LEE YS, KHO HS, KIM YK, CHUNG C. INFLUENCE OF TOPICAL CAPSAICIN ON FACIAL SENSITIVITY IN RESPONSE TO EXPERIMENTAL PAIN. J ORAL REHABIL 2007;34:9–14.

For relief of intractable localized pain, burning sensations in the face, and/or atypical facial neuralgia, a selective blockade of nociceptive pathways can be an alternative approach to surgical neuroablative interventions. At least it avoids important side effects of such surgical interventions. Some of the nociceptive afferent neurons involved are mainly small unmyelinated or thinly myelinated nerve fibers, which are sensitive to the pungent component of red peppers, capsaicin. Binding of capsaicin to the receptor inactivates heat and vanilloid-responsive neurons. It has been shown that prolonged topical exposure to capsaicin results in long-term desensitization of nociceptors. Also systemic administration of capsaicin (eg, for burning mouth syndrome) is therapeutically effective but has gastric side effects in up to 32% of patients. The present study examined whether repeated topical capsaicin application in the facial region causes long-term but reversible inactivation of the nociceptive neurons in young, healthy volunteers. Thirty young dental students (24.7 years of age) volunteered for the study, but only 20 completed all procedures. Ten dropped out because they forgot to apply the ointment or were not available for the 4 weeks of follow-up evaluation. None of the volunteers had any form of peripheral neuropathy or took medication. Around 40 μL of capsaicin cream (0.075%) was applied 4 times daily in the same mental area for 2 weeks. The other side served as a control side. After the active treatment period the subjects were re-evaluated every week for 4 weeks. The intensity of the burning sensation after application, rated on a 100-mm visual analog scale (VAS), was low; the mean was 1.44 ± 0.72 after the first week and 0.47 ± 0.40 after 2 weeks. The decrease during the test phase was 39.5% ± 4.0%. Only 1 subject reported some redness in the area. Tactile threshold was measured with von Frey monofilaments and defined as the bending force of the weakest filament detectable in at least 50% of the applications. No significant difference was found between the test and control sides. Mechanical pain sensation was evaluated with von Frey monofilaments with a bending force of 283 mN and a 100-mm VAS. This mechanical pain sensation decreased significantly ($P < .05$) after 3 days and recovered 3 weeks after the end of treatment. Heat pain sensation was initiated by a 24-mm diameter thermode probe at 53°C. The subject self-applied the probe for 5 seconds and then evaluated his or her pain with a VAS scale. The heat sensation decreased significantly after 3 days ($P < .01$) and recovered 4 weeks after the end of application. Cold pain sensation evoked by a 10-mm-diameter surface ice tube applied for 5 seconds followed the same pattern. A current perception threshold (CPT) evaluation was performed using a Neurometer in both mental regions with electric stimuli of 5, 250, and 2,000 Hz. The current was slowly increased from 0.01 mA until the subject reported pain. This test was performed in a double-blind manner until the exact CPT value was determined within a 20-μA range. At 2,000 Hz no difference was found in CPT between the test and control sides. At 250 Hz the CPT of the test area increased significantly ($P < .05$) after 3 days and returned to baseline 1 week after the end of treatment. At 5 Hz stimuli, the CPT followed the same pattern. CPT on the control side did not change over time.

The study showed that the repeated topical application of a capsaicin cream results in reduced pain sensation in response to experimental painful mechanical stimuli, heat, and cold sensation. However the reduced pain sensitivity returned to "normal" within 2 weeks after discontinuation of cream application. The application did not result in permanent sensory changes, and no side effects were observed. The authors suggest that this treatment can be used in some forms of facial pain, such as burning mouth syndrome, postherpetic neuralgia, and atypical facial pain. However the study was performed in healthy young adults; well designed clinical trials in patients are needed. *(JDB)*

SELIGMAN DA, PULLINGER AG. DENTAL ATTRITION MODELS PREDICTING TEMPOROMANDIBULAR JOINT DISEASE OR MASTICATORY MUSCLE PAIN VERSUS ASYMPTOMATIC CONTROLS. J ORAL REHABIL 2006;33:789–799.

Bruxism, very variable and episodic in time, is frequently cited a as a cofactor for development and maintenance of temporomandibular disorders (TMD). Only observations in a sleep laboratory can determine whether the patient is a bruxer. However these investigations are costly and comprise 2 or 3 nights of observation, which is too short to evaluate the chronic condition. Therefore, dental attrition is often considered as a proxy for chronic bruxism effects. Dental attrition can easily be observed and measured on dental casts. In a western population dental attrition arises from parafunctional habits and not (or not to a significant extent) from functional wear during chewing. Attrition severity is not linear with age, and the most wear occurs at an early age. Most univariate analyses of attrition in association with TMD have been unsuccessful also because ongoing acute bruxism activity is not predicted by the levels of previous attrition. In the present study the authors attempt to evaluate whether attrition severity and/or estimated rates can multifactorially differentiate patients with disc displacement, temporomandibular joint (TMJ) osteoarthrosis, or masticatory muscle pain from asymptomatic controls. First, patients received a proper diagnosis in these 3 categories. Fifty-two patients were diagnosed with a unilateral TMJ disc displacement, 73 were diagnosed with TMJ osteoarthrosis, and 43 were diagnosed with myofascial pain only. The diagnosis was based on the clinical research diagnostic criteria; no magnetic resonance imaging was carried out. The attrition severity was determined on the relative degree of faceting: no facet = 0; slight facet = 1; noticeable flattening = 2; flattening of cusp and grooves = 3; total loss of contour and dentinal exposure = 4. The rate of attrition was determined by the quotient of the attrition score divided by the age of the patient adjusted by 6 years to compensate for the primary dentition. Every effort was made to blind the investigators. The classification tree method was used to search for hidden structure in the data. In data analysis the goal was to generate the most predictive tree for each of the comparisons: Asymptomatic controls versus disc dislocation, osteoarthrosis, and muscular pathology. Because no difference was found between genders in severity and rate of attrition, the samples were not separated by sex. Also there was no difference between patients with disc displacement with and without reduction, and these 2 subgroups were combined for further analysis.

The asymptomatic controls were characterized by low to moderate anterior attrition (72%) combined with more than minimal mediotrusive attrition; only 14% had high laterotrusive attrition combined with midrange anterior attrition severity and more than minimal mediotrusive attrition. That means that they had some attrition in all areas of the dentition. The sensitivity and the specificity of the classification tree prediction were 74% and 86.4%, respectively.

In patients with disc dislocation attrition rate (sensitivity: 71.2%) was a better predictor than attrition severity (sensitivity: 53.8%). They were mostly characterized by severe anterior attrition and midrange anterior attrition combined with midrange or less severe laterotrusive attrition. However, 29% of the

patients were not identified by the attrition model and 24% of the asymptomatic controls were falsely classified as disc displacement. The value of this model should therefore not be overinterpreted.

The prediction of osteoarthrosis with this model was very accurate (82.9% sensitivity), but the lower specificity (67.4%) shows that many asymptomatic subjects would be classified as diseased. It should be noted that 92% of the osteoarthrosis patients had severe anterior attrition, with a small subset having moderate anterior attrition severity and slower anterior attrition rates.

For patients with masticatory muscle pain the sensitivity was 100% and the specificity was 86.4%. They were characterized mainly by low levels of mediotrusive attrition severity and rates in combination with more than minimal laterotrusive attrition. Some had faster anterior attrition rates than the asymptomatic controls.

The authors stress the fact that the study was a retrospective one and not a prospective incidence study. Another limitation of the study was that all observed wear was attributed to bruxism and not to functional movements. Readers are cautioned not to overinterpret individual factors extracted from a multifactorial model because the components are only relevant in the context of the model. This extensive and important study shows that patients with muscular pain can be differentiated from asymptomatic subjects based on dental attrition severity and rate. Therefore, anterior attrition severity and rate should be included in studies investigating the multifactorial etiology of masticatory muscle pain. For disc displacement and osteoarthrosis, the impact of attrition is less clear. *(JDB)*

Schmitter M, Kress B, Leckel A, Ohlmann B, Rammelsberg P. Limited jaw opening in TMD patients and in healthy control subjects. Deutsch Zahnärztl Z 2006;61:535–539.

A limited jaw-opening movement is a characteristic of patients suffering from temporomandibular disorders (TMD). Patients with disc displacement with or without reduction on opening as well as patients with myofascial pain often show limitation in jaw movements. It is not clear which category of patients is the most frequently affected by functional limitations. Magnetic resonance imaging (MRI) is considered the gold standard in the diagnosis of disc displacement; clinical examination can be used to diagnose myofascial problems in patients. The aim of this study was to record which type of displacement, as compared to myofascial pain, resulted in the most pronounced limitations in jaw movements.

One hundred nine patients (39.5 ± 15.3 years of age) with signs and symptoms of TMD participated in the study. The control group consisted of 43 healthy subjects (34.4 ± 15.5 years of age) without any sign or symptom of TMD, general joint diseases, or previous head and neck injuries. Two clinicians used the Research Diagnostic Criteria for TMD (RDC/TMD) to examine the 2 groups. The examiners were previously calibrated for RMD/TMD examination and assessed for reliability. The correlation was 87%. Pain on palpation in the musculature, joint sounds, and jaw mobility were recorded. Particularly the number of painful muscles and the maximal pain-free opening in mm were assessed. For all subjects MRI of both joints was carried out. A localizer image was produced to identify the condyles during opening and closing. The maximal opening position was stabilized using a mouth-opening device. The MRI scans were evaluated by 2 calibrated investigators. The interrater agreement was k = 0.7. The diagnosis disc dislocation with or without reposition was made after MRI. Statistical analysis was performed using the SPSS 13.0.1 program. Forty-three subjects serving as a control group did not have any disorder based on the RDC/TMD. Forty-nine patients were diagnosed with myofascial pain, 30 patients had disc displacement with reduction with or without myofascial pain, 46 patients had disc displacement without reduction with or without myofascial pain. Finally, 24 patients had both types of disc displacement with or without myofascial pain. Jaw-opening capacity ranged from 1 mm to 62 mm (mean, 37.2 ± 11.3 mm). In control subjects, the mean jaw opening in mm reached almost 50 mm, which is higher than what is generally reported in the literature. In patients with only myofascial pain the mean of the maximal opening was lower than in the controls and reached 39 mm. No difference was found between the control subjects and the patients having disc dislocation with reduction but without myofascial pain. Patients with disc dislocation with or without reduction and no myofascial pain showed a statistically significant reduction in opening compared to subjects without disc displacement (P = .001). Patients with only a disc displacement without reduction in at least 1 joint showed a statistically significant reduction in opening whether or not this was combined with myofascial pain symptoms. Patients with disc displacement with reduction in only 1 joint showed no difference with subjects without disc displacement.

In general, the results show that the occurrence of myofascial pain limited jaw opening in all groups mentioned except for the group with disc dislocation without reduction. The clinical diagnosis of arthrogenic TMD based on a limited jaw opening is relevant in patients without myofascial pain. Because patients with only myofascial pain have a limited mouth opening, the diagnosis of joint-related TMD in patients with myofascial pain is much more difficult. *(JDB)*

Kreiner M, Okeson JP, Michelis V, Lujambio M, Isberg A. Craniofacial pain as the sole symptom of cardiac ischemia. J Am Dent Assoc 2007;138:74–79.

The difficulty in correctly diagnosing an acute myocardial infarction (AMI) is reflected in the reported frequency (2% to 27%) of missed diagnoses found in emergency departments of general hospitals. One fourth of missed diagnoses result in lethal or potentially lethal complications. Patients with atypical symptoms and absence of chest pain were more likely to be discharged without any form of therapy. It has been shown that the mortality rate for patients with symptoms other than chest pain was twice that of patients with chest pain. It is well known that in AMI the pain can be referred to the face, head, neck, and mouth. The purpose of this study was to investigate the prevalence and distribution of pain induced by cardiac ischemia and referred to the craniofacial region. Special attention was given to those cases where craniofacial pain was the only symptom of cardiac ischemia.

Of 215 patients consecutively admitted to cardiology departments with signs and symptoms of cardiac ischemia, 186 fulfilled the internationally accepted criteria, excluding patients with temporomandibular joint (TMJ) disorders, psychiatric disorders, and chronic headaches. The study group was composed of 76 women and 110 men with an age range of 42 to 88 years (median, 65 years). Three calibrated investigators collected the data. In the interview the patients were encouraged to describe not only the main symptoms but also any other symptoms. Pain in the craniofacial region was found in 38% of the patients during an episode of cardiac ischemia. Male patients reported craniofacial pain more frequently than women (P = .031). Concomitant pain in typical anginal regions, such as the chest, shoulder, and arm was found in 85%. However, 15% of the patients experienced only craniofacial pain. In the group with craniofacial referred pain, 81.7% had pain in the throat, 45.1% in the left mandible, 40.8% in the right mandible, 18.3% (n = 13) in the left TMJ/ear region. The maxilla was almost never the location of the referred pain. Toothache affecting mandibular teeth occurred in 2 patients and in 1 patient toothache occurred in the left maxilla. Pain in TMJ/ear was bilateral in 11 patients and unilateral in 2 patients. The ratio of bilateral versus unilateral pain referral to the craniofacial region was 6:1. For the referred pain to the arms, this ratio was 1:1. Odontogenic pain rarely crosses the midline; thus, this characteristic is important in differential diagnosis. Chest pain was absent in 25 (13%) of the patients, with no difference between men and women. In the absence of chest pain, pain was most frequently reported in the craniofacial region (60%) followed by the left arm and left shoulder (both 20%). The stomach, right arm, and back were less frequently mentioned. Because public recognition of craniofacial pain as a symptom is low, the prevalence found in the present study is most likely an underestimation. This interesting clinical

study shows that referred pain in the mandible and in the TMJ/ear region is to be expected in a significant proportion of patients with cardiac ischemia and should receive more attention both by dentists and cardiologists. Since patients suffering from AMI without chest pain have a higher risk of missed diagnosis, the dentist's awareness of this symptomatology can be crucial. *(JDB)*

Zachariades N, Mezitis M, Mourouzis C, Papadakis D, Spanou A. Fractures of the mandibular condyle: A review of 466 cases. Literature review, reflections on treatment and proposals. J Craniomaxillofac Surg 2006;34:421–432.

Among all mandibular fractures, the prevalence of condylar fractures is between 17.5% and 52%. According to the literature the most common unilateral fracture is fracture of the condyle end, while the most common bilateral fracture is fracture of the condylar heads. Most fractures are not caused by direct trauma but follow indirect forces transmitted to the condyle from a blow elsewhere. Consequently, condylar fractures are those most commonly missed. This study includes a thorough literature review. A large number of the cited articles deal with epidemiologic or etiologic aspects, different approaches to therapy, and treatment outcome.

This clinical investigation analyzed 368 cases (288 males and 80 females) admitted to an inpatient department of maxillofacial surgery over an 8-year time period. Four hundred sixty-six fractures were diagnosed based on clinical data, radiographs, and computerized tomographic scans. Fifty-six percent of the patients were between 21 and 50 years old, and 19.2% were between 11 and 20 years. Very few cases were found in older people or in children less than 10 years old. Of the condylar fractures diagnosed, 55.9% were due to traffic accidents, 13.5% to violence, and 2.7% to sports. In men, 211 fractures were unilateral and 77 bilateral; in women, 59 were unilateral and 21 bilateral. No difference in prevalence was found between the left and right sides. Sixty-eight percent of the fractures were displacements; no important difference was observed between the left and right sides with regard to displacement. In 12.6% of the cases a deviation was found. A medial overlap was found in 29.6% of the patients and a lateral overlap in 8.7%. Anteroposterior override was found in 25.1% of all cases and was evenly distributed between the left and right sides. The majority of the fractures due to traffic accidents were subcondylar; fractures of the condylar neck were the second most common. Eighty-four percent of fractures due to violence were subcondylar. In 265 patients with 342 condylar fractures, 326 more fractures were recorded in addition to the condylar fractures, with some patients presenting with more than 1 additional fracture. In 123 cases, no other fractures were found. The types and percentages of additional fractures accompanying the condylar fractures were as follows: 52%, mandibular symphysis and parasymphyseal fracture; 19%, fracture of the mandibular body; 11%, fracture of the mandibular angle; 17%, fracture of the middle third of the face; and 1%, fracture of the coronoid process or ramus. No difference was found between the left and right sides. Three hundred five patients presented with malocclusion, while 63 patients did not. Of the condylar fractures without other fractures, 32.2% presented without malocclusion; of the cases associated with other fractures, 88.3% presented with malocclusion. In 84 condylar fractures not associated with other fractures, malocclusion was found in 7 cases of unilateral intracapsular fracture, 13 cases of unilateral condylar neck fracture, 36 cases of unilateral subcondylar fracture, and 14 cases of bilateral subcondylar neck fracture. Treatment was deemed unnecessary only in 32 cases. In addition, 9 cases with concomitant fractures required no surgical intervention. Physical therapy was performed in all patients; in 9 patients, this was the only form of therapy. Intermaxillary fixation was chosen for 316 patients. Miniplate osteosynthesis of a condylar fracture was applied in 22 cases.

Absolute indications for nonsurgical interventions are intracapsular condylar fractures and high condylar fractures close to or involving the articular surface. Surgical intervention should not be chosen in growing children. *(JDB)*