What's New in Dentistry

Vincent Kokich, DDS, MSD

Tooth bleaching increases mercury ion release from dental amalgam. Tooth bleaching has become a common procedure in esthetic dentistry. Today, some individuals simply purchase one of the many "over-the-counter" bleaching kits that are available commercially and bleach their teeth at night at home. Previous studies have been performed to determine the effectiveness of these self-administered products, and the risks to the patient seem low if the instructions are followed. However, the primary component of all bleaching products is hydrogen peroxide. What effect does this chemical have on pre-existing tooth restorations, such as amalgam? Does tooth bleaching cause release of mercury ions into the oral cavity? That question was answered in a study that was published in the *Journal of Dental Research* (2009:88:239–243). The purpose of this investigation was to quantify the mercury ion release from amalgam restorations during dental bleaching. This was a laboratory study. A total of 65 amalgam discs were prepared initially. After setting for one week, these discs were randomly divided into groups. The discs were immersed in various concentrations of hydrogen peroxide (from 0 to 30%) for varying periods (from one hour to 156 hours). Then the authors measured the amount of mercury that was released at various times and with the various concentrations of hydrogen peroxide. The authors clearly showed that there were statistically significant differences in ion release values between water and all other hydrogen concentrations at all exposure times. Furthermore the release of the mercury ions from dental amalgam was proportional to the surface area of the amalgam sample. In other words, the larger the restoration, the more mercury ions would be released. So, the authors conclude that mercury ion release does occur with the use of any concentration of hydrogen peroxide. Patients should be made aware of this side effect prior to using bleaching materials, if they have significant numbers of dental amalgam restorations in their mouths.

Stem cells from deciduous teeth help to repair mandibular bone defects. Reconstruction of orofacial defects secondary to trauma or congenital malformation relies on different sources of bone grafts, which have an inherent morbidity. Today, stem-cell-based tissue engineering is a promising alternative for bone regeneration. The stem-cell-based therapeutic approach can restore bone defects without incurring graft donor site morbidity. But where can the stem cells be obtained? Previous studies have indicated that dental pulp stem cells from human exfoliated deciduous teeth could be a viable source. But would these pulpal stem cells be able to regenerate bone experimentally? That question was answered in a study that was published in the *Journal of Dental Research* (2009;88:249–254). The purpose of this study was to examine the feasibility of using autologous stem cells derived from miniature pig deciduous teeth in order repair critical-size mandibular bone defects. The sample consisted of 126 minipigs. Deciduous incisor pulp tissues were harvested from each of the animals and were isolated and cloned following established protocols. A critical-size osseous defect was created in the symphyseal region of the mandible. In some animals, stem cells were implanted into these defects, while others did not receive the stem cells and were used as nontreated control defects. The regenerative effect was evaluated with computed tomography and histological analysis from 2 to 24 weeks after transplantation. The results of this study showed that the stem cells harvested from miniature pig deciduous teeth, which is an easily accessible stem cell source, were able to engraft and regenerate bone to repair these critical-size mandibular defects at 6 months post-surgical reconstruction. The authors believe that this information could help to change the way we look at facial reconstruction of bony defects in the future.

No difference in bone level between platform-switched and control implants. The technique of platform-switching has become popular in implant dentistry. What does this term mean? Traditionally, after placement of an implant in the dental alveolus, a separate abutment is attached to the implant on which the eventual crown is secured. Typically, the diameter of the head of the implant and that of the abutment are identical so that when connected, the two surfaces are flush with one another. However, when the implant is loaded, studies show that some bone loss occurs where the abutment meets the head of the implant. So, the idea of placing an abutment with a slightly narrower diameter was developed, so that perhaps the bone adjacent to the head of the implant would be less prone to resorption and remodeling after implant loading. This technique of placing a narrower diameter abutment is called "platform-switching." But does this technique really affect the bone levels adjacent to the implant? That question was addressed in a study that was published in the *International Journal of Oral and*

Maxillofacial Implants (2009;24:920–926). The purpose of this study was to evaluate the marginal bone around platform-switched implants and nonplatform-switched implants in humans. The sample for this study consisted of 45 patients, who had one or two hopeless teeth that required extraction and replacement with an implant. These individuals were assigned to one of two groups. The first group received 34 implants with the normal typical flush abutment design. The second group received 30 implants with platform-switched abutments. All implants were placed immediately after tooth extraction and were loaded immediately. After 24 months, a cumulative survival rate of 100% was reported for all implants. The platform-switching group showed about the same amount of bone loss as the control nonplatform-switched implants, and no statistically significant differences were noted. The authors conclude that platform-switching did not provide better bone levels than the conventional implant-abutment connection.

Predictors exist to forecast dental caries progression in primary teeth. Dental caries, especially in young children, should be prevented with the use of chronic disease management models that incorporate multiple strategies to target risk factors at the individual, family, clinical and community levels. But which individuals are at greatest risk of caries progression? That information can be found in an investigation that appeared in the *Journal of Dental Research* (2009;88:270–275). The purpose of this longitudinal analysis was to identify which factors at the individual, family, and community levels were associated with the development of new decayed, missing, and filled tooth surfaces. The information in this study consists of data collected from 788 children who were followed for two years. For each child, their parents, family, and other medical and socioeconomic data were made available in order to determine their impact on progression of dental caries. What did these researchers find? Based upon careful scrutiny of their results, the authors were able to determine that significant predictors of higher caries increment included: (1) higher consumption of soda drinks; (2) older age of child; (3) greater weight-for-age; (4) fewer dental treatment visits; (5) higher baseline caries levels of both children and their parents; and (6) neighborhood disadvantage status. The authors conclude that failure to consider the social and behavioral determinants of dental caries in any preventive program will lead to failure in the high-risk population.

Immediate restoration of lateral incisor implants is successful. Implant dentistry has progressed significantly in the past 30 years. Today, when space is created orthodontically for replacement of a congenitally missing maxillary lateral incisor, an implant is typically the restoration of choice. In fact, today a one-piece implant can be placed in ideal situations, so that the implant and abutment are connected. These implants could then be restored immediately to avoid the esthetic consequences related to delayed restoration using more traditional implant designs and techniques. But are these small, one-piece implant systems successful? Does immediate restoration of these implants result in less favorable long-term results? Those issues were addressed in a study that was published in the *Journal of Periodontology* (2009;80:1393–1398). The sample for this study consisted of 60 patients, who were to receive a maxillary lateral incisor implant. In 30 randomly chosen subjects, the implant was placed and restored at the same-time. In the other 30 subjects, the implant was placed, the tissue was covered over the implant, and no restoration was placed for six months. In both groups the final restorations were placed six months after implant insertion. After two years, the bone levels and tissue levels were compared between the two groups. The authors found no statistically significant differences between the immediate and one-stage implant groups with regard to implant survival, marginal bone loss, and probing pocket depth. The authors conclude that immediate restoration of small diameter lateral incisor implants is a viable and successful method of restoring missing maxillary lateral incisors.