



Title	Comparison of bone healing in four types of jaw cysts
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Present Pain Intensity and Respiratory Parameters in Experimental Pain.
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The purpose of this study was to examine the relationship between present pain intensity, expressed by the visual-analog-scale (VAS) score, and respiratory parameters, such as respiration rate, inspiratory mean peak flow rate and ventilation volume. Ten healthy, paid female volunteers were used as subjects. Experimental muscle pain was induced by means of the computer-controlled infusion of hypertonic saline into the masseter muscle. Isotonic saline was applied under single blind conditions as a control. Respiration was monitored using a large Plexiglas chamber. Pain intensity scores were obtained every 15 s. The average pain intensity was 3.6 ± 0.6 VAS scores during the infusion of hypertonic saline, and 0.3 ± 0.1 for isotonic saline. Averages of pain intensity scores and respiratory parameters, computed for time windows of 30 s, were used for correlational data analyses. Considering all 10 subjects while 10 minutes in pain, correlation coefficients for present pain intensity versus flow rate, ventilation volume and respiration rate were 0.79, 0.76 and 0.57, respectively ($p = 0.000; 0.000; 0.008; s.$) In the first 2.5 minutes in pain, the respiratory flow and volume were correlated at an even higher level with the present pain intensity ($r = 0.91; 0.91; p = 0.033; 0.030; s.$). It was concluded that present pain intensity was a strong modifier of the respiratory response. This effect was particularly expressed in the initial phase of pain.

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Comparison of Bone Healing in Four Types of Jaw Cysts.
M.B. COMFORT* and S. LEUVESWANU (Department of Oral & Maxillofacial Surgery, University of Hong Kong)

A retrospective study was undertaken to investigate the quality of bone healing and the factors affecting it in four types of odontogenic cysts in Chinese patients. The records were examined of all healthy patients with odontogenic keratocysts, radicular, residual or follicular cysts treated in the Department of Oral & Maxillofacial Surgery between 1981 and 1992 by enucleation and followed up radiographically until bone healing ceased. The study group comprised 378 cysts. The location and size of each, the presence of pre-operative infection and the use of primary wound closure or open packing were recorded. Bone healing of each cyst cavity was graded from panoramic radiographs as complete (full bony regeneration), incomplete (partial ossification with a static or decreasing sized defect) or unsatisfactory (ossification unchanged with a static or increasing sized defect). Complete healing was seen in 202 cysts (53.4%), incomplete healing in 145 cysts (38.4%) and unsatisfactory healing in 31 cysts (8.2%). A total of 110 (45.8%) radicular and residual cysts showed complete healing which was significantly less than for follicular cysts (64 cysts, 64.7%, $p < 0.01$) or for keratocysts (28 cysts, 63.7%, $p < 0.001$). Unsatisfactory healing was more frequently found in keratocysts than in follicular cysts. Healing was significantly better in all four groups in mandibular cysts compared to maxillary cysts ($p < 0.0001$). The cyst size and the method of wound closure had no effect on healing. In infected cavities, healing was more often incomplete. This study showed that bone healing was better in follicular cysts and odontogenic keratocysts than in radicular and residual cysts; better regeneration occurred in the mandible than the maxilla and pre-operative infection caused a reduction in bone infilling in cystic cavities.

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Autophosphorylation of PDGF α and β Receptors in Human Dermal Fibroblasts. D.V. MESSADI*, A. LE, S. BERG and C.N. BERTOLAMI, (University of California, Los Angeles, USA).

This study examined the expression of PDGF α and β receptors in human dermal fibroblasts and compared the ability of the three known PDGF isoforms (AA, AB and BB) to induce tyrosine phosphorylation of PDGF receptors in these cells. It has been previously demonstrated that PDGF α receptor subunit binds all three isoforms AA, BB and AB, while the β subunit binds mainly BB and to a lesser affinity AB. These different PDGF isoforms are secreted by a variety of inflammatory cells and play a role in wound healing and tissue fibrosis such as hypertrophic scarring and keloids. Using a modified radioimmunoassay on replicate cultures of normal skin (NSK), normal scar (NSC) and hypertrophic scar (HS) fibroblasts, mouse monoclonal antibodies specific for each of the receptor (over a concentration range of 0-100 ng/mL) were utilized to examine the expression of cell surface PDGF α and β receptors. Positivity was quantified using [¹²⁵I] conjugated goat anti-mouse secondary antibody. For the tyrosine kinase activity assay, cells were seeded at confluency in 6 well plates and treated with 20 ng/mL of each of the PDGF isoform (AA, AB and BB) in DMEM containing 0.1% BSA for 15 minutes at 37°C. Cells were then scraped and solubilized in lysis buffer containing 10 mM Tris base, 1% Triton X-100, 50 mM NaF, 1.5 mM MgCl₂, 10 μ g/mL leupeptin, 1 mM EGTA, 1 mM PMSF and 100 μ M sodium orthovanadate. Equal amounts of protein from each sample were loaded in a 7.5% SDS polyacrylamide gel electrophoresis and electroblotted to an immun-ite nylon membrane. Tyrosine phosphorylation was measured by Western blot using anti-phosphotyrosine monoclonal antibody and detected using Immun-Lite Chemiluminescent Assay Kit (Bio Rad). The results show that all three cell lines expressed both PDGF α and β receptors differentially; scar cells (NSC and HS) expressed higher PDGF β receptor than skin cells, while NSK cells demonstrated higher PDGF α receptor than scar cells. Differential tyrosine kinase activity of PDGF receptors was observed in all three cell lines, which was mainly induced by PDGF AB and BB ligands but not by PDGF AA. This work is supported by NIH/NIDR research grants DE 10033 and DE 09178.

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Changes of Alveolar Bone After Tooth Extraction. K. TOMINAGA*, K. KAWAHARA, T. NISHIKAWA and A. TANAKA (Dept. of Oral Pathology, Osaka Dental Univ., Osaka, Japan).

The resorption of alveolar bone after tooth extraction is one of the most important topics for the dentists. We investigated alveolar bone on 4, 7, 12, 24 and 48 weeks after tooth extraction by confocal laser scanning microscopy (LSM), to elucidate the delicate change of post-tooth extraction alveolar bone in rats. Mandibular left first molars of rats were extracted under anesthesia and injected subcutaneously with calcinein every day for 10 days before euthanasia. Then their mandibles were removed with time. Histologically, the extraction socket was occupied by newly-formed bone and healed 4 weeks after tooth extraction, but by LSM observation, bone formation was completed 7 weeks. The cortical bone reduced in width and the trabeculae of sponge bone in amount around the distal root 12 weeks after tooth extraction, especially the sponge bone near the cortical bone.

It is suggested that the reduction in width of cortical bone and in amount of trabeculae of sponge bone occurred around extraction socket after tooth extraction.

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Low Level Laser Treatment Improves Long-standing Sensory Aberrations.
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The incidence of Inferior Alveolar Nerve (IAN) damage following removal of 3rd molar teeth or sagittal split osteotomy has been reported as up to 5.2% and up to 100% respectively. Sensory aberrations in the IAN persisting for longer than 6 months leave some degree of permanent defect. Low Level Laser treatment (LLL) has a reported beneficial effect on regeneration of traumatically injured nerves. The purpose of this double blind clinical trial was to examine the effects of LLL using a GaAlAs laser (820nm, Rönvig, Denmark) on touch and temperature sensory perception following a long-standing post surgical IAN injury. Thirteen patients were divided into two groups one of which received real LLL (4x6 J per treatment along the distribution of the IAN to a total of 20 treatment episodes) and the other placebo LLL. The degree of mechanoreceptor injury as assessed by Semmes Weinstein Monofilaments (North Coast Medical, USA) were comparable in the two groups prior to treatment. Subsequent to LLL the real laser treated group showed a significant improvement in mechanoreceptor sensory testing ($p=0.01$) as manifested by a decrease in load threshold (g) necessary to elicit a response from the most damaged area. The placebo LLL group showed no significant improvement. In addition, the real LLL group reported a subjective improvement in sensory function too. The degree of thermal sensitivity disability as assessed using a Thermotester (Phillips, Sweden) was comparable between the two groups prior to LLL. However, there was no significant improvement in thermal sensitivity post LLL for either the real or placebo laser treated groups. In conclusion GaAlAs LLL can improve mechanoreceptor perception in long-standing sensory aberrations in the IAN.

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In Vitro Cultured versus Split-thickness Human Palatal Mucosa Grafts.
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In oral and maxillofacial surgery palatal mucosa grafts are used to cover mucosal defects caused by vestibuloplasty. In more extensive operations, the quantity of palatal mucosa is a limiting factor. The aim of this study was to investigate whether autologous cultured sheets of palatal mucosa can serve as a dressing for these defects. In eight patients (5 men, 3 women; mean age 43 years) a punch biopsy (4 mm) was taken from the keratinized palatal mucosa. Keratinocytes, enzymatically dissociated from these specimen (0.25% trypsin, 30 min, 37°C), were grown in vitro on a monolayer of lethally irradiated 3T3-mouse fibroblasts in a humidified incubator at 37°C and 5% CO₂ (Tomson et al., *Transplantation* 58, 1994, in press). Within three weeks, a 20 cm² multilayered epithelial sheet was cultured. The sheet was detached from the culture flask by enzyme treatment (dispase, 20-40 min, 37°C) and layered out onto a carrier of sterile vaseline gauze. Using a split mouth technique, the sheet was placed on one half of the mucosal defect created by vestibuloplasty, the other half of the defect being covered by a conventional split-thickness palatal graft. Both grafts were held in place by a refined denture fixed with perimandibular sutures. Three months after vestibuloplasty, punch biopsies of each grafted site were taken and processed for light- and transmission electron microscopy (LM, TEM). The grafted mucosa closely resembled palatal mucosa and allowed denture bearing. Both grafts were vascularized, did not evoke a homograft reaction, and showed a smooth graft-IP mucosa junction. LM and TEM revealed that both types of grafts formed a fully differentiated keratinizing mucosa with a well developed basement membrane zone with a continuous lamina densa in association with hemidesmosomes and anchoring fibrils. It is concluded that in vitro cultured palatal mucosa grafts, just like split-thickness grafts, formed a fully differentiated, firmly anchored mucosa after transplantation to the mandibular vestibule.

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Oral and cutaneous soft tissue healing following wounding with an Erbium laser. I. Rizou*, R. EVERSOLE, Biolase Technology and UCLA, School of Dentistry, San Clemente and Los Angeles, CA, USA

An erbium laser that employs a hollow tube fiberoptic photon delivery system is effective for surgical interventions of soft tissue, bone and dental hard tissues. In this study, the effects on oral mucosa and skin were assessed. Thirty New Zealand white rabbits were anesthetized with IV pentothal and wounds were made on the ventral tongue mucosa, supracartilaginous skin of the ear and dorsal skin of the back. Two types of wounds were induced: 1. a circular 3 mm open wound and 2. a linear cut, 5 mm in length. One set of wounds was introduced with a punch biopsy instrument (circular wound) or scalpel (linear wound), the other with the erbium laser delivered via a handpiece unit, and conforming in outline to the punch and scalpel incisions. Animals were euthanized at 8 hrs, 24 hrs, 48 hrs, 7 days and 30 days. At the time of surgery, bleeding occurred with punch and scalpel wounds whereas there was no bleeding encountered with the laser wounds. All tissues were processed routinely for histopathologic examination. Both types of wounds showed comparable healing with a neutrophilic infiltrate at 8 and 24 hours followed by mononuclear infiltration at 48 hours and formation of a granulation tissue bed. At 7 days, epithelialization was established and all wounds were resolved by 30 days. Wound healing over the ear cartilage was delayed for both conventional surgical and laser wounds. It is concluded that the Erbium laser system is effective for soft tissue surgery, can be employed with no or minimal hemorrhage and exhibits clinical and histopathologic wound repair processes comparable to conventional surgical wounding.

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Ridge Augmentation Using Distraction Osteogenesis. M.S. BLOCK, C.H. CRAWFORD*, J. PENCHUS, I.M. FINGER, K.C. JORDAN (LSU School of Dentistry, New Orleans, La, USA)

Distraction osteogenesis has been used to lengthen long bones and the mandible and in this study the technique was applied to augment the atrophic mandible. Four dogs had their left premolars and first molar extracted and four small diameter HA coated implants (Calcitek, Inc) were placed horizontally. After ten weeks for integration, transfer impressions were used to fabricate a distraction device, which was secured to the implants with screws. A split thickness dissection allowed for a horizontal osteotomy to be performed between the top two implants and the device was immediately placed. After 7 days for healing, the ridge was distracted superiority 1/2 mm twice a day for 10 days for a total distraction of 10 mm. The soft tissues remained intact without breakdown. After ten weeks, bone had formed within the distraction gap with an intact cortex. Serial decalcified sections indicated denser bone formation along the areas adjacent to the osteotomy, with less dense bone at the center. This study indicates that distraction osteogenesis is a viable technique for ridge augmentation in dogs. Supported by NIDR T35 DE07237-03