3M Science. Applied to Life.™

# Taking Preventive Measures for Orthodontic Patients

Assessing risks for caries and white spot lesions, and identifying solutions

# Introduction

Every orthodontist knows that his or her patients with brackets or clear aligners are at an elevated risk for caries. Orthodontic brackets trap caries-producing material and make thorough self-care difficult, especially for younger patient groups who may not be particularly focused on oral hygiene. Also, excessive etching can make the tooth more susceptible to demineralisation.

Clear aligners come with their own set of problems, as wearing the devices for 22 hours per day limits the natural cleansing and neutralising effects of saliva.

With a combined effort from both the oral health team and the patient, negative results including white spot lesions and caries can be prevented, resulting in a positive treatment experience for all involved and lifelong benefits for the patient.


## Menu:

# Understanding white spot lesions

While orthodontic treatment is common for teenagers[1], the number of adults seeking treatment has steadily increased nearly 40% since 1996[2]. Though these populations are different, both groups are hoping for similar outcomes – they want to feel good about their smiles.

Unfortunately, teeth undergoing orthodontic treatment are just more difficult to keep clean, which puts orthodontic patients at risk for caries. White spot lesions (WSLs) are one of the most common side effects during orthodontic treatment, and can have a lasting negative impact.[3] Research shows that the incidence of new clinically visible WSLs during orthodontic treatment ranged between 40%-70%.[4]

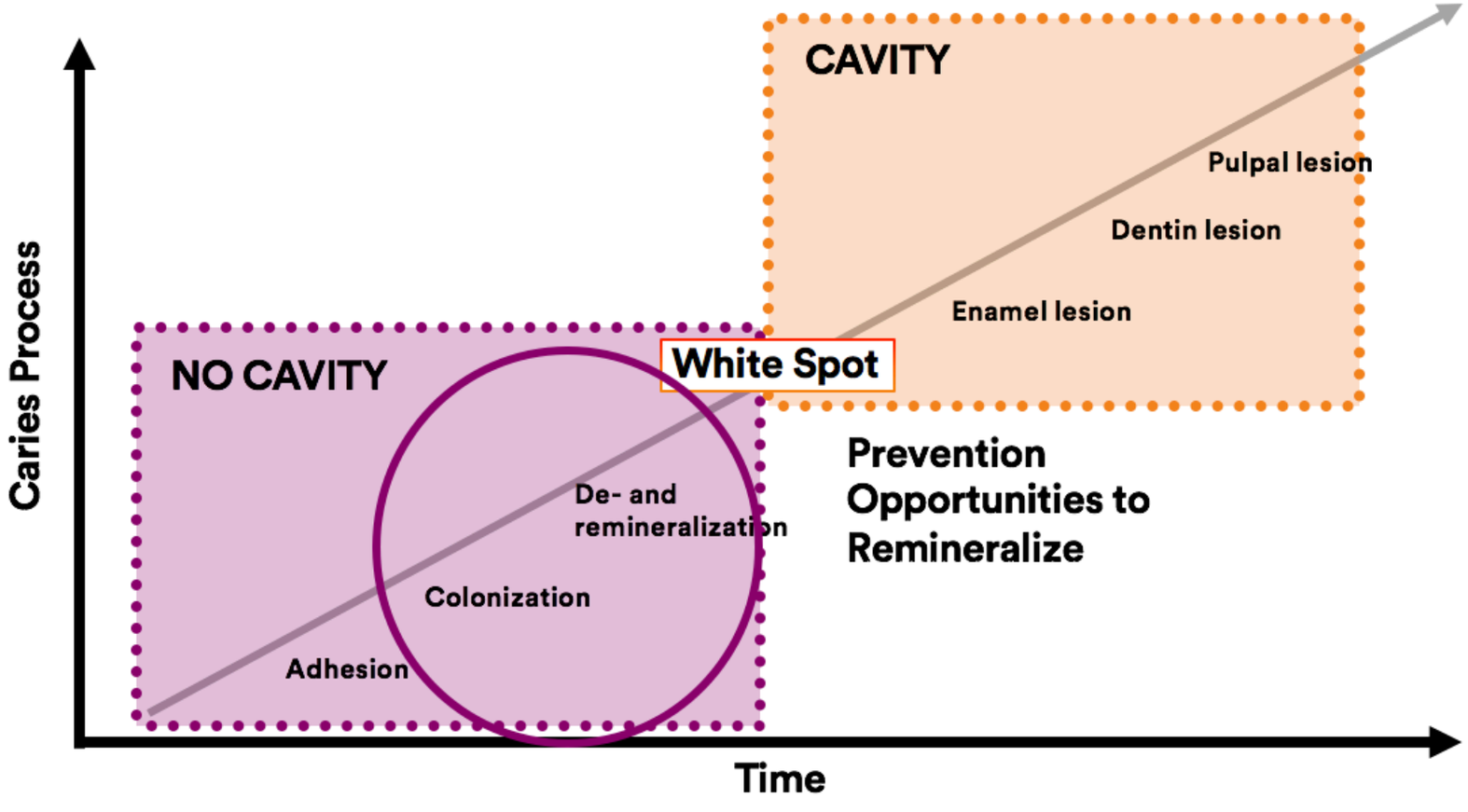
WSLs are defined as “subsurface enamel porosity from carious demineralisation” that presents as “a milky white opacity” when located on smooth surfaces.[4]

**White spot lesions (WSLs) occur most frequently in the following order:**

1. Maxillary lateral incisors
2. Canines
3. Premolars
4. Central incisors
5. Potentially all teeth are at risk

Photo courtesy of Deborah Mills, RDH

WSLs are directly in the middle of the caries progression. The time before the WSL forms is the time to remineralise through prevention methods.



# A preventive oral health programme for orthodontic patients

# Industry trends and shifts

There have been significant shifts in the oral health industry, as well as emerging innovations that continue driving preventive efforts in orthodontics. Financially, it makes more sense for practices and patients to pay for prevention rather than costly reparative treatment, and care organisations are held accountable and incentivised to keep people healthy.

**The most notable shifts and innovations include:**

- Improved diagnostics and digitization of information
- Big data driving true cost and better outcome analysis
- Advancements in the understanding of biofilms and the caries process
- Revolutionary diagnostic technologies and applications
- Genomic understanding and the ability to customise care

There also has been a shift in consumer attitude toward treatment. Well-educated patients are taking control of their health by actively seeking regular preventive care and taking advantage of progressive insurance options that provide both medical and dental coverage.

## What does this mean for orthodontics?

Our goal for prevention within orthodontics is to help tooth enamel and dentin better resist acid challenges in order to remineralise and avoid progressing to cavitated lesions. This means adding calcium and phosphate back to the hydroxyapatite and reversing the demineralisation process.

# Benefits of a preventive oral care programme

Having an effective preventive oral care programme in place benefits the patient for obvious reasons – reduced risk of white spot lesions (WSLs) and caries, as well as the appearance of whiter, healthier teeth.

The orthodontist can also benefit from having a solid plan in place because reduced risk of WSLs and caries to the patient results in less potential complaints, an enhanced reputation and happy patients who are willing to provide referrals.


## Potential negative effects of WSLs during orthodontic treatment

**Patients**

- Jeopardise aesthetic result
- May cause removal of braces
- May require intervention and need costly restoration

**Orthodontists**

- Counteract clinical excellence
- Patient complaints
- Harm reputation and referrals[2]
- Lawsuits[3]

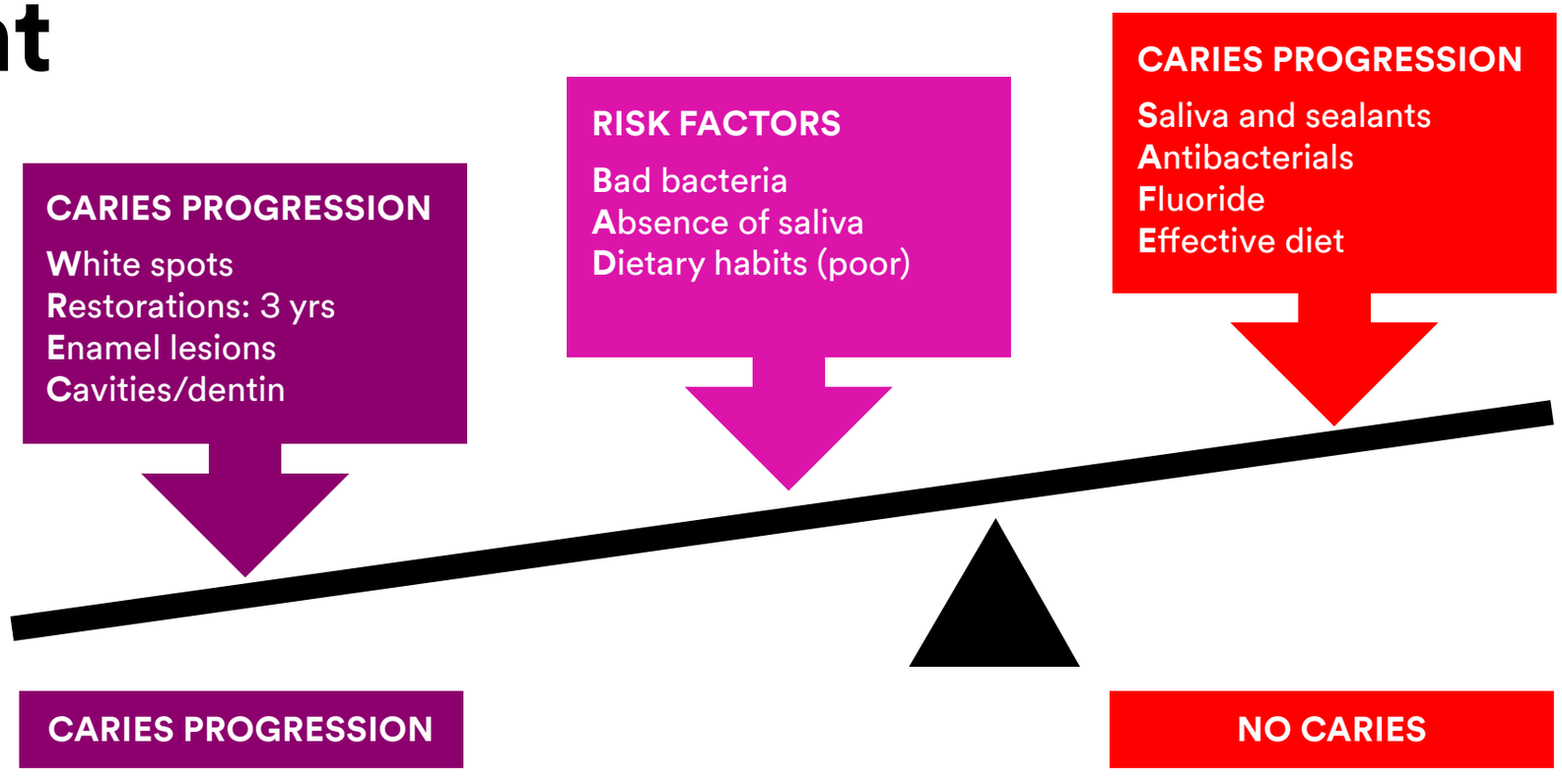
1 J Int Soc Prev Community Dent. 2015 Nov-Dec; 5(6): 433–439.
2 JADA 143(7) http://jada.ada.org July 2012, “Preventing and treating white-spot lesions associated with orthodontic treatment: A survey of general dentists and orthodontists”
3 Practical Reviews, 2012, “White Spot Lesions/Decalcification — An Orthodontic Dilemma”

# Risk Management

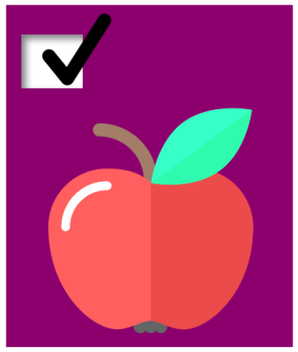
First, you'll want to assess the risk factors. The caries imbalance diagram to the right illustrates how different factors affect the potential for caries development.

Focus heavily on these three things: plaque, snacking and decay history. Most orthodontists already do this when gathering assessment information and taking the medical history, and are asking the following questions:

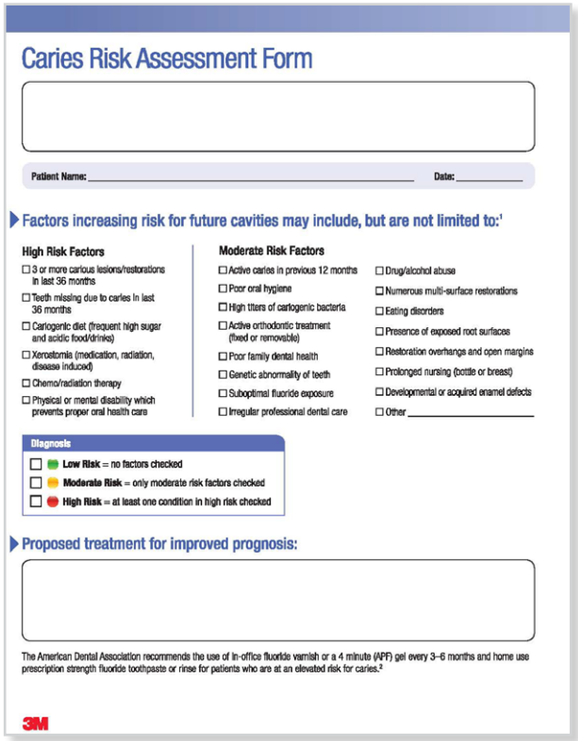
- Do they have heavy plaque?
- Do they frequently snack?
- Do they currently have active decay or have they had active decay in the last year?
- Do they have a history of restorations/filled teeth?




Used with permission from the California Dental Association.



No one can control what patients do in their own time, but you can help by continually reminding them to eat a nutritious diet and focus on their oral hygiene. Show them what white spot lesions look like, and help them understand what they can do at their end to prevent the caries process.



Caries Risk Assessment Form

Patient Name: _____ Date: _____

Factors increasing risk for future cavities may include, but are not limited to:[1]

**High Risk Factors**

- ☐ 3 or more carious lesions/restorations in last 36 months
- ☐ Teeth missing due to caries in last 36 months
- ☐ Cariogenic diet (frequent high sugar and acidic food/drinks)
- ☐ Xerostomia (medication, radiation, disease induced)
- ☐ Chemo/radiation therapy
- ☐ Physical or mental disability which prevents proper oral health care

**Moderate Risk Factors**

- ☐ Active caries in previous 12 months
- ☐ Poor oral hygiene
- ☐ High titers of cariogenic bacteria
- ☐ Active orthodontic treatment (fixed or removable)
- ☐ Poor family dental health
- ☐ Genetic abnormality of teeth
- ☐ Suboptimal fluoride exposure
- ☐ Irregular professional dental care
- ☐ Drug/alcohol abuse
- ☐ Numerous multi-surface restorations
- ☐ Eating disorders
- ☐ Presence of exposed root surfaces
- ☐ Restoration overhangs and open margins
- ☐ Prolonged nursing (bottle or breast)
- ☐ Developmental or acquired enamel defects
- ☐ Other _____

**Diagnosis**

- ☐ **Low Risk** = no factors checked
- ☐ **Moderate Risk** = only moderate risk factors checked
- ☐ **High Risk** = at least one condition in high risk checked

Proposed treatment for improved prognosis:

The American Dental Association recommends the use of in-office fluoride varnish or a 4 minute (APF) gel every 3–6 months and home use prescription strength fluoride toothpaste or rinse for patients who are at an elevated risk for caries.[2]

3M

You can use a caries risk assessment to identify a patient's risk and create a customised treatment plan.

# Fortunately, we have an arsenal of tools to fight white spot lesions.

- Diet
- Modification of biofilm pH
- Probiotics
- Caramide peroxide
- Protective barrier for enamel
- Xylitol
- CHX / antimicrobial
- Appropriate patient compliance
- OTC fluoridated toothpaste
- 950 ppm toothpaste
- Fluoride varnish
- Fluoride rinse
- Fluoride releasing bonding materials

# The fluoride factor

The deliberate application of fluoride throughout orthodontic treatment is key for remineralisation. Fluoride absorbs onto mineral surfaces, attracts calcium and phosphate ions in saliva and results in the formation of fluorapatite, which exhibits lower solubility than naturally occurring hydroxyapatite and helps resist the inevitable acid challenge[5].

Not only does fluoride application aid in remineralisation, it also helps to proactively inhibit demineralisation by absorbing onto mineral surfaces and protecting teeth against dissolution[6].

The American Dental Association (ADA) has released valuable fluoride recommendations for at-risk patients that are equally relevant to orthodontic patients:

- In-Office Fluoride: According to the ADA, fluoride varnish or four-minute gel applied every 3-6 months is effective in preventing caries
- Home Use Fluoride: 0.21% Sodium Fluoride (950 ppm) toothpaste twice per day

**Fluoride varnish applications compared to fluoride gel:**

- Take less time
- Create less patient discomfort
- Achieve greater patient acceptability

Photo courtesy of Dr. Jeremy Smith

# Prophylaxis for orthodontic patients

Patients need prophylaxis during orthodontic treatment, but cleaning around orthodontic brackets with prophy pastes and cups is very difficult. Orthodontic patients might need to visit the practice more than twice a year to remove supra- and sub-gingival biofilm, and for the application of fluoride varnish. If the patient is high-risk, the ADA recommends a prophylaxis every three months.

Conventional air polishing powders like sodium bicarbonate can be abrasive, and may potentially damage metal and ceramic orthodontic appliances. Glycine powder is a gentler and less abrasive option than hand scaling or power-driven instruments, and is safe and effective around orthodontic brackets, along the gingival margin and on root surfaces.

3M™ Clinpro™ Glycine Prophy Powder is made with soft and water-soluble glycine technology, for a thorough but gentle cleaning[7]. It can be used in commercially available air-polishing equipment to access all hidden areas and remove supra- and sub-gingival plaque and biofilm without affecting orthodontic appliances[8].

Photos courtesy of Dr. Shane Langley

# Protecting against demineralisation, hypersensitivity and erosion

**It can be difficult for patients** to clean thoroughly around orthodontic brackets, and over time this can lead to white spot lesion (WSL) development.

In addition to in-office solutions, patients may require prescription-strength toothpaste to brush with at home. 3M™ Clinpro™ Tooth Crème 0.21% Sodium Fluoride Anti-Cavity Toothpaste helps patients remineralise their teeth and prevent the progression of caries[9] in a gentle toothpaste that is not abrasive to enamel or dentin[10].

**Another in-office fluoride solution is 3M™ Clinpro™ White Varnish***, which contains 22,600-ppm fluoride as well as 3M's proprietary tri-calcium phosphate (TCP) ingredient. After it is applied to the tooth surface, the rosin slowly dissolves and releases fluoride, calcium and phosphorus ions into the saliva.

Clinpro White Varnish remains fluid and continues to flow across tooth surfaces, penetrating hard-to-reach places,[11] including interproximal areas and around brackets. In a clinical study, Clinpro White Varnish produced elevated salivary fluoride levels for at least 4 hours after application.[12]

*3M Clinpro White Varnish is recommended to treat hypersensitivity

# A recommended plan for orthodontic patients


### 3M™ Clinpro™ White Varnish with Tri-Calcium Phosphate

*In-Office*

Apply Clinpro White Varnish at bracket bonding appointment; then every three months throughout treatment.

*3M Clinpro White Varnish is recommended to treat hypersensitivity


### 3M™ Clinpro™ Tooth Crème 0.21% Sodium Fluoride Anti-Cavity Tooth-paste

*Take-Home*

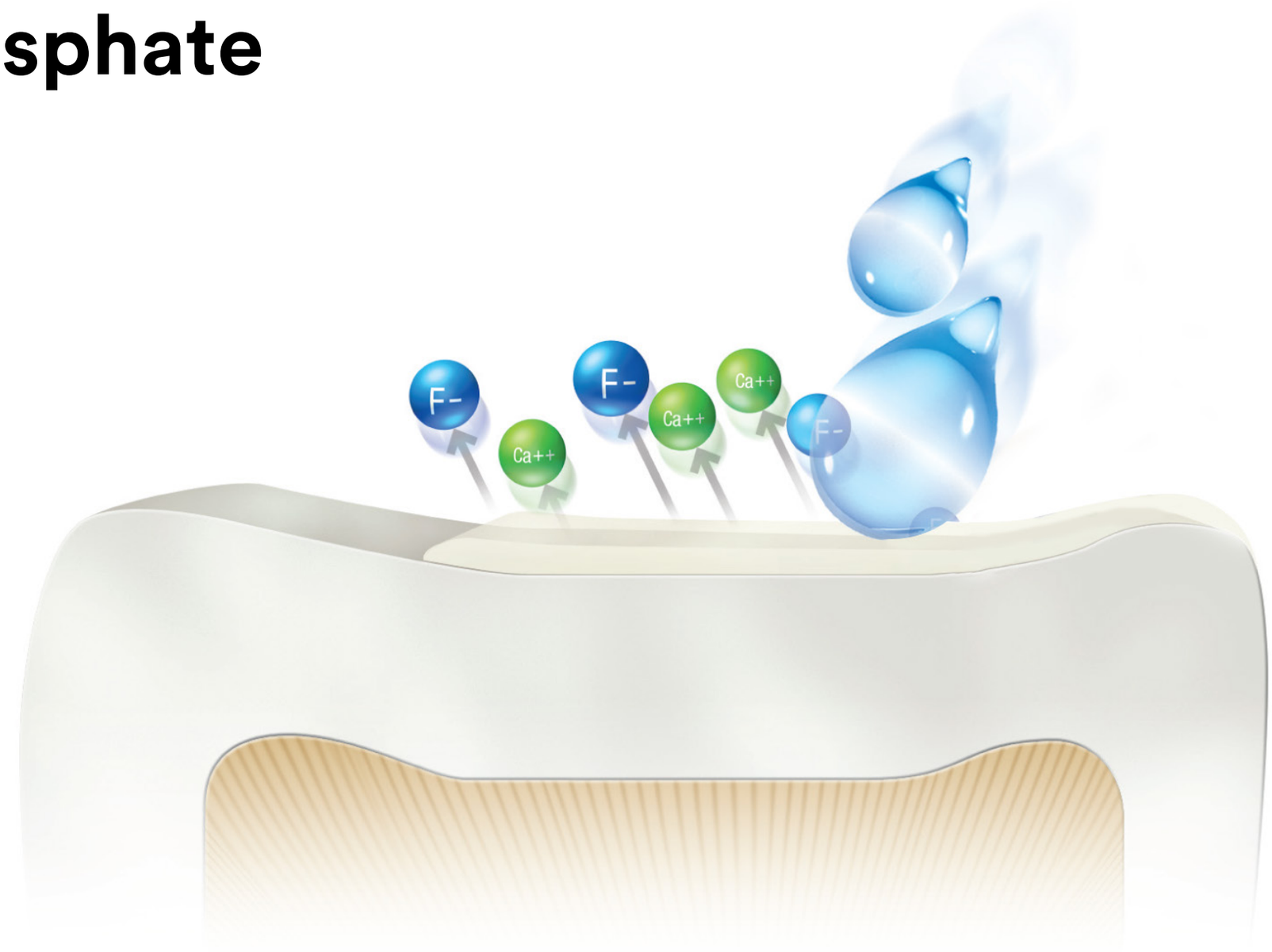
Patients should use prescription strength Clinpro 950 anti-cavity tooth-paste throughout treatment, and for several months after.

# Using Functionalized Tri-Calcium Phosphate

3M's differentiated science for prevention during orthodontic treatment, focuses on fluoride, calcium and phosphate minerals.

3M™ Clinpro™ White Varnish and 3M™ Clinpro™ Tooth Crème, contain an innovative calcium and phosphate ingredient – Functionalized Tri-Calcium phosphate (fTCP), available exclusively from 3M. When fTCP is added to products, a protective coating on the minerals ensures the calcium and fluoride do not combine prematurely to form calcium fluoride within the package, which renders the fluoride less effective.

After the products are applied to the tooth surface and are exposed to saliva, the protective coating slowly dissolves, allowing the calcium and phosphate to be released together with fluoride ions[13]. When fluoride, calcium and phosphate are released together on the tooth surface, TCP works with fluoride to deposit high quality, acid-resistant mineral[14] to help create strong, healthy teeth.



# The importance of communication

Throughout the orthodontic treatment process, communication is key. Patients need to know that white spot lesions (WSLs) are a possibility, but that compliance on their end combined with their oral care team's efforts can prevent the progression of caries and formation of WSLs.

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