One of the most successful preventive health stories is the role fluoride has played in the management of dental caries. Procter & Gamble (P&G) is proud to have developed Crest, the first clinically effective fluoridated toothpaste for caries prevention.

**History of Crest Toothpaste**

Stannous fluoride, a broad spectrum antimicrobial agent, provides multiple benefits to improve oral health. In the mid 1950s, stannous fluoride was introduced in toothpaste, specifically for the purpose of caries prevention. Considered a major scientific breakthrough, the stannous fluoride in Crest, the first toothpaste to earn the ADA Seal for cavity prevention, became a key contributor in preventing tooth decay by decelerating the breakdown of tooth enamel.

Crest toothpaste with Fluoristan (trade name for stannous fluoride) was available for many years and made a contribution to the prevention of decay in the United States. Though the caries prevention benefits from stannous fluoride were well documented, the product formulation held some challenges. The formulation of a dentifrice is critical. The fluoride used must be compatible with all of the other ingredients in the toothpaste. Different fluorides have incompatibility potential with several ingredients, including abrasive systems. The original Crest formulation used stannous fluoride and a dicalcium pyrophosphate base, and had a short shelf life and stability issues.

Twenty-five years after the introduction of Crest toothpaste with Fluoristan, the formulation was changed to incorporate sodium fluoride with an abrasive system based on silicone dioxide. The Fluoristat (sodium fluoride) version of Crest was much more stable than the original formulation and offered even better caries prevention than the original formula. This formulation is available today and continues to help provide caries protection to consumers throughout the world.

Though P&G moved away from stannous fluoride as the active ingredient for caries prevention, researchers & dental professionals alike always knew it had therapeutic benefits above what sodium fluoride could offer. Many years were spent developing an improved “stabilized” stannous fluoride dentifrice that provided all of the benefits of stannous fluoride, without the stability issues. In 1995, “stabilized stannous fluoride” was perfected and Crest Gum Care was introduced. While Crest Gum Care was a very effective product against caries, gingivitis and sensitivity, its major drawbacks were taste and stain. In certain formulations, stannous fluoride may have an astringent taste and may cause extrinsic staining. Whitening was becoming very popular and consumers were not willing to sacrifice esthetics for therapeutics. Though Crest Gum Care had a small following, mostly dental professionals who recognized the therapeutic value, it was discontinued in the early 2000s.

Even before Crest Gum Care was discontinued, research continued to improve the formulation. Concurrently, a new cleaning agent was incorporated into dentifrice. Sodium Hexametaphosphate was introduced in Crest Dual Action Whitening. This unique ingredient provides powerful chemical whitening (extrinsic stain removal) and whitening protection. It provides powerful whitening by loosening and breaking the bonds of extrinsic stains. It also...
penetrates the pellicle, helping to lift away the stains attached to it. In addition to extrinsic stain removal, sodium hexametaphosphate forms a long-lasting protective barrier to help prevent future stain buildup. Sodium hexametaphosphate (NaP03)21Na20, a molecule 10 times longer than the leading anti-tartar agent, bonds to the tooth more effectively and for a longer time, thus providing stain prevention.

The whitening properties of sodium hexametaphosphate were so compelling researchers began to incorporate it into a stannous fluoride formulation. The result was the creation of the Polyfluorite System™. The Polyfluorite System is a combination of stabilized Stannous Fluoride (0.454%) and Sodium Hexametaphosphate in a low water high viscosity paste matrix. This unique patented system allows the benefits of stannous fluoride to be fully recognized, while providing extrinsic stain removal and prevention. Believe it or not, the Polyfluorite system makes it possible to have a stannous fluoride product that actually whitens by way of extrinsic stain removal and prevention.

The Polyfluorite System

Benefits of Stabilized Stannous Fluoride

Caries

Stannous fluoride, in addition to demonstrating broad spectrum activity against both gram positive and gram negative bacteria, shows particular activity against Streptococcus mutans and in inhibiting metabolism of carbohydrates by saccharolytic organisms. This is one of the ways stannous fluoride helps protect against caries. The other mechanism of action of stannous fluoride with respect to caries is the role it plays in the remineralization process.

Fluoride has been found to enhance the remineralization process. Fluorapatite, or tooth structure that has been remineralized in the presence of fluoride, is more resistant to caries than the original hydroxyapatite. Stannous fluoride, as well as other types of fluoride, play a role in this process.

Gingivitis

The FDA Oral Health Care Drug Products for Over-the-Counter Human Use: Antigingivitis/Antiplaque Drug Products proposed monograph subcommittee concluded that stannous fluoride in a compatible dentifrice base at a concentration of 0.454% is safe and effective for OTC use as an antigingivitis active ingredient.

In addition to having been named as one of the three ingredients on the FDA proposed monograph for gingivitis, stannous fluoride is also one of the three ingredients on the FDA monograph for the prevention of caries.

Sensitivity

Stannous fluoride has been shown to be effective in treating dentinal hypersensitivity, by occluding the dentinal tubules. Dentinal hypersensitivity is caused by fluid movement in the dentinal tubules. The stimuli displace the fluid in the dentinal tubules, activating the nerve endings at the pulp-dentin interface which causes pain (Brännström's hydrodynamic theory). The occlusion of the dentinal tubules prevents the movement of fluid, thereby preventing sensitivity.

The desensitizing properties of stannous fluoride have been recognized by the ADA. At least two stannous products have received the ADA Seal of Acceptance for the therapeutic prevention of sensitivity and caries (Gel-Kam® and Crest Pro-Health Toothpaste).

Benefits of Sodium Hexametaphosphate

Stain and Tartar

P&G has many products in addition to Crest. Sodium hexametaphosphate is an ingredient commonly used in soaps and detergents and as a food additive. Sodium hexametaphosphate research, done primarily with soaps and detergents such as Tide®, was shared across businesses within P&G and found to be an excellent cleaning and tartar control ingredient that could be used in dentifrice. As mentioned before, sodium hexametaphosphate removes and prevents extrinsic staining, even those stains associated with stannous fluoride. Additionally, it helps interfere with calculus formation, to both reduce calculus formation and to make the calculus that does form less tenacious and easier to remove.
Crest Pro-Health Toothpaste

Crest Pro-Health toothpaste is the first commercially available product to contain the Polyfluorite System and provides all its benefits.

"Crest Pro-Health's Polyfluorite System is the result of more than 10 years of testing and development to create a dentifrice that successfully merges the gold standard in health technology with whitening benefits," says Robert Gerlach, DDS, MPH. "The product has the ADA seal of acceptance and protects against cavities, gingivitis, plaque sensitivity, tartar, stains and freshens breath. The technology is supported by 15 patent applications and more than 70 published pieces of literature on the ingredients. And, Crest Pro-Health toothpaste delivers three FDA-recognized oral health care benefits: anticaries, antigingivitis and protects against sensitivity."

For more information on the Crest Pro-Health toothpaste, including product research, MSDS information and free continuing education (Antimicrobial and Therapeutic Effects of a Novel Stabilized Stannous Fluoride/Sodium Hexametaphosphate Dentifrice) visit www.dentalcare.com.

Crest and Oral-B

In late 2005, P&G acquired Gillette, parent company of Oral-B. Crest has strong roots in making fluoridated toothpaste available to consumers throughout the world. It seems fitting that now, with the acquisition of Oral-B, the family of fluoride products is nearly complete. Oral-B offers in-office fluoride products (Minute Foam®, Neutra-Foam®, fluoride trays) as well as professionally dispensed products (Stop®, NeutraCare® and Fluorinse®) to compliment the assortment of Crest dentifrice products that are sold to dental professionals. Please contact your Burkhart Account Manager for more information.

The ADA Council on Scientific Affairs' Acceptance of Crest Pro-Health toothpaste is based on its finding that the product is effective in helping to prevent and reduce tooth decay, gingivitis, and plaque above the gumline, to relieve sensitivity in otherwise normal teeth and to whiten teeth by removing surface stains, when used as directed.

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