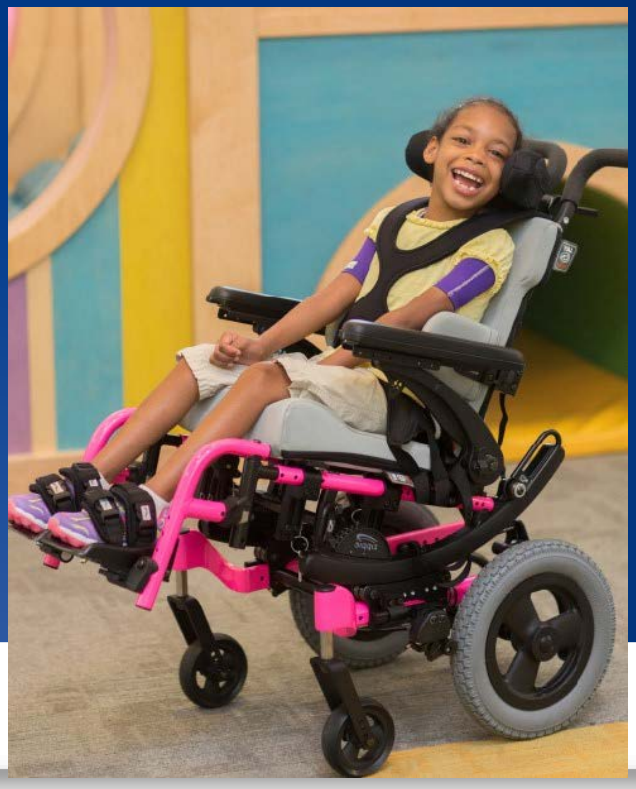


Clinical Indications

- Pre-Cooperative children

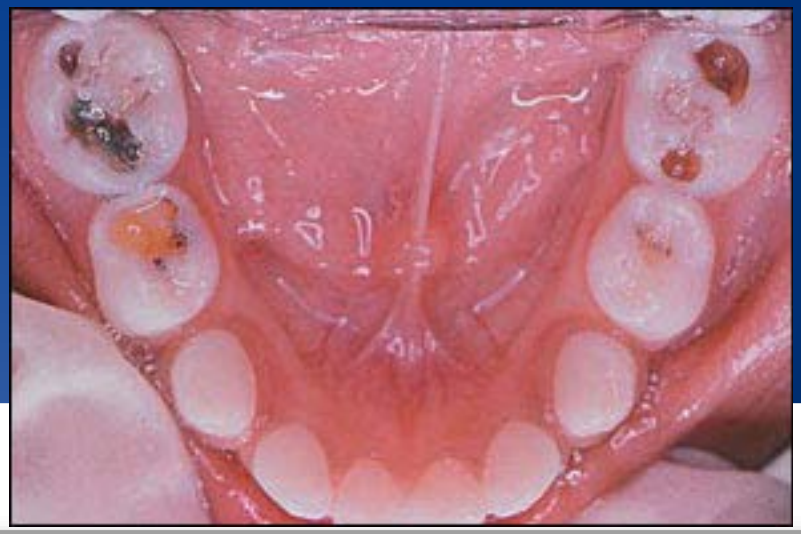
Clinical Indications

- Pre-Cooperative children
- Treatment challenged by behavioral or medical management.



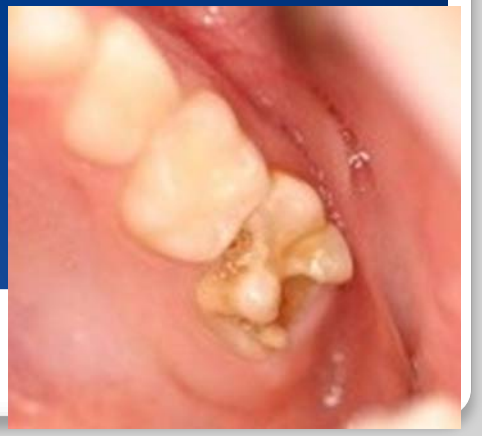
Clinical Indications

- Pre-Cooperative children
- Treatment challenged by behavioral or medical management.
- Patients with carious lesions that may not all be treated in one visit.



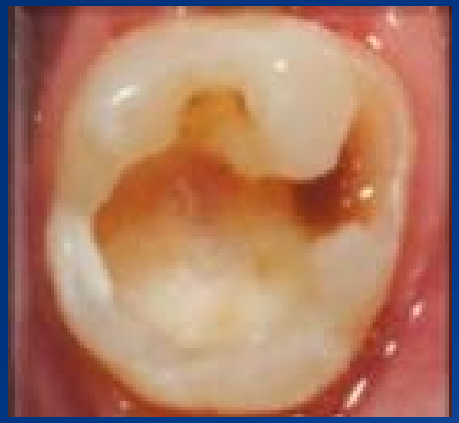
Clinical Indications

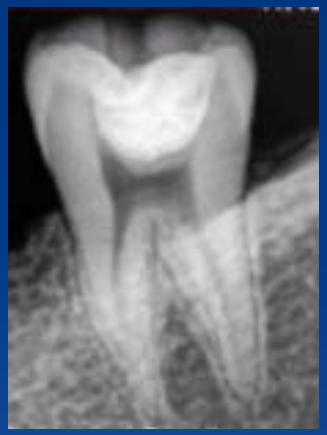
- Pre-Cooperative children
- Treatment challenged by behavioral or medical management.
- Patients with carious lesions that may not all be treated in one visit.
- Difficult to treat carious lesions



Clinical Indications

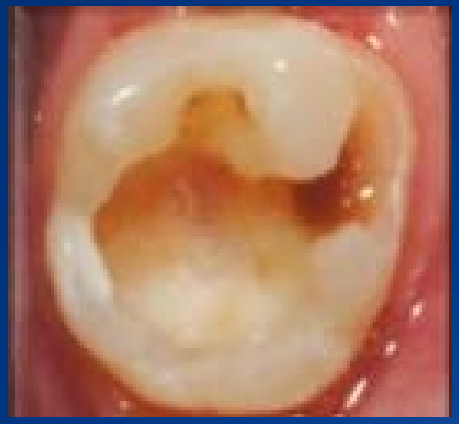
- SDF can be placed under indirect pulp caps

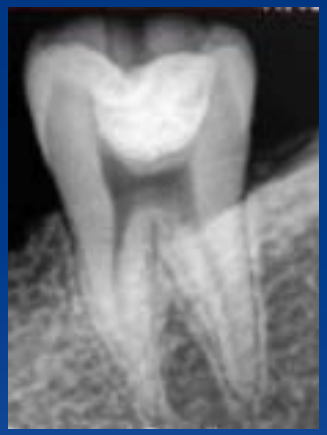




Clinical Indications

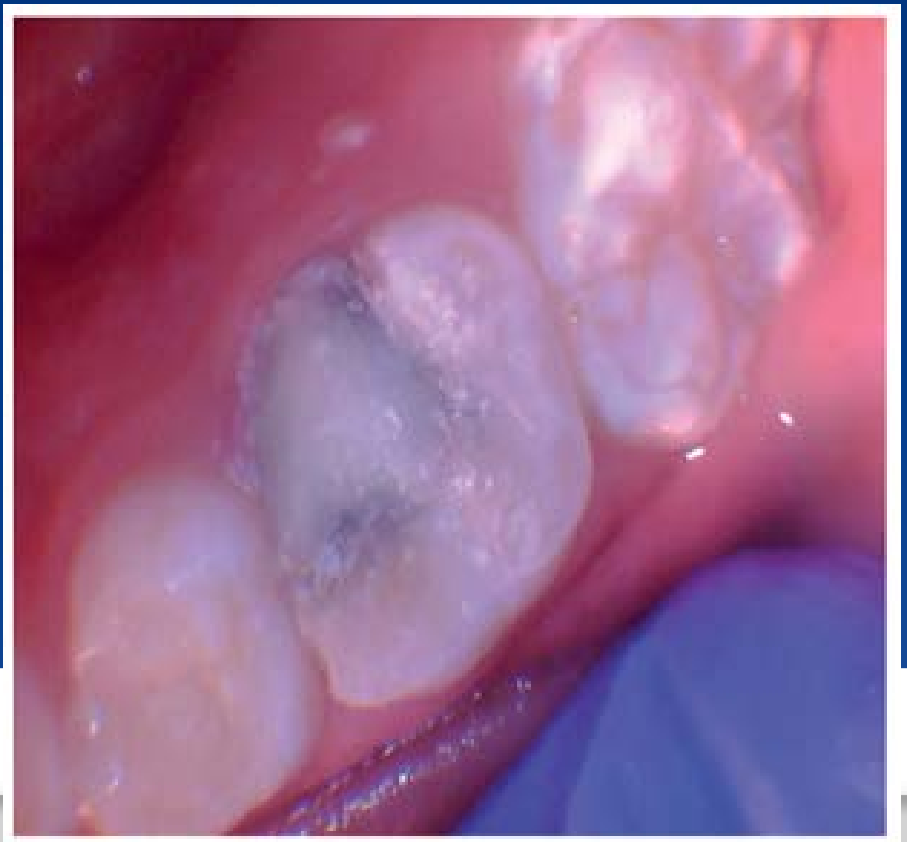
- SDF can be placed under indirect pulp caps





Clinical Indications

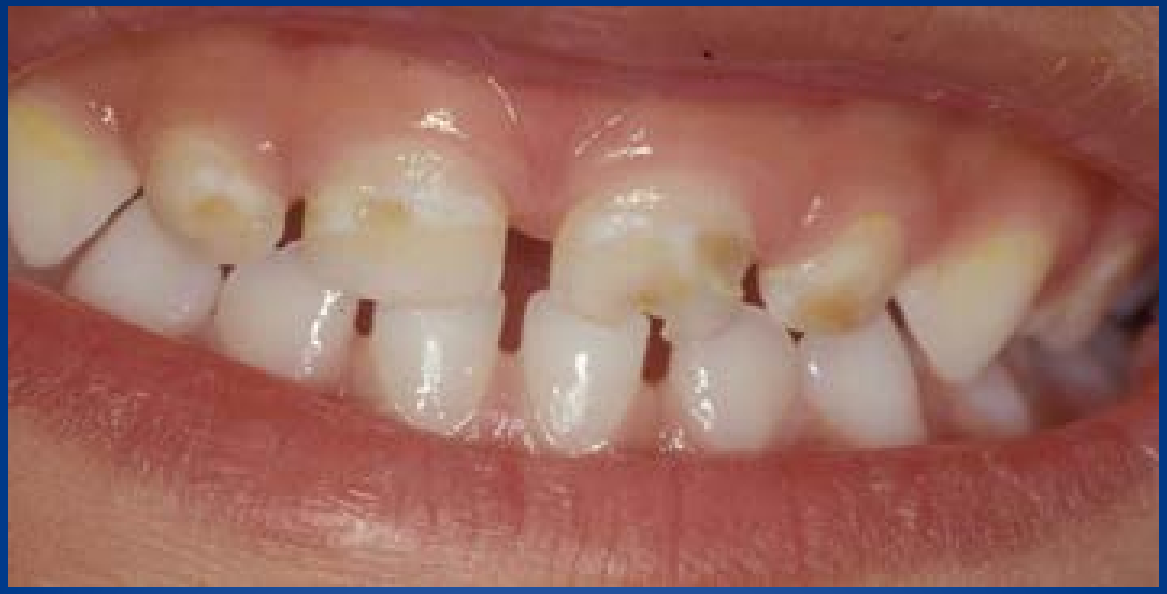
- The dark stain will be minimalized but still visible under composite restorations



Indications for Adults

Evidence / Prevention

- When SDF was applied to lesions, there was a halo effect for prevention for other teeth



Evidence / Prevention

- Semiannual applications are better than annual

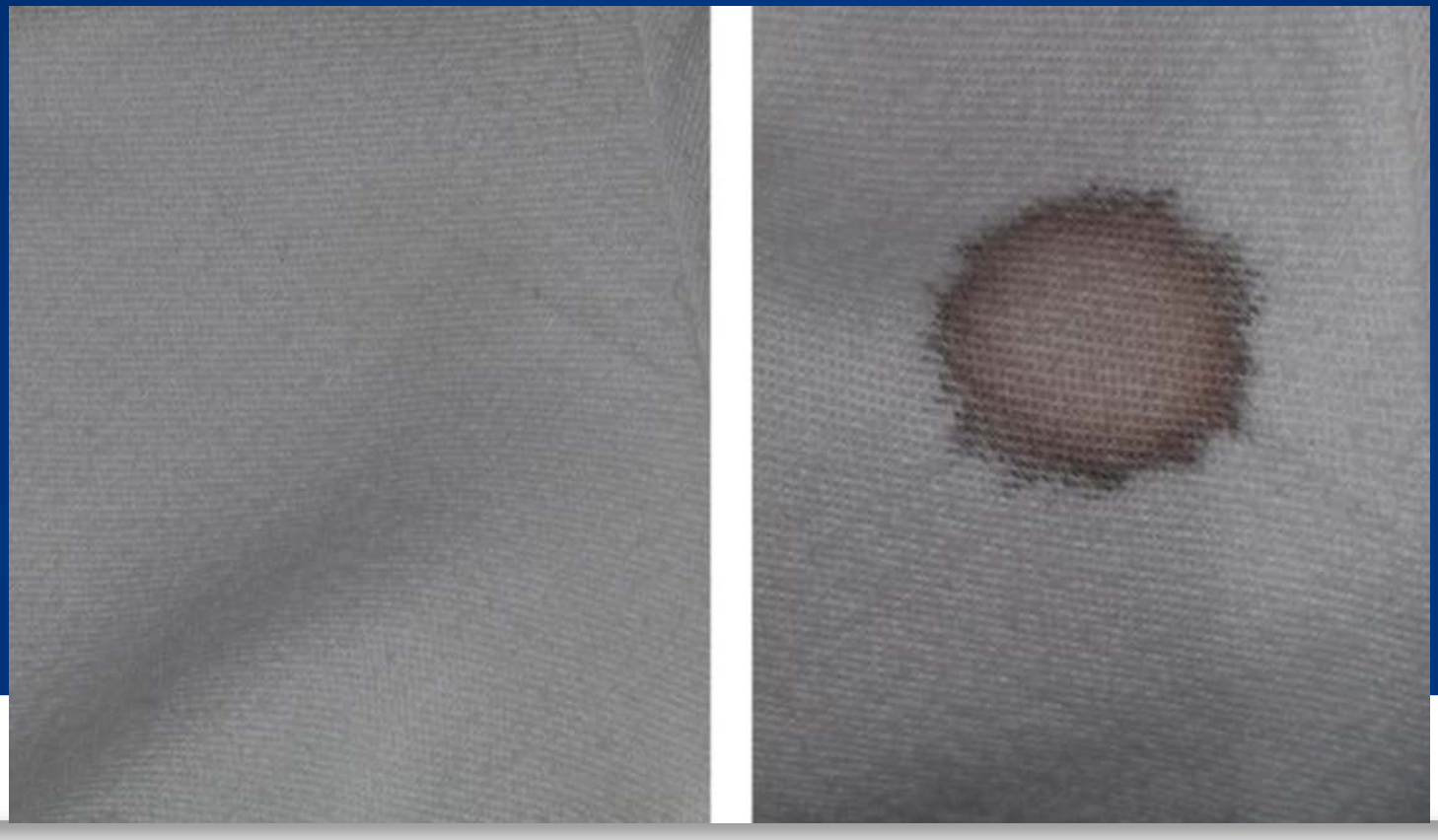
SDF Application Requires Improved OH and Eating Habits

CDT D1354

"Conservative treatment of an active, non-symptomatic carious lesion by topical application of a caries arresting or inhibiting medicament and without mechanical removal of sound tooth structure"

SIDE EFFECTS:

- Bitter/metallic taste
- Black color change on teeth as well as countertops and clothing



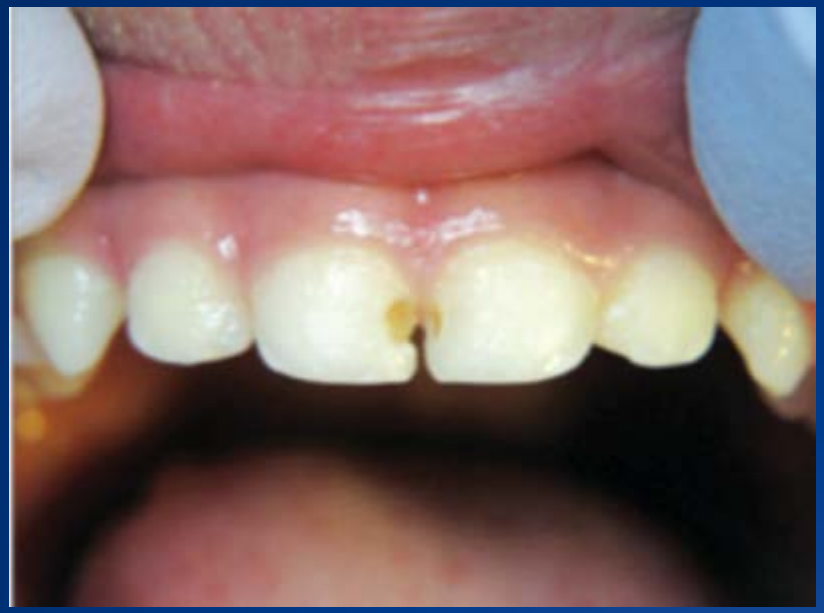
SIDE EFFECTS:

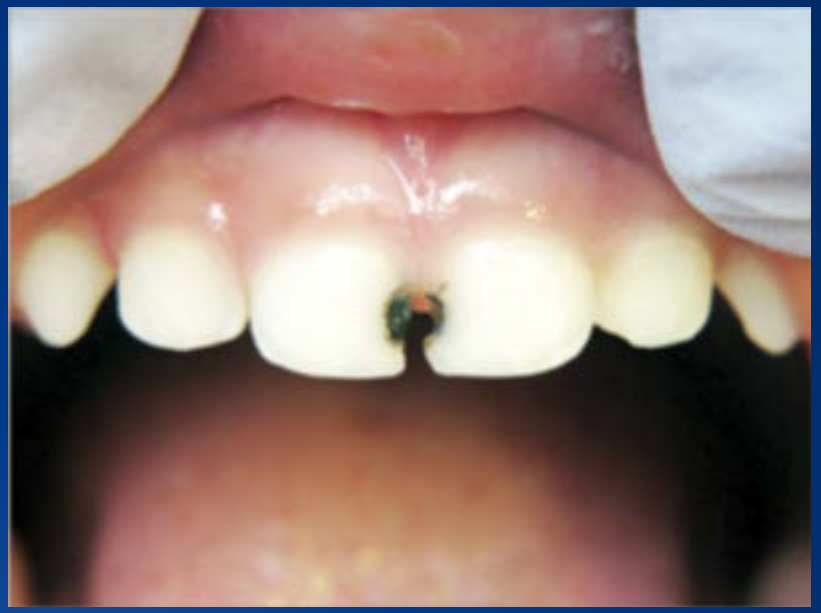
- Bitter/metallic taste
- Black color change on teeth as well as countertops and clothing

CONTRAINDICATIONS:

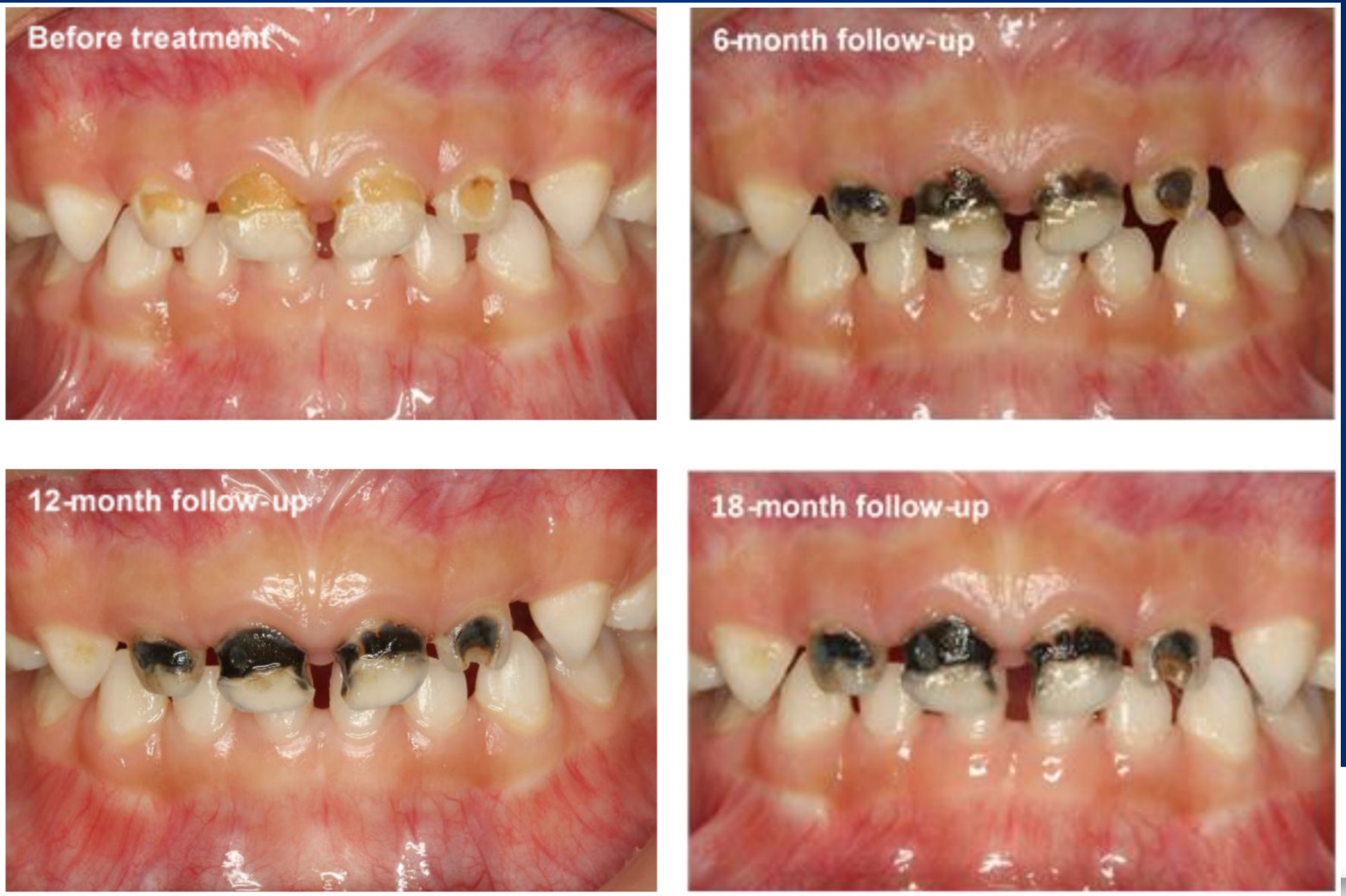
- Not for pregnant or nursing women
- Silver allergies
- Pulpally involved teeth (<1 mm from pulp)
- Desquamative Mucositis

Indications





Indications



Indications

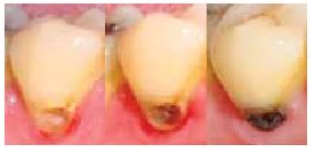
Informed Consent

- **UCSF Protocol**

UCSF Dental Center Informed Consent for Silver Diamine Fluoride

Facts for consideration:

- Silver diamine fluoride (SDF) is an antibiotic liquid. We use SDF on cavities to help stop tooth decay. We also use it to treat tooth sensitivity. SDF application every six to 12 months is necessary.
- The procedure: 1. Dry the affected area. 2. Place a small amount of SDF on the affected area. 3. Allow SDF to dry for one minute. 4. Rinse.
- **Treatment with SDF does not eliminate the need for dental fillings or crowns to repair function or esthetics. Additional procedures will incur a separate fee.**
- I should not be treated with SDF if: 1. I am allergic to silver. 2. There are painful sores or raw areas on my gums (i.e., ulcerative gingivitis) or anywhere in my mouth (i.e., stomatitis).



Benefits of receiving SDF:

- SDF can help stop tooth decay.
- SDF can help relieve sensitivity.

Risks related to SDF include, but are not limited to:

- **The affected area will stain black permanently.** Healthy tooth structure will not stain. Stained tooth structure can be replaced with a filling or a crown.
- Tooth-colored fillings and crowns may discolor if SDF is applied to them. Color changes on the surface can normally be polished off. The edge between a tooth and filling may keep the color.
- If accidentally applied to the skin or gums, a brown or white stain may appear that causes no harm, cannot be washed off and will disappear in one to three weeks.
- You may notice a metallic taste. This will go away rapidly.
- If tooth decay is not arrested, the decay will progress. In that case the tooth will require further treatment, such as repeat SDF, a filling or crown, root canal treatment or extraction.
- These side effects may not include all of the possible situations reported by the manufacturer. If you notice other effects, please contact your dental provider.
- Every reasonable effort will be made to ensure the success of SDF treatment. There is a risk that the procedure will not stop the decay and no guarantee of success is granted or implied.

Alternatives to SDF, not limited to the following:

- No treatment, which may lead to continued deterioration of tooth structures and cosmetic appearance. Symptoms may increase in severity.
- Depending on the location and extent of the tooth decay, other treatment may include placement of fluoride varnish, a filling or crown, extraction or referral for advanced treatment modalities.

I CERTIFY THAT I HAVE READ AND FULLY UNDERSTAND THIS DOCUMENT AND ALL MY QUESTIONS WERE ANSWERED:

_____(signature of patient) _____(date)

_____(signature of witness) _____(date)

Informed Consent

- Advantages: can stop decay and reduce sensitivity
- Risks: affected area will darken permanently; tooth colored restoration may stain; transient stain of skin or gingiva; metallic taste
- There is no guarantee of success and tooth may require further treatment by SDF or surgical intervention
- Alternatives: no treatment; fluoride varnish, surgical intervention

Procedure

- Caries removal does not offer any significant benefit in arresting dental caries

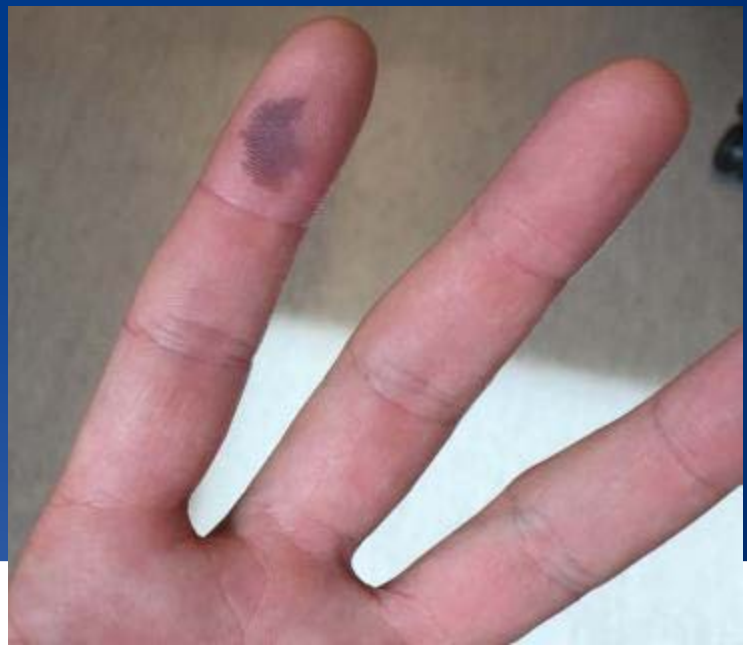
(Remove Food Debris)

Procedure

- 1 drop/ 4-5 Teeth

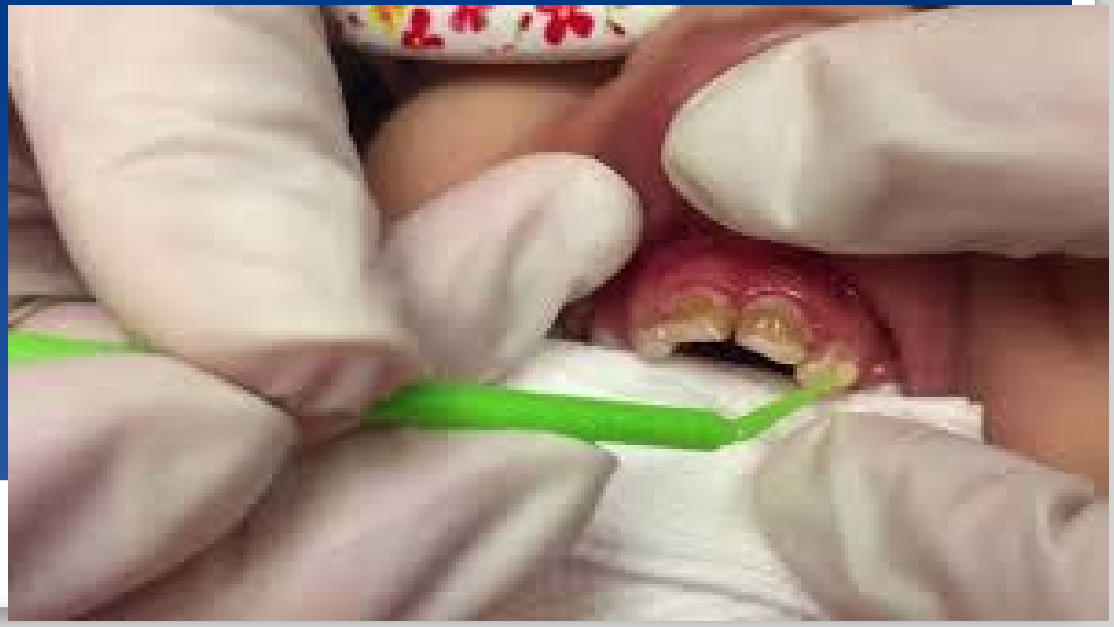
Procedure

- 1 drop/ 4-5 Teeth
- Vaseline over lips and gingiva to minimize staining



Procedure

- 1 drop/ 4-5 Teeth
- Vaseline over lips and gingiva to minimize staining
- Remove excess saliva and use cotton roll or gauze isolation

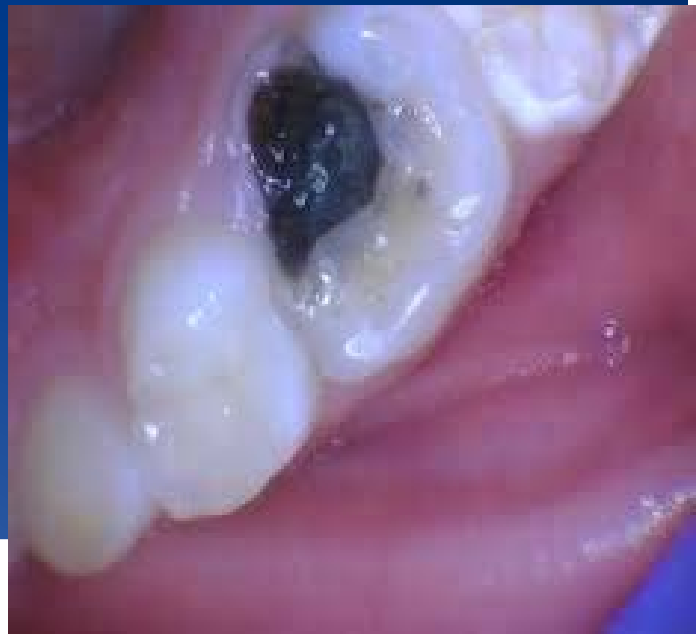


Procedure

- Allow absorption for up to 1 minute; Remove excess with gauze or cotton (suggest the patient be asked to rest on a gauze for 1 minute)
- A curing light activates the SDF and makes it turn dark immediately.
- Place fluoride varnish over carious lesion to prevent saliva from washing SDF away.

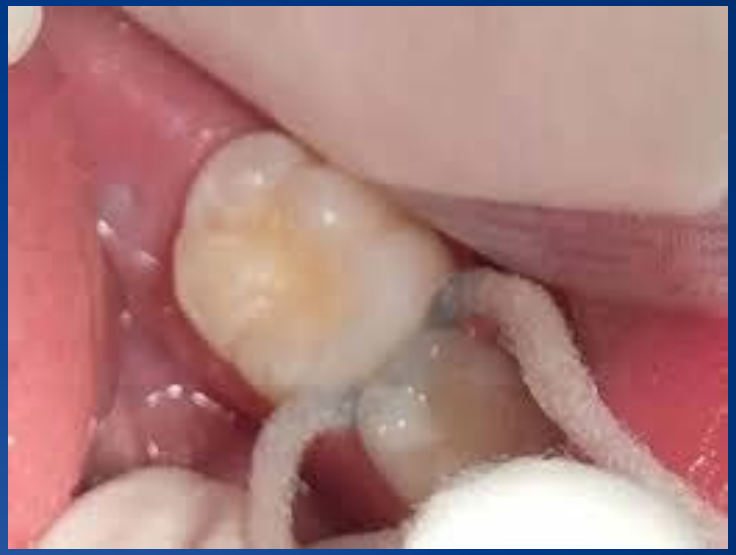
Follow up

- Re-apply in 2-4 weeks to assure evidence of arrest (85% rate with more than one application).
- Re-evaluate and reapply q 6months



Procedure

- Interproximal lesions are more tricky



Safety

- Average lethal dose used for obtaining FDA approval was LD50 520 mg/kg orally
- One drop contains 9.5mg of SDF
- 10kg child (22lbs) exposure is 0.95 mg/kg
- There have been no reports of adverse effects in Japan in the past 80 years of use

Decreasing Staining

- Super Saturated Potassium Iodide (SSKI) can be applied onto skin and soft tissue to remove dark stain.

Cost Effectiveness

1 drop/ 4-5 Teeth

1 ampule/ 4-5 teeth

100 drops per bottle

1 bottle =$162.50

$1.63 per drop

1 drop per ampule

30 ampules =$132.50

$ 4.42 per drop

Cost Effectiveness

We charge $35 per tooth

One drop will cover 4 anterior teeth or all 4 baby molars in one jaw

One drop could equal $140 charged out

Cost Effectiveness

We charge $35 per tooth

One drop will cover 4 anterior teeth or all 4 baby molars in one jaw

One drop could equal $140 charged out

100 drops=$14,000 for a $162.50 bottle

or 30 drops=$4200 for a $132.50 ampule

Cost Effectiveness

I do not charge for the second application 2-4 weeks later, or for the re-application at the subsequent check up visits

Cost Effectiveness

MEDICAID PATIENTS:

Reimbursement rate is $2.67 per tooth

every 6 months with a lifetime maximum of

4 applications per tooth

Cost Effectiveness

MEDICAID PATIENTS:

1 drop=4 molars x $2.67 = $10.68 per drop

Cost Effectiveness

MEDICAID PATIENTS:

1 drop=4 molars x $2.67 = $10.68 per drop

100 drops = $1068 for a $162.00 bottle

or 30 drops = $320.40 for a $132.50 ampule

Cost Effectiveness

MEDICAID PATIENTS:

4 applications = 4 drops x $1.63/drop= $6.52

Cost Effectiveness

MEDICAID PATIENTS:

4 applications = 4 drops x $1.63 = $6.52

1 tooth x $2.67 a tooth x 4 times = $10.68

4 teeth x $2.67 a tooth x 4 times = $42.72

Cost Effectiveness

MEDICAID PATIENTS:

4 applications = 4 drops x $1.63 = $6.52

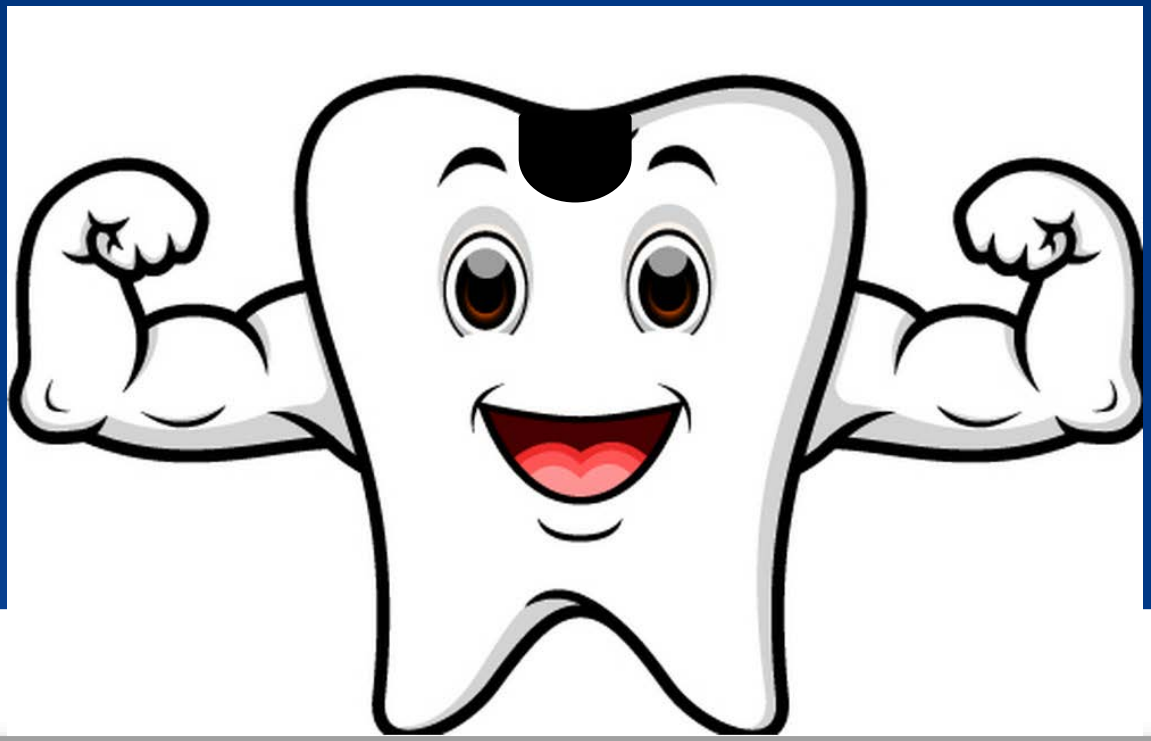
1 tooth x $2.67 a tooth x 4 times = $10.68

4 teeth x $2.67 a tooth x 4 times = $42.72

Concerns

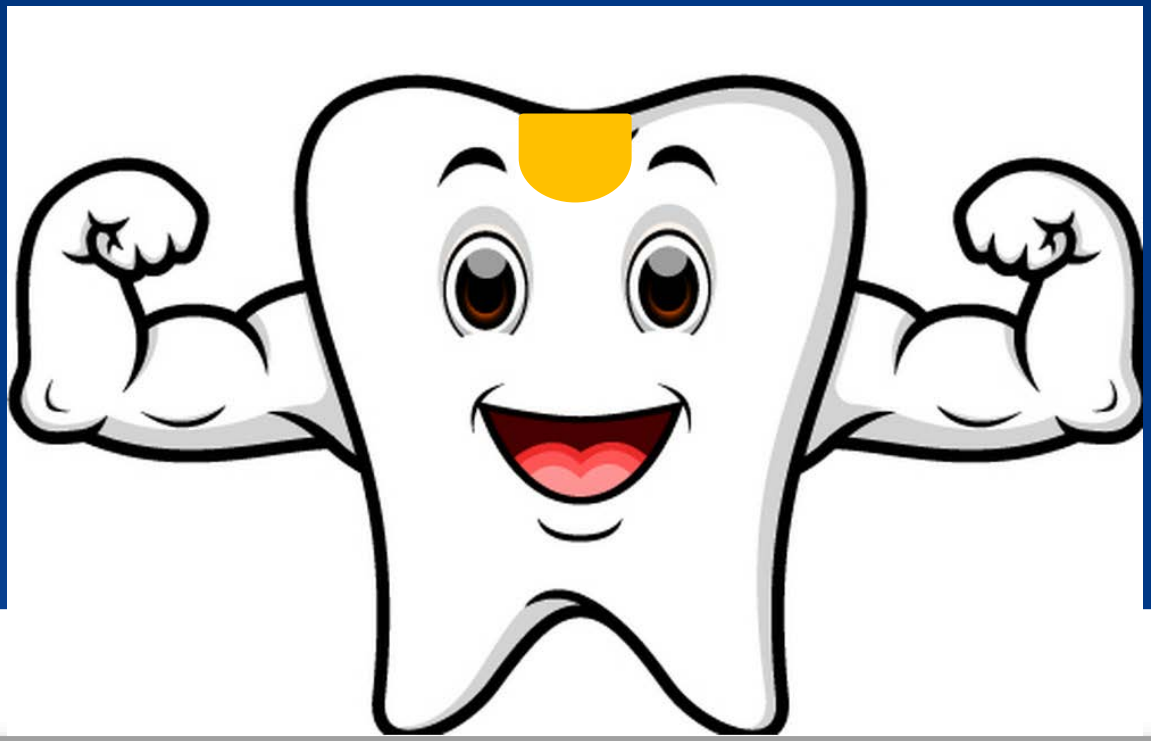
- Silver diamine fluoride is not a magic bullet.

  It should never be considered definitive care



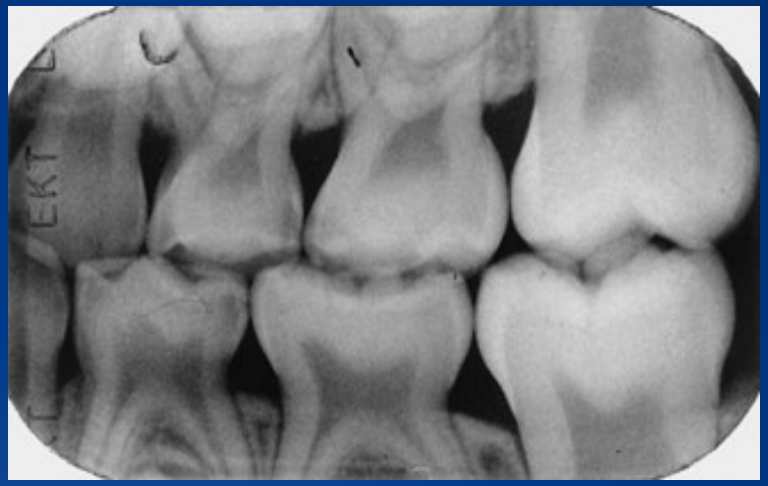
Concerns

- I will end up restoring a tooth previously treated with SDF if the lesion has gotten larger or the patient's OH has not improved.



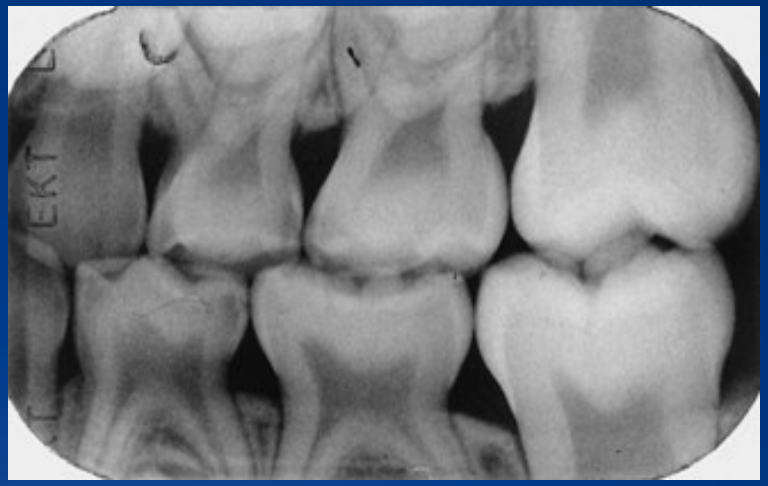
Other Concerns

- Interproximal lesions will still show up on radiographs



Other Concerns

- Interproximal lesions will still show up on radiographs



- Make sure your patients doesn't transfer care to another dental office, or the new dentist may end up restoring the tooth.


Questions?