Illustration: Lee Ann Engle

Progress on Engineered Mandibular Condyle Holds Promise for Other Joints

By utilizing adult stem cells from rats, scientists have produced a mandibular condyle, an exact 3-D formation of the human joint.

Emphasizing their discovery is preliminary and that major scientific tests await, researchers, as reported in the December 2003 issue of the *Journal of Dental Research*, are encouraged because they created it from a single population of stem cells and then prompted them to form two distinguished levels of cartilage and bone — the first ever in the tissue engineering field.

University of Illinois at Chicago scientist and an author on the study Jeremy Mao, DDS, PhD, said the work is helpful for not only learning to engineer mandibular condyles but other body joints.

The mandibular condyle joins the lower jaw to the temporal bone of the skull on both sides of the head at the temporo-

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ADEL ALHADLAQ, DDS, MS

mandibular joint or TMJ.

"The TMJ is a synovial, or free-moving, joint," Mao said. "So are the knee, hip, and shoulder joints, all of which include rounded, moveable condyles. We certainly hope our results will be applicable to other synovial joints."

The most significant result of the study was that within the tier of the implants inserted with osteoblasts, mineral deposits in island structures were found, an indication that osteoblasts adhered to their biological program and produced bone. With the other layer, scientists identified "sparse chondrocyte-like cells within abundant extracelluar matrix," that produced proteins characteristic of cartilage.

Scientists have long wanted to engineer body joints including hips and knees using a person's own cartilage and bone generating adult stem cells. The question has been how to best manage the cells and encourage them to form tissues exactly matching the 3-D structure and mechanical strength of healthy and normal joints.

Tissue engineering blends the principles of life sciences and engineering to manipulate the body's biological materials to mend, rebuild and eventually replace tissues and organs, bone and cartilage that are damaged.

Success in the area of tissue engineering would cut out the need for bone grafts and prevent complications related to artificial replacement joints including immunorejection, transmission of pathogens, atypical wear and tear, and donor site defects.

Advancements in the area of tissue engineering are expected to have remarkable healing possibilities; however, those with acute arthritis face some limitations. "People with very severe osteoarthritis or rheumatoid arthritis often have large condyle defects, so the entire condyle needs to be replaced," said Mao.

In 2001, Mao, his team of dentists, cell biologists, surgeons, materials scientists and clinicians embarked on an effort to create a mandibular condyle.

"Why the mandibular condyle?" posed Adel Alhadlaq, DDS, MS, a coauthor on the paper and a University of Illinois at Chicago scientist. "We began our research using mice that were no larger than a human hand, and, obviously, it wasn't possible to engineer a large human tibia or femur that way. Because the mandibular condyle is smaller and could be transplanted into a mouse, it was just a practical structure to try and engineer."

Mao noted that his research team had long been interested in temporomandibular joint disorders, an often excruciating condition that approximately 90 million Americans suffer from.

The December 2003 issue of *The Journal of Dental Research* chronicled the success of Mao's team who isolated adult mesenchymal stem cells taken from rat bone marrow and treated them to separate into cartilage- or bone-producing cells, osteoblasts and chondrocytes. Individual adult mesenchymal stem cells can generate thousands of osteoblasts or chondrocytes.

The team then seeded the differentiated cells into a hydrogel polymer solution and placed them into a polyurethane form made from a human mandibular condyle.

Scientists subsequently inserted three small molded structures just under the skin of severe combined immunodeficient (SCID) mice. Each implant then was encapsulated in a hydrogel coat that subdivided into layers seeded either with osteoblasts or chondrocytes, in an effort to engineer distinct layers of cartilage and bone.

Approximately two months later, Mao and his team collected the three tissue-engineered condyles from the mice. The scientists discovered the implants formed their own into "firm" structures, retaining the exact contour and 3-D structure of the sculpted human mandibular condyle.

Mao said he and his team now would work to improve the mechanical and biological properties of the tissue-engineered condyle.

"It is no small task by any measure to recapitulate what nature does perfectly during development," said Mao. "Although we understand many of these cues during natural development, we need to learn how to utilize them to tissue engineer mandibular condyles."

Using Up-to-Date Codes Leads to Quicker Payment

Dentists who use the current version of the Code on Dental Procedures and Nomenclature will be paid more expediently than those utilizing the outdated codes.

"It doesn't matter to us if a claim is filed electronically or on paper," said Bill Blake, application manager for the life and dental subsidiaries of Blue Cross Blue Shield of Illinois, Texas and New Mexico. "Once claims are entered into our claims adjudication system, they're really all the same. And if current codes are used, the claims can be paid faster."

Only the current dental terminology, as published in the CDT-4 for electronic claims or paper, are the codes Blue Cross Blue Shield recognizes.

Philip Hardin, WebMD Dental president, the nation's largest claims clearinghouse, suggested dentists utilize the CDT-4 codes as soon as "is practical."

ADA always has recommended utilizing the current code version to make the coding and claim filing process easier as well as take into account advances in clinical practice when reporting. The Oct. 16, 2003, deadline for electronic transactions and code sets, under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), provided more motivation for dentists to use the current version of the code as required under the electronic claims submission rules.

"Under HIPAA, we're not supposed to change any of the codes that come in," Blake said. "If dentists send in claims under obsolete codes, we've got to ask them if it's OK to change the code to update it, and then the claim just takes longer to process."

"Under HIPAA, we're not supposed to change any of the codes that come in."

BILL BLAKE

The Genetics of Cleft Palate and Cleft Lip

A recent review of the genetics of cleft palate (CP) and cleft lip (CL) was to educate dentists on the differences between non-syndromic and syndromic cleft as well as help dental professionals recognize and provide genetic counseling for patients and their families.

In The Journal of Clinical Pediatric Dentistry, published in Summer 2003, researchers said both CP and CL are the single most common defects affecting the oral facial structures. Additionally, it has been the topic of many studies, according to All India Institute of Medical Sciences, New Delhi, India, researchers.

Treating these cases not only requires speech therapy, multiple surgeries, but orthodontic and dental treatments by the patient's 18th birthday. Cleft palate and lip can be seriously disfiguring. In children, it also can affect function to a certain extent.

Researchers said care requires meeting the basic medical needs of the patient, but also educating patients and their parents about the genetics of CL and CP. Studies have shown that genetics is a significant factor in the etiology in the cleft conditions. Using a good family history, dentists can determine the possible extent to which the genetic factors are involved in the etiology of CP and CL and provide counseling on genetics.

However, the researchers cautioned that results were inconsistent when trying to identify susceptibility loca via family and case-control studies. They speculated it's possible that initial predictions of the complex interactions associated with facial development were underrated.

Another Brush with History

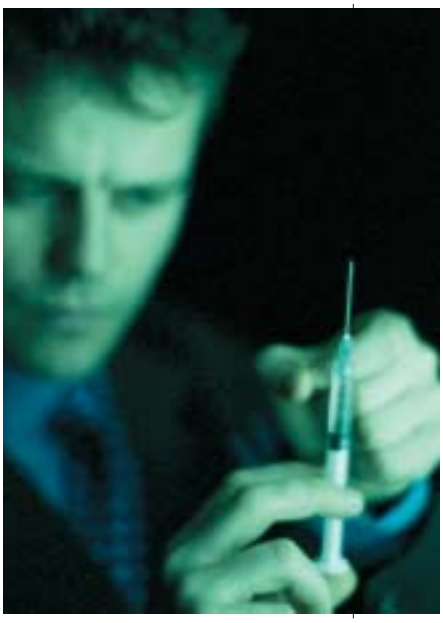
A toothbrush recently unearthed at the former site of a Minden, Germany, city hospital is speculated to be at least 250 years old.

According to the Landscape Association of Westfalen-Lippe, which is overseeing the excavation, the bristles have disintegrated. What remains is a four-inch handle made of animal bone. On the other side of the toothbrush is a small, sculpted spoon thought to be used for cleaning ears.

A similar toothbrush was found months before in early 2003 near the city of Quedlinbug in central Germany, approximately 100 farther east. Experts dated that personal hygiene tool at around 1750, the oldest discovered in Europe. The second toothbrush, experts said, may have been manufactured from the same workshop.

Use of toothbrushes in the 18th century became more common wealthier Europeans made caries-causing sugar a staple to their diet.

Identifying the Substance Abuser



With prescription medication the second-most abused substance after alcohol, and with approximately 22 million substance abusers in the U.S. alone, it is highly likely general dentists during their career will encounter such a patient.

Substance abuse and chemical dependency presents health care and societal problems. It's also a complication for dentists regardless if they're treating current abusers or those in recovery, according to an article in the Academy of General Dentistry's newsmagazine, *AGD Impact*.

The challenge for the dentist is to identify the common indicators of a drug-seeking patient, understand the contraindications between street drugs and medications used in dental treatment as well as the oral health implications of drug abuse. Dentists also must concisely and sympathetically talk to the patient about the risk factors of abuse and how to get help.

Successfully treating recovering addicts and alcoholics involves the dentists learning about the chemical dependency disease process, using added precautions when prescribing potentially addictive medications, as well as understanding the possible impacts of anesthesia and mouthwash on a patient's sobriety.

Michael Fishman, MD, an addiction specialist and program director of adult addiction medicine services at Atlanta's Ridgeview Institute, said like most people, dentists share a general ignorance of the disease process of chemical dependency.

"There is a bias about addiction, a belief that persists that chemical dependency is a moral issue and not a disease," Fishman said. "The problem is that this bias can be deadly when it is held by health care professionals."

Fishman warned a doctor's ignorance of addiction can endanger patients and leave general practitioners exposed on several fronts, from lawsuits for prescribing a drug that triggers a recovering addict's relapse to threats from a drug-seeking addict. Cases are rare, but they do occur.

According to Richard C. Engar, DDS, FAGD, attorney in fact/CEO for Professional Insurance Exchange in Salt Lake City, there have been patients who've accused dentists of creating an addiction, having them relapse or blaming them for health complications related to drug interactions.

Engar said that continuing education or reviewing practice management policies could help GPs protect themselves and provide care to patients with substance abuse problems extending beyond their oral health.

UCSF School of Dentistry to Research Tobacco-Cessation

Hoping to prevent 600,000 premature deaths annually from tobacco use, the UCSF School of Dentistry will utilize a grant to research tobacco-ending programs in dental offices.

The $2.4 million grant, from the National Institute of Dental and Craniofacial Research and the National Institute on Drug Abuse, allows researchers to look at different methods that dentists can assess and treat a patient's addiction to tobacco. The affiliated Delta Dental Plans in California and Pennsylvania will help researchers collect information and identify dental offices to be included in the study.

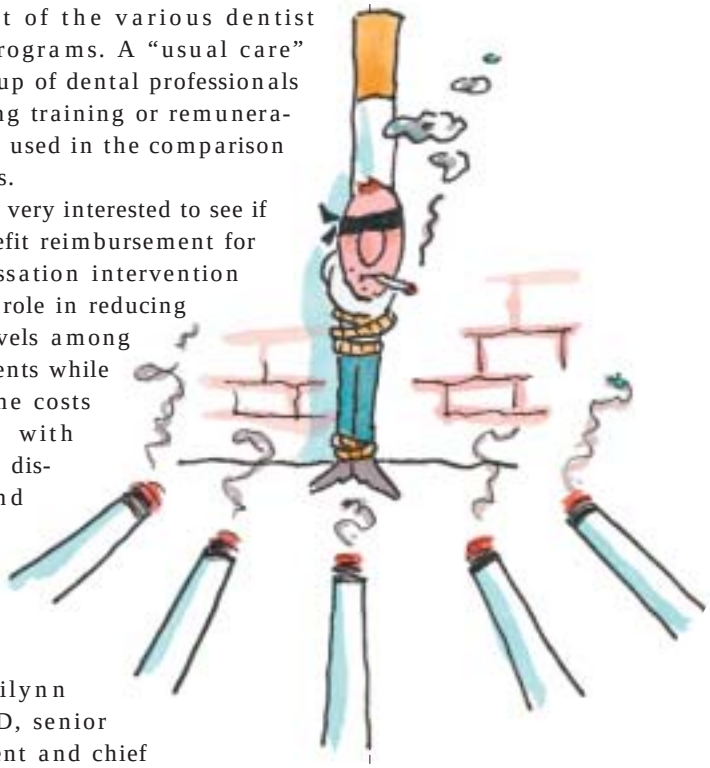
According to research, an estimated 10 percent of patients advised by healthcare workers to stop using tobacco products actually comply. And since nearly half of the 46 million American adult smokers visit a dentist annually, dental professionals have an opportunity to provide tobacco-cessation resources to the patients.

"Given that about one third of all smokers die prematurely, we think reaching that 10 percent in the dental office could translate into 600,000 premature deaths avoided," said Margaret M. Walsh, RDH, EdD, Professor in the department of Preventive and Restorative Dental Sciences at UCSF, and principal investigator of the five-year study.

"In addition to increasing risk of heart disease, lung disease, cancer, and other illnesses, tobacco use is associated with 75 percent of all squamous cell oral cancers and 50 percent of adult periodontitis cases in the nation," Walsh said. "Tobacco use also significantly predicts failure of periodontal therapy and dental implants, impairs oral wound healing, increases the risk of dental caries, and affects a wide range of oral soft tissue changes."

Selected dentists, who also are members of Delta Dental's network, will be trained by UCSF researchers to provide tobacco-ending counseling to patients in a dental setting. Some of the dentists will be monetarily compensated for the service.

The study will assess a number of factors. Among them, how insurance reimbursement may affect the quantity of patients counseled in the dental office and the impact of the various dentist training programs. A "usual care" control group of dental professionals not receiving training or remuneration will be used in the comparison of programs.

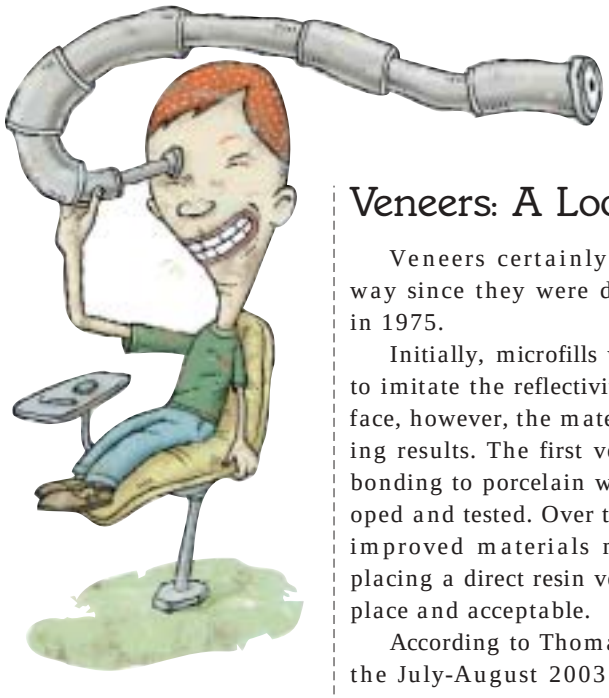


"We are very interested to see if dental benefit reimbursement for tobacco cessation intervention can play a role in reducing smoking levels among dental patients while lowering the costs associated with periodontal disease and other tobacco-related dental problems," said Marilynn Belek, DMD, senior vice president and chief dental officer for Delta Dental.

"If effective, it is conceivable that group benefit sponsors would be very interested in incorporating tobacco cessation benefits as part of a dental benefits program," said Belek, adding the company looks forward to collaborating on the project.

Walsh previously completed research on tobacco cessation, primarily on techniques to assist dentists and dental hygienists in the use of oral cancer screenings as a "teachable moment" to encourage smokers to quit.

Among the key collaborators on the grant include members of the Department of Preventative and Restorative Dental Sciences: Steven Silverstein, DMD, MPH, UCSF Professor; Jane Weintraub, DDS, MPH, UCSF Professor; James Ellison, DDS, MPH, UCSF Assistant Professor; Umo Isong, DDS, PhD, UCSF Assistant Professor; and Stuart Gansky, DrPH, UCSF Assistant Professor.



Matt Mullin

Veneers: A Look Back

Veneers certainly have come a long way since they were developed and tested in 1975.

Initially, microfills were commonly used to imitate the reflectivity of the enamel surface, however, the materials had disappointing results. The first veneers evolved when bonding to porcelain was successfully developed and tested. Over time, light curing and improved materials made the process of placing a direct resin veneer more commonplace and acceptable.

According to Thomas D. Larson, DDS, in the July-August 2003 *Northwest Dentistry*, using any veneer on a tooth in those early days was viewed as drastically different from what was considered accepted treatment.

There now are three types of tooth preparation. The method selected is based on the materials bonded to the tooth, what porcelains are utilized and type and shade of discoloration the operator is trying to conceal.

Other developments over the years include the practice of using layered composites with large particle or hybrid composites to replace missing tooth structure layered with a microfill. Although this method did not address the issue of composites that cracked, it did decrease it to a level more reasonable, said Larson, an associate professor in the restorative sciences department at the University of Minnesota School of Dentistry.

Upcoming Meetings

2004

Feb. 15-21	Barbados Dental Association 16th annual Midwinter Convention, Barbados, www.barbadosda.org
Feb. 19-22	Chicago Dental Society 2004 Midwinter meeting, Chicago, www.cds.org/mwm/
March 2-3	Academy of Laser Dentistry Certification Program, Standard Proficiency and Advanced Proficiency, Palm Springs, (954) 346-3776, www.laserdentistry.org.
March 3-6	Academy of Laser Dentistry 11th Annual Conference, Palm Springs, (954) 346-3776, www.laserdentistry.org.
March 5-8	Academy of Laser Dentistry 10th Anniversary Conference and Exhibition, Destin, Fla., (954) 346-3776, www.laserdentistry.org.
March 10-13	International Association for Dental Research's 83rd general session and exhibition (also 33rd annual meeting of the American Association for Dental Research and the 28th annual meeting of the Canadian Association for Dental Research), Honolulu, Hawaii, (703) 299-8094, www.dentalresearch.org.
April 15-18	CDA Spring Scientific Session, Anaheim, (866) CDA-MEMBER (232-6362).
April 27-May 2	American Academy of Cosmetic Dentistry's 20th annual Scientific Session, Vancouver, British Columbia, www.aacd.com.
Sept. 8-11	International Federation of Endodontic Association's sixth Endodontic World Congress, Brisbane, Queensland, Australia, www.ifea2004.im.com.au.
Sept. 10-12	CDA Fall Scientific Session, San Francisco, (866) CDA-MEMBER (232-6362).
Sept. 30-Oct. 3	ADA Annual Session, Orlando, Fla., (312) 440-2500.

To have an event included on this list of nonprofit association meetings, please send the information to Upcoming Meetings, *CDA Journal,* P.O. Box 13749, Sacramento, CA 95853 or fax the information to (916) 443-2943.

Correction

In the January 2004 issue of the *Journal*, a list of council members was inaccurate. The correct list for the Council on Membership is:

John P. Cunningham, DDS

Nita V. Dixit, DDS

Joseph M. Nunez, DDS

Parisa Zarbafian, DDS

Judee Tippett-Whyte, DDS