Advances in Remineralization Therapy

Provided By Dentsply

During the past few decades, a more comprehensive understanding of the process of demineralization coupled with scientific developments in diagnostic systems and dental materials have facilitated change in dentistry’s approach to the management of demineralized lesions. The “minimally invasive” approach to treating demineralized lesions incorporates detecting, diagnosing, and treating these areas earlier, and employing a medical model, emphasizing prevention, rather than the traditional surgical model. Each member of the dental team should understand this approach in order to take a more active role in caries prevention and treatment.

Though we are familiar with the preventive properties of fluoride, both from community water supplies and topical applications, and have made fluoride a part of our preventive strategy, caries continues to be a major problem in both children and adults. Dental caries is now the most common chronic disease in children. There are five times more children in the United States with untreated dental disease than with childhood asthma. We have focused our efforts on treating the symptoms of the disease, rather than to treat the disease itself. We must continue exploring additional measures for reducing dental caries. This includes addressing the bacteria and breaking the chain of infection, as well as enhancing remineralization and repair of early lesions.

Enamel, cementum and dentin are composed of millions of tiny crystals of carbonated hydroxyapatite. During the demineralization process, acids may readily diffuse into the tooth and dissolve the vulnerable mineral, producing calcium and phosphate into the aqueous solution between the crystals. These calcium and phosphate ions diffuse out of the tooth leading to the formation of an initial carious lesion, which eventually may develop into a cavitated lesion if the process continues without reversal.

Remineralization occurs when the acid in the plaque is buffered by saliva allowing calcium and phosphate to flow back into the tooth and form new mineral on the partially dissolved subsurface crystal remnants. The key is to reduce mineral transfer out of the tooth during acid attacks, and to promote transfer into the tooth following acid attacks. This can be achieved by ensuring the availability of fluoride, calcium and phosphate adjacent to the tooth during and after an acid attack.

“\textbf{We owe it to our patients and to ourselves to continue to evolve in an effort to provide the very best care.}”

Bioactive glass materials have been used in medicine and dentistry for years. This unique material (NovaMin®) has numerous novel features, including the ability to act as a biomimetic mineralizer, matching the body’s own mineralizing traits, while also affecting cell signals in a way that benefits the restoration of tissue structure and function. Bioactive glass is considered a break-through advance in remineralization technology. This is because the current standard treatment for tooth remineralization and prevention of decay is slow acting and is dependent on adequate saliva as a source of calcium and phosphorus.

NovaMin, when in contact with saliva or water, first releases sodium ions. This elevates the pH into the range essential for hydroxyapatite formation (7.5 – 8.5). The calcium and phosphate are released to supplement the normal levels found in saliva. This increase in ionic concentration, combined with an increase in pH, causes the ions to precipitate onto the tooth surface and form calcium hydroxy-carbonate apatite (HCA) to remineralize the defect and to occlude open tubules. Studies have shown that this new mineral is a form of crystalline hydroxyapatite which is just like natural tooth mineral.
Hygiene Success

An in vitro study demonstrated that treatment with a NovaMin-containing prescription fluoride dentifrice improved hardening of white-spot lesions compared to fluoride-only dentifrice. From that study, preliminary data also indicated that NovaMin®-containing fluoride dentifrices have greater potential to remineralize and repair white spot lesions than fluoride-only dentifrices. An additional in vitro study indicated that incorporation of NovaMin into fluoride dentifrices could arrest the tooth decay process earlier than currently available fluoride dentifrices.

An in vitro study demonstrated that treatment with a NovaMin-containing prophylaxis paste immediately occluded the tubules by the formation of a protective layer of HCA (hydroxycarbonate apatite). Samples were polished for 10 seconds and rinsed (after waiting one minute). Occlusion of the tubules is evident in the treated sample compared to the control sample (Figure 1).

NovaMin is found in two new NUPRO® NUSolutions™ products. NUPRO NUSolutions Prophy Paste (DENTSPLY Professional York, PA) delivers the benefits of tooth desensitization, tubule occlusion and stain removal; it integrates a desensitization treatment into standard prophylaxis treatment. NUPRO NUSolutions Remineralizing and Desensitizing Take-home Paste contains 5% NovaMin and 5000 ppm sodium fluoride for the prevention of caries and the relief of tooth sensitivity.

Conclusion
As our profession and professional knowledge continues to evolve, our diagnostic procedures, techniques and therapeutic options will follow. We owe it to our patients and to ourselves to continue to evolve in an effort to provide the very best care.

Dental health care providers now have the ability to address the infectious agents causing caries; we can now eliminate or reduce their effect rather than surgically removing the damage created. The goal is to implement the technologies and products for prevention, early detection and intervention such as fluoride varnish, dental sealants, caries detection devices, and remineralization treatment which will ultimately result in conservative, long-lasting dentistry.

References: