



Minimally Invasive Approaches

IN

RESTORATIVE
DENTISTRY

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Minimally Invasive Dentistry MID

- ➔ *Conserve healthy tooth structure*
- ➔ *Focus on prevention, remineralization and minimal dentist intervention*
- ➔ *Perform the least amount of dentistry*
- ➔ *NOT removing tooth structure more than required*
- ➔ *Get the best possible result*

Minimal Invasive Dentistry



Knowledge

Techniques

Materials



Tools

Magnification



Skills

Practicing

Treatment options

Non-invasive

Hard and soft tissue are **not** prepared

Micro-invasive

Hard and soft tissue prepared at **micro** level

Minimal-invasive

Hard and soft tissue prepared at **superficial
and minimal** level

Macro-invasive

Hard and soft tissue prepared at **deeper**
level

Treatment options

Non-invasive



Micro-invasive

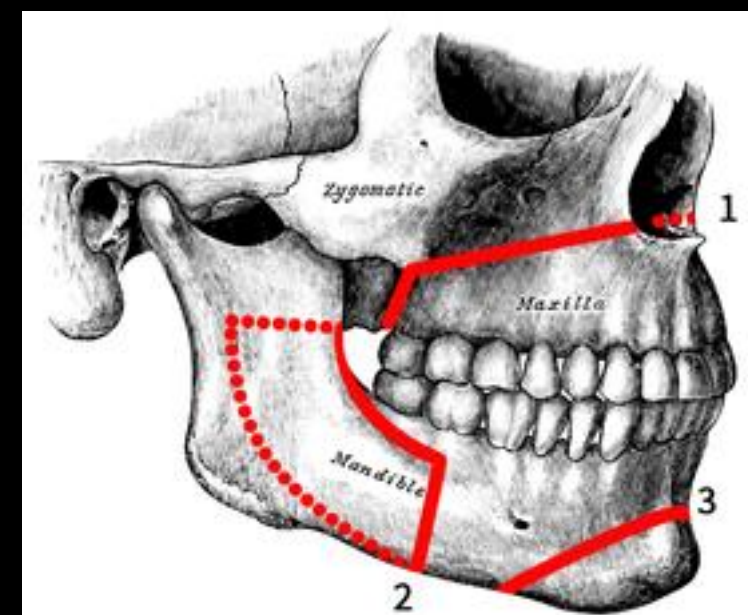


Treatment options

**Minimal-
invasive**



Macro-invasive



MIND ANTERIOR TEETH

BLEACHING

REMINERIZATION OF WHITE SPOTS

NON-PREP VENEERS

MICRO-ABRASION, DIRECT BONDING

NON-EXTRACTION ORTHO, GINGIVAL DEPIGMENTATION

BLEACHING

1st line of Cosmetic treatment

Vital teeth bleaching

In-office bleaching

Hydrogen Peroxide 35%



Home bleaching

Carbamide Peroxide 10 - 22%



BLEACHING



BLEACHING



BLEACHING

NON-VITAL TEETH BLEACHING

INTERNAL BLEACHING

“WALKING BLEACH” TECHNIQUE

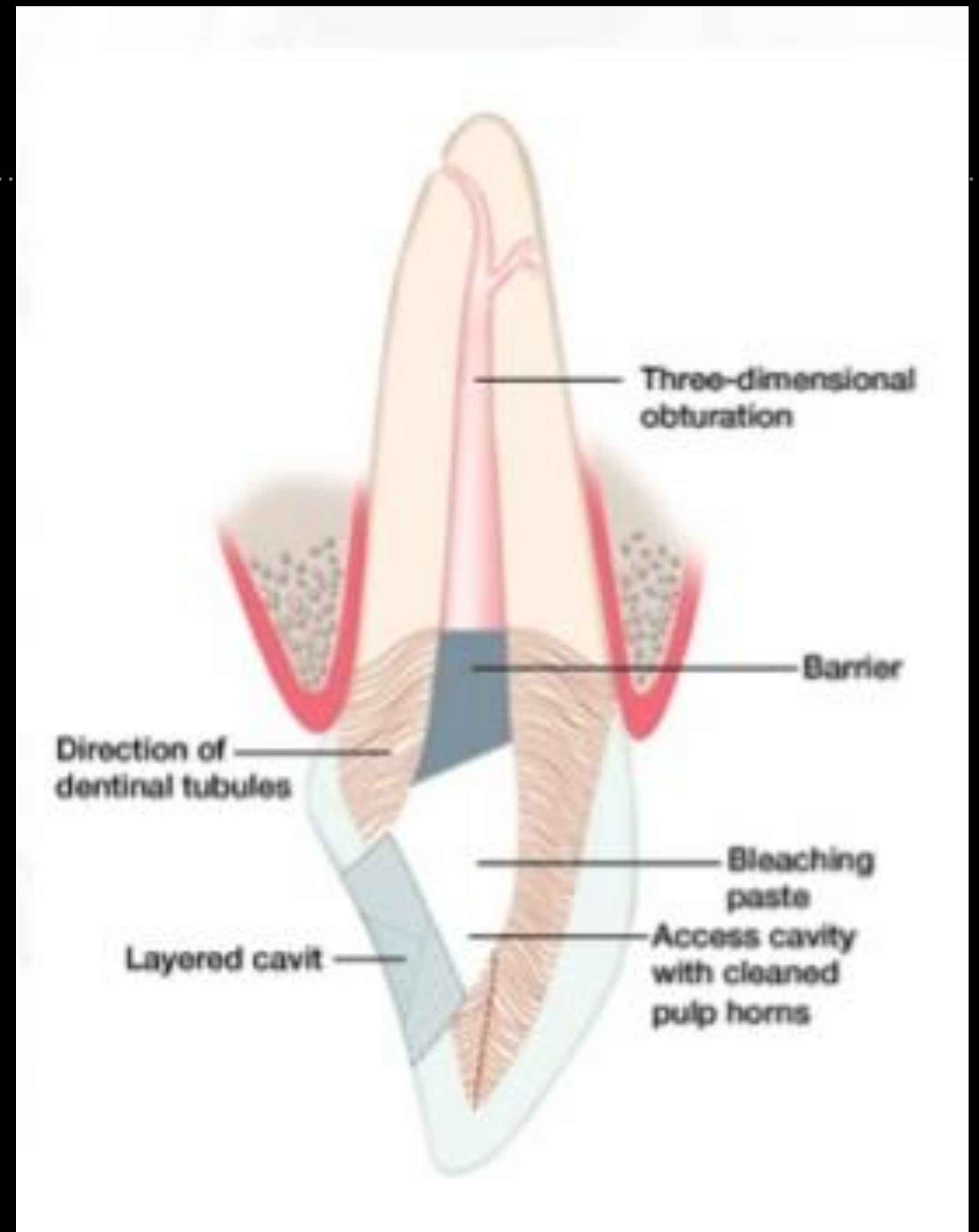


BLEACHING

NON-VITAL TEETH BLEACHING

INTERNAL BLEACHING

“WALKING BLEACH” TECHNIQUE



BLEACHING

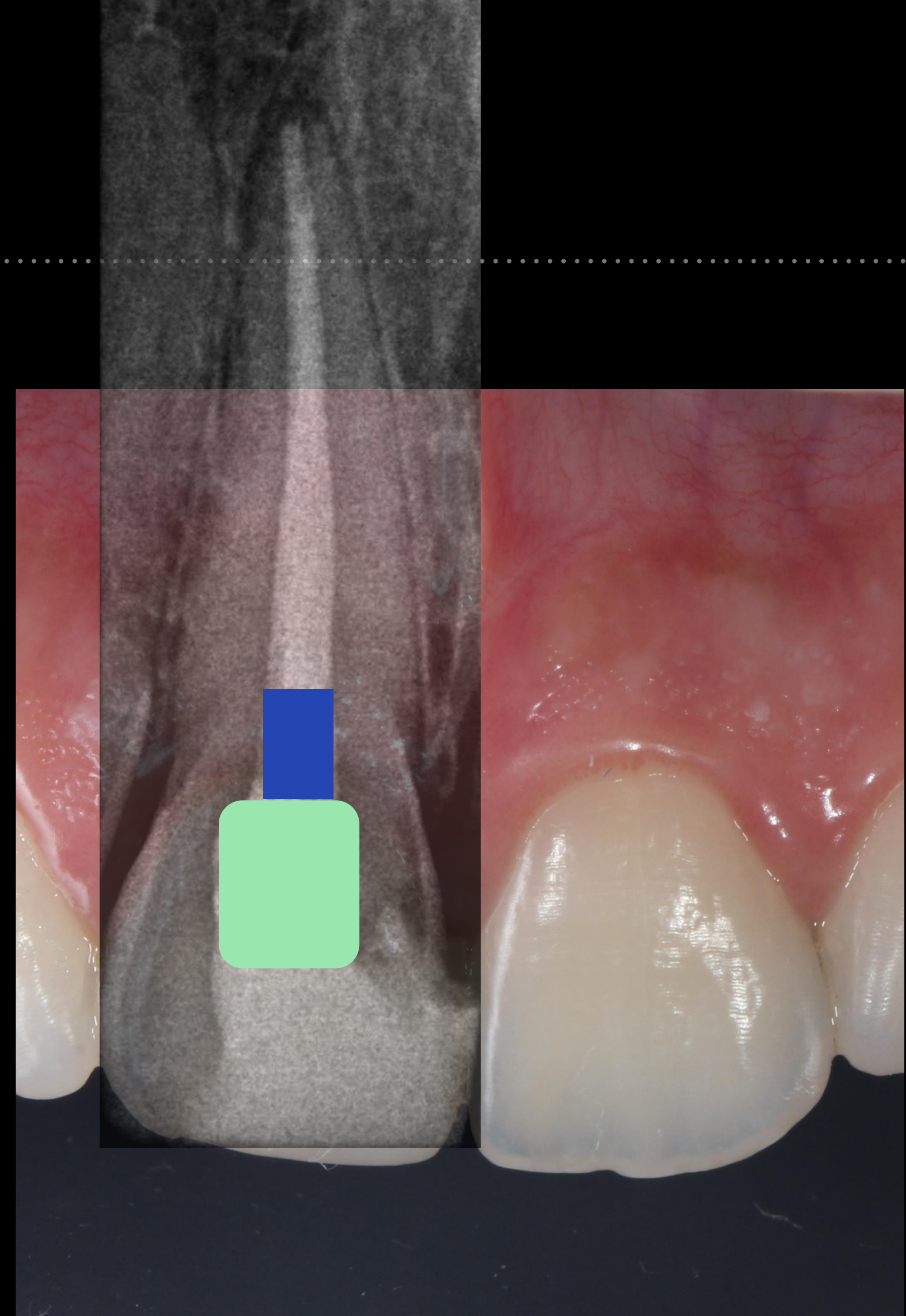
NON-VITAL TEETH BLEACHING

INTERNAL BLEACHING

“WALKING BLEACH” TECHNIQUE

Hydrogen Peroxide 35%

3-5 DAYS



WHITE SPOT LESION

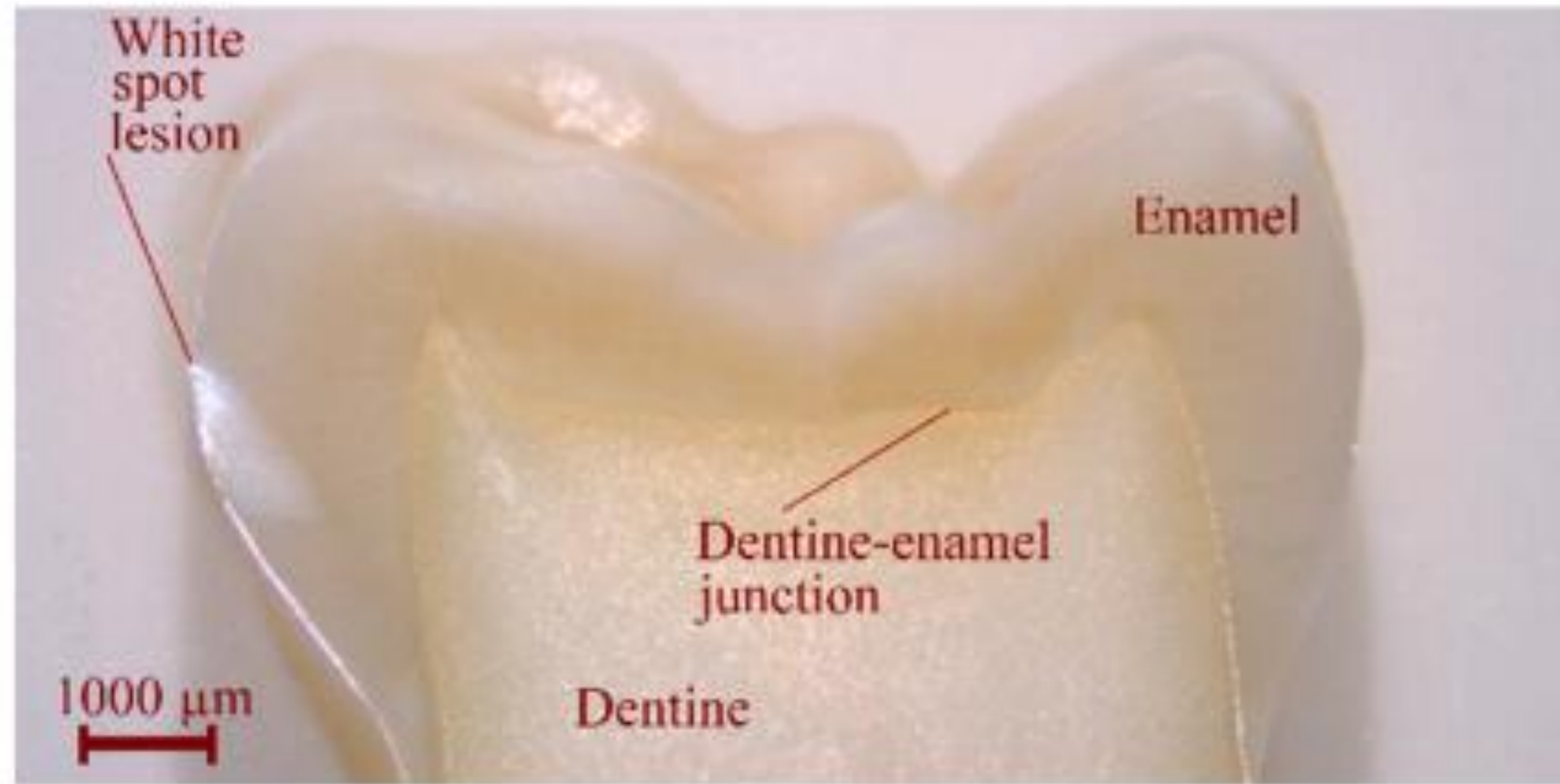
WHITE OPACITY

SUBSURFACE ENAMEL
DEMINERALIZATION THAT IS LOCATED
ON SMOOTH SURFACES OF TEETH

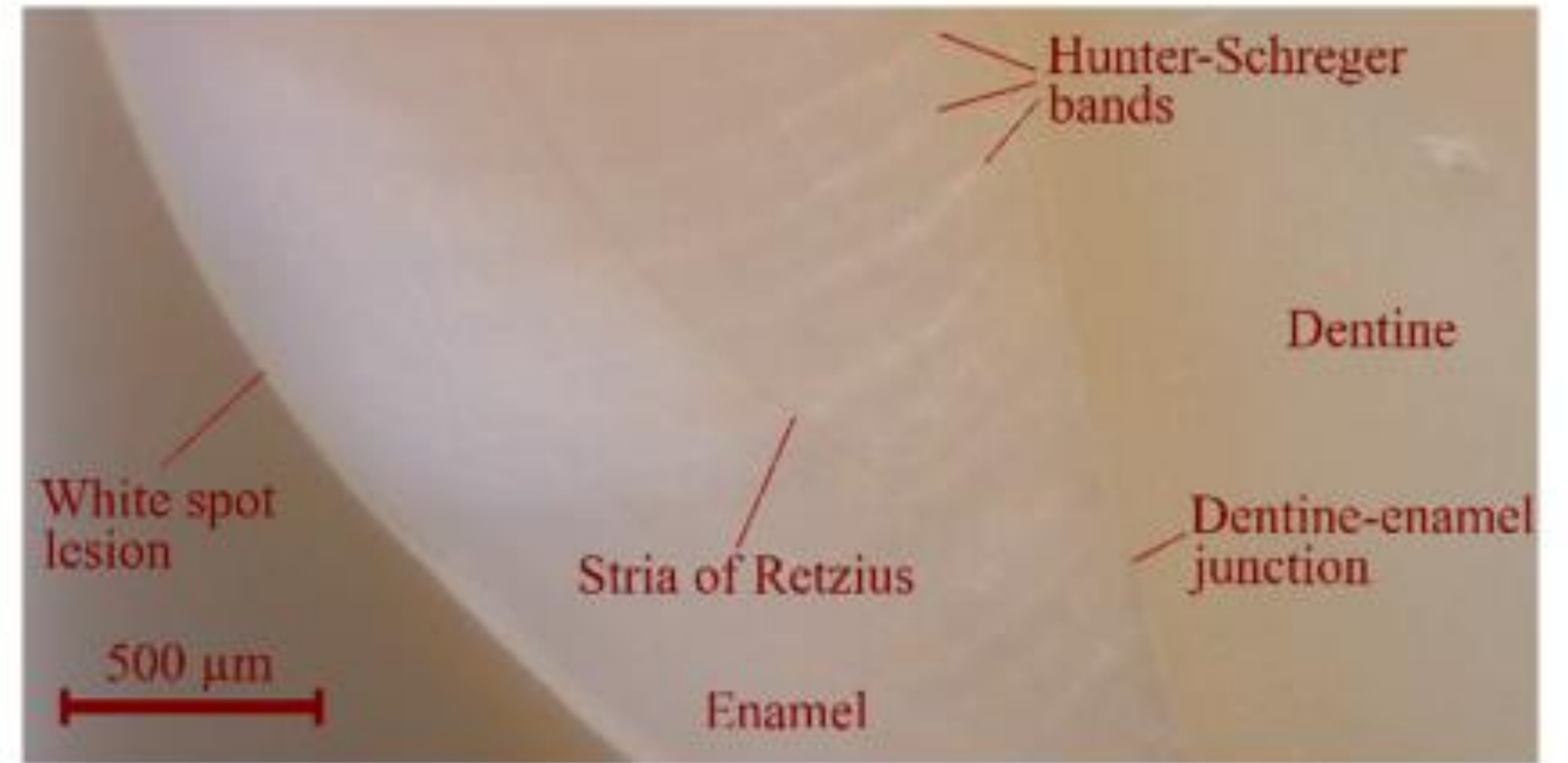
CHANGES IN LIGHT-SCATTERING
OPTICAL PROPERTIES OF THE
DECALCIFIED ENAMEL



WHITE SPOT LESION



(a)



(b)

Figure 1. Optical microscopy of the sample after final polishing: (a) the crown overview; (b) the white spot lesion (WSL) area.

PREVALENCE OF WSL

Introgenic effect of orthodontic therapy

WSLs is common during fixed orthodontic treatment with an incidence and prevalence rate of 45.8 and 68.4%.

A significant increase was reported in the prevalence of these lesions around the brackets bases or between the brackets/bands and in the gingival margins in the cervical areas and the middle thirds of the teeth under orthodontic wires (**Mizrahi, 1982**)

examination immediately after removal of fixed appliances and concluded that 97% of the subjects had one or more lesions

Increase with age and treatment duration.

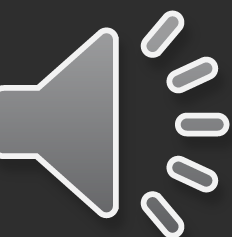


ETIOLOGY OF WSL

Demineralization of enamel develops due to prolong **plaque accumulation**

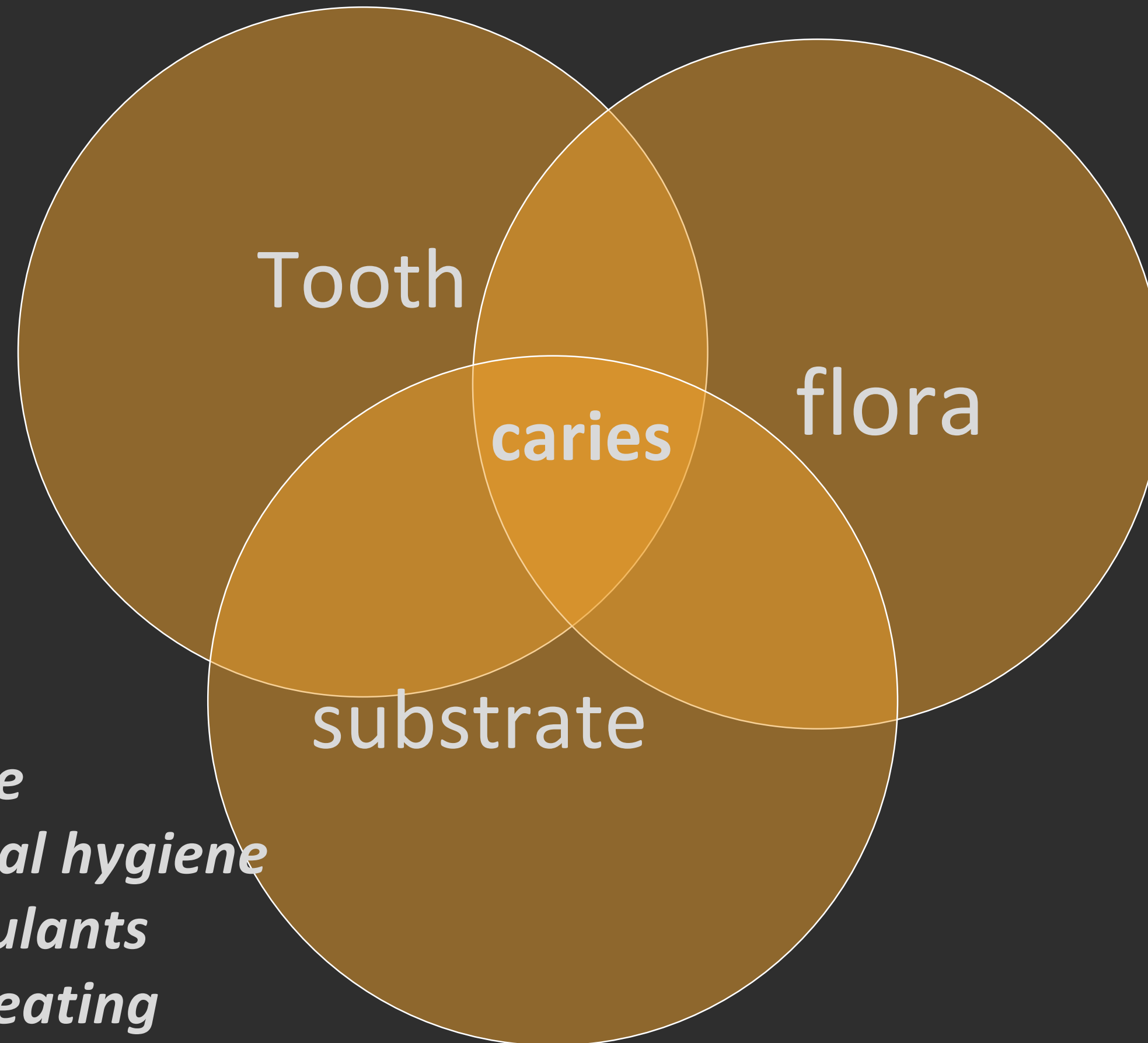
❖ **Formation of white spot lesions:**

- ❖ Plaque accumulation
- ❖ limited clearance of saliva
- ❖ reduced buffering in plaque of saliva
- ❖ low PH
- ❖ increase cariogenic risk of *S.metanus*
- ❖ decalcification of enamel



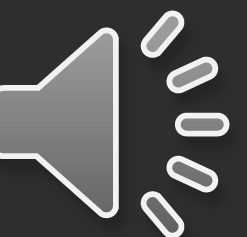
FACTORS NECESSARY FOR CARIES DEVELOPMENT

Tooth:
*Florid, morphology,
nutrition
Age, carbonate level*



Flora
*Strep.mutan
s
Oral hygiene*

Substrate
*Oral clearance, oral hygiene
Salivary stimulants
Frequency of eating
Carbohydrate (types and
concentration)*



classification made by **(Gorelick et al, 1982)** which considers both size and intensity of lesions

1. No clinical WSL



2. Minor WSL



3. Severe WSL



4. WSL with cavitation



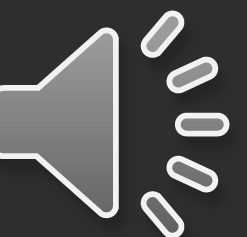
DIAGNOSIS OF WHITE SPOT LESIONS

- ◆ The white spot lesions chalky appearance is an optic phenomena caused by mineral loss in the subsurface and the surface of enamel
- ◆ In visual observation, reflected light is used to detect changes in color, texture, and translucency of the tooth substance
- ◆ Porous enamel scatters light more than sound enamel

However, these traditional methods for early caries diagnosis have been found to be inaccurate and insensitive
(korishettar et al, 2015).



*Chalky appearance of white spot lesions
(dry)*



DIAGNOSTIC METHODS



Trans-illumination method

Fluorescence method

QLF

laser fluorescence

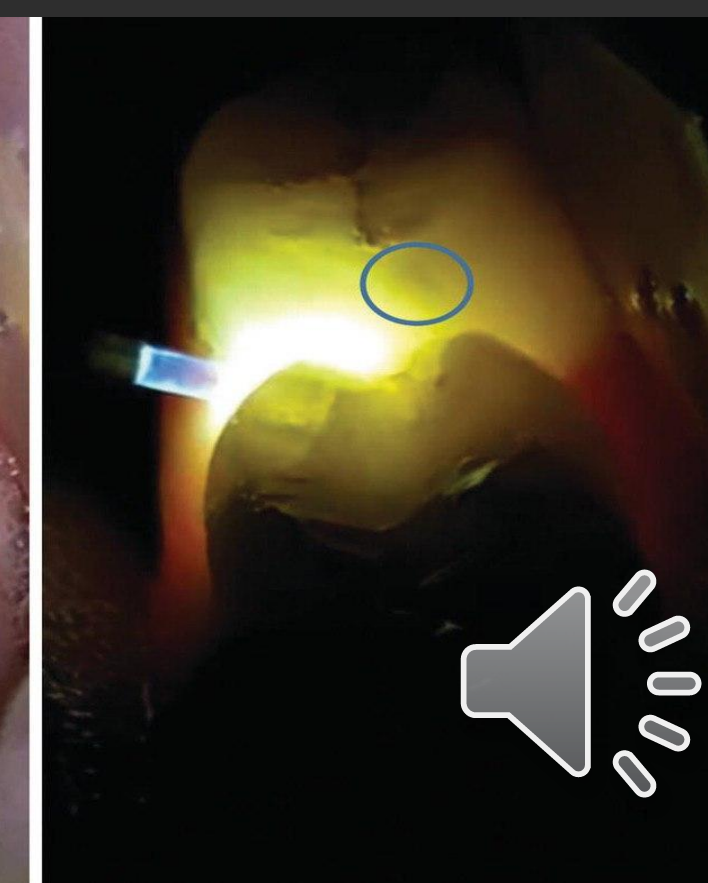
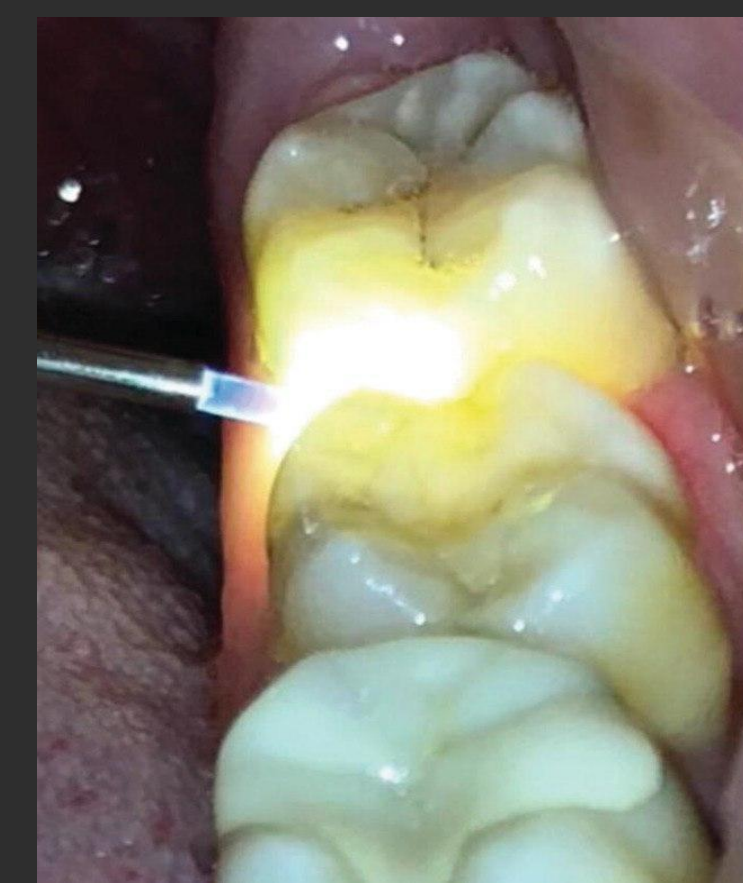
Electrical conductivity

ECM

Ultra sonic method

Optic coherence tomography

Laser induced radiometry



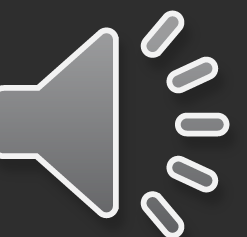
DEFERENTIAL DIAGNOSIS

Procedure:

Clean and dry the tooth

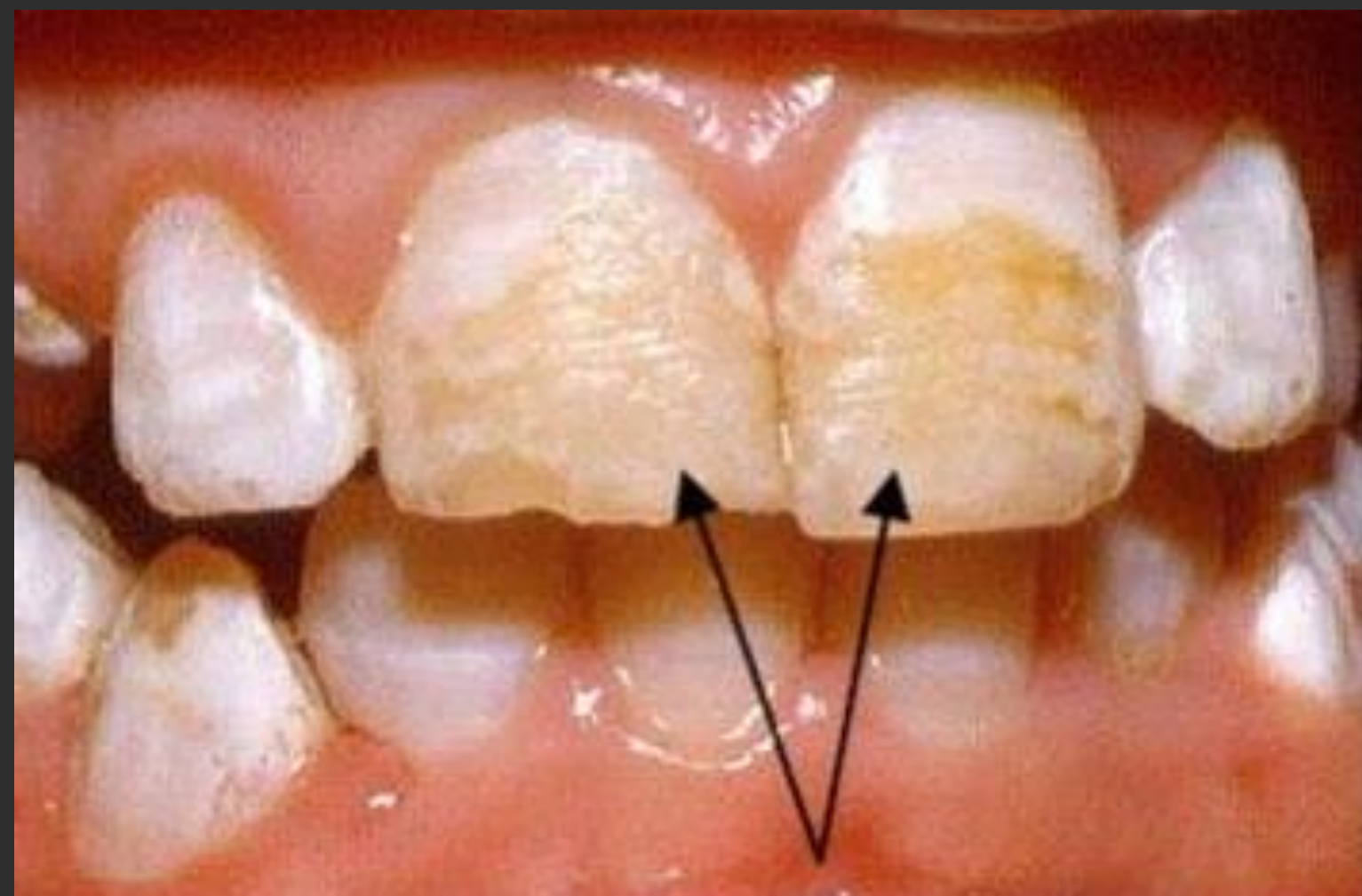
Carefully evaluate the lesion (magnification, good lightning)

Carious lesion appear rough, opaque, and porous Noncarious lesion would appear smooth and shiny.



Differential diagnosis of white spot lesions (WSLs) occur due to hypomineralization of the enamel, Conditions causing hypomineralization such as:

- ✓ fluorosis
- ✓ traumatic hypomineralization
- ✓ molar-incisor hypomineralization
- ✓ genetic defects causing enamel hypoplasia
- ✓ as well as environmental factors should be considered during the diagnosis



TREATMENT OPTIONS OF WHITE SPOTS

- ➔ WAIT 6 MONTHS AFTER DEBONDING AIMING FOR SPONTANEOUS REMINERALIZATION AT HOME
- ➔ TOOTH MOOSE (CPP-ACP) = CASEIN PHOSPHOPEPTIDE - AMORPHOUS CALCIUM PHOSPHATE.
- ➔ HIGH FLOURIDE VARNISH.
- ➔ BLEACHING
- ➔ RESIN FILTRATION
- ➔ MIRCOABRASION

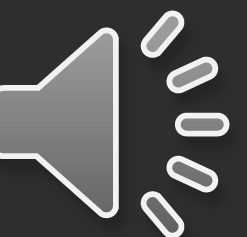


CALCIUM-PHOSPHATE-BASED DELIVERY SYSTEMS (CPP-ACP)

Casein phosphopeptide-amorphous calcium phosphate

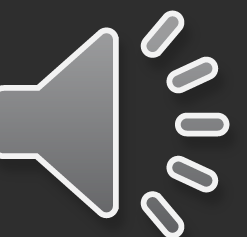
Delivered from milk casein

Enhances formation of calcium phosphate crystals



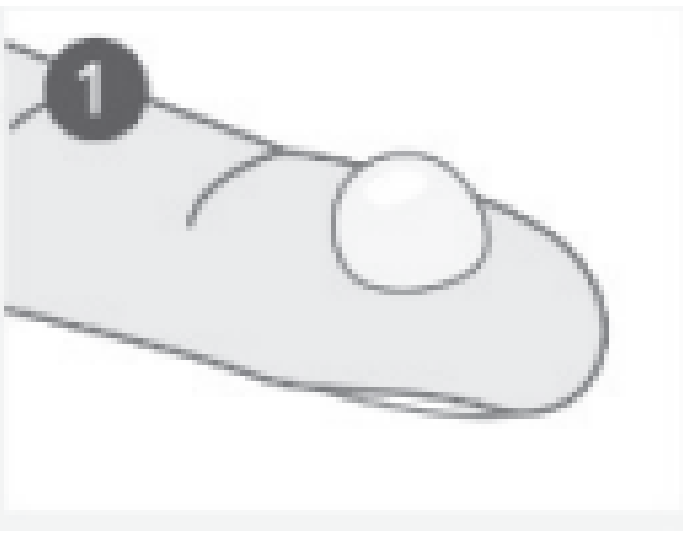
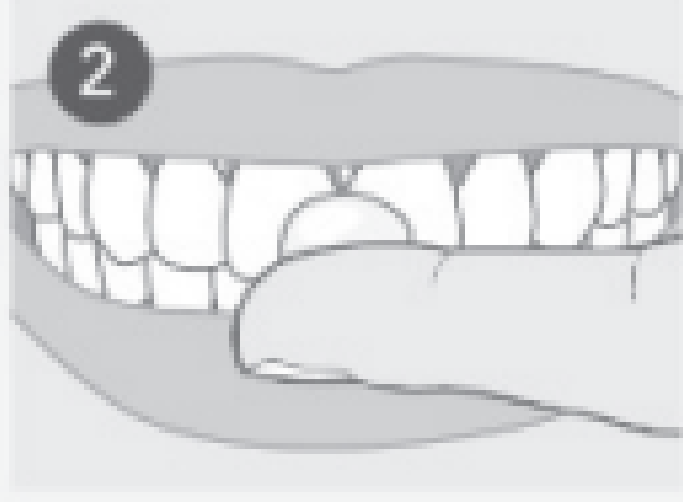
CALCIUM-PHOSPHATE-BASED DELIVERY SYSTEMS (CPP-ACP)

- ❖ *CPP-ACP has a beneficial sub-surface effect, whereby its milk-protein-based formulation can promote the natural salivary healing process.*
- ❖ *its nanoclusters of ACP are small enough to access demineralised areas through an existing remineralised surface zone*



At home application:

Day and nighttime application after tooth brushing as recommended by a dental professional

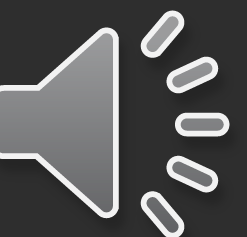
 <p>1</p>	<p>1. Squeeze a pea-size amount of GC Tooth Mousse® onto a clean finger.</p>
 <p>2</p>	<p>2. Apply to all teeth with a clean finger and use your tongue to spread around evenly. For difficult areas (between the teeth) use an interproximal tooth cleaning brush or dental floss coated with GC Tooth Mousse®.</p>
<p>3</p> <p>3 MINUTES</p>	<p>3. Leave GC Tooth Mousse® on teeth for a minimum of 3 minutes avoiding spitting out and swallowing. Saliva will enhance the effectiveness of GC Tooth Mousse® and the flavour will help stimulate saliva flow - the longer GC Tooth Mousse® and saliva are maintained in the mouth (an additional 1 – 2 minutes), the more effective the result.</p>
	<p>4. Spit out excess. Any GC Tooth Mousse® remaining on the surface can be left to gradually dissipate. Avoid rinsing, and do not eat or drink for 30 minutes following application.</p>

RESIN INFILTRATION

Resin infiltration is a technique used to improve the appearance of white spot lesions (WSL)

Resin infiltration technique obstructs the pores that provide diffusion pathways for acids and dissolved minerals in enamel. Thus, it prevents acid penetration into the lesions.

This technique creates a diffusion barrier inside the enamel lesions. Fissure sealants only form a barrier on the enamel surface. Resin infiltration could strengthen enamel after an acid etching procedure.





INITIAL



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TREATMENT BEGAN WITH AT-HOME BLEACHING WITH TRAYS AND CARBAMIDE PEROXYDE 10% DURING 15 NIGHTS.



INCREASING THE OVERALL BRIGHTNESS OF THE TEETH, ACTS AS MASKING OF SMALL WHITE DEFECTS IN THE ENAMEL.



APPLICATION OF 15 % HYDROCHLORIC ACID FOR 2 MINUTES.



AFTER RINSING (30 SECONDS) AND DRYING
ETHANOL SOLUTION (30 SECONDS).



INFILTRATION OF HYDROPHOBIC RESIN WITH A SPONGE (3 MIN) AND THEN LIGHT-CURE INFILTRANT RESIN FOR 40 SECONDS. THE INFILTRATION STEP WAS DONE TWICE.



POLISHING



THE RESULT AT THE END OF INFILTRATION SESSION

Bleaching

Resin Infiltration



MICROABRASION

- ▶ Ideal for removing superficial white and brown decalcification stains
- ▶ 6.6% hydrochloric acid slurry contains silicon carbide microparticles
- ▶ 6.6% hydrochloric acid slurry contains silicon carbide microparticles
- ▶ remove enamel decalcification defects that are less than 0.2mm in depth.
- ▶ using a rubber dam, or light-cured resin barrier at the gingival margin
- ▶ apply a 1mm thick layer of Opalustre over the discolored area and using a rubber prophy cup. Apply medium to heavy pressure at approximately 500 RPM for 60 seconds at a time.



-
- ▶ Once complete, suction the paste from the teeth. Rinse
 - ▶ For patients that have hypo-mineralization greater than 0.1-0.3mm, use a fine-grit water-cooled tapered diamond bur and lightly sweep over the stained area for 5-10 seconds prior to applying the Opalustre.
 - ▶ Can be used in combination with bleaching and/or direct resin restoration



A comparison of resin infiltration and microabrasion for postorthodontic white spot lesion

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Introduction: The objective of this research was to evaluate and compare the effectiveness of microabrasion and resin infiltration for white spot lesions (WSLs). **Methods:** Patients with postorthodontic WSLs were enrolled and randomly assigned to the control, microabrasion, and resin-infiltration groups. Intraoral photographs were taken before and after (6 months later) treatment. WSL sizes were determined through ImageJ (Wayne Rasband, Kensington, Md). Integrated optical density (IOD) was determined for a WSL and its surrounding normal enamel through Image-Pro Plus (version 6.0; Media Cybernetics, Rockville, Md), and their differences of IOD were considered as the IOD surrogate for that WSL. The color change of WSL were measured through ΔE . **Results:** A total of 27 eligible patients were enrolled; 9 subjects were assigned to each group, resulting in 56 teeth in the control group, 72 in the microabrasion group, and 58 in the resin-infiltration group. The ratios of WSL size (after/before) were similar between the microabrasion and resin-infiltration group ($43.94 \pm 0.03\%$ vs $45.02 \pm 0.03\%$; $P = 0.96 > 0.05$), but those of the 2 groups were significantly lower than



Fig 6. Representative pictures of a patient treated with microabrasion before, right-after, and after 6 months of the treatment.



Fig 7. Representative pictures of a patient treated with resin infiltration before, right-after, and after 6 months of the treatment. *ICON*, ICON resin infiltration.

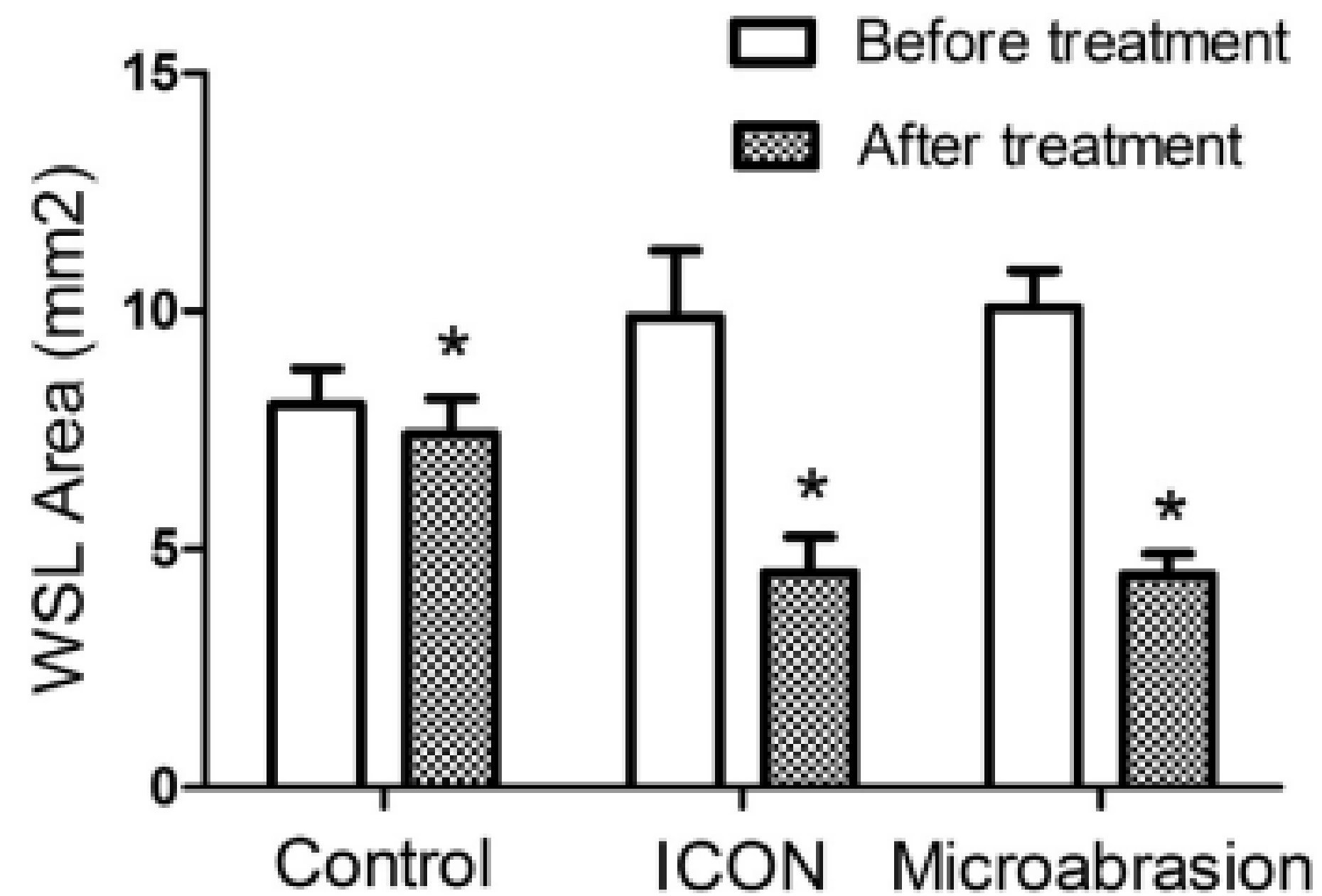


Fig 1. Lesion sizes were significantly decreased for all the 3 groups ($P < 0.001$). The asterisk symbol stands for significant difference. *ICON*, *ICON* resin infiltration.

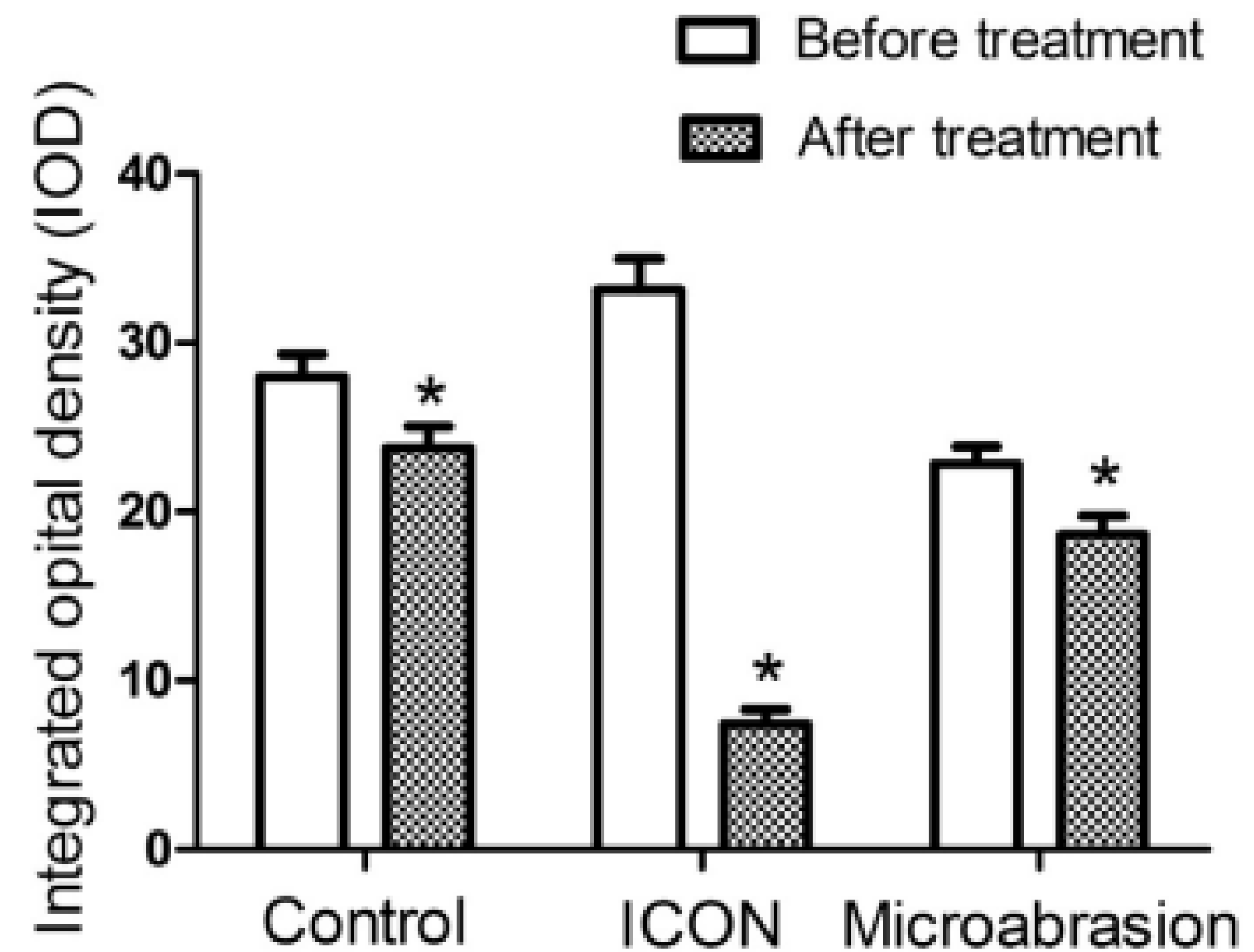


Fig 3. IOD decreased significantly for all the 3 groups ($P < 0.001$). The asterisk symbol stands for significant difference. *ICON*, *ICON* resin infiltration.

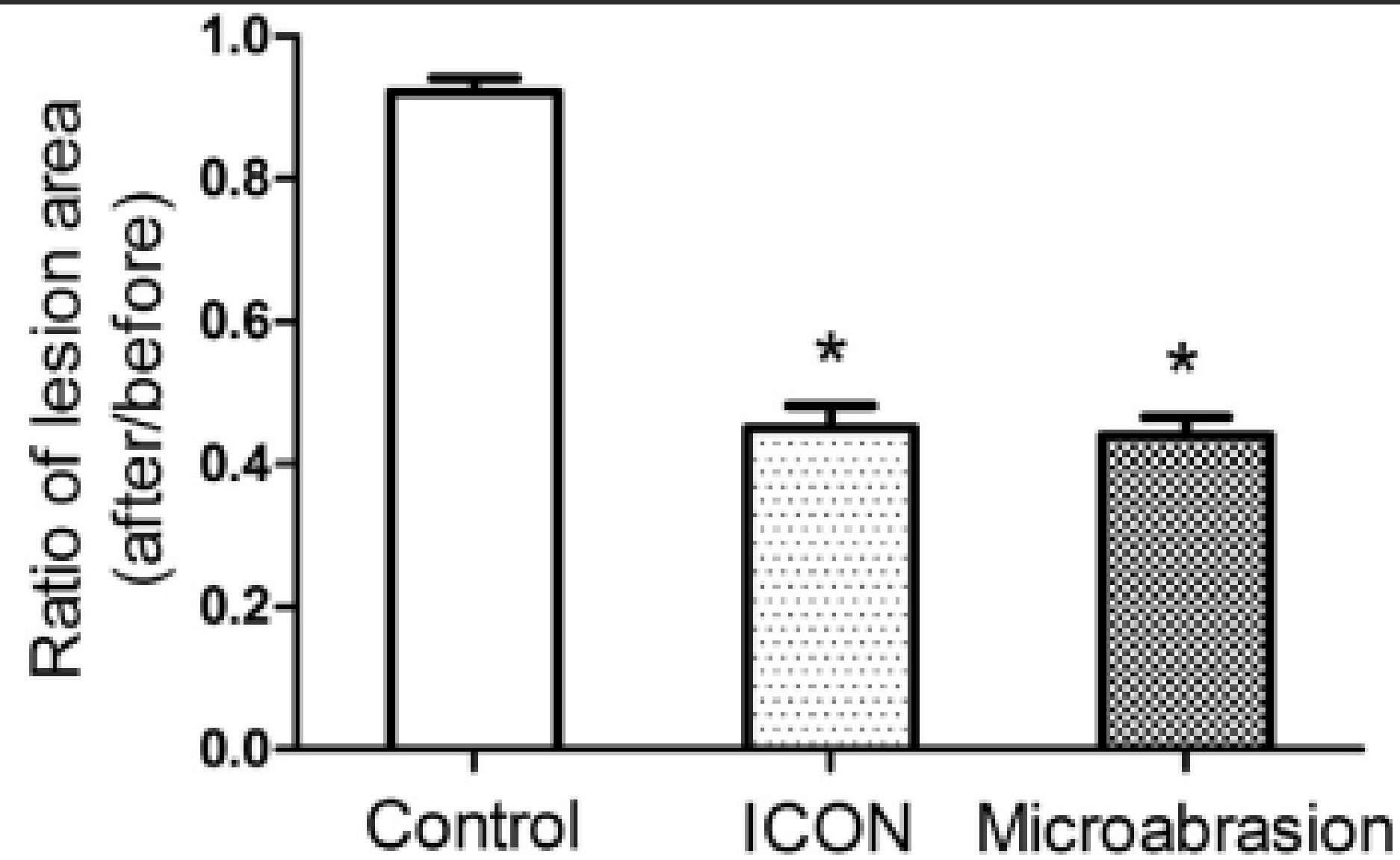


Fig 2. The ratios of lesion sizes (after/before) were significantly lower in microabrasion and resin-infiltration groups than control group ($P < 0.001$). And those were similar between the resin-infiltration groups and the microabrasion group ($P > 0.05$). The asterisk symbol stands for significant difference. *ICON*, ICON resin infiltration.

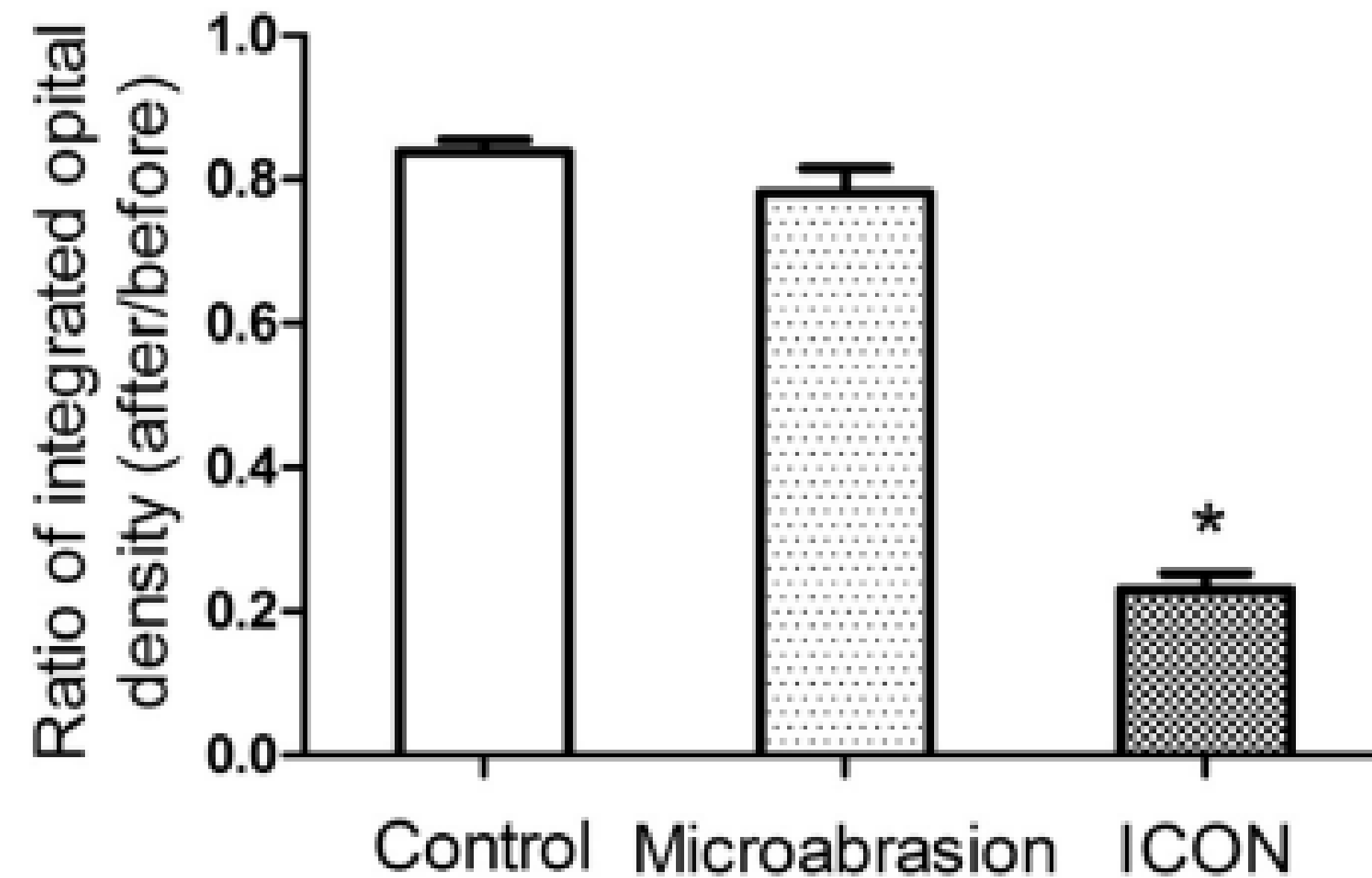


Fig 4. The ratios of IOD (after/before) were significantly lower in resin-infiltration group than those of the control and the microabrasion group ($P < 0.001$). And were similar between the control group and the microabrasion group ($P > 0.05$). The asterisk symbol stands for significant difference. *ICON*, ICON resin infiltration.

Treatment of white spot lesions with ACP paste and microabrasion

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Affiliations + expand

PMID: 22352382 PMCID: PMC8823107 DOI: 10.2319/111611-710.1

[Free PMC article](#)

Abstract

Objective: To examine the effects of application of casein phosphopeptide amorphous calcium phosphate (CPP-ACP) paste and microabrasion treatment on the regression of white spot lesions (WSLs).

Materials and methods: Artificially-induced WSLs in bovine enamel were divided into four treatment groups: CPP-ACP paste only, microabrasion only, CPP-ACP paste and microabrasion, and control. Samples were treated with each regimen twice weekly for 4 weeks with a 2-week rest period and a 2-week solution between the treatments. Quantitative light-induced fluorescence (QLF) measurements were taken at baseline and at 2, 4, 6, 8, 10, and 12 weeks. Changes in fluorescence, which indicate changes in mineral content, were measured.

Results: There was a statistically significant ($P < .05$) gain in fluorescence associated with the microabrasion only, as well as the microabrasion and CPP-ACP treatments. The changes in fluorescence for the CPP-ACP treatment alone were not statistically significant ($P = .40$).

Conclusions: CPP-ACP paste alone does not significantly improve the fluorescence value (ie, the mineral content) of WSLs. Within the limitations of this in vitro study, microabrasion treatment with or without CPP-ACP improved the fluorescence and thus reduced WSLs.

Treatment of white spot lesions with ACP paste and microabrasion

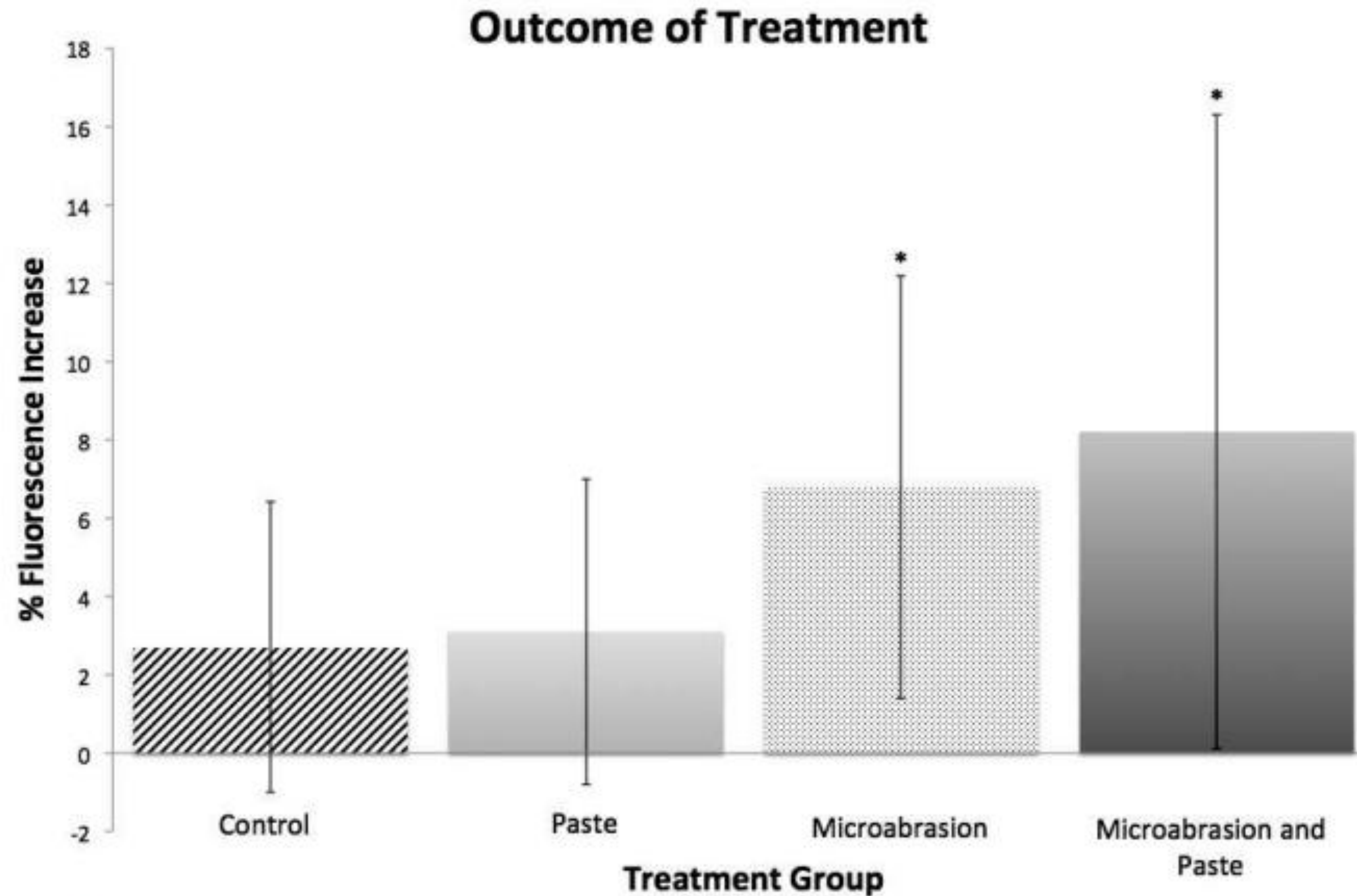


Figure 1. Mean gain in fluorescence as a percentage of baseline for each treatment group. An increase in fluorescence reflected a gain in mineral content. Error bars indicate standard deviations; significant ($P < .05$) changes above baseline indicated by *.

SUMMERY

OHI+MOTIVATION

Fluoride Rinse
Fluoride Varnish
Fluoride Gel
Fluoride Foam

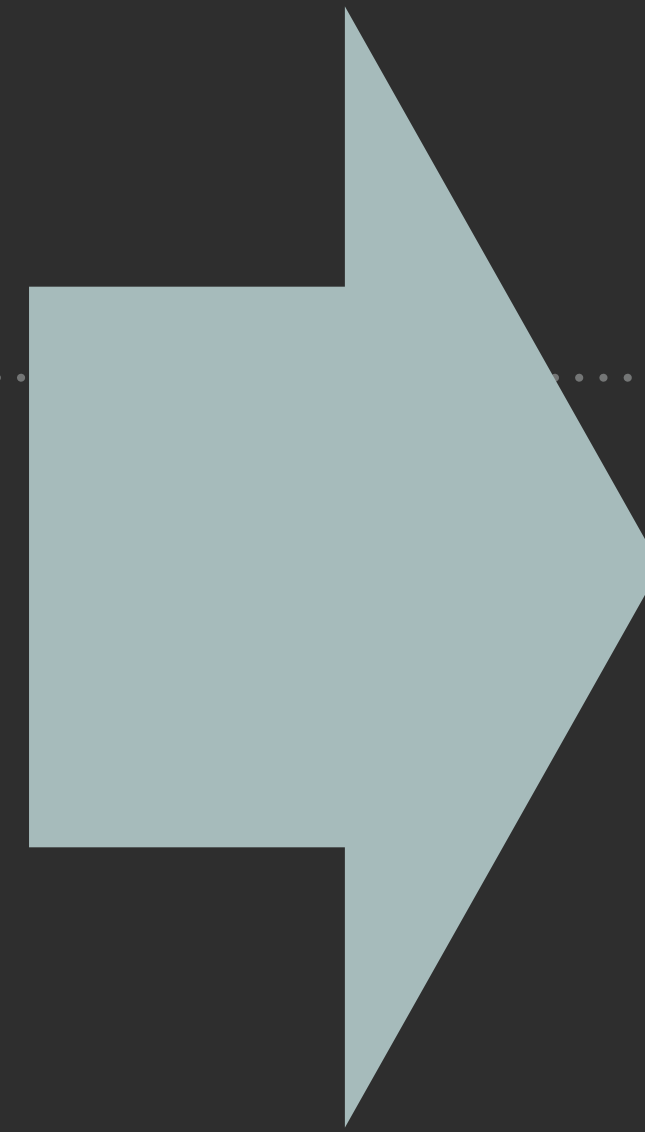
CPP-ACP

BLEACHING (HOME
or IN-OFFICE)

RESIN INFILTRATION
+ BLEACHING

MICROABRASION
With or without
BLEACHING

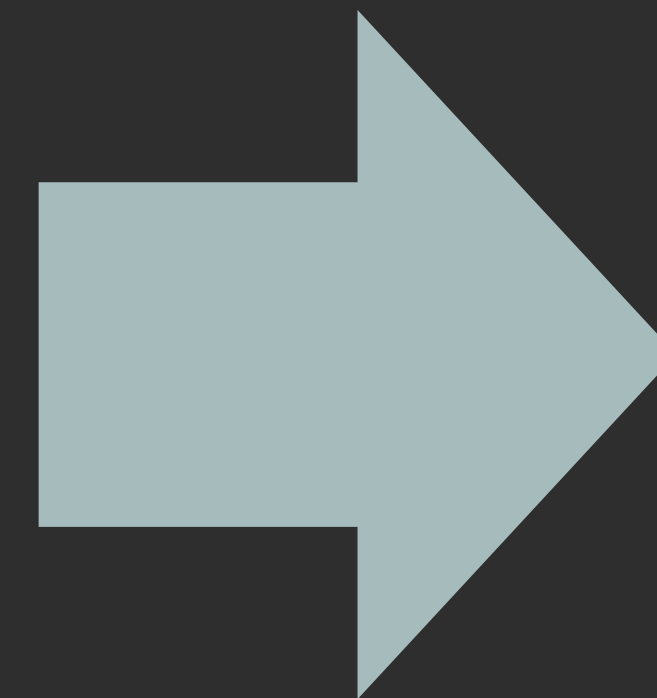
DIRECT COMPOSITE
RESTORATION



CI I or CI II



CI II



CL III



CL IV

Thank you

