What's New in Dentistry

Vincent Kokich, DDS, MSD

Persons with painful TMJs are hypersensitive to mechanical stimuli. TMD is a collective term including several pathological conditions involving the temporomandibular joints (TMJ) and the masticatory musculature. The pathophysiology and etiology of most craniofacial pain conditions are not completely understood, and there is still no mechanism-based classification. As a result, researchers recently tested whether persons with TMJ arthralgia have a modality-specific and site-specific hypersensitivity to somatosensory stimuli. The results of this study were published in the *Journal of Dental Research* (2007;86:1187–1192). The sample consisted of two groups of individuals: a control group of 43 healthy persons with no TMD symptoms and a group of 20 subjects with TMJ arthralgia. They were each given quantitative sensory tests consisting of: sensory and pain detection thresholds and summation threshold to intra-articular electrical stimulation, tactile and pinprick sensitivity in the TMJ area, pressure-pain threshold and tolerance on the lateral side of the TMJ and on the finger. The results were then tabulated and analyzed statistically. These researchers found that pain detection and summation thresholds in persons with TMJ arthralgia were significantly lower than in healthy participants. In addition, the numerical rating scales scores for both tactile and pinprick stimulation of the TMJ area were significantly higher in persons with TMJ arthralgia than in healthy participants. Also, persons with TMJ arthralgia had significantly lower pressure thresholds than did healthy participants with a significant side-to-side effect, but no gender-related differences. Both pressure thresholds in fingers were significantly lower in persons with TMJ arthralgia compared with healthy participants. The results of this study provide new evidence of sensitization of the TMJs and suggest that quantitative sensory tests will help to facilitate a mechanism-based classification of temporomandibular disorders.

Number of natural teeth affects a person's diet. The consumption of fruits, vegetables, and dietary fiber in the United States is below recommended levels based upon recent studies. Although many factors have been associated with lower intakes of healthy foods, one factor, seldom mentioned, is the numbers and condition of natural teeth in a subject's mouth. A study published in the *Journal of Dental Research* (2007;86:1171–1175), analyzed the relationship between dental status, in terms of numbers of teeth present, and diet and nutritional status in a representative sample of US civilian, non-institutionalized adults, aged 25 years and older, who did not wear dental prostheses to replace missing teeth. The study population of 7000 individuals was classified into one of four groups by numbers of permanent teeth present: those who had (1) 28 permanent teeth (n = 35%), (2) from 21 to 27 teeth (n = 54%), (3) from 11 to 20 teeth (n = 10%), or (4) from one to 10 teeth (n = 1%). The dietary data for this sample was drawn from the NHANES III study, which involved a food frequency questionnaire and a 24-hour dietary recall. In addition, serum levels of beta-carotene, folate, and vitamin C were measured with isocratic high-performance liquid chromatography. The results of this study showed that people with fewer than 28 teeth had significantly lower intakes of carrots, tossed, salads, and dietary fiber than did fully dentate people. Those people with fewer teeth also had lower serum levels for beta-carotene, folate, and vitamin C. This is the first analysis of a nationally representative survey of United States adults to assess the relationship among diet, nutritional status, and disparities in dental status in terms of numbers of natural teeth present. In conclusion, this study has shown that the intake of nutritious food items and dietary fiber declined, and there were lower levels of biochemical serum beta-carotene, folate, and vitamin C as numbers of teeth per subject decreased.

Beneficial bacteria interfere with colonization of pathogenic bacteria. Colonization of host tissues by pathogens is an important step in the development of infectious diseases such as periodontitis. The emergence of selected periodontal pathogenic bacteria can lead to bone and attachment loss around teeth. It is believed that non-pathogenic, or beneficial, bacteria are important for maintaining a healthy subgingival ecosystem. Bacteria are considered beneficial in periodontal microbiology when their numbers are high in periodontal health and low in diseased situations. A study published in the *Journal of Dental Research* (2007;86:611–617), evaluated the effect of beneficial

oral bacteria for their ability to interfere with epithelial colonization by the periodontopathogen *Actinobacillus actinomycetemcomitans*. This was a laboratory study. Epithelial cells were incubated with *A. actinomycetemcomitans* and seven different beneficial bacteria. These researchers measured the ability of the beneficial bacteria to inhibit the colonization of the pathogenic bacteria. The results of this study showed that *Streptococcus sanguinis*, *Streptococcus mitis*, and *Streptococcus salvarius* showed prominent inhibitory effects on either *A. actinomycetemcomitans* recovery or colonization. This study is the first to describe in vitro interference with epithelial colonization of an oral pathogen. Beneficial species of the indigenous oral microbiota and their role in epithelial colonization of oral pathogens have in the past been largely unexplored. The authors believe that their results highlight the importance of the indigenous microbes in oral ecology, and suggest that replacement therapy may offer a new therapeutic approach for the prevention of plaque-related periodontal diseases.

Certain bone grafting techniques for implants are successful. Implants are now a common method of replacing missing teeth. However, if teeth have been absent for several years, the alveolar ridge may have resorbed. In these situations different types of bone grafting techniques have been used to create sufficient bone to place implants. These techniques range from the use of autogenous bone, bovine bone, cadaver bone, sinus lift procedures, block grafts, and other innovative procedures. Now that these procedures have been used for well over a decade, researchers are able to look back on these techniques using evidence-based methods to determine which, if any, are predictable in creating a successful outcome for implant placement. A meta-analysis of this topic was published in the *International Journal of Oral and Maxillofacial Implants* (2007;22:49–70). This project involved a systematic online review of the main database and manual search of relevant articles from refereed journals between 1980 and 2005. Hard tissue augmentation techniques were separated into two anatomic sites, the maxillary sinus and alveolar ridge. Within the alveolar ridge, different surgical approaches were identified and categorized including guided bone regeneration (GBR), onlay/veneer grafting (OVG), combinations of onlay, veneer, interpositional inlay grafting (COG), distraction osteogenesis (DO), ridge splitting (RS), and socket preservation (SP). After identifying 526 potential articles these researchers found that 90 of these articles provided sufficient data for analysis. In general the authors found that the maxillary sinus augmentation procedure has been well documented, and the long-term clinical success/survival ($>$5 years) of implants placed, regardless of graft materials used, compares favorably to implants placed conventionally, with no grafting procedure, as reported in other systematic reviews. Alveolar ridge augmentation techniques do not have detailed documentation or long-term follow-up studies, with the exception of guided bone regeneration. The authors believe that more in-depth, long-term, multi-center studies are required to provide further insight into augmentation procedures to support dental implant survival.

Strong genetic control of emergence of primary incisors. Our understanding of the biological processes that cause teeth to erupt within the jaws and then emerge into the oral cavity remains incomplete, despite considerable research in humans and animals. Molecular studies indicate that a complex interplay of regulatory genes leads to a cascade of signaling molecules that determine eruption rates, but the nature of the links between the genes and phenotypic variation remains unknown. Is tooth eruption primarily under genetic control? That question was addressed in a study that was published in the *Journal of Dental Research* (2007;86:1160–1165). The purpose of this investigation was to use a sample of twins to quantify the contributions of genetic and environmental factors to variations in timing of emergence of human primary incisors. The study sample was comprised of 98 pairs of twins aged between 1 and 3 y. The sample included 25 pairs of monozygous males, 21 pairs of monozygous females, 21 pairs of dizygous males, and 12 pairs of dizygous females, and 19 pairs of opposite-sexed dizygous twins for whom complete records of incisor emergence were available. The results of this study showed that there were no significant differences in incisor emergence times between zygosity groups or genders. Emergence times of maxillary central incisors and mandibular lateral incisors were less variable than those of maxillary lateral incisors and mandibular central incisors. Variation in timing of the emergence of the primary incisors was under strong genetic control, with a small but significant contribution from the external environment. Estimates of heritability ranged from 82 to 94% in males and 71 to 96% in females.