113 Revascularization and histological evaluation of the connective tissue graft R GUIHA*, R G CAFFESSE, L MOTA (University of Texas-Houston HSC, Dental Branch, Houston, TX)

The aim of this study is to evaluate histologically the healing and revascularization of the subepithelial connective tissue graft at different time points and to observe the type of tissue attachment developed between the grafted tissue and the root surface Recessions were created in 6 beagle dogs. Thirty five days later, the recipient sites were prepared by elevating a split thickness flap. A subepithelial connective tissue graft was removed from the palate The graft was placed over the denuded root surfaces and sutured to the periosteum The flap was coronally repositioned to cover the connective tissue part of the graft and sutured interproximally 3 dogs provided specimens for 7 and 14 days and 3 dogs provided them at 28 and 60 days The animals were sacrificed by exsanguination and perfused through the carotid arteries with a combined solution of equal parts of India Ink and 10% formalin solution. After fixation and decalcification, cleared specimens following the Spaltehotz method were obtained as well as routine histology Histometric measurements were recorded for the 28 and 60 days The vascularization of the graft at 7 days originated from the periodontal plexus, periosteum and the overlying flap At 14 days, the graft was completely vascularized At 28 and sixty days, normal vascularization was present Within the limits of the study we conclude that the vascularization of the graft originates from the periosteum, periodontal plexus and the overlying flaps. The attachment of the subepithelial connective tissue graft is mediated by a combination of epithelial downgrowth and connective tissue attachment After a subepithelial connective tissue graft, there is little potential for new cementum and bone formation

114 **THE EFFECT OF PREEMPTIVE AND POSTOPERATIVE IBUPROFEN FOR ORTHODONTIC PAIN.** M BERNHARDT, K SOUTHARD, K BATTERSON*, K. BAKER, J JAKOBSEN, H LOGAN (University of Iowa, Iowa City, IA)

The purpose of this study was to compare the effectiveness of preemptive and/or postoperative ibuprofen for orthodontic pain. Forty-one patients were chosen based on the following criteria 1) need for comprehensive orthodontic treatment, 2) prophylactic antibiotic coverage not required, 3) no debilitating systemic diseases, 4) no current use of antibiotics or analgesics, 5) no contraindication to the use of ibuprofen, 6) subject not older than 16 years and a minimum of 88 pounds Patients were randomly assigned to 1 of 3 experimental conditions 1) 400 mg ibuprofen taken orally 1 hour prior to separator placement and 400 mg ibuprofen taken orally 6 hours after initial dose (Group A), 2) 400 mg ibuprofen taken orally 1 hour prior to separator placement and a sucrose capsule taken orally 6 hours after initial dose (Group B) or 3) sucrose capsule taken orally 1 hour prior to separator placement and 400 mg ibuprofen taken 6 hours after initial dose (Group C) A questionnaire utilizing a visual analog scale was administered to the patients to quantify the amount of pain during each of four activities chewing, biting, fitting back teeth together, and fitting front teeth together Incidence and severity of pain were recorded from time of separator placement at 2 hours, 6 hours, bedtime on the day of appointment, upon rising on the day after, 2 days, 3 days, and 7 days Analysis of Variance (ANOVA) revealed a significant difference in pain scores ($p<0.05$) at two hours after separator placement between Group C (30.1±8.9) and the other two groups A (4.3±1.4) & B (9.0±3.9) with respect to postoperative "pain to biting" Similarly, at two hours after separator placement, Group A (0.9±0.4) and B (1.9±0.5) had significantly lower levels of "pain to fitting front teeth together" than those of Group C (10.5±3.8) There was also a significant difference between Group B (20.1±7.6) and Group C (46.2±10.2) with respect to postoperative "pain to biting" at bedtime the day of separator placement In conclusion, these data indicate that prescribing ibuprofen 60 minutes prior to separator placement may alleviate pain at 2 hours and at bedtime following treatment

115 Buffered Ketoprofen in Postoperative Pain after Third Molar Surgery R A SEYMOUR* and J.R. HAWKESFORD (Depts of Restorative Dentistry & Oral Surgery, University of Newcastle upon Tyne, UK

We have shown previously that low dose ketoprofen (12.5 and 25mg) provides effective analgesia in the early postoperative period after third molar surgery (Seymour et al Br J Clin Pharmacol 41: 581-5, 1996). The aim of the present study was to evaluate the efficacy of a new low dose buffered ketoprofen preparation in patients with postoperative pain after third molar surgery 178 patients (58M) who required the removal of their impacted third molars participated in the study which had received prior ethical approval Surgery was completed under general anaesthesia and in the early postoperative period patients received in random, double-blind order either a single dose of buffered ketoprofen 12.5mg, ibuprofen 200mg or matched placebo. Efficacy parameters assessed during a 6-hour investigation period included time to meaningful pain relief, pain intensity (SPID), pain relief (SPRID) and total pain relief (TOTPAR), and time to rescue medication Buffered ketoprofen provided a significantly earlier onset in time to more meaningful pain relief than either ibuprofen ($p=0.023$) or placebo ($p=0.043$) Similarly, SPIDs, SPRIDs and TOTPAR values for ketoprofen were significantly different from both the ibuprofen ($p=0.004$) and placebo treatment groups ($p<0.001$) Time to rescue medication was significantly later in patients medicated with ketoprofen when compared to ibuprofen ($p=0.003$) and placebo ($p<0.001$). It is concluded that a single dose of buffered ketoprofen 12.5mg is superior to ibuprofen 200mg and placebo in the treatment of postoperative pain after third molar surgery

116 Post-operative Pain Experience After Third Molar Surgery M B COMFORT*, A S K TSE AND A C C TSANG, Faculty of Dentistry, The University of Hong Kong, Hong Kong China)

The purpose of this study was to determine if there was any difference between males and females in post-operative pain and its control following third molar surgery. Three analgesic agents were used (paracetamol/codeine, etodolac and diflunisal), and 232 consecutive Chinese patients attending for surgical treatment under local anaesthesia were divided into three groups based on the medication received Two tablets were given on completion of treatment and more were prescribed for use as required Visual analogue scales were used to record pain intensity at 4 hours, 8 hours and 12 hours post-operatively, on awakening on the next two days and one week later Patients recorded the timing of analgesic consumption Analysis of the pain scores showed that maximum pain occurred in the first 4-8 hours post-operatively and decreased steadily during the first 24 hours and then more slowly throughout the next two days Although females showed lower mean pain scores in the first 12 hours and higher mean scores than males throughout the rest of the post-operative period the differences were not statistically significant The only significant difference in analgesic consumption between males and females was seen in the diflunisal group, both in the first 12 hours when males took one tablet more than females and on the third post-operative day when females took one tablet more ($p < 0.05$) In both situations this use of analgesics corresponded to the differences in the pain scores This study shows that the timing and intensity of post-operative pain experienced after third molar surgery is similar in male and female patients, and their utilisation of analgesic agents is not remarkably different

117 **Dose-Range Evaluation of Nitroglycerin for Postoperative Pain Following Oral Surgery.** L JABER*, J BRAHIM, J ROWAN, R A DIONNE (NIDR, NIH, Bethesda, MD)

The use of organic nitrates has been extended beyond cardiovascular diseases to include treatment of pain associated with anal fissures, shoulder pain syndrome, menses, and acute thrombophlebitis. It has been proposed that organic nitrates act as nitric oxide donors to produce analgesic effects through a direct action of nitric oxide in the peripheral nervous system The present dose-range study evaluated the possible analgesic effects of an organic nitrate (nitroglycerin) on pain following oral surgery One partial or full bony impacted lower third molar was removed from 108 healthy subjects Eighty subjects who developed moderate pain were included in the dose-range study The patients were randomly allocated to one of four treatments: 100 µg, 150 µg, or 200 µg of nitroglycerin or placebo The drug was prepared in a final volume of 1 ml delivered over 20 min to the surgical site via PE50 tubing placed under the flap elevated for tooth extraction Pain was evaluated by a 10 cm visual analog scale during the first three hours after drug delivery The sum of the pain intensity difference scores demonstated a small but detectable analgesic effect ($P< 0.05$) in patients who receive 150 µg or 200 µg of nitroglycerin compared to placebo. **These data suggest a role for nitric oxide in acute postoperative pain in the oral surgery model and provide a rationale for further studies to evaluate the potential analgesic effects of drugs acting through this mechanism.**

118 Comparison of two topical anesthetics for anesthesia of human gingiva J G MEECHAN* and A S McMILLAN (Universities of Newcastle upon Tyne, U K and Hong Kong)

EMLA® cream (a 5% mixture of lidocaine and prilocaine) was compared with 5% lidocaine gel as an agent to anesthetize human gingival mucosa in a double-blind, split-mouth, volunteer study Ethical approval was obtained and 10 healthy volunteers took part EMLA® cream was applied for ten minutes to the attached buccal gingiva between the upper premolar teeth on one side using a customized splint, 5% lidocaine gel was applied to the other side at the same time Side of application was randomized An operator blinded to the side of application performed two sensory tests on the buccal attached gingiva between the upper premolar teeth A pin-prick test was performed by applying a load of 20g at right angles to the gingiva with a periodontal probe Pain was defined as the reporting of a sharp pin-prick sensation The second test was a measurement of the pain threshold using a calibrated algometer For both pin-prick and pressure pain threshold two trials were made at each site and the side tested first was randomized Recordings were made prior to splint application, immediately after splint removal, at 2 and 3 minutes later and then every 5 minutes up to 50 minutes following splint removal Data were analyzed using the Wilcoxon signed rank test EMLA® gave a mean ± s e time of 21.7 ± 2.0 minutes for loss of sharp sensation compared to 12.5 ± 2.7 minutes for lidocaine ($p = 0.022$) EMLA® elicited a greater increase in pressure pain threshold compared to lidocaine (462±14g and 423±11g respectively, $p = 0.011$)
EMLA® is a more effective topical anesthetic for human gingiva than 5% lidocaine

119 Clinical comparison of capsaicin and common anesthetic agents for topical intraoral anesthesia P Fotos & P Eleazer Univ of Louisville School of Dentistry, Louisville, Ky

Capsaicin (8-methyl-N-vanillyl-6-nonenamide), a component found in red pepper, when applied to skin surfaces produces a brief initial irritation, followed by insensitivity to further noxious stimuli without producing any noticeable morphologic lesion This is thought due to the depletion of Substance P (a decapeptide neurotransmitter) from terminal sensory nerve endings. Capsaicin is available commercially for the management of pain for conditions such as postherpetic neuralgias, cluster headaches, and osteoarthritis. This study has focused on the analgesic efficacy of capsiacin in transmucosal intraoral applications prior to the injection of local anesthetic Two topical anesthetic agents, 5% lidocaine (L) and 20% benzocaine (B), capsaicin 0.025% (C), and an inert placebo (P as the negative control) were each prepared in identical methyloxycellulose carrier bases supplemented with 0.1% benzethonium chloride as a preservative All four compounds were aliquoted in key numbered 2mL freezer vials In this blind placebo controlled protocol, one agent (approx 2mL) was applied by cotton applicator to an intraoral mucosal site in healthy adult human volunteers immediately prior to the injection of local anesthetic for routine dental procedures Following the injection, each patient was asked to rate their pain perception on a visual analogue scale (1=no discomfort to 10=severe pain) Additional controlled independent variables included injection site, patient age, gender, and injected anesthetic type. Data was subjected to analysis of variance Mean pain perception scores were L=2, B=1.8, C=2.1, and P=1.7 No significant difference was observed between any of the three anesthetic agents or the placebo (N=200) when independent variables were considered. These data suggest that the topical application of capsiacin is as effective as both lidocaine and benzocaine These findings also suggest that other issues may be more important than topical anesthetic type for reducing pain during intraoral transmucosal anesthetic injection
This research was sponsored by the L. D. Pankey Dental Foundation

120 Potential Use of Adjuvant Drugs to Enhance Lidocaine Local Anesthesia. E.Y LEE* and F.L. SMITH (School of Dentistry, Medical College of Virginia Campus of Virginia Commonwealth University, Richmond, VA, USA).

Some patients experience inadequate local anesthesia during certain dental procedures. The purpose of this study was to examine whether concomitant use of adjuvant drugs would enhance the potency and duration of action of lidocaine. Local anesthesia was measured in the tail of ICR mice A noxious stimulus was generated by focusing a radiant heat source (at 52.5 °C) on the dorsal aspect of the tail. A baseline tail-flick latency was obtained before subcutaneous infiltration of lidocaine into the mouse tail Adjuvant drugs were either co-injected with lidocaine, or were given by another route of administration At the appropriate times tail-flick test latencies were obtained, and a 10-s cut-off was employed to avoid tissue damage The hypothesis was tested that potassium channel drugs would enhance lidocaine local anesthesia. The potassium channel openers diazoxide, TEA and 4-AP were co-injected with lidocaine in the tail However, these agents had no influence on the potency or duration of action of lidocaine (2-factor ANOVA, *post hoc* Tukey's test) The potassium channel blocker glyburide also failed to affect lidocaine. Thus, the initial abolition of action potential development with lidocaine may have obviated the impact of potassium channel drugs. Considerable evidence indicates that pre- and post-treatment of patients with non-steroidal antinflammatory drugs (NSAID) enhances the duration and magnitude of pain suppression following dental surgery (Giglio *et al*, *Anesthesia Prog* 31: 74-76, 1984). The hypothesis was tested that flurbiprofen would directly enhance the potency and duration of action of lidocaine Surprisingly, flurbiprofen administered intraperitoneally or *per os* blocked the local anesthetic effects of lidocaine. Other experiments should examine whether flurbiprofen will block other local anesthetics. Furthermore, it remains to be determined whether other NSAIDs will block local anesthesia These findings could raise concerns given that NSAIDs are frequently consumed prior to certain dental procedures. Funded in part by an A.D Williams Summer Fellowship to E.Y Lee.