An assessment tool is available that provides a validated, reliable, and objective means of aiding in the planning of treatment for periodontal disease.

**Background:** Periodontal disease has a varied and multifactorial etiology making a predictable prognosis difficult. Periodontitis affects 8% to 10% of the population and has been shown to be progressive in nature if not treated with individual supportive therapy. It is a biogenetic disease, rather than just a plaque-dependent process. However, the primary causative risk factor appears to be pathogenic biofilm, and correlated risk predictors may be described as either systemic or local.

**Objective:** In order to minimize variability among clinicians, an unbiased evaluation system was developed that would also include clinical tests for inflammatory reactivity. This would be tested for predictability.

**Methods:** A validation sample was generated in an open, prospective clinical trial and tested with an appropriate predetermined validation analysis. The algorithm is a web-based product that uses clinical and radiographic variables for each tooth and the dentition as a whole. These are determined by a complex formulation, with a clinical utility score being given. The sample was a multicenter consecutive selection. Baseline evaluation was done between December 1998 and March 1999, with follow-up evaluations done between October and December of 2002. A total of 183 patients were available for follow-up evaluation. Systemic predictors included age and chronicity of the periodontitis, systemic disease, patient cooperation and disease awareness, as well as smoking and genetic history. Local predictors included bacterial plaque, functional involvement, angular defects, radiographic marginal bone loss, probing depth, and increased mobility. Three outcome variables (radiographic marginal bone loss, development of furcation, and angular bony destruction) were used together as one indicator of progression; radiographic bone loss over time alone and tooth loss over time.

**Results:** The measured progression was significant on both a full-mouth analysis and a tooth-by-tooth analysis. There was strong and significant evidence, with increasing parameter estimates, indicating that both the full-mouth and tooth-by-tooth analyses were reliable measurements, with high expectancy values. The authors have included multiple, consistent statistical analyses and reports to validate their chosen assessment tool.

**Conclusions:** These results suggest that there is an assessment tool available that provides the practitioner with a validated, reliable, and objective means of aiding in periodontal treatment planning.

**Reviewer's Comments:** The degree of statistical validation is voluminous, and to this reviewer, the system makes logical sense. As this becomes clinically available and is followed with multiple individual validations, it may provide the practitioner with a reliable method to achieve a useable prognosis for their patients. (Reviewer-Charles R. Hoopingarner, DDS).

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Keywords: Algorithm, Periodontitis, Risk Assessment

Print Tag: Refer to original journal article
Background: Many patients present with various pain complaints that affect the orofacial areas and are not all the same. There are 4 basic pain mechanisms that may come into play.

Objective: To make a diagnosis on a 34-year-old female presenting with persistent pain, described as being in the left side of her jaw, which has been ongoing for 2 years.

Methods: The pain was described as constant and located around the TMJ, the masseter, the temporalis muscles, and at the angle of the mandible. It became worse on function. When gently touching the skin around the angle of the mandible, she felt a strong burning pain that lasted for minutes. She also described pain in the shoulders and cervical areas, as well as feelings of depression and a tired feeling. Neither over-the-counter medication nor oral splints gave significant relief. She had undergone total joint replacement in the left side jaw.

Results: The 4 basic types of pain mechanism include nociception, inflammatory, neuropathic, and functional pain. Nociception is the processing of pain from the primary afferent nerve that innervates the oral facial tissue. A series of receptors and ion channels located on the primary afferent nerve endings detect and respond to stimuli. This pain disappears upon cessation of the stimulus and would therefore not appear to be particularly inherent with this patient's presentation. Damage due to trauma is associated with inflammatory pain. Inflammatory pain can trigger spontaneous changes in action potential without the presence of peripheral stimulation. Central sensitization, which is a lowered activation threshold and increased modulation, can be triggered by this type of pain seen over a longer period of time. Second-order neurons react differently because of prolonged bombardment with nociceptive or inflammatory input, even when primary stimulation has ceased. Neuropathic pain develops following some sort of trauma or injury and can lead to hypersensitivity to painful stimuli or conditions such as alodynia, which is a painful response to a nonpainful stimulus. Functional overlays can occur; even though the mechanics of this pain are poorly understood, it may include genetic and environmental linkages. In this patient, it was decided that part of the pain profile could be due to neuropathic pain subsequent to the surgical implantation of the prosthesis. It was also thought that functional pain mechanisms may be contributing.

Conclusions: Invasive intervention should be discouraged, with the treatment of choice being palliative in nature.

Reviewer's Comments: One thing that was not properly evaluated was the possible contribution of cervical dysfunction. The patient presented with neck and shoulder pain and had lingering pain upon stimulation of the angle of the mandible. As the angle of the mandible has cervical sensory innervation, this should have been part of the differential diagnosis. (Reviewer-Charles R. Hoopingarner, DDS).

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Keywords: Pain, TMJ, Orofacial Pain

Print Tag: Refer to original journal article
Almost 33 Percent of Children Have Oral Mucosal Pathology

Oral Mucosal Lesions in Children From 0 to 12 Years Old: Ten Years' Experience.
Majorana A, Bardellini E, et al:

Keywords: Oral Mucosal Lesions, Prevalence
Print Tag: Refer to original journal article
In elderly patients (age range, 70 to 80 years), multi-rooted teeth and maxillary molars have a higher risk for periodontal disease progression compared to other teeth.

**Background:** Tooth-related risk factors for periodontal disease (PD) have not been identified in the elderly. Because PD tends to be site-specific, the risk for PD progression is likely to be site-specific in this population.

**Objective:** To investigate tooth-related factors and subject-related factors in a multilevel model for PD progression in Japanese elderly people in a 10-year longitudinal study.

**Methods:** All inhabitants aged 70 years in Niigata City, Japan in 1998 were invited to participate; 600 healthy respondents were randomly selected for a 10-year longitudinal study. Oral examinations and questionnaires were completed at baseline, at 5 years, and at 10 years. A total of 45 edentulous subjects were excluded. At the 5-year follow-up, 68.2% of participants were available; 11 were edentulous. At 10 years, 52.5% of patients were available; 3 were edentulous. Examinations included clinical attachment level (CAL), probing pocket depth (PPD) at 6 sites for each tooth; PD progression was defined as CAL ≥3 mm at each site. Restorations recorded included single crown or abutment for fixed partial denture (FPD) or removable partial denture (RPD). Questionnaires were used to obtain information on smoking status, oral hygiene habits, and regular dental visits. The multilevel mixed effects logistic regression model considering subject and tooth levels was used to analyze data.

**Results:** 286 subjects (51.6% of the original 554 dentate subjects enrolled) completed all 3 examinations. There were 5574 teeth at baseline (mean, 19.5 ± 7.2 teeth per subject). During the first 5 years, 374 teeth lost, and over the entire 10 years, 791 teeth lost; at 5 years, 5200 were examined and at 10 years, 4783 teeth were examined. Nonrespondent patients included more current smokers with fewer teeth compared with participants. At baseline, 3.4% of the 5574 teeth had deep PPD, and 13.8% had severe CAL (≥6 mm). PD progression occurred in 76.2% of subjects at 5 years and 79% at 10 years, and males had more disease progression than females (P <0.01). Those with 1 to 9 teeth at baseline had less progression (P <0.001). Nonsmokers had less progression over 5 years (P <0.05) as did patients wearing RPDs. The highest rate of disease progression was seen in maxillary molars. The highest rate of PD progression was associated with maxillary teeth, multi-rooted teeth, teeth restored with a single crown and abutments for RPD or FPD, and teeth with deep PPD or CAL at baseline. Over the first 5 years, wearing an RPD (subject level), maxillary teeth, multi-rooted teeth, and abutments for an FPD (tooth level) were associated with significant PD progression. Over 10 years, multi-rooted teeth (2.2 times) and abutment teeth for RPD (1.5 times) or for FPD (1.4 times) had higher risk for progression.

**Conclusions:** Multi-rooted teeth and abutments for FPDs were tooth-specific risk factors for PD progression. Periodontal maintenance of prosthodontically treated teeth is important to prevent PD progression.

**Reviewer’s Comments:** Elderly patients who have prosthodontic treatment, including RPDs and FPDs, have greater risk for periodontal disease progression and may benefit from more frequent dental recall and maintenance therapy. (Reviewer-Carol Anne Murdoch-Kinch, DDS, PhD).

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Keywords: Periodontal Disease, Tooth-Related Risk, Elderly People

Print Tag: Refer to original journal article
Salivary Contamination of Enamel Reduces Bond Strength

Effect of Saliva Contamination and Decontamination on Bovine Enamel Bond Strength of Four Self-Etching Adhesives.

Jiang Q, Pan H, et al:


Salivary contamination during the restoration of teeth will reduce the enamel bond strength of the self-etching adhesives.

Background: Salivary contamination of the enamel is a common problem encountered while performing adhesive dentistry procedures. This contamination can significantly reduce the microtensile bond strength (μTBS) of the composite resin, so achieving good moisture control is important. The use of self-etching adhesives now being used shortens treatment time, shortening the time interval when contamination could occur.

Objective: To investigate several different types of self-etching adhesives and how saliva contamination at different times during the treatment affects the strength of their bond to enamel.

Methods: The labial surfaces of 40 noncarious bovine incisors were roughened prior to application of any adhesive or resin. The teeth were divided into 5 groups, one of which was the noncontaminated or control group. The other 4 groups differed as to whether the saliva contamination occurred before or after priming and at what point in the treatment water spraying was done. Four different self-etching adhesives and resins were applied to the enamel surfaces. After storage for 24 hours in room temperature tap water, the teeth were sectioned perpendicularly through the resin-enamel interface. The μTBS was tested for each subgroup, and statistical analysis was performed.

Results: The μTBS of the adhesives on the teeth tested was reduced significantly in teeth that had been contaminated by saliva. This detrimental effect, even if of a short duration, resulted whether the saliva contamination occurred before or after priming. However, water spraying prior to adhesive placement improved retention. Saliva is composed of inorganic and organic macromolecular proteinaceous compounds that will be adsorbed on the enamel and form a pellicle layer. This protein presence will interfere with the hydrophilic monomer, reducing bond strength and preventing primer polymerization.

Conclusions: When saliva contaminates the enamel, it will adversely affect hydrophilic self-etching adhesives used during adhesive procedures, such as those involving composite resin restorations and orthodontic bracket attachments. Some salivary protein does remain on the enamel, and despite rinsing with water, this can decrease bond strength.

Reviewer's Comments: The use of self-etching adhesives is becoming more widespread, so the authors wisely chose to evaluate several of them to provide relevant comparisons of their efficacy. This article provides data that support their use, wherein the treatment time can be shortened to lessen the chance of saliva contamination. The study also stresses the importance of moisture control and proper isolation. (Reviewer-Edward N. Friedman, DDS).

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Keywords: Saliva Contamination, Bovine Enamel, Self-Etching Adhesives

Print Tag: Refer to original journal article
**Background/Objective:** Resin composites are being used as an alternative to amalgams in Class II restorations. Difficulties in achieving an adequate marginal seal lead to microleakage at the composite-tooth interface. This study compares the differences in the amount of marginal seal achieved between the open- and closed-sandwich centripetal build-up techniques.

**Materials/Methods:** 30 noncarious molars were divided into 2 groups. A Class II mesio-occlusal restoration was prepared, with the proximal extent being 1 mm apical to the cementum-enamel junction. Both groups were restored with adhesive, flowable resin, and a hybrid resin composite. In Group 1, the open-sandwich technique was used, where a 1-mm thick base of flowable was applied and cured, followed by 2-mm incremental application of the hybrid resin composite into the proximal box. The closed-sandwich technique in Group 2 involved applying the bonding agent and then the 1-mm incremental addition of hybrid resin composite to build the interproximal wall. This was followed by placement of a 1-mm layer of flowable composite on the pulpal floor. Adaptation of the cervical margin was evaluated by measuring the dye penetration and scanning electron microscope analysis.

**Results:** This in vitro study of the 2 techniques for restoring Class II restorations demonstrated less dye penetration, significantly better marginal adaptations, and less microleakage with the open-sandwich technique (Group 1). The flowable composites have a thermal coefficient of expansion similar to tooth and a lower modulus of elasticity. The elastic deformation will minimize polymerization shrinkage stresses, and thereby reduces the creation of open margins. More microleakage is seen in areas where the margin is in dentin than if it is in enamel. The open-sandwich technique helps achieve a better seal in gingival margins in weak areas, such as in the dentin or cementum (versus enamel).

**Conclusions:** This in vitro study showed that a significantly better marginal seal was produced with the centripetal open-sandwich technique than with the centripetal closed-sandwich technique. Neither seal resulted in an interface that completely prevented dye penetration. However, the difference between the 2 groups clearly demonstrates that placing flowable composite resin prior to hybrid resin composite will result in restorations with fewer voids and less marginal microleakage.

**Reviewer's Comments:** As in all materials, specific limitations exist in the properties of composites as a restorative material. The authors' comparison of 2 restorative techniques being used with this material provides relevant data about one approach to minimize these limitations. The simple steps they demonstrate are relevant, and if used, they can reduce postoperative problems than may otherwise occur. (Reviewer-Edward N. Friedman, DDS).

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Keywords: Microleakage, Centripetal Build-Up, Class II

Print Tag: Refer to original journal article
It is important to not only understand the amount of curing time necessary to cure a composite resin, but also the amount of light energy required.

**Background:** Composite resin manufacturers rarely specify the amount of light energy required to cure their composite. Rather, manufactures typically give recommended curing times and/or recommended minimum irradiance (mW/cm²) to adequately cure their products.

**Objective:** To measure the amount of light energy (J/cm²) that dental students actually deliver to a Class I preparation in a dental mannequin. Hypothesis #1: the total energy delivered would be >10 J/cm²; Hypothesis #2: students would deliver more energy to the Class I restoration after specific instructions.

**Materials/Methods:** A 6.2-mm diameter Class I restoration was prepared in a composite maxillary molar, and a 3.9-mm photodetector was fixed in the preparation. Twenty volunteer dental students were given the same quartz-tungsten-halogen (QTH) light and instructed to cure the restoration for 20 seconds. After curing the restoration, the students were given specific instructions on how to optimize light delivery to the restoration (ie, wearing protective eyewear, paying attention, and holding the light close and perpendicular to the restoration), and the project was repeated. After the experiment was complete, the energy delivered by each student before and after receiving instructions was calculated. The amount of light energy necessary to adequately cure the experimental composite was determined by applying the QTH light over various periods of time to a 2-mm thick composite increment and applying the Knoop microhardness test to the top and bottom of the specimens. The maximum amount of energy delivered to the light detector in 20 seconds was determined by securing the end of the light guide perpendicular with the light detector and the mean maximum energy (J/cm²) calculated after three 20-second measurements. Finally, the angle of the light guide to the tooth was measured 3 times at 0°, 15°, 30°, 45°, and 60° to determine the etiology of low irradiance delivery after instruction.

**Results:** The mean irradiance delivered to the detector was 695 mW/cm², and the greatest amount of light energy that could be delivered to the detector was 13.9 J/cm². Before instruction, the students delivered 2 to 12 J/cm² of energy, and after instruction, the students delivered 7.7 to 13.5 J/cm² of energy; 15 (75%) of the students delivered <10 J/cm² of energy. The students delivered 2.1 J/cm² more energy after instructions. A change from 0° to 30° in the light guide angulation resulted in a 26% decrease in the amount of energy delivered. Beyond 30°, <10 J/cm² of energy was delivered in 20 seconds.

**Conclusions:** Because 50% of the students could not deliver 10 J/cm² of energy, the first hypothesis was rejected. Hypothesis 2 was accepted because more light energy was delivered to the class I restoration after the students received instructions.

**Reviewer's Comments:** This was a very clinically relevant article, as manufacturers rarely disclose the amount of light energy required to adequately cure their composite resin. (Reviewer-Kelly A. Halligan, DDS).
Cardiac pacemakers and implantable cardioverter-defibrillators may be susceptible to electromagnetic interference produced by common dental equipment.

Background: Pacemakers and implantable cardioverter-defibrillators (ICDs) are electronic devices that are sensitive to electromagnetic signals in the vicinity. Surgically implanted pacemakers provide pacing for cardiac bradyarrhythmias, while ICDs are being placed increasingly to prevent sudden cardiac death. Because of the popularity of these devices, it is estimated that most practices have at least 1 patient with one of these implanted devices.

Objective: To determine whether electromagnetic interference of pacemaker and ICD activity occurs during the operation of electronic dental devices.

Design/Methods: This in vitro study tested 9 common electronic dental devices for their ability to interfere with the function of 2 commonly used pacemakers and 2 commonly used ICDs (all made by Medtronic). Devices with leads attached were placed in a 1.5-L saline solution. Resistance was adjusted to replicate electrical resistance of the human body. All devices were set to maximum sensitivity and monitored for interference by 2 trained cardiologists. Dental devices were operated to simulate normal use. Distances from pacemakers and ICDs ranged from directly on the device to 3 feet away. Each test was repeated 3 times.

Results: The use of the ultrasonic scaler, the ultrasonic cleaning system, and the battery-operated curing light inhibited pacing activity, some as far as away as 23 cm from the pacing generator. The operation of the ultrasonic scaler and curing light interfered with the ICDs' pacing function from as far away as 7 cm with respect to the ultrasonic scaler. This distance was related more from the leads versus the generator. Operating an amalgamator, electronic toothbrush, electronic pulp tester, electrosurgical unit, and high- and low-speed handpieces did not produce electromagnetic interference on pacemakers or ICDs.

Conclusions: Caution should be used when operating ultrasonic scalers (Cavitron), ultrasonic cleaning systems (Transitor), and possibly even battery-operated curing lights around patients and coworkers who have pacemakers or ICDs. It may be more advisable to use hand scalers for such patients. The author did not make any recommendations relating to alternatives to battery-operated curing lights.

Reviewer’s Comments: The science here is solid, but the clinical relevance is vague (ie, is this interference dangerous or even significant?). The author noted that in vivo studies would be beneficial, and I totally agree. At this point based on these results, I would recommend that dentists treat patients based on standard of care and be aware of possible complications. Our world is filled with electromechanical devices, and there is no way a patient can isolate themselves from this ever present energy source. As a hospital dentist, I am concerned that this article may make dentists even more cautious of these patients from both a clinical and legal standpoint. They may see this as just another reason not to treat the medically compromised population who already has limited access to care. (Reviewer-Timothy J. Halligan, DMD).

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Keywords: Cardiac Pacemaker, Defibrillator, Electromagnetic Interference, Dental Equipment

Print Tag: Refer to original journal article
Early Diagnosis, through screening of all patients, will improve outcomes in oral cancer, but not without additional public awareness campaigns.

**Background:** Oral cancer is associated with a very high mortality rate (50%), largely because it is frequently diagnosed only in advanced stages.

**Objective:** To identify early responses of young oral cancer patients to their symptoms, and their interactions with health care professionals and the health care system, and to then relate these to factors involved in delays in obtaining secondary care for the tumor.

**Design:** Interviews of appropriate volunteer subjects with qualitative analysis of individual responses.

**Participants/Methods:** Patients <45 years of age with a previously diagnosed oral or oropharyngeal cancer were recruited from 3 surgical oncology clinics in Scotland. Following appropriate informed consent procedures, subjects underwent a semi-structured interview based on questions about their recognition of symptoms, attitudes toward their initial symptoms, self-treatment, their behavior in response to advice from or treatment by primary healthcare providers, missed opportunities for early diagnosis, and reasons for delays in their referral for definitive care.

**Participants:** 15 Caucasian subjects (7 males, 8 females) completed the study.

**Results:** Most participants were aware of oral cancer from a variety of sources before their diagnosis, but no clear relationship between oral cancer awareness and seeking care was identified. Most subjects knew of a relationship between tobacco use, alcohol consumption, and oral cancer, although smoking was not a concern. Most subjects (13) realized that an early symptom was present in their case, and >50% did not believe the symptom was serious until they were referred for further evaluation and treatment. Five individuals had felt a "lump," a few described a "white spot," some mentioned "soreness," and some had noticed ulceration. Six of the participants self-treated the lesion with over-the-counter agents, but none of these indicated that this treatment was effective. In addition to self-treatment, causes for delay in definitive diagnosis and treatment included waiting for a previously-made regular visit and a lack of pain. Socioeconomic status was not determined to be a factor.

**Conclusions:** The authors of this preliminary, small-scale study conclude that early diagnosis is key in determining the prognosis for oral cancer. Continued investment in public awareness campaigns is most likely to improve early entry of patients into the diagnostic and treatment system.

**Reviewer's Comments:** This study confirms many of the suspicions that we have regarding the failure of early diagnosis and treatment of oral cancer. Our obligation continues to be thorough routine screening of all patients and prompt referral in suspected cases. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Oral Cancer, Oral Examination, Risk Factors

Print Tag: Refer to original journal article
The usual methods can be used to diagnose cracked teeth, but now the dentist should consider making a resin composite band to get more information.

**Background:** Cracked teeth may present as a syndrome, may result from numerous etiologic factors, and are very challenging to diagnose and manage.

**Objective:** To provide an overview of the epidemiology, etiology, and diagnosis of cracked tooth syndrome (CTS).

**Design:** Expert literature review; no specific review protocol was described.

**Methods:** The authors reviewed 44 published articles dealing with the epidemiology, etiology, and diagnosis of cracked teeth from a variety of publications (mostly peer-reviewed) spanning the period from 1954 to the present.

**Results:** With regard to the epidemiology of CTS, the published literature suggests that mandibular molar teeth are the most frequently fractured, followed by maxillary premolars and maxillary molars. Generally, cracked teeth seem to be most frequent in the adult population, aged 30 to 60 years, and with no predilection for either sex. Among endodontic referrals, nearly 10% are the result of a cracked tooth, and there are 4 major factors that predispose teeth to fracture. These factors include: (1) restorative procedures (pins, non-incremental filling with resin, excessive cementation forces, excessive removal of tooth structure); (2) occlusion (biting on hard foods, occlusal interferences on susceptible cusps, bruxism); (3) developmental conditions (deep occlusal grooves, large pulp spaces, steep cusp angles); and (4) "miscellaneous" factors (erosion, thermal cycling, aging). The diagnosis of cracked teeth continues to emphasize symptomatology (cold sensitivity), occlusal testing (sharp pain on biting), and visual and tactile examination (transillumination, explorer tip). The authors propose that a composite resin band can be temporarily placed over the occlusal and buccal and lingual surfaces to confirm the outcome of a biting test (ie, the band would presumably eliminate the pain of biting force), but this is not confirmed scientifically. Finally, the authors suggest that the prognosis for a cracked tooth is dependent on the location of the crack, with cracks that are confined to dentin, horizontal, no pulpal exposure, and limited to a single marginal ridge having the most favorable outcomes.

**Conclusions:** Early recognition of cracks is a key factor in improving outcomes to avoid increasing the size of the crack; cracked teeth that require root canal therapy have an especially poor prognosis. As in most procedures, the skill and experience of the operator will influence outcomes to a great extent.

**Reviewer's Comments:** This article confirms current approaches to the diagnosis and management of cracked teeth, with interesting suggestions for making an appropriate diagnosis (composite band). Still, there are no randomized, controlled trials of the interventions, nor will there likely ever be, given the nature of the condition and the range of variables involved. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Cracked Teeth, Fracture, Etiology, Diagnosis

Print Tag: Refer to original journal article
Lasers may serve as an adjunct to conventional therapies in the treatment of chronic periodontitis, but the limitations in scientific evidence do not support their use as an alternative to traditional therapy modalities.

**Background:** Recently, lasers have been promoted as an adjunct to, or substitute for, standard mechanical debridement of subgingival root surfaces and periodontal pockets.

**Objective:** To provide an expert summary of clinical evidence on the use of soft-tissue lasers in the nonsurgical treatment of patients with periodontal disease. In addition, the author hopes to aid clinicians in their decisions to purchase and use soft-tissue lasers, based on their clinical indications and cost effectiveness.

**Design:** Literature review and expert summary; no search protocol was provided. **Discussion:** Lasers were introduced in the dental setting in 1985. They have been advocated for use with the removal of caries, specified for use with soft tissues, or promoted for their hemostatic ability. More recently, lasers have been promoted in the dental setting as a painless alternative to surgical treatment of periodontal disease and a benefit over these traditional therapies. Lasers differ by the specific wavelength with which they emit energy and how their radiation is delivered. The laser beam may be absorbed, scattered, or reflected, depending on the optical properties of the tissue the laser is targeting. Energy absorption is dependent on the laser wavelength, power, pulse duration, duration of exposure, angle of energy delivery, and waveform (pulsed vs continuous). Furthermore, this energy absorption will cause the target tissue to warm up, coagulate, vaporize, or melt and recrystallize. Because periodontal tissues vary in water and mineral content, as well as pigment and tissue density, the optical properties vary.

**Methods:** The author reviews the indications for use of the Nd:YAG, diode, and CO\textsubscript{2} lasers with respect to periodontal tissues, clinical treatment goals, and desired outcomes, comparing wavelength, contact mode (ie, ability for tactile sensation), thermal damage, need for protective eyewear, and precautions. Furthermore, she summarizes the randomized, controlled clinical trials comparing lasers and mechanical debridement in the treatment of chronic periodontitis, citing a 2009 study from Slot et al and a 2008 systemic review of the literature by Schwartz et al. Finally, regarding laser use for nonsurgical periodontal therapy, she emphasizes the limitations in clinical evidence supporting the use of lasers for photodynamic therapy, as well as the lack of clinical evidence to support the claims that: (1) laser wounds heal faster than scalpel wounds; and (2) lasers sterilize periodontal pockets (as efficacy of therapy is based on gains in clinical attachment levels vs levels of subgingival microbes in the pocket).

**Conclusions:** There is no evidence that any laser system adds clinical value over and above scaling, root planing, and conventional surgical treatment.

**Reviewer's Comments:** More longitudinal randomized, controlled clinical trials need to be performed to support the use of lasers as an alternative to conventional therapy for the treatment of chronic periodontitis. (Reviewer-Kelly A. Halligan, DDS).

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Indirect pulp treatment may be an alternative to pulpotomy in primary molar teeth with deep caries.

**Background:** Indirect pulp treatment (IPT) is a procedure in which caries close to the pulp are left and covered with a restorative material to prevent microleakage. The main goal is to preserve dentinal structure and maintain pulp vitality. Obviously, IPT is not indicated when there is carious exposure or when teeth have irreversible pulp pathology, such as spontaneous pain, sensitivity to pressure, swelling, radiographic radiolucencies at the apex, or furcation.

**Objective:** To evaluate clinical and radiographic outcomes of IPT in primary molars after long-term function (up to 60 months).

**Design:** Clinical study conducted at a single institution involving 40 primary molars in 21 healthy children aged 4 to 8 years. Teeth with irreversible pulpitis or necrosis were excluded. Teeth were treated under a rubber dam, removing the outermost infected demineralized dentin. Teeth were then randomized into 2 indirect pulp treatment groups: Clearfil SE Bond or Dycal (control). Both groups were restored with Z250 using standardized restorative methods to prevent microleakage.

**Results:** 32 of 40 teeth completed the study. Of these, 25 teeth (78%) met clinical and radiographic criteria for success. No statistical difference was noted between the Clearfil SE Bond and Dycal groups.

**Conclusions:** IPT provides an alternative treatment for primary molars with deep carious lesions. In addition, this treatment is less invasive and maintains pulpal vitality.

**Reviewer's Comments:** I found this article very interesting, having been required to do hundreds of pulpotomies earlier in my career while stationed as an Air Force dentist in Korea. I found pulpotomies incredibly challenging, mostly because of the patient’s age and unwillingness to cooperate. I remember the patients in whom the decay just kept progressing toward the pulp. I wish there had been a way I could just have gotten the restoration placed before everything deteriorated to crying and screaming, mostly by me. Indirect pulp caps for most general dentists are quick and technically simpler to perform than a pulpotomy. You add the possibly of not requiring a stainless steel crown (SSC), which parents usually hate due to aesthetics (in my training, all primary molars with pulpotomy required SSCs). I say give it a try. My only concern is that if failures occur early (within the first year as noted in this study), space maintenance might be required more often. The permanent successor may not have erupted into position to stabilize the dentition. (Reviewer—Timothy J. Halligan, DMD).

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Keywords: Pulpotomy, Primary Teeth, Decay, Indirect Pulp Treatment

Print Tag: Refer to original journal article
Dental Decay Is in the Genes

Genes and Their Effects on Dental Caries May Differ Between Primary and Permanent Dentitions.
Wang X, Shaffer JR, et al:
Caries Res 2010; 44 (July): 277-284

Up to 70% of the risk for dental caries in primary teeth is genetic.

**Background:** Dental caries is a multifactorial disease, and estimates of heritability vary. It is not known if the heritability of caries is the same for primary and permanent teeth.

**Objective:** To determine which methods of quantifying caries best represent the underlying genetic risk for future studies of heritability of dental caries in children and adults.

**Methods:** The Center for Oral Health Research in Appalachia conducted this study. Families were recruited from West Virginia and western Pennsylvania with at least one parent-child pair; children ranged in age from 1 to 18 years. All members of the household were included. Excluded were those with neurological impairment, severe physical or mental handicap, or psychosis; parents with reduced immunity or clotting problems were also excluded. From a total of 732 households enrolled, 2600 people from 740 distinct biological families were enrolled (mean, 4.72 family members per household). A total of 3232 relative pairs were analyzed: 1817 parent-child, 756 siblings, 347 half-siblings, 120 avuncular pairs, 104 first cousins, and 88 other relative pairs. Dental examinations included visual assessment for caries of dried teeth. White spot, decayed (D), filled (F), and missing (M) teeth (T) were recorded as DMFT/dmft. Composite caries scores were DMFT and DMFT/number of permanent teeth present. Composite scores for primary teeth were dft and dft/number of primary teeth present. Next, the caries composite scores were recalculated with or without white spot lesions being included. Heritability analysis was performed using a family-based likelihood method for children and adults.

**Results:** Caries prevalence and caries scores did not differ between males and females aged 0 to 6 years, 14 to 18 years, and >18 years. Primary teeth caries scores were greater in males than in females in the mixed dentition. In the primary dentition, dental caries were highly heritable. Genes accounted for 54% to 70% of the variation in primary caries. In the permanent dentition, heritability was 35% to 55%. When white spot lesions were included, heritability increased. Heritability of the DMFT proportion and the dft proportion were greater than DMFT and dft counts.

**Conclusions:** Heritability of dental caries is different in the primary and permanent dentitions. Different genes may be involved. It is important to include white spot lesions in the phenotype in genetic studies of caries risk.

**Reviewer's Comments:** Including white spot lesions as part of the caries phenotype increased the study’s ability to detect the impact of genetic factors on caries risk. This study is important because these data will help design future trials of genetics of dental caries and lead to a better understanding of the biological pathways that result in dental caries. (Reviewer-Carol Anne Murdoch-Kinch, DDS, PhD).

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Keywords: Genetics, Dental Caries Risk, Primary Teeth, Permanent Teeth

Print Tag: Refer to original journal article
Candida Associated With Dental Caries in Children

Association of Oral Candidal Carriage With Dental Caries in Children.
Raja M, Hannan A, Ali K:
Caries Res 2010; 44 (July): 196-200

Approximately 65% of children carry Candida in their oral cavity.

**Background:** In children, dental caries has been associated with carriage of oral Candida, which enhances the adherence of Streptococcus mutans to the biofilm and carious tooth surfaces. Candida can also ferment carbohydrates to form plaque acids.

**Objective:** To determine the relationship between oral Candida carriage and the prevalence of dental caries in children with mixed dentition.

**Participants/Design:** 100 girls and boys aged 6 to 12 years with mixed dentition participated in this cross-sectional study.

**Methods:** 2 groups were evaluated: caries-free (n=50) and caries-positive (n=50) subjects. Data collected included age, gender, medical history, oral hygiene index-simplified (OHI-S), and decayed, missing, filled teeth (DMFT/dmft score) by visual detection. Swabs were obtained from the buccal mucosa, tongue dorsum, and occlusal surfaces of the teeth (carious teeth in caries-positive groups; lower right permanent first molar for caries-free group) to culture for Candida. Oral rinses were obtained to quantify Candida species. Candida albicans was identified by the germ tube test.

**Results:** 53 girls and 47 boys participated (mean age, 8.83 ± 1.59 years). In the caries-positive group, the mean age was 8.22 years, and there were 29 males and 21 females. In the caries-free group, the mean age was 7.42 years, and there were 18 males and 32 females. The caries-positive mean DMFT/dmft score was 3.86 and was highest in 11 to 12 year olds (3.44). The OHI-S score was worse in caries-positive than in the caries-free group (P < 0.05). Sixty percent of all subjects were Candida positive by the oral rinse technique; Candida carriage was associated with dental caries (OR, 67.37; P < 0.01); 65% of positive samples contained C. albicans, 25% contained Candida tropicalis, 8.3% contained Candida parapsilosis, and 1.7% contained Candida rugosa. There was a higher frequency of positive swabs from occlusal surfaces of teeth than from soft tissues.

**Conclusions:** Candida carriage was associated with dental caries in children with mixed dentition.

**Reviewer’s Comments:** These results cannot support a causal relationship between Candida and dental caries in children. Further studies should explore the mechanism of Candida in the dental caries process. It is not clear whether a similar environment favors Candida growth and caries, or if Candida plays a causative role in the caries process. (Reviewer-Carol Anne Murdoch-Kinch, DDS, PhD).

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Keywords: Dental Caries, Children, Oral Candida

Print Tag: Refer to original journal article
Background: There are several reports on the effectiveness of oral opioids in the management of pain in temporomandibular (TM) disorders, but there is little evidence regarding the use of these agents via intra-articular injection as a sole intervention in this challenging disease.

Objective: To evaluate the analgesic efficacy and safety of repeated intra-articular injections of morphine compared with a local anesthetic and saline injections in the management of TMJ pain.

Design: Prospective, randomized, double-blind, single-center clinical trial.

Participants: 48 adult patients aged 21 to 79 years with single-side TMJ pain of ≥3 months' duration.

Methods: After appropriate informed consent procedures, subjects rated pain on a visual analog scale (VAS), and all cases were rated at ≥6 on the 10-point scale. Patients were divided into 4 parallel groups: (1) 5 mg morphine; (2) 10 mg morphine; (3) 0.5% bupivacaine; or (4) isotonic saline, all in comparable volumes via intra-articular injection. Three administrations were performed at 48-hour intervals. The same operator performed all injections, and neither the patient nor the operator knew the agent being administered. End points measured included analgesic effect assessed with the VAS at various intervals up to 1 week after the injection and the need for additional medication (500 mg acetaminophen).

Results: No untoward events were observed. Regardless of the intervention, all subjects experienced pain relief within 60 minutes after the first injection, but patients in the saline and local anesthetic group had a return of pain to baseline levels prior to subsequent injections. In the 5-mg morphine group, a "distinct" relief of pain (<4 VAS score) was reported in 25% of subjects and a poor response in 50%. However, administration of 10 mg of morphine resulted in completed relief of pain in 17% of subjects after the third injection, and 42% achieved a "distinct" effect. Functional parameters (jaw movement, opening) improved related to these analgesic actions.

Conclusions: Repeated intra-articular injections of 10 mg of morphine are a treatment option for the management of pain of TMJ disease, and 0.5% bupivacaine or saline cannot be expected to provide significant pain relief.

Reviewer's Comments: Given the difficulty of conducting double-blind, controlled clinical studies of interventions for TMJ pain, we are indebted to the authors for this contribution. However, this is still a relatively small sample of patients, and multiple variables are in play in determining therapeutic outcomes. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Temporomandibular Disorders, Intra-Articular Injections, Morphine

Print Tag: Refer to original journal article
How Do Irrigants Affect Dentin Wettability, Roughness?

Effects of Irrigation Solutions on Dentin Wettability and Roughness.
Hu X, Ling J, Gao Y:

J Endod 2010; 36 (June): 1064-1067

Hypochlorite irrigation may be expected to enhance dentin-bonding procedures used to restore endodontically treated teeth, but the effect also must be weighed against the potential of increasing bacterial adhesion.

Background: Antimicrobial and chelating irrigants are an indispensable part of endodontic therapy, but their effects on radicular dentin and subsequent dentin-bonding restorative procedures is not well known.

Objective: To characterize the effects of sodium hypochlorite, ethylenediaminetetraacetic acid (EDTA) and hydrogen peroxide on the wettability and surface roughness of human root canal dentin.

Design: In vitro laboratory study utilizing standardized root specimens.

Methods: Roots of 20 extracted human incisor and canine teeth from adult subjects were selected for study, based on a lack of caries and uniform dimensions. These specimens were sectioned longitudinally to produce 40 slices, and then the slices were ground smooth. Specimens were divided into 4 groups and then subjected to 1 of 4 treatments for 10 minutes: (1) 15% EDTA solution; (2) 5.25% sodium hypochlorite solution; (3) 3% hydrogen peroxide solution; or (4) distilled water (control). Wettability of the sections was then measured by optically assessing water contact angle, and roughness was assessed using an atomic force microscope. Experimental values were compared using parametric statistical tests.

Results: Wettability of the dentin was significantly increased by treatment with 5.25% sodium hypochlorite and 3% hydrogen peroxide, while EDTA did not affect this parameter. Surface roughness was also increased significantly by 5.25% sodium hypochlorite and 17% EDTA, with no effect of hydrogen peroxide.

Conclusions: Sodium hypochlorite makes radicular dentin more hydrophilic and rough, and its removal of collagen creates a surface resembling acid-etched enamel. This may enhance resin-bonding techniques used to restore endodontically treated teeth, but it also promotes bacterial adhesion.

Reviewer's Comments: An interesting study with some interesting implications for clinical practice. The outcomes would suggest improvement in dentin bonding by some root canal irrigant, but if resin-bonding and restoration are delayed, the root canal surfaces could be more easily populated by bacterial plaque. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Atomic Force Microscopy, Irrigation, Roughness, Wettability

Print Tag: Refer to original journal article
Background: Some metabolic disorders carry serious potential complications associated with some aspects of dental care, especially during administration of drugs by the dentist. Other disorders may not have been diagnosed by a physician and should be recognized through a careful history.

Objective: To review the diagnostic and dental care implications for 9 relatively common metabolic diseases and to suggest appropriate alterations of dental care.

Design: Expert literature review; no specific search protocol was described.

Methods: The review was based on citations published in high-quality, peer-reviewed journals. Nine relevant studies were cited.

Results: The authors made recommendations for the diagnosis and dental treatment of patients with hypercholesterolemia, porphyrias, malignant hyperpyrexia (hyperthermia), neuroleptic malignant syndrome, G6PD deficiency, suxamethonium apnea (cholinesterase deficiency), hemochromatosis, amyloidosis, and glycogen storage disease.

Conclusions: For patients with hypercholesterolemia, there is an associated risk of coronary artery disease but no specific oral diagnostic signs. In cases of porphyrias, predominantly in persons of Afrikaans ethnicity, an acute attack may result in neuropsychiatric symptoms and/or hypertension and tachycardia. Porphyria may be precipitated by bisulfite antioxidant present in vasoconstrictor-containing local anesthetics. Malignant hyperthermia is severe and may be precipitated by infection or stress, but major risks for drugs are associated only with some general anesthetics and anesthesia adjuncts. Neuroleptic malignant syndrome is neither common nor precipitated by commonly used dental agents. G6PD deficiency may be triggered by methemoglobinemia associated with prilocaine, benzocaine, or large doses of aspirin. Cholinesterase deficiency was formerly of no significance with the widespread use of amide local anesthetics, but now may result in accumulation of articaine due to lack of one of its metabolic pathways. Hemochromatosis does not contraindicate local anesthesia, but indicates an increased risk for cirrhosis, cardiomyopathy, diabetes, and adrenocortical insufficiency. Amyloidosis carries these risks, in addition to the risk of impaired coagulation. The dentist should be most concerned about adverse drug interactions in these cases, especially with highly interactive antibiotics such as erythromycin and the antifungazole compounds.

Reviewer’s Comments: A well-written and concise review, this article reinforces the need for a careful medical history and thorough treatment planning when dealing with patients with a metabolic disease. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Hypercholesterolemia, Porphyria, Hyperpyrexia, Neuroleptic Malignant Syndrome, G6PD Deficiency

Print Tag: Refer to original journal article
Endodontists will be increasingly offering implant placement for patients referred to them, and this represents a potentially positive impact on the acceptance of implants by patients.

**Background:** Scope-of-practice issues are constantly being discussed in dentistry, and an area of extensive debate is that of placement of dental implants by specialists and/or general dentists.

**Objective:** To provide a critical summary of the published outcomes of a recent American Academy of Endodontists (AAE) survey on whether endodontic specialists believe that implant placement should be included in their scope of practice.

**Design:** Expert critical assessment of the scientific quality of a survey instrument for assessing endodontists’ beliefs about implant placement in their own practices.

**Methods:** The author utilized an assessment of the survey subjects, key study factor(s), main outcome measure, main results, and conclusions of a professional survey published in the *Journal of Endodontics* in 2009.

**Results:** The author observed that the national survey used to assess respondents' beliefs regarding implant placement was based on 692 completed surveys out of 1505 mailed items, for approximately a 46% response rate. No statistically significant differences were attributable to geographic region or demographic characteristics of the respondents. However, the author notes that there was no information on the derivation of the precise questions asked in the survey, test-retest reliability, or discussion of internal consistency. The report also lacked application of some important statistical validation tests. The author did acknowledge, however, that these concerns were relatively minor and that the study did, in fact, provide valuable data about beliefs of endodontists regarding implant placement. The original study indicated that 57% of the responding endodontists believe that implant placement should be a part of endodontic practice; 5.7% actually placed implants at the time of the survey, and 25.4% of respondents expressed an interest in adopting implant placement into their practices in the future.

**Conclusions:** A majority of practicing members of the AAE believe that implant placement should be within their scope of practice. Given this outcome, increasing numbers of endodontists may offer this service, although the AAE currently has no specific, official recommendations regarding the issue.

**Reviewer's Comments:** The original survey report may not come as a big surprise, given the AAE's own systematic review indicating approximately equal survival rates for implants versus retained, endodontically treated teeth. The AAE, however, continues to advocate preservation of natural teeth when possible. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Dental Implants, Endodontics

Print Tag: Refer to original journal article
Fluoride Ingestion in Children Varies With Diet

Type of Dietary Fluoride Source May Be Associated With Various Fluoride Consumption Levels.

Shenkin JD:

J Evid Base Dent Pract 2010; 10 (June): 103-104

Caution is advised when prescribing fluoride supplements in the absence of good information on routine dietary sources, as the dentist may underprescribe or overprescribe based on dietary variables.

**Background:** Dentists are well aware of optimal fluoride levels in drinking water by patient age and the need to supplement fluoride in the diet when drinking water fails to provide adequate amounts of fluoride. However, accurate determination of total fluoride ingestion is complicated by dietary sources.

**Objective:** To critically review a scientific study of dietary fluoride intake by children receiving different sources of systemic fluoride, originally published in 2009.

**Design:** Scientific analysis of study design, population, and statistical testing.

**Methods:** The author assessed the hypothesis, study design, level of evidence recommendation, risk/study factors, and conclusions of the original publication.

**Results:** The original study included 121 children aged 4 to 6 years from 5 cities in Brazil and Peru. Sources of fluoride included community water fluoridation, salt fluoridation, milk fluoridation, natural fluoride in surface water, and no fluoridation. The average dietary intake (in mg/kg body weight) from these sources was 0.04, 0.05, 0.60, 0.06, and 0.01, respectively.

**Conclusions:** The original authors concluded that dietary fluoride intake should be taken into account before implementing additional supplementation, and fluoride exposure monitoring should be established. However, the author of this critical appraisal noted that the study was statistically underpowered because of a very small sample size and intake of fluoride not being related to indicators of fluorosis. Additionally, the original study clearly differentiated how foods for the children were prepared (eg, foods prepared in fluoridated communities will add fluoride intake for children who consume the foods), but it did not address the possibility of fluoride ingestion coincidental with toothbrushing with a fluoridated dentifrice.

**Reviewer's Comments:** Even with studies described in this analysis, we continue to be challenged to develop individual fluoride supplementation strategies for a patient because of the multiple and variable sources of fluoride in foods and beverages, as well as community drinking water. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Fluoride, Fluoridation, Salt Fluoridation, Fluorosis

Print Tag: Refer to original journal article
Cavitated Carious Lesions -- Is Silver Diamine Fluoride Effective?

Silver Diamine Fluoride (SDF) May Be Better Than Fluoride Varnish and No Treatment in Arresting and Preventing Cavitated Carious Lesions.

Beltrán-Aguilar ED:

J Evid Base Dent Pract 2010; 10 (June): 122-124

Even if a small, cavitated carious lesion can be arrested by conservative application of fluoride, questions remain as to how long the lesions will remain so.

**Background:** There is currently a great interest in conservation of tooth structure when small carious lesions are present, and several areas of research are focused on remineralization as a key strategy in this effort.

**Objective:** To critically appraise and summarize a systematic review on the use of topically applied silver diamine fluoride to arrest or prevent cavitated carious lesions.


**Methods:** The author of the analysis evaluated the key study factors, main outcome measure, results, conclusions and level of evidence provided in the original report.

**Results:** The published research study was a systematic review of randomized, controlled, or case-controlled human studies from 5 databases between 1966 and 2006. Of 12 relevant studies, only 2 met the final inclusion criteria. These studies were based on the prevalence of arrested and new cavitated lesions, comparing 38% silver diamine fluoride application to fluoride varnish or water as controls, but another eligible study was not included because it was published after 2006. Outcomes indicated greater effectiveness of silver diamine fluoride over controls, based primarily on arrested caries. Adverse effects were reported to be <1% "pulpal incidents" and 7% incidence of staining.

**Conclusions:** The authors of the systematic review concluded that 38% silver diamine fluoride applied twice annually can be used to arrest or prevent cavitated lesions with minimum local and reversible side effects. The author of this analysis of that study notes that there remains a scarcity of scientific data to confirm the efficacy of silver diamine fluoride, and also correctly points out that fluoride varnish was not designed for use on cavitated lesions. Leaving a cavitated lesion open after arrest of caries with any agent is not an appealing strategy for most dentists, but may be a viable, minimal intervention that is cost-effective in underserved populations, in which even atraumatic restorative techniques or other approaches are not available and when validated by additional research.

**Reviewer's Comments:** The search for a noninvasive, nonrestorative approach to managing small, cavitated carious lesions is likely to continue for some time. Silver diamine fluoride, even when used at a relatively high 38% concentration, is not supported by current science as the answer. (Reviewer-Arthur H. Jeske, DMD, PhD).

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Keywords: Fluoride, Silver Diamine Fluoride, Fluoride Varnish, Caries, Cavitated Lesion

Print Tag: Refer to original journal article