

*“There is an important shift in the strategy concerning caries control because we now have the ability to promote remineralization and protection of the tooth surface.”*

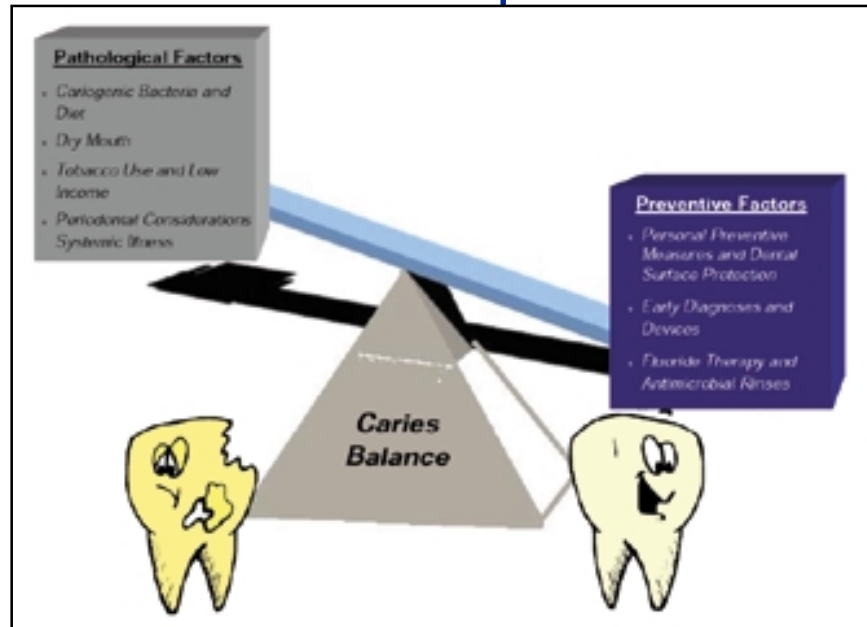
the balance of demineralization and remineralization, with the former winning out (Figure 2). JBD Featherstone, MSc, PhD, professor and chair, Department of Preventive and Restorative Dental Sciences, University of California, San Francisco, explains that “demineralization is the loss of mineral (calcium and phosphate) from the tooth as a result of attack by the acids...remineralization is the natural repair process that replaces some of the lost minerals.”

During remineralization, calcium, phosphate, and other minerals are replaced after being lost to demineralization. There also can be the welcome addition of the fluoride mineral. An active lesion is progressing towards cavitation (demineralizing). An inactive lesion is not progressing or is healing (remineralizing).<sup>2</sup> Some of us might remember seeing the cyclic process demonstrated in school by the use of an egg because the shells are close in chemistry to tooth enamel (teachhealthk-12.uthscsa.edu/).

Dr. Featherstone goes on to further explain that the minerals that are replaced during remineralization actually make the tooth stronger against acid attack than the original. Newly erupted teeth are especially vulnerable to acid attack since at the surface they have fewer minerals present (hypomineralization), similar to the exposure of roots with their layers of less-mineralized dentin.

**CARIES RISK ASSESSMENT (KEY #1)**

There is an important shift in the strategy concerning caries control because we now have the ability to promote remineralization and protection of the tooth surface. Today the emphasis is on a prevention model, moving away from a repair model.<sup>4</sup> Restoring the teeth did nothing to control caries. The first key to prevent-



**Figure 2** – The ‘caries balance’ between pathological factors and protective factors, between demineralization and remineralization. The sum of the preventive or protective factors should outweigh the pathological factors, “tipping the balance toward caries control and future dental health.”<sup>3</sup>

**TABLE 1 — Caries Risk Assessment Factors** <sup>4,5,6,21</sup>

Plaque biofilm: quantity and composition	Previous caries experience
Frequent exposure to fermentable carbohydrates or oral acids	Active periodontal therapy
Saliva: quantity and quality	Number of periodontal pockets >3 mm
Systemic illness or disability, cancer therapy or stomach regurgitation	Number of exposed roots, furcations and crowded teeth
Tobacco use	Fewer than 9 remaining teeth
Low Income	Orthodontic appliances or removable partial dentures

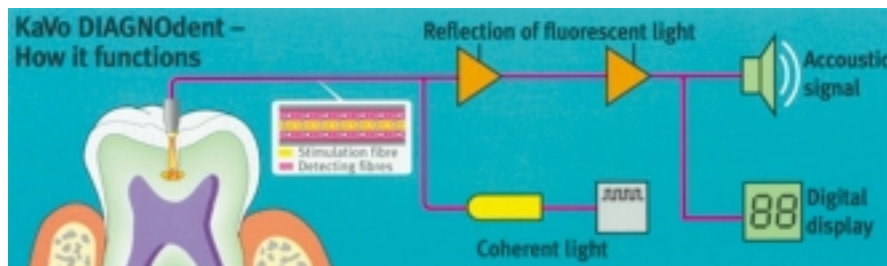
*“Though remineralization can take place at anytime, the level of activity varies according to conditions in the mouth.”*

ing caries in our patients is to perform a caries risk assessment on each of our patients (Table 1), listing the personal factors involved in their oral cavity, as well as medical and dental history that can lead to caries. There are forms available to help with this assessment and there are even online computer programs you can access.<sup>3</sup>

#### EARLY DIAGNOSIS TECHNIQUES (KEY #2)

The second key to prevention of caries in our patients is to use improved techniques available for early diagnosis of noncavitated occlusal lesions, and then to arrest or reverse such lesions through procedures designed to promote remineralization or afford protection. Until recently, caries detection methods have been appearance, explorer, and radiographic, all of which have limitations for the occlusal surface.<sup>4</sup> We need methods that can detect occlusal lesions while they are still in the enamel and can be arrested by remineralization (Figure 3). Lesions that were once ‘watched’ can now be accurately diagnosed and properly treated.

One other method that may soon be moving from the lab to the office is the Quantitative Light-induced Fluorescence (QLF) (Inspektor Research Systems) method that uses the auto-fluorescence of teeth. When teeth are illuminated with high intensity harmless blue light they will start to emit light in the green part of the spectrum, with the data going to a computer. The fluorescence of the dental material has a direct relationship with the mineral content of the enamel, thus a loss due to caries would be easily detected on any exposed tooth surface, even on the root.<sup>5</sup>



**Figure 3 – Improved Technique for early diagnosis of noncavitated occlusal lesions.** The only FDA-approved and over-90%-accurate device, the DIAGNOdent (KaVo) allows this detection. It shines a red laser into the occlusal subsurface via a specially designed handpiece and tip. As the laser detects demineralized tooth substances and bacteria products, it produces fluorescence. The fluorescent light comes back, interacts with the detector, and is read out as a number and an audible signal if there is a lesion. Numbers 15-30 need preventive remineralization or operative care depending on the caries risk assessment.<sup>1</sup> Numbers over 30 indicate the probability of a subsurface lesion and need for operative care. *Reproduced with permission from Kavo America.*

Other lower-tech methods can help visualization during diagnosis of caries. The “use of magnification with loupes or, better yet, with an intraoral camera...allows us to better see the pits and irregularities of occlusal surfaces. If we were to effectively debride the grooves of plaque and microscopic debris with an air abrasion system at low pressure or with a prophylaxis brush with pumice...[it will] dramatically improve our ability to fully examine the tooth.”<sup>6</sup>

#### MANAGEMENT OF DENTAL CARIES THROUGHOUT LIFE (KEY #3)

During the course of our lives our teeth are perpetually undergoing the process of either demineralization or remineralization. Though remineralization can take place at anytime, the level of activity varies according to conditions in the mouth. Thus there are opportunities during your patient’s life for prevention of caries by the use of remineralization or protection, the third key. To prevent demineralization and caries, remineralization of all the patient’s teeth should be our goal. If

remineralization is not always possible, protection from demineralization should be afforded the patient.

#### PERSONAL PREVENTIVE MEASURES AND DENTAL SURFACE PROTECTION

Effective personal preventive measures (e.g., tooth brushing and flossing to remove plaque biofilm) should be started as soon as teeth erupt and be supervised by a parent until children are old enough to do well on their own, typically around age 6 or 7, the same time that they can write their name. Some clinicians are recommending alternating between dry brushing, that does not use toothpaste, and using toothpaste so that a patient learns to feel the roughness of the plaque biofilm on their teeth and the smoothness of really clean teeth. Early dental visits with children provide an opportunity to check the child’s dietary and hygiene practices, as well as to place sealants for protection on vulnerable permanent teeth that erupt between the approximate ages of 6 and 12.<sup>7</sup> Studies show that use of dental sealants more than doubled in the last few years, but usage still

*“The mainstay in caries prevention through remineralization is the frequent exposure of the tooth to low levels of fluoride.”*

remains low (found on only 19% of permanent teeth of children and adolescents).

Permanent first molars erupt into the mouth at about 6 years of age. Placing sealants on these teeth shortly after they erupt protects them from developing occlusal caries. If sealants were applied routinely to susceptible tooth surfaces in conjunction with the appropriate use of fluoride, most tooth decay in children could be prevented. Permanent second molars erupt into the mouth at about age 12 and the occlusal surfaces are as susceptible as the first permanent molars of younger children. Therefore, young teens need to receive dental sealants shortly after the eruption of these teeth; most studies do not recommend waiting until the molar is fully erupted. Even some adults at high risk for decay can benefit from the protection that sealants afford.

Today there are many choices in sealant surface protection. The old stand-by is the unfilled resin systems that have been available for years. One of the relatively new types is the glass ionomer sealant. It releases high levels of fluoride to assist in remineralization of the surrounding area. It is not as sensitive to moisture contamination during placement, which can be a big concern with partially or newly erupted molars.<sup>8</sup> Another new sealant uses the latest system of amorphous calcium phosphate that releases these important minerals to assist in remineralization. It tends to be a lower cost option.<sup>9</sup> Offices may find that they should have many different types of sealants on hand to individualize their approach to this important part of caries control. There are many new moisture control products and cordless light curing devices available to make most sealant procedures easier to perform.<sup>10</sup>

Root caries in adults are also being treated with glass ionomer surface

protection, instead of composite resins, allowing remineralization of the surrounding at-risk root surface. If the diagnosis of root caries is early, the treatment usually involves an atraumatic restorative treatment (ART) where not all infected dentin is removed, as long as a secure seal can be achieved between tooth and material.<sup>11</sup> Fluoride therapy, discussed next, is also being used in adults and not just with children. This is especially true for patients receiving periodontal therapy (non-surgical and surgical) because the superficial layer of the exposed root which contains the majority of fluoride is removed during scaling and root planing.<sup>12</sup>

#### **FLUORIDE THERAPY IS THE MAINSTAY**

The mainstay in caries prevention through remineralization is the frequent exposure of the tooth to low levels of fluoride. It is truly remarkable the difference that a very small amount of fluoride (<1 ppm) has upon remineralization and demineralization. However, studies now show that the role of systemic fluorides appears to be limited and fluoride primarily has a topical effect (unlike what we used to think). This is because fluoride acts as a catalyst and influences various calcium phosphate mineral phases within tooth structure, as well as those that are within the plaque biofilm or saliva adjacent to tooth surfaces. The Centers for Disease Control have released new recommendations for fluoride which have been discussed in a past PREVENTIVE ANGLE newsletter that can be accessed online.<sup>13</sup>

Exposure to this important remineralization procedure may be accomplished with over-the-counter fluoridated toothpastes, supplemented with over-the-counter mouthrinses (0.05% NaF), as well as application of fluoride in the dental office. Many

researchers are now showing that with all the fluoridated toothpastes, for optimum uptake, patients should just spit and not rinse their mouths after use. Application in the dental office can involve the use of acidulated or neutral fluoride gel or foam depending on the caries risk and presence of composite or porcelain restorations or implants.

Now there are also fluoride varnishes (5% NaF) that provide some remineralization and may be safer and easier than gels or foams since there is less systemic intake for the patient.<sup>14</sup> They are now available in many different formulations and dispensing modes but tend to be more expensive than other forms of office-applied treatments. It is true that using fluoride varnish for caries control is an off-label application at this time but it is supported by numerous studies showing its efficacy. There are, unfortunately, significant cost barriers for companies to support the investigations for full approval as a therapeutic agent.<sup>15</sup> Most studies have shown 25-45% reductions in the decay rate with the use of fluoride varnish. Of special note is the reduction of decay in pits and fissures, as well as on smooth surfaces.

Now dental offices also have the ability to prescribe fluoride toothpastes (5,000 ppm twice daily), and rinses (0.2% weekly for one minute), or gels (5,000 ppm fluoride daily for four minutes in a custom tray) for use at the patient's home to continue remineralizing their early lesions.<sup>6</sup> Because of the high levels of fluoride, special care must be taken to control these products in the presence of young children (younger than 6 years of age) to prevent ingestion and

*“It is important overall that your patient realizes that they can reduce the amount of demineralization of their teeth by modification of their diet.”*

resulting toxicity. Prescription topical fluoride should only be used to prevent dental fluorosis on children after they have fully formed their permanent teeth. We may also consider the use of prescription fluoride lozenges to help our more mature patients with dry mouth achieve greater levels of remineralization.

#### **SALIVA IS THE MIRACLE FLUID**

The caries balance is modified with the presence of saliva. There are many different agents within saliva that miraculously serve to protect the tooth surface against caries development. They do this by inhibiting demineralization by neutralizing oral acids, as well as assisting in remineralization of exposed tooth surfaces. Patients with dry mouth (or xerostomia) are at a higher risk for caries. Thus there needs to be an enhancement of saliva flow to control caries; the procedures involved in this have been discussed in a past PREVENTIVE ANGLE newsletter which can be accessed online.<sup>16</sup>

#### **CARIOGENIC BACTERIA, DIET, AND ANTIMICROBIAL RINSES**

Cariogenic bacteria levels within plaque biofilm determine whether most caries will occur or not. Their concentration is directly related to the type of carbohydrates ingested and the frequency of ingestion, as well as the preventive hygiene techniques practiced by the individual.<sup>17</sup> There are many sources online that discuss the ‘pros and cons’ of specific food products for keeping caries controlled and preventing demineralization.<sup>18</sup> Today’s daily diet includes more snacking, fast

foods, and increased sugar consumption, all putting teeth at risk for decay.

It is important also that the amount of acid contained, especially citric acid (which tends to more easily break down enamel) be considered in the food, drink, or even gum, before recommending it as a regular part of a patient’s diet. We are seeing more and more caries in our patients due to more frequent acid intake that assists in intensifying decay. It is important overall that your patient realizes that they can reduce the amount of demineralization of their teeth by modification of their diet. Dr. Featherstone, when discussing a new type of chewing gum, states that the “substitution of the fermentable carbohydrates with noncariogenic sweeteners, such as aspartame, sorbitol, or xylitol, can play a big part in reducing the acid challenge to the teeth. This enhanced chewing gum (2gm/piece, one stick three times a day, preferably after meals) enhances salivary function, helps neutralize any acids present, and promotes remineralization.”<sup>11</sup> Xylitol shows in studies that it also inhibits the growth of cariogenic bacteria.<sup>19</sup> However, it is not yet approved for its anticaries effects by the FDA.

Antimicrobial rinses are now being used to reduce the higher levels of cariogenic bacteria present in some patients. These levels may be discovered by bacterial testing.<sup>20</sup> The regimen for these high caries risk patients usually consists of chlorhexidine gluconate therapy (0.12%), a once daily rinse with 10 ml for 1 minute at bedtime for 1 week so as to involve minimal staining and calculus formation. This should be repeated for 1 week every month, for up to 6 months.<sup>6</sup>

#### **RISK INTERVENTION SCENARIOS**

Looking at caries prevention using protection and remineralization, there are some possible risk intervention

scenarios you may want to consider for your patients.<sup>21</sup> It is important to note that preventive strategies are more effective when combined with one another.<sup>1</sup> Moreover, it is important to consider each patient individually since many times prevention involves the hard task of incorporating changes in the patient’s lifestyle. You may also want to discuss these changes over many appointments, especially with a new patient, so that they are not overwhelmed. Understanding of the role of prevention in caries control is the most important concept you can deliver to your patient who may be used to the older concept of repair.<sup>21</sup>

The following is a suggested risk intervention protocol you might want to consider for your practice. It provides a guideline to help you design an individualized program for each patient. Inform the patient that you are attempting to remineralize rather than restore the lesions and that success will depend largely on their compliance with your instructions. The patient must understand the need for follow-up at the appropriate time so that lesion progression can be monitored. Some lesions may require restoration if remineralization efforts are ineffective.

**Low risk patients** have no caries risk factors present. They should receive personal preventive hygiene and general diet instruction during regular dental visits, use fluoride toothpaste, and be informed of possible future complications if there is any change in their hygiene or diet. Sealants should be placed where necessary for protection. Fluoride in various forms should be introduced to promote remineralization.

**Moderate risk patients** have one to five risk factors present. They should be treated the same as low risk patients, but with more frequent fluoride interventions at the office (2-4 applica-

*“Studies have been showing that remineralization may also be enhanced by providing low levels of calcium and phosphate, in conjunction with minimal amounts of fluoride.”*

tions over 2-4 weeks in conjunction with restorative treatment), as well as non-prescription fluoride use at home. There should be a complete diagnosis of early noncavitated lesions and restoration of active caries, with exposed roots protected as needed. A food diary may help patients find areas that need better control such as snacks, soda pop, and candied mint intake. How to incorporate noncariogenic substitutions daily in the diet should be addressed. There should be discussion of tobacco cessation and ways to increase oral moisture if needed. Finally, there should be evaluation of remineralization procedures to arrest lesions at regular recall intervals so as to reduce future risk levels using all available diagnostic procedures.

**High risk patients** have more than five risk factors present. They should be treated the same as moderate risk with the addition of the home use of prescription fluoride, possibly bacterial testing and antimicrobial rinses, as well as more frequent recall appointments.

#### **FUTURE TRENDS IN REMINERALIZATION AND PROTECTION**

Studies have been showing that remineralization may also be enhanced by providing low levels of calcium and phosphate, in conjunction with minimal amounts of fluoride. Presently, there are new toothpastes, candies, and rinses that are becoming available that incorporate this type of remineralization; however, they need to be studied further in relationship to the overall processes occurring in the mouth. New antibacterials are also expected to become available in the near future, in the form of rinses, gels, and varnishes. Hopefully, more protection will be provided to other portions of the tooth, such as the interproximal surfaces. The production of other materials that are easy to use,

#### **Low Risk Patients**



#### **Moderate Risk Patients**

#### **High Risk Patients**



remineralize the tooth, and are at low cost levels will also be forthcoming. Dr. Vogel, Ph.D, Senior Project Leader, NIST Laboratory, states that “remineralization is a very complicated process... that without definite experiments it’s hard to predict what would happen: I am constantly amazed at what ‘works’. Thus each product needs to undergo rigorous

testing to see how it reacts in the oral cavity as a remineralization process.”

For now, it is important to study and understand all the products and procedures available to create an individualized program for each patient’s needs. The dental profession needs to keep current in this important area of dentistry.

#### DISCLAIMER

Unless otherwise specified, neither the sponsor of this newsletter or its editor maintains or is responsible for the content of any of the websites cited for reference. The listing of any of these sites should not be misconstrued as an endorsement of the information in them. The addresses of these websites are subjected to change and may need updating over time. The information provided in this newsletter is designed to support, not replace, the relationship that exists between a patient and the existing dentist, physician or pharmacist or other health care professional. The information is provided "AS-IS" and without warranty, expressed or implied. All implied warranties of merchantability and fitness for a particular use or purpose are hereby excluded.

#### REFERENCES

- 1 NIH Consensus Statement, *Diagnosis and Management of Dental Caries Throughout Life*, 18:1, 2001. Available by website [www.nidr.nih.gov/news/consensus.asp](http://www.nidr.nih.gov/news/consensus.asp) or mail at no cost
- 2 From the NHANES Study (1971-1975) and NHANES III Study (1988-1994). [www.hhs.gov/news/press/1996pres/960311.html](http://www.hhs.gov/news/press/1996pres/960311.html)
- 3 Chart adapted from Featherstone JDB: Prevention and reversal of dental caries: role of low level fluoride. *Community Dental and Oral Epidemiology*. 1999. 27:31-40.
- 4 Steinberg, SC: A Paradigm Shift for Caries Diagnosis and Treatment- Part I: Diagnosis, *Journal of Practical Hygiene*, March/April 2004.

- 5 PreViser Oral Health Information Suite. [service.previser.com/products/](http://service.previser.com/products/)
- 6 Featherstone, JDB: The caries balance: contributing factors and early detection. *Journal of the California Dental Association*. February 2003.
- 7 DIAGNOdent, KaVo [www.kavousa.com/prophylaxe/diagnodent.htm](http://www.kavousa.com/prophylaxe/diagnodent.htm)
- 8 Pretty IA, Ingram GS, Agalamanyi EA, Edgar WM, Higham SM: The use of fluorescein-enhanced quantitative light-induced fluorescence to monitor de- and re-mineralization of in vitro root caries. *Journal of Oral Rehabilitation*. 2003. 30(12):1151-6.
- 9 Levato C: *Early caries detection: What are we waiting for?* [www.dentalproducts.net/](http://www.dentalproducts.net/)
- 10 Berger, EK: Molar eruption and glass ionomer sealants. *Contemporary Oral Hygiene*. October 2003.
- 11 Taifour D, Frencken JE, et al: Effects of glass ionomer sealants in newly erupted first molars after 5 years: a pilot study. *Community Dental Oral Epidemiology*. 2003 31(4):314-9.
- 12 Skrtic D, Antonucci JM, Eanes ED, Brunworth RT: Silica- and zirconia-hybridized amorphous calcium phosphate: effect on transformation to hydroxyapatite. *Journal of Biomedical Materials Research*. 2002. 15;59(4):597-604.
- 13 Young Dental moisture control products, [www.youngdental.com/productindex.phtml](http://www.youngdental.com/productindex.phtml)
- 14 ART. [www.e-stomatology.ru/dopdoc/mon0ffluoride/art.htm](http://www.e-stomatology.ru/dopdoc/mon0ffluoride/art.htm)
- 15 Maquire, B: Fluoride therapy and the periodontal patient. *Journal of Practical Hygiene*, May/June 2004.
- 16 Barnes, CM, Hlava GL: Review of CDC recommendations for fluoride use, *Preventive Angle*, Young Dental. [www.youngdental.com/msds.phtml](http://www.youngdental.com/msds.phtml)
- 17 Ekstrand J, Koch G, Petersson LG. Plasma fluoride concentration and urinary fluoride excretion in children following application of the fluoride containing varnish Duraphat. *Caries Research*. 1980. 14:185-189.
- 18 Oskouian R, Domoto PK, Berg JH: Furthering Fluoride Usage. *Dimensions in Dental Hygiene*. June 2004. [www.dimensionsofdentalhygiene.com](http://www.dimensionsofdentalhygiene.com)
- 19 Fehrenbach, MJ: Common oral lesions in the geriatric population: section 1- traumatic and infective lesions, *Preventive Angle*, Young Dental. [www.youngdental.com/msds.phtml](http://www.youngdental.com/msds.phtml)
- 20 Hicks J, Garcia-Godoy F, Flaitz C: Biological factors in dental caries: role of saliva and dental plaque in the dynamic process of demineralization and remineralization (part 1). *Journal of Clinical Pediatric Dentistry*. 2003. 1;28(1):47-52.
- 21 ADHA, *Diet and Nutrition Implications for Oral Health*, continuing education course, [www.adha.org/CE\\_courses/](http://www.adha.org/CE_courses/)
- 22 Lynch, H, Milgrom P: Xylitol and dental caries: an overview for clinicians. *Journal of California Dental Association*. March 2003.
- 23 Overman PR. Biofilm: A New View of Plaque. *Journal of Contemporary Dental Practice* 2000. 3:018-029 [www.thejcdp.com/issue003/index.htm](http://www.thejcdp.com/issue003/index.htm)
- 24 Barber, LR, Wilkins, EM: Evidence-based prevention, management, and monitoring of dental caries. *Journal of Dental Hygiene*. 2002. 76:IV.



# The Preventive Angle

Preventive & Hygiene Insights from Young

Volume 3 • Issue 4

US \$6.00

## Guest Editor:

Margaret J. Fehrenbach is a dental hygienist and has her Master's degree in Oral Biology. She presents seminars in oral biology and pain control across the U.S. Her recent work involves the development of on-line continuing education course work. She is also Adjunct Faculty in the Dental Hygiene Program at Marquette University, Milwaukee, WI, and webmaster for their on-line CE program. She has authored and contributed to several textbooks for the Elsevier Company, including her contribution to *Oral Pathology for the Dental Hygienist*, as well as articles for *Access*, *Journal of Dental Hygiene*, *Journal of Practical Hygiene*, and *RDH Magazine*. She has also presented at both the ADA and ADHA Annual Sessions and Under One Roof. Her award-winning website can be accessed at [www.dhed.net](http://www.dhed.net).

## Featured Article:

Remineralization, Protection, and the Caries Experience

## Abstracts:

Advancements in Radiology

Bilateral Occurrence of Dental Caries Among 12-13 and 15-19 Year Old School Children

## Learning Objectives:

1. To gain an understanding of the caries process, conduction of a caries risk assessment, and caries diagnosis.
2. Understand the remineralization process and the various protection procedures available.
3. Learn how to integrate this knowledge of caries, remineralization, and protection and prevention into the dental practice.

Provided as a professional service by:



In conjunction with  
**The Richmond Institute**  
 for Continuing Dental Education  
 A division of Young Innovations, Inc.

# Remineralization, Protection, and the Caries Experience

By Margaret J. Fehrenbach, RDH, MS

The development of dental caries is a complex, multistage process. Even though many of our younger patients do not exhibit caries, it still affects a large portion of our patients (20% have 80% of the decay), regardless of gender, age, and ethnicity. However, it does tend to be more prevalent among low income individuals (Figure 1). Caries is no longer just a disease of children either. Due to increased amounts of recession we are seeing increased occurrence of root caries in our more mature patients. Thus, we are seeing a new overlap between caries and periodontal diseases which makes our discussions with patients much more complex!

The caries experience in the permanent teeth increases with age. For example, it is higher among teens than among young children. By the time your patients finish high school, approximately 80% have experienced tooth decay. More than 33% of patients aged 35 - 44 years have lost at least one permanent tooth due to decay. Studies show that 23% of adults have root caries. The U.S. government in 2001 published a landmark consensus statement concerning caries and how to diagnose and manage them throughout a person's lifetime.<sup>1</sup> This newsletter will use this information as a basis for discussion and



update it as necessary citing new studies and concerns.

## CARIES PROCESS

The enamel of the tooth is the hardest substance in the body. However, with caries there is a loss of the enamel's minerals, or demineralization, and subsequently the dentin that it overlies and protects. It is important to remember that caries occur in a tooth because there is a disruption between

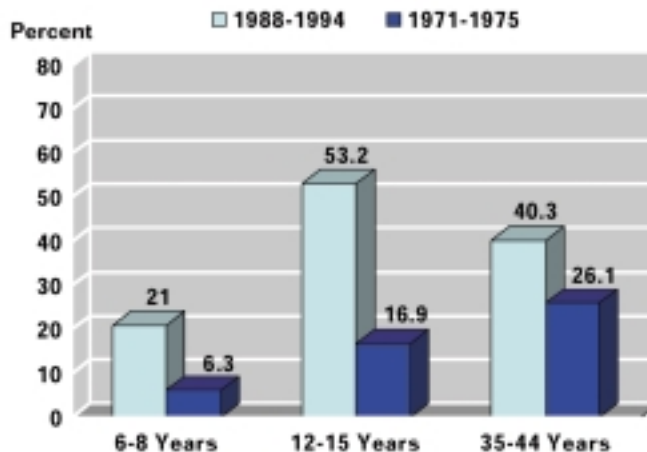


Figure 1 – Trends in Permanent Dentition Untreated Dental Caries Prevalence by Age Group<sup>1</sup>

## Abstracts

*Advancements in Radiology.*  
Howerton LJ, *Dimensions in Dental Hygiene*,  
May 2004,  
[www.dimensionsofdentalhygiene.com/](http://www.dimensionsofdentalhygiene.com/)

### INTRODUCTION

This article describes digital imaging and compares it with the traditional processing of radiographs. It continues by comparing direct digital system in a dental office that uses a digital machine with a wire connection that downloads automatically to a computer system, with an indirect method that uses traditional radiographs but scans them digitally into a computer system. The indirect method might also use "photostimulable phosphor technology," which uses no wire connection to the computer. The article goes on to cover changes in film and aprons as well.

### DISCUSSION

The article discusses the advantages and disadvantages of digital imaging, with the most important advantage being that "less radiation is required to produce a diagnostic image than traditional radiography because the sensor is more sensitive to x-rays than dental film." It answers the questions concerning cost, improvement of image, learning curve, and patient discomfort. Most importantly, the article states that "findings have concluded that film and digital imaging are not significantly different in their abilities to record dental disease."

The article recommends the use of faster speed film and softer packaging for those who are not yet ready to convert to digital radiography since they both are a benefit to patients.

The article notes that "lead aprons stop nearly 98% of scatter radiation from reaching the reproductive organs, while the thyroid collar prevents approximately 92% of exposure to this gland." It states that the lead apron "should not be cracked or damaged...not folded." The new environ-

mentally-safe, lead-free aprons are also discussed and "offer the same attenuation...as the traditional lead apron, yet each apron is approximately 50% lighter in weight."

### SUMMARY

The article helps dental professionals to stay on top of new products and techniques in the radiographic arena. It also answers many of the perplexing questions associated with this new technology.

*Bilateral Occurrence of Dental Caries Among 12-13 and 15-19 Year Old School Children.*  
Wyne AH, *The Journal of Contemporary Dental Practice* 2004. (5)1:042-052.  
[www.thejcdp.com/](http://www.thejcdp.com/)

### INTRODUCTION

The purpose of the study was to determine the bilateral occurrence of dental caries in two distinct adolescent populations located in Saudi Arabia: "a high caries population where the majority live in low fluoride areas." There were around 600 participants in each of the two groups (about half were boys and half girls in each group). All children were examined for dental caries using the World Health Organization criteria for the diagnosis of dental caries. The list of fluoride zones served as the sampling frame for the study.

### DISCUSSION

A bilaterally symmetrical pattern in the occurrence of dental caries has been reported previously by several researchers around the world. Knowing caries disease patterns will ultimately assist in caries research and prevention.

There were no significant differences between the caries prevalence of right and left sides for most teeth at the significance level of 0.05. Among younger children, maxillary first molars (86.5%), mandibular central incisors (86.2%), and mandibular first molars (86.0%) showed very high ( $p < .01$ ) caries bilaterality. Among the older children, mandibular first molars (91.6%), maxillary first molars (87.9%), and mandibular second

molars (79.9%) showed very high ( $p < .01$ ) caries bilaterality.

### SUMMARY

It was concluded caries occurs bilaterally. The conditional probability for bilateral occurrence of caries was highest in first molars followed by second molars and central incisors. The bilateral caries occurrence and conditional probability for bilateral caries occurrence were significantly higher in the older children as compared to the younger children. This will have an impact on future studies and public health surveys since the "caries status and treatment needs can be assessed by the dental examination of only one side of the mouth, resulting in quite accurate overall information while saving considerable time and precious resources." However, further investigation is required in this area, as "there is also a need to study the phenomenon of bilateral caries occurrence in terms of tooth surfaces."

#### Continuing Education Units

One hour of CEU is available with this newsletter through The Richmond Institute for Continuing Dental Education. See enclosed test sheet for details.

#### To Assure Future Copies

If you received this via mail, you are on our mailing list. If you received this from a third party and want to make sure you receive future copies, mail, fax or e-mail Young Dental with your name, address and comments. Fax Toll Free: (847) 458-0063, E-mail: [newsletter@youngdental.com](mailto:newsletter@youngdental.com), Address: 2260 Wendt St., Algonquin, IL 60102

©2004 Young Dental (10-04)

Provided as a professional service by:

**YOUNG**  
[www.youngdental.com](http://www.youngdental.com)

In conjunction with

**The Richmond Institute**  
for Continuing Dental Education

A division of Young Innovations, Inc.

**ADAC•E•R•P**<sup>®</sup>  
CONTINUING EDUCATION RECOGNITION PROGRAM

The Richmond Institute for Continuing Dental Education is an ADA CERP Recognized Provider.

**A**  
Academy  
of General Dentistry

**PACE**  
Program Approval for  
Continuing Education

Approved PACE Program Provider  
FAGD/MAGD Credit  
10/19/03 to 10/18/07

