What's new in dentistry?

As orthodontists we are often unaware of the technical and methodological advances in other dental specialties. However, many of these new experimental developments may ultimately become accepted dental therapy and influence the diagnosis and treatment of our orthodontic patients. Therefore, as part of the dental community, we must keep abreast of current information in all areas of dentistry. The purpose of this section of The Angle Orthodontist *is to provide a brief summary of "What's new in dentistry."*

By Vincent G. Kokich, DDS, MSD

GORE-TEX NOW USED TO REGENERATE PERIODONTAL ATTACHMENT — Now that most orthodontists are treating more adult patients, they are also encountering the periodontal problems that are found in many adult patients. Some of the more severe situations involve loss of bone in the root furcations around maxillary and mandibular molars. These areas are almost impossible for patients to clean. When bands are placed on these teeth, it further complicates the problem and perpetuates the inflammation. Today, periodontists are developing new techniques for regenerating bone in incipient and moderate furcation defects using a semi-permeable membrane called Gore-Tex. Evidence of this was given in a recent article that appeared in the *Journal of Periodontology* (60:694-698, 1989). In this article, Dr. Lekovic and his colleagues from UCLA studied the effectiveness of Gore-Tex in improving Class II furcation defects in a sample of 12 human subjects. Each patient had two mandibular molars with moderate bone loss from the buccal aspect of the furcation. One of the molars was used as the control site while the other was designated the experimental area. Initially, mucoperiosteal flaps were elevated over both sites. After complete cleaning and debridement of the furcation area, Gore-Tex was laid across the experimental site and the flap was sutured. In the control site, the flap was simply sutured without the Gore-Tex. Since the Gore-Tex is a semi-permeable membrane, it will prevent epithelial invagination after surgery. This would allow for filling in of the osseous defect. The technique is called guided tissue regeneration. On the experimental side, the Gore-Tex was removed after two months. After six months, both experimental and control sites were re-entered to determine the effects of the experiment. The results of this study show that sites treated with guided tissue regeneration had nearly 3 mm improvement in attachment level while the control sites had a loss of attachment. However, when the sites were re-opened, the bone level changes showed only a small improvement in sites where Gore-Tex was placed. In the control areas there was a deterioration of the bone level. The results of this study are in general agreement with previous reports showing that moderate furcations showed significant clinical improvement when treated with guided tissue regeneration. However, these changes in attachment level were due to the formation of dense connective tissue coronal to the osseous defect. Future studies need to histologically evaluate the regenerated tissue within the furca over a longer term to see if bone develops in these areas.

ELECTRICALLY-CHARGED BEADS STIMULATE BONE FORMATION — Bone grafting of osseous defects is currently a hot topic in the literature. Bone grafting materials are obtained from cadavers or are synthetically made. Cadaver bone can be demineralized to accentuate its ability to induce bone formation. Currently researchers are experimenting with adding an electrical charge to the surface of synthetic hydroxylapatite beads to stimulate bone formation with this type of grafting material. The results of this experiment were published in the *Journal of Oral and Maxillofacial Surgery* (48:468-475, 1990), in a study by Dr. Marilyn Krukowski. In this investigation, hydroxylapatite beads were chemically treated to confer either a negative, positive, or neutral charge to their surface. These beads were then placed into osseous defects that were created in the cranium or mandible of rats. One

month later, histologic examination of these areas showed extensive new bone formation in about 80% of those lesions that had been packed with negatively charged beads. In contrast, defects that had received positively charged beads were filled with dense connective tissue. Defects packed with neutral or uncharged beads displayed only small quantities of bone and mostly connective tissue filled these defects. The mechanism by which the beads foster either osteogenic or fibroblastic responses is unclear. Although these experiments have only been performed in animals, in the future there may be application for the use of negatively charged synthetic bone to stimulate bone formation in various types of human osseous defects.

BEWARE OF MAXILLARY ADVANCEMENT IN CLEFT PALATE PATIENTS — Many orthodontists are challenged to treat patients with cleft lip and palate deformities. In some of these individuals, the scarring that occurs after lip and palate surgery can produce deficient maxillary growth. Therefore, some of these patients require surgery to advance the maxilla anteriorly. Prior to surgery, many cleft palate patients have hypernasal speech. Does this speech become worse after surgery? A recent article published in the *Journal of Oral and Maxillofacial Surgery* (4:685-689, 1990), evaluated this question. In this study, Dr. Ingeborg Watzke evaluated the velopharyngeal orifice size in a group of 24 cleft palate patients prior to maxillary advancement and a minimum of one year following surgery. The average age was 17 years. Four patients had bilateral clefts and the remaining 20 had unilateral clefts of the palate. All patients underwent maxillary advancement in conjunction with complete orthodontic therapy. Autogenous bone grafts were placed in the surgical defects during the operation. The size of the velopharyngeal orifice was evaluated before and after surgery with accepted techniques. After careful evaluation, the authors reported that 23% of the sample showed deterioration of velopharyngeal function following the surgery. However, speech in these patients could be improved by performing a pharyngeal flap after the maxillary advancement. A pharyngeal flap is a procedure performed by a plastic surgeon to help close the velopharyngeal opening in patients with poor movement or function of the soft palate. The authors recommend performing the maxillary advancement first and then doing a pharyngeal flap if necessary at a later time.

CIGARETTE SMOKING CAUSES PERIODONTAL DETERIORATION — As orthodontists, we occasionally encounter patients who smoke cigarettes. We are all aware of the extensive research that has proven the detrimental effect of smoking on general health. However, in the past, divergent opinions have been published about the role of smoking and its effect on the periodontium. As health professionals, orthodontists are often questioned about these relationships. A recent study published in the *Journal of Periodontology* (61:364-367, 1990), evaluated the association of smoking with periodontal treatment needs. In this study, Dr. Josef Goultschin evaluated 344 adults who worked at a hospital facility. The sample was divided equally among males and females and the age range was 17 to 75 years. The amount of bleeding, probing depth, and amount of supra and subgingival plaque and calculus, as well as the periodontal pocket depths were recorded. In addition, the subjects were questioned about smoking habits and the frequency of cigarette smoking. This study clearly showed that nonsmokers in general were periodontally healthier than smokers. The difference was highly statistically significant. More severe periodontal conditions such as deep pocketing were more frequent in smokers irrespective of plaque exposure. Lastly, the more cigarettes smoked, the greater the severity of the problems. In conclusion, this survey lends support to that body of dental research indicating the association between smoking and periodontal disease.

CADAVER BONE SUCCESSFUL AT FILLING-IN PERIODONTAL DEFECTS — The principle goal of periodontal therapy is to regenerate the periodontal attachment apparatus. This may be an important aspect of treatment for many of our adult orthodontic patients that have lost bone prior to orthodontic therapy. Various methods or materials have been proposed to restore lost alveolar bone. Currently, periodontists are advocating the use of cadaver bone that can be obtained from tissue banks. But are these materials effective? A recent study published in the *Journal of Periodontology* (60:655-663, 1989), evaluated the effectiveness of two types of cadaver bone in human periodontal defects. Once removed from a cadaver, the bone is freeze-dried and stored in tissue banks. Recently, researchers have found that demineralizing the freeze-dried bone with a dilute acid may accentuate its activity. It is believed that demineralizing the bone results in the production of a protein that may produce an osteoinductive effect and thereby stimulate bone production. In this study, the authors placed freeze-dried bone into one osseous defect and demineralized freeze-dried bone into another defect in each of nine adult patients with advanced periodontitis. The areas were evaluated with the usual methods of periodontal assessment before and after the procedures. The results show that both freeze-dried and demineralized freeze-dried cadaver bone are effective at regenerating lost periodontal attachment in adult patients. There were no significant differences between the two. In the future, we will probably see more of our periodontally compromised orthodontic patients treated with this type of technique.