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The Evolution of Prophy Paste

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The Evolution of Prophy Paste

From flavor to therapeutic additives, this staple of dental hygiene practice continues to undergo significant change to provide more benefits for your patients.

By Caren M. Barnes, RDH, MS

The subject of prophylaxis polishing paste (prophy paste) may not be a hot topic, but it is a product used in dental hygiene practice every day. Many changes have been introduced to prophy pastes and dental hygienists need to be up to date on the evolution of this highly-utilized product.

The most important change in prophy paste occurred more than four decades ago with the introduction of individual unit-dose packaging of commercially-prepared prophylaxis paste. Prophy paste was initially sold exclusively in bulk. Unit-dose packaging provided the ability to dispense prophy paste without the risk of contamination and eliminated the need to estimate how much paste was needed for each patient.

What about improvements in the paste itself? Developments have come in two areas: flavorings and therapeutic additives. The traditional flavors of mint and bubble gum are still available, but there has been an explosion of new flavors that encompass such diverse tastes as fruit salad and freshly brewed coffee. Therapeutic or therapeutic-like additives, however, are the most important innovations.

Fluoride

Approximately 35 years ago, fluoride became the first therapeutic additive to prophy paste. The addition of fluoride may have seemed logical but it was far from simple. Manufacturers had to determine how to make the fluoride stable and maintain a reasonable shelf-life. Now prophy pastes are available with 1.23% acidulated phosphate fluoride, stannous fluoride, and sodium fluoride.

The addition of fluoride to prophy paste was complicated by two misconceptions. The first was that fluoride needed to be burnished into the tooth surface. Burnishing was unnecessary because saliva is the medium by which fluoride is adsorbed into the tooth surface.[1] Fluoride ions are released into the saliva and the fluoride-enriched saliva surrounds the teeth. Subsequently, fluoride uptake occurs in the outermost surface of the teeth.

The second misconception was that fluoride applied during a prophy could be considered a professionallyapplied fluoride treatment.[2-4] A fluoridated prophy paste does not have the same efficacy as a professionally- applied fluoride treatment, and the American Dental Association issued a strong statement against the practice of billing a fluoridated prophy paste as a professionally applied fluoride treatment.

Many new compounds have been added to prophy pastes over the past 5 years. These additives all have the same goal: to strengthen enamel, remineralize enamel, and decrease dentinal hypersensitivity.

Changes in the way dental caries is detected and treated provide the impetus for the use of these additives. The ability to detect carious lesions before they are visually apparent has enabled dental professionals to intervene and begin remineralization at the earliest stages of the caries process.[5]

Prophy Paste Additives

All of these additives work synergistically to become new complexes, and they require moisture to become bioavailable. Once these additives have dissolved, they are incorporated into the tooth.

Table 1. Prophy Paste Additives

Additives	Brand Names	Purpose
Calcium, phosphate, fluoride	MAXmin™ with NuFluor™ (Preventech)	Remineralization
Amorphous calcium phosphate	Enamel Pro® (Premier)	Remineralization
Amorphous calcium fluoride phosphate	Enamel Pro (Premier)	Reduce high caries risk
Calcium sodium phosphosilicate (NovaMin®)	NUPRO® Sensodyne® Professional (DENTSPLY and GlaxoSmithKline)	Remineralization and reduce hypersensitivity
Arginine-calcium carbonate, bicarbonate (Pro-Argin™ Technology)	Colgate® Sensitive Pro-Relief™ (Colgate)	Reduce hypersensitivity

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Remineralizing systems use minerals that dental hygienists know well: calcium, phosphate, and fluoride. However, the remineralization of enamel through calcium and phosphate is complex. Calcium phosphates have a low solubility in the presence of fluoride ions. Therefore, the calcium and phosphate must be delivered in high concentrations to be effective in remineralizing subsurface enamel demineralization.[6] Based on this fact, unique calcium phosphatebased remineralization systems have been developed using high concentrations of calcium phosphate. There are three calcium phosphate remineralization systems that are used as additives: amorphous calcium, unstabilized amorphous calcium phosphate, and stabilized amorphous calcium phosphate. Table 1 provides a list of the additives and their purposes.

Calcium Phosphate and Fluoride

Calcium, phosphate, and fluoride are interdependent for remineralization. Remineralization of teeth will not occur unless there are adequate amounts of calcium and phosphate ions available to interact appropriately with the fluoride ions. Initially, when the prophy paste containing calcium, phosphate, and fluoride is applied, the calcium and phosphorous are not bioavailable. To become bioavailable, the calcium and phosphorous must be stabilized. The stabilization occurs when the calcium and phosphate mix with saliva and the salivary phosphoproteins ensure the calcium and phosphate remain bioavailable. The fluoride ions that are negatively charged attract the calcium and phosphate ions that are positively charged. The minerals are then available in the saliva to be precipitated on the surface enamel and form fluorapatite for remineralization.[7]

Treating Hypersensitivity

Two additives are designed specifically to address dentin hypersensitivity. Calcium sodium phosphosilicate releases calcium and phosphate ions in the presence of moisture, which then form a mineral layer on the enamel to reduce hypersensitivity.[8] Arginine-calcium carbonate contains 8% arginine (an amino acid normally found in saliva), bicarbonate, calcium carbonate, and a pH buffer.[9] The positively-charged arginine ions in the prophy paste attract the negatively-charged calcium and phosphate ions in saliva. The arginine compound acts like saliva and deposits calcium and phosphate ions into open dentin tubules.[9] The calcium and phosphate ions fill the tubules. Once the tubules are blocked, a protective surface layer of salivary glycoproteins and calcium phosphate is formed.

Summary

Dental hygienists have many products to choose from when deciding which prophy paste is best for each patient. To date, the evidence supporting prophy pastes formulated to remineralize enamel or eliminate dentinal hypersensitivity is somewhat unclear. Most of the research has been conducted in vitro among environments that do not accurately simulate clinical conditions. Additional clinical research performed in vivo is needed to provide the evidence base necessary for effective clinical decision making.

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