## What's New in Dentistry

Vincent Kokich, DDS, MSD

Ultrasonic scalers do not harm implant surfaces. Today, all of dentistry is experiencing an implant revolution. Titanium implants are being used routinely to replace missing teeth in adults. Many of these adult patients may also receive orthodontic therapy, where the implants could be used not only as restorative abutments, but also as orthodontic anchorage to assist in difficult tooth movement. During and after orthodontic therapy, the teeth and the implants must be professionally maintained on a regular basis either by a periodontist or the patient's general dentist. Since ultrasonic scalers are routinely used to aid in cleaning tooth surfaces, there has been concern that the scaler tip could damage the implant surface. A study published in the Journal of Periodontology (2004;75:1269-1273), compared the effects of a new ultrasonic scaler, a conventional ultrasonic scaler, and a plastic scaler on titanium surfaces. This was a laboratory study. Three groups of titanium implants were embedded in plastic, and an ink stain was painted on one side of the titanium surface to simulate oral plaque or debris. Then, an ultrasonic scaler with a carbon tip, an ultrasonic scaler with a plastic tip, and a conventional plastic scaler were used to remove the ink stain. A scanning electron microscope was used to assess the degree of surface roughness of each of the specimens after the scaling had been completed to determine the efficiency of the cleaning and also if any damage had occurred on the titanium surface. The carbon tip ultrasonic scaler was the most efficient at cleaning the stain from the implant surface, followed by the plastic tip ultrasonic scaler, and finally the plastic hand scaler. None of the instruments tested produced any roughness or damage to the surface of the titanium and were judged to be safe to use clinically in maintaining implant surfaces in patients.

Attachment loss and tooth loss associated with coronary heart disease. To date, over 17 longitudinal studies have examined the relationship between oral disease and cardiovascular disease. While a number of these studies showed positive associations for oral measures and cardiovascular disease many of these studies have methodological limitations. An area that has received recent attention is the incidence of coronary heart disease in individuals with periodontitis and those who became edentulous during followup. The findings of these studies suggest that tooth loss, rather than periodontal disease may be the important exposure for systemic conditions. So, a study published in the Journal of Periodontology (2004;75:782-790), evaluated the interrelationship of periodontal status, tooth loss, and edentulism and their joint association with prevalent coronary heart disease. The sample consisted of over 8000 men and women of a community aged 52 to 75 years of age at baseline. These individuals had a dental examination that included collection of gingival crevicular fluid, oral plaque and serum. The patients' attachment loss was calculated and the number of missing teeth was determined. In addition, an assessment was made of prevalent coronary heart disease, and the patients were given a number of laboratory tests and questionnaires. The results of this study showed that individuals with both high attachment loss and high tooth loss, and edentulous individuals had elevated odds of prevalent coronary heart disease compared to individuals with low attachment loss and low tooth loss. The results of this study suggest that tooth loss and periodontal disease are associated with prevalent coronary heart disease, but only when both are present. The authors suggest that the weaker relationships between periodontal disease and coronary heart disease that have been found among older adults may be due to older adults having fewer teeth.

Stem cells aid periodontal tissue regeneration. Mesenchymal stem cells isolated from bone marrow have the potential for differentiating into several different types of tissues. In recent years, a major emphasis in periodontal therapy has been the regeneration of periodontal attachment that had been previously destroyed by periodontal pathogens. In a study published in the Journal of Periodontology (2004;75:1281-1287), the authors examined whether autotransplantation of mesenchymal stem cells into periodontal osseous defects would be useful for periodontal tissue regeneration. In this study, class III furcation defects were created in experimental animals. Then, mesenchymal stem cells were harvested from the bone marrow of the same animals and cultured in vitro for two weeks. Then, the stem cells were transplanted into some of the furcation defects, and the other defects served as controls. The transplanted areas were opened, and the amount of regeneration was evaluated. The results of this study showed that in the mesenchymal stem cell groups, significant amounts of new bone and adequate width of periodontal ligament were observed. The denuded root surfaces were almost completely covered with new cementum, and regenerated periodontal ligament separated the new bone from the cementum. In the control group, epithelial cells invaded the top of the furcation and no cementum regeneration was observed. The authors believe that the findings of this study suggest that auto-transplantation of bone marrow mesenchymal stem cells can promote periodontal tissue regeneration.

Photodynamic therapy useful in killing periodontal pathogens. The presence of a bacterial biofilm on a tooth or root surface is a major cause of gingivitis and periodontitis. Besides non-pathogenic species of bacteria, several periodontal pathogens are associated with periodontal disease. These bacteria are typically anaerobic and are located deep in the periodontal pockets. Consistent eradication of these periodontal pathogens in susceptible patients is the goal of periodontal maintenance. Typically, this eradication process is performed with mechanical debridement and the use of certain chemical adjuncts. However in a recent article published in the Journal of Periodontology (2004;75: 1343-1349), a new approach, photodynamic therapy, has been suggested as an alternative to conventional therapeutic methods. The photodynamic technique is based on the principle that a photoactivation substance, called the photosensitizer, binds to the target cell and can be activated by light of a suitable wavelength. During this process, free radicals are formed, which then produce an effect that is toxic to the cell. In this study, periodontopathogenic bacteria were cultured in vitro in Petri dishes. Then, the bacterial cultures were mixed with solutions of the photosensitizer. After drying, the inoculated agar plates were illuminated with a diode laser to activate the photosensitizer. Then the plates were incubated for an additional two days to evaluate the effect. The results of this study showed that photodynamic therapy has a positive effect on killing gram-negative anaerobic periodontopathogenic bacteria or inhibiting their growth. In the future, the authors believe that this technique may be useful in managing certain forms of periodontal disease in patients.

Small diameter implants are highly successful. In implant dentistry, the use of standard-size or wide-diameter implants is generally recommended to insure adequate bone-to-implant contact. However, occasionally, the space available for the implant may be insufficient for placing standard size implants. This is especially true in the maxillary anterior region in patients who are congenitally missing a maxillary lateral incisor. In these patients, narrower implants must be placed. Will these narrow implants be successful long-term? A recent study published in the International Journal of Oral and Maxillofacial Implants (19: 703-709, 2004) evaluated the long-term success rate of small-diameter implants after seven years. In this study, 192 small-diameter implants were placed in 165 patients from 1992 to 1996. The implants were either 2.9 mm or 3.25 mm in diameter and were placed by two different surgeons. All prosthetic restorations were fabricated by the same prosthodontist. About half of the implants supported singletooth cemented restorations, and the remaining half supported cemented or screw-retained partial prostheses. The results of this study showed that the implant survival rate after seven years was 95.3%. The authors found that the small-diameter implants demonstrated a survival rate that was similar to those reported in previous studies of standard-size implants. The authors suggest that small-diameter implants can be successfully included in implant treatment and that they may be preferable in cases where space is limited.