
**Purpose:** The purpose of this study was to examine the relative variability in clinical outcome measures, independent of the magnitude of gains, within controlled clinical trials comparing Demineralized bone matrix (DBM) or GTR to Open flap debridement (OFD) therapy for the management of intrabony defects. A similar analysis was performed evaluating clinical outcomes with other Bone replacement graft (BRG) materials in relation to OFD alone.

**Materials and Methods:** The bibliographic MEDLINE, EMBASE databases and hand search were done from 1966 and 1974, respectively, to April 2007 for studies in which BRGs or GTR (barrier membranes) were compared to OFD in the treatment of periodontal osseous defects. Fifty-five randomized controlled clinical trials comparing regenerative therapy (seven DBM, 22 BRG, and 26 GTR) to OFD and meeting inclusion criteria provided mean change scores (pretreatment to post-treatment) and variance estimates for CAL, PD, and bone fill, allowing for calculation of a coefficient of variability (CV) for each measure within studies were included. Exclusion criteria were non-randomized observational studies.

**Findings:** Intrabony defects grafted with DBM exhibited significant gains in CAL and defect fill as well as modest, but non-significant, reductions in PD compared to OFD alone. Grafting with other BRG materials, independent of graft material, supported significantly greater gains in CAL, reductions in PD, and gains in defect fill than OFD alone. GTR therapy was associated with significantly greater gains in CAL and reductions in PD than OFD alone. Intrabony defects grafted with DBM were associated with a significantly lower variability in CAL gain (96.3 – 38.6 versus 137.7 – 30.9) and defect fill (69.1 – 11.2 versus 133.1 – 15.3) compared to OFD alone. Mean gains in defect fill were non significantly greater following GTR therapy than OFD alone (1.95 – 0.71 versus 1.38 – 0.82, respectively). GTR therapy also was associated with a significantly lower mean percent CV for CAL gain compared to OFD alone (50.6 – 5.0 versus 68.7 – 8.2, respectively) however, variability in PD reduction (37.3 – 3.3 versus 42.5 – 4.9) and defect fill (101.5 – 36.6 versus 99.4 – 36.6) were similar following treatment with GTR and OFD, respectively.

**Conclusion:** The results indicate that treatment of intrabony defects is associated with a relatively high degree of variability in clinical outcome regardless of the therapeutic approach. However DBM and GTR therapy support more consistent improvements in clinical parameters, with the exception of defect fill following bone grafting, the reduction in variability in clinical outcomes seems relatively modest in comparison to OFD alone.
Purpose: To evaluate histomorphometrically the reestablishment of new cementum (CEM) and newly formed bone (NB) in surgically membrane-protected experimental periodontal and intrabony defects in a dog model using a synthetic peptide (P-15) analog of collagen added to anorganic bovine bone material (ABM) in a new putty form (PEP).

Materials and Methods: 9 mongrel dogs, 2 to 4 years old, with a clinically healthy periodontium were used. General anesthesia and local infiltration were used prior to the surgery. Reflection of an advanced full thickness gingival flap was done on the facial aspect of the maxillary canine in each dog. Two different surgical defects were then created. The first defect was a circular fenestrated periodontal defect 5 mm in diameter and about 2 mm in depth made on the mid-buccal aspect of the canine root. The second defect had similar dimensions and was located in the diastema anterior to the canine. The experimental defects were filled with ABM/P-15 and covered with a bioabsorbable membrane. The same operational procedure was done on the contralateral side to serve as a control but no graft material was placed in the defects. Dogs were killed 120 days later. Tissue fixation was completed and bilateral jawbone blocks were removed to be examined histologically. A statistical analysis of the results was then done.

Findings: In the grafted and non-grafted fenestration root surface defects, the linear percentage of new cementum (%CEM) averaged 59.5% and 73.9% (p < 0.02), respectively; the area percentage of new bone (%NB) averaged 36.1% and 31.4%, respectively; and the residual biomaterial particles (%PEP) averaged 20.6%. The mean percentage of osteoconductivity level (OSC) was 52.4%. In the intrabony grafted and non-grafted sites, %NB averaged 50.7% and 60.1%, respectively (p < 0.02). Residual %PEP averaged 26.1% and OSC averaged 35.6%. At the intrabony sites, higher %NB and lower %OSC were found compared to the fenestration sites (p < 0.001 and p < 0.03, respectively). Correlation analysis showed a negative correlation between %NB and %PEP at the fenestration defects. In between the two defects, %OSC was significantly correlated (p < 0.05).

Conclusions: ABM/P-15 putty, used for a short period in experimentally periodontal and intrabony lesions, was found to be a biocompatible and osteoconductive filler material. However, its application in membrane-protected defects did not enhance regeneration.
**Carnevale et.al. Fibre retention osseous resective surgery: how deep is the infrabony component of the osseous resected defects? J clin periodontol 2008; 35: 133-138.**

**Purpose:** 1. To describe the baseline radiographic depth of infrabony defects for pockets treated by means of Fibre retention osseous resective surgery (FibReORS) or extraction, and 2. To assess the anatomical elements associated with the decision to apply FibReORS or to extract a tooth with an infrabony defect.

**Materials and Methods:** This was a retrospective study that examined the radiographs of patients that had undergone active periodontal treatment (APT) in a private practice. The variables that these pt’s had to have during their consultation, or following the active phase of treatment were as follows: 1. At least 1 radiographic infrabony defect with a probing depth (PD) of ≥4mm. 2. Less than 20% FMPS. 3. No contributory medical history. 4. Complete clinical records and diagnostic radiographs. After completion of the initial phase of therapy, sites with PD ≥4mm were eliminated with an apically positioned flap with FibReORS or extraction if the tooth was deemed hopeless. The radiographic analysis on the pre and post surgical radiographs consisted of the following measurements: 1. The root length for the CEJ to the root apex, 2. The depth of the defect for the bone crest to the defect bottom. The data collected was put through statistical analyses to explore the different variables on tooth extraction, such as age, gender, and smoking.

**Findings and Conclusions:** The total number of pt’s that were included in the study was 68, with a mean age of 54.3 and 324 defects to be treated. Lesions were associated with molars in 57% of the cases, premolars in 23%, canines 7%, and incisors 13% of the time. The mean root length was 11.7mm. The PD associated with an infrabony defect was 6.6mm. The mean radiographic depth of the infrabony defect was 3.9mm. In defects ≥6mm, 71.4% were located around pre-molars. Based on radiographs, 16% of the teeth (53) were considered hopeless. The mean PD and Root length of extracted teeth was 9.8mm and 10.3mm, respectively. In the 271 treated teeth, the mean PD and Root length was 5.9mm and 11.9mm, respectively. Statistical analysis showed a significant correlation between the radiographic depth and root length and the probability of tooth extraction. The risk of extraction of a tooth with a defect increases sharply as probing depth increases from 6mm to 8mm.

**Purpose:** To clinically evaluate the effects of PRP on the healing of deep intrabony defects treated with anorganic bovine bone material (ABBM) and GTR by means of a non resorbable expanded polytetrafluoroethylene (ePTFE) membrane.

**Materials and Methods:** Twenty-Four patients with advanced chronic Periodontal disease and displaying one intrabony defects were randomly treated with a combination of either Platelet rich plasma , ABBM and GTR or ABBM and GTR. The patient inclusion criteria were 1) good oral hygiene ,2) compliance of maintance program, 3) no intra bony defects extending into furcation area, and none of the patients were smokers. The following clinical parameters were evaluated at baseline and at 1 year after treatment 1) plaque index, 2) gingival index, 3) bleeding on probing 4) probing depth, 5) gingival recession and clinical attachment level.

**Findings:** No complications such as allergic reactions, abscesses, or infections were observed during the study period. Post operative healing was uneventful in all cases. At 1yr after therapy, the sites treated with PRP + ABBM +GTR showed a reduction in mean PD from 8.6+ 1.7mm to 3.1+1.3mm and a change in mean CAL from 10.3+1.4mm to 5.7+1.6mm. In the group treated with ABBM +GTR, mean PD was reduced from 8.8+1.7mm to 3.1+ 1.0mm and the mean CAL changed from 10.4 +2.6mm to 5.9+1.8mm. In both groups, all sites gained >3mm of CAL. Gains of >4mm of CAL were measured in 83% of the cases treated with PRP+ABBM+GTR and in 92% treated with ABBM and GTR.

**Conclusion:** The study shows optimal clinical results were achieved at 1 year after regenerative therapy in periodontal intrabony defects which were treated with ABBM +GTR with a non resorbable barrier, with or without the addition of PRP.

Purpose: To compare both radiographically and clinically the results of using either Anorganic Bovine-Derived Hydroxyapatite Matrix (ABM)/cell-binding peptide flow or open flap debridement (OFD) in the treatment of human Class II furcation defects in mandibular molars over a 6 month period.

Materials and Methods: The study design represented a prospective, randomized, intrasubject, double-blinded controlled trial utilizing 12 patients with a total of 24 Class II furcation defects in contralateral mandibular molars. Clinical measurements were obtained via a University of North Carolina probe with a prefabricated stent. The following clinical parameters were measured at both baseline and the 6-7 month postsurgical appointment: 1) relative vertical clinical attachment level (v-CAL); 2) relative horizontal clinical attachment level (h-CAL); 3) relative gingival recession (GR), and 4) bleeding on probing. Probing depth (PD) was determined by calculating the difference between v-CAL and GR. The furcation defects were measured with a Nabers probe with the following classification: 1) Class 0, no furcation; 2) Class I, horizontal PD ≤ 3 mm; 3) Class II, > 3 mm; or 4) Class III, through-and-through furcation involvement. Both surgeries were performed at the same appointment and consisted of intrasulcular incisions, full thickness mucoperiosteal flaps and removal of granulation tissue with concomitant scaling and root planning of the root surfaces. The defects of each patient were randomly assigned to one of two treatment groups: 1) The experimental group consisting of ABM/P-15; or 2) the control group consisting of OFD. Within the experimental group, the defect was filled completely with ABM/P-15 and the flaps were coronally positioned in both groups and sutured with ePTFE sutures. The patients were maintained every 2 weeks for a 6 to 7 month period. These maintenance visits consisted of professional prophylaxes with reinforcement of oral hygiene procedures. During both the baseline and 6-7 month post-operative visits radiographs were taken and standardized utilizing a lone-paralleling technique and bite-block stents fabricated with an occlusal registration in auto-polymerizing PMMA. Both the baseline and the post-operative radiographs were aligned under a video camera and digitized for subtractive radiography analyses in order to determine the resulting differences in bone density between the test and control groups. The measurements were then subjected to statistical analyses in order to determine differences between the test and control groups.

Findings: The initial differences in the clinical parameters between the groups were not statistically significant indicating that the defects were similar in both groups. Likewise, the differences between the test and control groups at the 6-7 month follow-up period
were not statistically significant for any clinical parameter. When comparing the baseline and final measurements, h-CAL gain (2.5 mm vs. 1.5 mm (OFD group) and GR reduction (0.9 mm) were statistically significant only in the test group. The gain in v-CAL was significant in both groups; however, the improvement in PD was not significant in either group. With a Nabers probe, the following was determined in the test group: 1) 4 out of 12 sites demonstrated complete furcation closure; and 2) 5 out of the 12 showed partial closure. In the control group, 3 defects demonstrated complete closure and 4 Class II defects showed partial closure. The subtraction radiography demonstrated the following: 1) Similar gain in bone height (BH) in both groups (ABM/P-15, 0.92 ± 0.89 mm; OFD, 0.57 ± 0.60 mm); 2) All sites except one demonstrated a gain in bone height; and 3) A non-significant difference in the mean bone density was noted between the 2 groups (ABM/P-15, 30.72%; OFD, 22.60%).

**Conclusions:** Within the limitations of this study, it was found that the use of ABM/P-15 in the treatment of Class II furcation defects yielded a positive radiographic and clinical result over a 6-7 month period. However, when compared to the OFD control group, these differences were not significant. Larger sample sizes and longer follow-up times are necessary in order to further evaluate the efficacy of the use of ABM/P-15 in the treatment of Class II furcation defects.

Purpose: To assess gene expression of growth and mineral-associated factors in the gene regenerating tissue formed under membrane-protected intrabony defects in the presence or absence of root cementum.

Materials and Methods: 30 subjects (18F and 12M) having deep intrabony defects (≥5mm) with a recommendation for extraction were included in the study. Teeth should be without endo treatment, dental mobility, caries or restoration close to gingival margin. Exclusion criteria: pregnant or lactating women; anti-inflammatory, antibiotic or hormone use within 6 mos; evidence of systemic modifiers of periodontal disease such as osteoporosis, smoking or diabetes within 6 mos. No previous periodontal treatment for the test group. In the control gp(N=15) total cementum was removed after surgical access. In the test gp(N=15) calculus was detached carefully aiming at maximum cementum preservation. Then defects in both gps were treated according to GTR principles using a non-resorbable e-PTFE memb. The memb. was removed after 21 days and regenerating tissue was collected to assess gene expression of alkaline phosphatase(ALP), osteopontin(OPN), osteocalcin(OCN), platlet-derived growth factor-alpha(PDGFA), bone sialoprotein (BSP) and basic fibroblast growth factor(bFGF) by PCRq technique. 3 teeth from each gp were randomly selected for SEM analysis.

Findings: At the end of experiment period, soft tissues had healed totally and exhibited no clinical signs of inflammation. SEM analysis showed cementum was present along the entire root surface in all of the evaluated test sites whereas in the control sites, dentin was observed along the complete extension of defect. Gene expression analysis demonstrated that PDGFA, BSP and bFGF levels were higher in the sites where root cementum was place compared to the sites where root cementum was removed completely. No difference was observed for ALP and OPN expressions between the control and test gps.

Conclusion: Results of the present study demonstrate that root cementum may actively take part in periodontal regeneration through its effect on the expression of growth and mineral-associated factors.

**Purpose:** To assess if the sustained release of 4% doxycycline through a bioabsorbable barrier would enhance the regenerative outcomes of healing furcation sites.

**Materials and Methods:** The study consisted of 29 patients who presented for treatment of mandibular molar degree II furcation defects. Patients participated in the study if they met the following inclusion criteria: 1) ≥ 18 years of age; 2) good general health; 3) good oral hygiene after initial therapy; 4) mandibular molar tooth with a facial or lingual degree II furcation defect with ≥ 3 mm of horizontal probing depth (HPD); 5) vital teeth or non-vital teeth treated with endodontic therapy; and 6) tooth mobility of ≤ Miller Class II. Both clinical parameters and hard tissue (Intrasurgical) parameters were measured. A full mouth periodontal exam was completed at baseline. Presurgical and post-surgical measurements were made and included the following: 1) plaque index; 2) gingival index; 3) bleeding on probing; 4) vertical probing depth (VPD); and 5) vertical clinical attachment loss (VCAL). The HPD into the furcation areas was measured at the facial or lingual furcation entrances. The measurements of the vertical and horizontal components of the furcation defects were evaluated after both surgical flap access and complete debridement utilizing a University of North Carolina (UNC) periodontal probe. The intrasurgical measurements included the following: 1) fornix to base of defect (FBD); 2) alveolar crest to base of defect; 3) depth of the horizontal component of the furcation (FHC); and 4) furcation width. The patients after flap reflection and soft tissue debridement were randomly placed into one of 3 treatment groups: 1) bone graft (demineralized freeze dried bone allograft (DFDBA)) covered with a poly (DL-lactide) polylactic acid (PLA) barrier containing 4% doxycycline hyclate (BG + PDox) (test group- 9 patients); 2) bone graft covered with a poly (DL-lactide) PLA barrier (BG+P) (control- 9 patients); or 3) bone graft alone (BG) (control- 11 patients). The flaps were then replaced and sutured to achieve primary closure. Supragingival plaque control was performed weekly for the 1st 2 weeks and then twice a week for 6 weeks. After 6 weeks, the patients were placed on 2 month maintenance exams until the reentry surgery after 9 months of healing. At the reentry surgery, all the hard tissue measurements were repeated in order to assess the amount of bone fill in the furcations defects. The data obtained were subjected to statistical analysis.

**Findings:** No significant differences were found in the mean plaque or gingival indices within or between the groups. The use of a barrier demonstrated more favorable outcome compared to the BG group. Of the 29 furcations treated, 11 furcations were reduced to a degree I furcation, 17 of the 29 defects remained as a degree II and one furcation from the BG + PDox group was completely closed. For gingival recession, the BG alone group (0.63 mm) produced no gingival recession; the BG+PDox group produced gingival recession of -1.33 mm; and the BG+P groups demonstrated -0.60 mm of gingival recession. The mean changes at 9 months for all groups yielded VCAL gains and VPD reductions. No significant differences were noted between the group that was treated with 4% doxycycline barrier compared to the control groups. Furcation horizontal bone fill was measured as 2.33 mm, 2.11mm, and 1.18 mm for the BG+PDox, BG+P, and BG.
groups, respectively. It was noted that there were no statistical differences between the groups; however, the BG+PDox and BG+P groups demonstrated superior amounts of bone fill compared to the BG group. Vertical bone fill was 0.89 mm, 1.44 mm, and 1.18 mm for the BG+PDox, BG+P, and BG groups, respectively. There were no statistical differences noted among the groups.

**Conclusions:** Within the limitations of this study (i.e. small sample size, no negative control (open flap debridement)), it can be concluded that the addition of 4% doxycycline hyclate to a poly (DL-lactide) PLA barrier did not enhance the treatment outcomes compared to either bone graft alone or the poly (DL-lactide) PLA barrier without antibiotic. The 3 treatment groups demonstrated similar improvements in both clinical and intrasurgical parameters.

Purpose: To understand the contribution to wound healing of pyridinoline cross-linked carboxyterminal telopeptide of type I collagen (ICTP) during tissue repair after local PDGF-BB reconstructive therapy.

Materials and Methods: Forty-seven patients (5 different clinical centers) participated in this study. Patients qualified for the study if one tooth showed PD ≥ 7 mm and vertical bone defect ≥ 4 mm (at least with one bony wall). Subjects were randomized into one of 3 treatment groups: β-TCP carrier alone (15 patients, active control), β-TCP + 0.3 mg/ml of rhPDGF-BB (14 patients), or β-TCP + 1.0 mg/ml of rhPDGF-BB (18 patients).

Before surgical treatment, each subject received non-surgical therapy (ScRP). Surgical treatment consisted of full-thickness flaps, debridement, root decontamination with a tetracycline paste. Then, the test sites were treated with β-TCP alone or 2 dose levels of rhPDGF-BB followed by achieving primary closure.

The wound fluid (WF) samples were taken directly from the defect site at the periodontal pocket and evaluated at baseline, week 3, 6, 12, 18, and 24.

(*ICTP: a biomarker involved in bone turnover in osteoporosis and periodontal bone remodeling.)

Findings:

<table>
<thead>
<tr>
<th>Time (weeks)</th>
<th>Carrier (pg/10s) (mean+SEM)</th>
<th>rhPDGF-BB (0.3 mg/ml) (pg/10s) (mean+SEM)</th>
<th>rhPDGF-BB (1.0 mg/ml) (pg/10s) (mean+SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>64.9 ± 42.7</td>
<td>113.1 ± 43.7</td>
<td>109.7 ± 54.6</td>
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<tr>
<td>3</td>
<td>41.9 ± 33.6</td>
<td>72.6 ± 39.1</td>
<td>103.1 ± 33.7</td>
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<tr>
<td>6</td>
<td>45.1 ± 36.2</td>
<td>125.9 ± 63.1*</td>
<td>139.7 ± 58.5*</td>
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<tr>
<td>12</td>
<td>60.0 ± 35.5</td>
<td>65.6 ± 27.4</td>
<td>63.7 ± 25.4</td>
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<tr>
<td>18</td>
<td>50.7 ± 50.7</td>
<td>63.3 ± 27.6</td>
<td>60.2 ± 27.6</td>
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<tr>
<td>24</td>
<td>74.1 ± 50.7</td>
<td>63.3 ± 41.7</td>
<td>57.5 ± 21.7</td>
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<tr>
<td>Overall (AUC)</td>
<td>437.5 ± 287.1</td>
<td>641.7 ± 164.1</td>
<td>672.8 ± 183.0</td>
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</table>

- β-TCP carrier alone group shows a decrease in the amount of ICTP released in the WF up to week 24.
- The 0.3 and 1.0 mg/ml PDGF-BB groups had an increased in the amount of ICTP released up to 6 weeks. There were statistical differences at week 6 between carrier group and test groups.
- The AUC (overall) analysis of ICTP for all groups over 24 weeks showed no statistical differences.

Conclusions: rhPDGF-BB may promote the rate of bone turnover in terms of ICTP release.
Purpose: To examine recombinant human transforming growth factor-β3 for its ability to induce periodontal tissue regeneration in the nonhuman primate, P. ursinus.

Materials and Methods: 4 clinical healthy adult baboons were selected for the study. In order to induce heterotopic bone, recombinant human transforming growth factor-β3 was used either alone or in combination with recombinant human osteogenic protein-1 with either Matrigel matrix or baboon insoluble collagen bone matrix as a carrier. The periodontal implants consisted of recombinant human transforming growth factor-β3 in Matrigel matrix, recombinant human transforming factor-β3 combined with minced rectus abdominus muscle tissue, and heterotopically induced ossicles harvested from the rectus abdominus. Pouches were prepared by dissection in the rectus abdominus muscles and materials containing different concentrations of recombinant human transforming growth factor-β3 were implanted into the muscles. Following heterotopic implantation, Class II furcation defects were surgically prepared. After 40 days of healing, the ossicles were palpated in the muscle. They were then harvested, fragmented, and placed on ice awaiting transplantation to the allocated periodontal sites. In the furcation areas, mucoperiosteal flaps were raised to re-expose the alveolar bone and furcation defects. The furcation defects were then implanted with the following 5 different implant materials: 1) Matrigel carrier alone (control); 2) 75 µg of recombinant human transforming growth factor-β3 in Matrigel (TGF-β3); 3) 75 µg of recombinant human transforming growth factor-β3 + minced muscle in Matrigel (TGF-β3/Mus); 4) Heterotopic bone ossicles induced by 75 µg of recombinant human transforming growth factor-β3 in Matrigel (IB/Mat); and 5) Heterotopic bone ossicles induced by 2.5 µg of recombinant human transforming growth factor-β3 + 25 µg of osteogenic protein-1 in insoluble collagenous bone matrix (IB/ICBM). The periodontal defects were allowed to heal for 60 days. The animals were then sacrificed and maxillary and mandibular tissue blocks were harvested. The tissues were processed for both histologic and histomorphometric analysis.

Findings: The histology of the periodontal implants revealed the following results: 1) Matrigel control: Partial healing was noted with an abundance of fibrous tissue that extended to the coronal area of the furcation defect; 2) TGF-β3 group: Newly formed alveolar bone with new periodontal ligament and new cementum was noted within the defect areas. Well-demarcated Sharpey’s fibers were noted with capillary sprouting in close contact with the PDL fibers; 3) TGF-β3/Mus group: New alveolar bone appeared to be well distributed within the exposed furcation defects. New cellular cementum and new PDL with Sharpey’s fibers were also noted in the defect; 4) IB/Mat group: New alveolar bone was seen extending into the coronal area of the furcation defect. New cementum appeared to be cellular with a newly formed collagenous matrix of cementoid. New PDL was seen which was well vascularized and contained well-organized Sharpey’s fibers; and 5) IB/ICBM group: Incomplete regeneration of new alveolar bone was demonstrated with a highly vascularized PDL with inserting Sharpey’s fibers. The histomorphometry
demonstrated that the Transforming growth factor-β3/muscle group (58.9% ± 3.2%) and the Matrigel- based heterotopic bone (64.9 ± 9.4%) implants regenerated the most alveolar bone as measured by percentage of bone area when compared with the control (31.3 ± 9.1%). When comparing the percentage of bone volume, the alveolar bone regenerated by the Matrigel- based heterotopic bone (53.1 ± 4.9%) demonstrated significantly more bone volume than the control (30.3 ± 5.4%).

Conclusions: Within a nonhuman primate population, recombinant human transforming growth factor-β3 significantly enhanced regeneration in surgically created Class II furcation defects when evaluated both histologically and histomorphometricly. The formation of new cementum was particularly enhanced in defects implanted with recombinant human transforming growth factor-β3/muscle. The quantity of new alveolar bone was significantly greater in defects implanted with recombinant human transforming growth factor-β3/muscle than in control defects.

**Purpose:** The purpose of this study is to examine the de novo bone formation in bone defects after insertion of Puros Allograft of human origin or Navigraft of bovine origin, and compared the regenerative potential of each material to that of autogenous bone in a animal study.

**Materials and Methods:** The sample consisted of nine adult females pigs, three test groups were formed: Group A received autogenous bone; group B received Puros Allograft; group C received Navigraft. Animals were examined at 3 different time points: 1 week, 8 weeks, and 12 weeks after the procedure. In each test period we examined 3 animals, each of which had 10 bony defects. In each animal, we treated 9 of the defects with the 3 different bone substitute materials (autogenous bone, Puros Allograft, or Navigraft) using random assignment; 1 defect per animal was left untreated to serve as an internal control. Microradiographic was performed to identified, histologic, and polychromatic fluorescence labeling evaluations of the bone specimens at 1, 8, and 12 weeks after the procedure.

**Findings and Conclusions:** Both of the materials allowed for complete bony consolidation of the defects by the end of the test period. After 12 weeks, the microradiographically measured mineralization rate was 5% to 10% lower than the mineralization rate of autogenous bone grafts. Test groups A, B, and C showed complete bony regeneration at the end of the test period, whereas the reference group retained a defect of 25% of the size of the original defect. Both Puros Allograft and Navigraft met the clinical requirements for bone substitutes, promoting predictable regeneration of the bony defects.

**Purpose:** To report histologic wound healing following use of Laser-Assisted New Attachment Procedure (LANAP) surgery for periodontal pockets.

**Materials and Methods:** Six patients with 2 single rooted teeth that had isolated moderate to severe periodontal disease treatment planned for extraction were used for this study. Subjects received occlusal adjustment/odontoplasty prior to treatment and were also splinted to neighboring teeth. Measurements included the BOP, modified gingival index (mGI), Quigley-Hein plaque index (PI), and mobility. A quarter inch round bur notch was placed at the clinically and radiographically measured apical extent of calculus. Experimental teeth received an initial laser treatment (3 W, 150µs pulse duration, 20H). Root debridement was then completed coronal to the area of the calculus reference notch with ultrasonic and hand instrumentation. The test teeth were then lasered again (4 W, 635µs pulse duration, 20H) to help form a pocket seal. Control teeth received same treatment except for laser treatment. Triple antibiotic ointment and a light cured dressing was placed on all teeth. Patients were given NSAIDS, doxycycline, and chlorohexidine twice daily. Teeth were removed en bloc 3 months after treatment. Teeth were sectioned with the 3 most central slices being used for histologic examination.

**Findings:** The LANAP treatment resulted in greater mean probing depth reduction (4.7mm vs. 3.7mm) and greater clinical probing attachment level gain (4.2mm vs. 2.4mm) than the control teeth. mGI, PI, and BOP were improved on all teeth. All six laser treated teeth demonstrated new cementum and new connective tissue attachment. In 2 specimens, periodontal regeneration was noted. Five of the 6 control teeth demonstrated long junctional epithelial attachment with no evidence of new attachment or regeneration.

**Conclusions:** New attachment and periodontal regeneration was noted following a specific protocol with a free-running pulsed Nd:YAG laser.