

EDITORIAL

A NOVEL BIOTECHNOLOGY PRODUCT FOR THE DEGRADATION OF BIOFILM-ASSOCIATED POLYSACCHARIDES PRODUCED BY *STREPTOCOCCUS MUTANS*

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In this study we evaluated the activity of ABR preparation, a first-in-class agent obtained through fermentation process by genetically unmodified *Bacillus* spp., in breaking down polysaccharide produced by *Streptococcus mutans*, primary coloniser of tooth surface and abundant in dental biofilms. Our results showed that ABR preparation is able in degrading sugars formed by *S. mutans*, both in broth culture and onto teeth surface. Its activity is not influenced by the presence of saliva, commercial mouthwashes or oral disinfectants. ABR preparation has the potential to remove preformed plaque and counteract its development, thus offering conservative control of gingival and periodontal disease.

MICROBIOLOGIC EVALUATION OF CREVICULAR FLUID IN PATIENTS TREATED WITH PLATFORM SWITCHING AND TRADITIONAL IMPLANTS

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Background: The purpose of this study was to compare the microbiota around natural teeth and dental implants with different restorative platforms. Attention was focused on whether the microbiological environment could change according to the implant platform used i.e. traditional or Platform Switching implants. As the latter show less signs of bone resorption, a correlation with the presence of certain periodontal bacteria was suggested. **Methods:** Seven partially edentulous patients with dental implants, either traditional or Platform Switching, were included in this study. All the implants were in function at least for 1 year. Gingival crevicular fluid samples were obtained before any periodontal probing from natural teeth and different implant platforms and assayed using DNA extraction and PCR sequences in order to determine quality and quantity of microbiota. Statistical analysis included chi square test were used to establish differences in the microbiological distribution between the two implant platforms. **Results:** There were not statistical differences neither regarding the distribution of microbiota around natural teeth and implants nor between the two implant platforms. The presence of *B.forsythus* was revealed in the majority of the samples (from 90% to 100%) while *A.actinomycescomitans* was rarely found (from 0% o 25%). As for the other periodontal microbiota, their presence or absence showed a variation according to different sites or patients, without a predictable pattern. **Conclusions:** It was not possible to find a link between the colonization of certain types of bacteria and the reduction of bone loss which occurs around Platform Switching implants. Therefore the preservation of bone crest is only due to biomechanical aspects, which are related to the reposition of the implant-abutment interface away from the outer edge of the implant platform and from the bone.

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DISCLOSURE: ALL AUTHORS REPORT NO CONFLICTS OF INTEREST RELEVANT TO THIS ARTICLE.

HISTOLOGICAL AND HISTOMORPHOMETRIC EVALUATION OF IMPLANT WITH NANOMETER SCALE AND OXIDIZED SURFACE. *IN VITRO* AND *IN VIVO* STUDY.

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Background: The biological fixation of an implant to bone is influenced by numerous factors, including surface chemistry and surface topography. Various methods have been developed to create rough implant surfaces in order to improve the clinical performance of implants and to guarantee a stable mechanical bone-implant interface. Anodic oxidation is a dental implant surface modification technique that results in oxide layer growth up to a thickness of 1–10 micron. The purpose of this study was to evaluate the performance of the surface through the osteoblasts cells growth and the influence of oxidized surface on BIC %, in the human posterior maxilla after 2 months of unloaded healing. **Material and methods:** In vitro commercially available primary human osteoblasts (NHOst) from both femur and tibia of different donor systems (Lonza Walkersville Inc, Walkersville, MD, USA) were grown in Osteoblast Growth Media (OBM) (Lonza). Osteogenic differentiation was induced for a period of 4 weeks by the OGM medium (OBM basal medium supplemented with 200nM of hydrocortisone-21-hemisuccinate and 7.5 mM of β -glycerophosphate). The viability of NHOst cells seeded test A and B was measured by the quantitative colorimetric MTT (3-[4,5-dimethyl-2-thiazolyl]-2,5-diphenyl-2H-tetrazoliumbromide test) (Promega, Milan, Italy). One custom-made 2 x 10-mm site evaluation implant (SEI) with nanometer scale and oxidized surface (test) (Evo® Plan 1 Health s.r.l. - Amaro, UD, Italy), and one SEI with hydroxyapatite sandblasted surface (control) (Osseogrip® Plan 1 Health s.r.l. – Amaro, UD, Italy), were placed in the posterior maxilla of 15 patients. Patients received one of each type of SEI placed on controlateral side. **Results:** The proliferation rate studied by the MTT assay showed that during the incubation time, starting at 24 h, an increased proliferation rate was evident in Test B respect to Test A. After 2 months of unloaded healing BIC% was significantly higher in oxidized implants. BIC% mean values for the Osseogrip® surface was $36,133 \pm 4,888$ ER and $53,533 \pm 5,180$ ER for the Evo® surface ($P = 0,028$). **Conclusion:** These results seem to confirm that implant surface topography entails mechanical restrictions to the spread and locomotion of the cells involved in bone healing

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EFFECTS OF BISPHOSPHONATES IN ORTHODONTIC THERAPY: SYSTEMATIC REVIEW

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Background: Currently, the use of oral and systemic bisphosphonates, in the form of anti-osteoporosis medications or as a part of a chemotherapeutic regimen for several malignant diseases, is increasing dramatically in a large group of orthodontic patients. Animal studies have reported adverse dental effects from bisphosphonates, including decreased tooth movement, impaired bone healing, and osteonecrosis in the mandible and the maxilla. **Objective:** The objective of this paper was to analyze the effects of bisphosphonates on orthodontic therapy in humans. **Strategy:** The literature was systematically reviewed using PubMed, LILACS and OvidMedline up to December 31, 2011. Handsearching included several dental journals. **Study selection:** All RCT's, controlled trials and case reports-series about the effects of bisphosphonates on orthodontic therapy were analyzed and selected independently by two different researchers based on previously established inclusion and exclusion criteria. The main search terms were: bisphosphonates, orthodontic treatment and tooth movement. **Results:** The search strategy yielded 136 titles/abstracts: 134 from PubMed and 2 from LILACS; no articles from OvidMedline, Chocrane Library and manual search. Eighty three records were screened, after removal of duplicates. After applying the inclusion/exclusion criteria, 135 papers were removed: 43 studies on animals, 4 French and Portuguese articles, 17 reviews and letters, 18 unrelated to orthodontic therapy or to the topic of this review. **Conclusions:** Further studies are required to assess possible adverse effects of bisphosphonate on orthodontic treatment in humans.

ENDODONTIC-ORTHODONTIC RELATIONSHIPS: EXPRESSION OF NO SYNTHASE IN HUMAN DENTAL PULP DURING ORTHODONTIC TOOTH MOVEMENT.

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Inflamed human pulp tissue presents an increase in the level of nitric oxide synthase (NOS). The aim of this study is to verify the presence of NOS in human pulp of teeth that are subject to orthodontic force. 20 healthy subjects, wearers of fixed braces on the upper arch, were selected. An open coil-spring in NiTi was applied on the upper premolar test tooth (TT); the controlateral control tooth (CCT) was subjected to orthodontic treatment but not to the further force of the open coil-spring; the antagonist control tooth (ACT) did not undergo any orthodontic treatment. Pulpes were taken from test, controlateral control and antagonist control teeth immediately after the extractions which were done at 15 and 30 days from the start of application of the orthodontic force. The pulp tissue was analyzed through immunohistochemical and molecular biology examinations. The results showed tooth pulps subject to orthodontic treatment were very inflamed in the first 15 days with high levels of iNOS and low levels of eNOS; after 30 days a decrease of the inflammation and an increase of the pulp vascularization were observed together with a reduction of iNOS and an increase of eNOS respectively.

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MICROARRAY EVALUATION OF GENE EXPRESSION PROFILES IN INFLAMED AND HEALTHY HUMAN DENTAL PULP: THE ROLE OF IL1 β AND CD40 IN PULP INFLAMMATION.

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Dental pulp undergoes a number of changes passing from healthy status to inflammation due to deep decay. These changes are regulated by several genes resulting differently expressed in inflamed and healthy dental pulp, and the knowledge of the processes underlying this differential expression is of great relevance in the identification of the pathogenesis of the disease. In this study, the gene expression profile of inflamed and healthy dental pulps were compared by microarray analysis, and data obtained were analyzed by Ingenuity Pathway Analysis (IPA) software. This analysis allows to focus on a variety of genes, typically expressed in inflamed tissues. The comparison analysis showed an increased expression of several genes in inflamed pulp, among which IL1 β and CD40 resulted of particular interest. These results indicate that gene expression profile of human dental pulp in different physiological and pathological conditions may become a useful tool for improving our knowledge about processes regulating pulp inflammation.

THERMAL ANALYSIS OF LASER-SOFTENED GUTTA-PERCHA

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The aim of this work is to examine the behaviour of laser treated gutta-percha (a–b) after heating, to test the validity of a new obturation technique. Samples of laser- and no laser- treated gutta-percha have been examined by the thermal/thermogravimetric analysis and compared. All samples have been submitted to four runs of heating from the temperature of 25–130 °C, followed by spontaneous cooling. It was found that some samples have shown the typical behaviour of the α -gutta-percha; others have shown characteristics similar to the conventional β -gutta-percha. The laser treated gutta-percha has shown a significant mass loss after the first run of heating, while the mass tends to stabilize after the third run. It has been demonstrated that the 980 nm diode laser used with cited parameters does not alters thermal behaviour of gutta-percha cones.

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IN VITRO EVALUATION OF MESENCHYMAL STEM CELL ISOLATION POSSIBILITY FROM DIFFERENT INTRA-ORAL TISSUES.

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Mesenchymal stem cells (MSCs) are of great interest for the regeneration of tissues and organs. Bone marrow is the first sources of MSCs, but in the recent years there has been interest in other tissues for the isolation of these pluripotent cells. In this study, we investigated the features of MSCs isolated from different oral regions in order to evaluate their potential application in the regeneration of damaged maxillofacial tissues. Sampling from human periodontal ligament, dental pulp, maxillary periosteum as well as bone marrow were collected in order to obtain different stem cell populations. Cells were morphologically and immunophenotypically characterized. Their proliferation potential and their ability to differentiate in osteoblasts were also assessed. All tested cell population showed a similar fibroblast-like morphology and superimposable immunophenotype. Slight differences were observed in proliferation and differentiation potential. Cells isolated from human periodontal ligament, dental pulp, maxillary periosteum had the characteristics of stem cells. Considering their peculiar feature they may alternatively represent interesting cell sources in stem cell-based bone/periodontal tissue regeneration approaches.

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ANTIBIOTIC-MODIFIED HYDROGEL COATINGS ON TITANIUM DENTAL IMPLANTSS. COMETA¹, M. MATTIOLI-BELMONTE*², D. CAFAGNA³, R. IATTA⁴, E. CECI⁵, E. DE GIGLIO³¹ *Department of Chemistry & Industrial Chemistry, University of Pisa, S. Piero a Grado -Pisa (Italy)*² *Department of clinical and Molecular Sciences, Università Politecnica delle Marche, Ancona (Italy)*³ *Department of Chemistry, University of Bari Aldo Moro, Bari (Italy)*⁴ *Department of Biomedical Sciences and Human Oncology, University of Bari Aldo Moro, Bari (Italy)*⁵ *Department of Public Health, Faculty of Veterinary Medicine, University of Bari Aldo Moro, Bari (Italy)*

Implant-associated infections represent an occasional but serious problem in dental and/or orthopaedic surgery. A possible solution to prevent the initial bacterial adhesion may be the coating of the implant surface with a thin layer of antibiotic-loaded biocompatible polymer. Hydrogels are one of the promising and versatile materials as antibiotic controlled release systems. In this work, antibiotic-modified poly(ethylene-glycol diacrylate) hydrogel coatings on titanium substrates were prepared by electrochemical polymerization and tested against methicillin resistant *Staphylococcus aureus* (ATCC 33591). Two different methods to load vancomycin and ceftriaxone were used. We show that the proposed titanium coatings displayed an interesting antibacterial activity, however, further studies on their effective cytotoxicity will furnish evidence of their real clinical efficacy.

TWO-STEP IMPRESSION/ INJECTION, AN ALTERNATIVE PUTTY/ WASH IMPRESSION TECHNIQUE: CASE REPORT

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We here describe a new technique for making a definitive impression that we refer to as the two-step impression/injection technique. This technique initially follows the classical one-step putty/ light-body impression technique with the polymerization of the putty and the light-body compound. This is then followed by the second step: injection of extra-light-body compound into the preparation through a hole in the metal stock tray. The aim of this additional step is to control the wash bulk and minimize the changes that can produce unfavorable impression results. This new two-step impression/injection technique allows displacement of soft tissues, such as the tongue, during the first seating of the putty and wash materials, while in the second step, the extra-light-body compound records all of the finer details without being compressed.

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**LATE DEVELOPMENT OF A SUPERNUMERARY PREMOLAR IN A 17-YEAR-OLD FEMALE:
TIMING OF MINERALIZATION AND MEDICOLEGAL CONSIDERATIONS**

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This report presents a case of a patient who developed a mandibular premolar supernumerary tooth after 14 years of age. Panoramic radiographs show the complete absence of the tooth (or tooth lacuna) at 14 years of age, and the crown as 50% developed at 17 years of age. The panoramic radiograph and computed tomography show dislocation of the roots of the adjacent teeth and a morphology similar to a premolar. Although the patient concluded the orthodontic treatment just before the premolar detection on any panoramic radiograph, the parents of the patient complained about the poor information received from the orthodontist.

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MICROMORPHOMETRICAL AND HISTOLOGICAL ANALYSES USING TWO DIFFERENT OSCILLATING OSTEOTOMY TECHNIQUES COMPARED WITH CONVENTIONAL ROTARY OSTEOTOMY.

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The recently introduced ultrasonic osteotome procedure is an alternative to conventional rotatory burs. The aim of this study was to establish the differences between two ultrasonic osteotomes and conventional rotatory burs, in order to perform micromorphological and histological analyses of osteotomized bone surfaces. Bony samples were taken from adult bovine ribs including both the cortical and marrow bone. Soft tissues have been removed and the bone pieces were divided into four groups, to test four devices: a conventional osteotomy round bur, a Lindeman bur and piezoelectric osteotomes ES007 and the T-Black. Each device performed cuts that were examined via scanning electron microscope (SEM) and light microscopy (LM) to check respectively cut precision and bone architecture all along the defect borders. SEM analysis of specimens showed that burs created defects of greater width and with irregular edges while those produced by ultrasonic osteotomes were narrow and had mostly smooth cutting surfaces. The edges of incisions made by drills were full of bone fragments while less bone chips were observed on piezoincision's ones. Dimensions of fragments were wider if cuts were made by burs too. LM analysis of samples showed focally, delicate bony trabecules crushed and pressed into the bone marrow in cutting made by burs. Samples cut by ultrasonic devices showed small or no smear layer and only partial or no crushed trabecules. Osteocytes seemed to be intact all along the cutting surface in all samples observed. In the present study, according to literature, ultrasonic surgery's validity is confirmed. As a matter of fact, the greater the number of bone chips products, the greater the magnitude of the inflammatory process induced, as well as the possibility of a greater bone loss and delay in wound healing near the osteotomized area.

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SUBJECTIVE PAIN RESPONSE TO TWO ANESTHETIC SYSTEMS IN DENTAL SURGERY: TRADITIONAL SYRINGE VS. A COMPUTER CONTROLLED DELIVERY SYSTEM

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The present study was conducted to evaluate human pain perception at different phases of dental surgery using a computer controlled device, the Single Tooth Anesthesia System (STA System®), versus the traditional syringe technique. One hundred healthy patients participated in this single-blind split-mouth design study. Individuals provided pain ratings at needle insertion, delivery of anesthetic solution and tooth extraction via a numeric visual rating scale or NVRS. The anterior middle superior alveolar, or AMSA, injection was compared with traditional syringe injections in maxillary quadrants. NVRS scores for AMSA were significantly lower for the STA System® when compared to traditional syringe technique at needle insertion, delivery of anesthetic solution ($p < 0.0001$) and also during tooth extractions ($p = 0.0002$). A higher percentage of patients (23%) required a second injection after the traditional syringe technique. Subjects reported having less clinical pain with AMSA injection at every step of the dental surgery. The STA System® combines an anesthetic pathway and controlled flow rate resulting in virtually imperceptible needle insertion and injection, and a rapid onset of profound anesthesia. NVRS scoring system facilitated patient comprehension in assessing pain value and intensity experienced. The two anesthetic delivery techniques were therapeutically equivalent for maxillary injections but AMSA/computer controlled protocol significantly minimizes subjective pain perception at needle insertion, anesthetic delivery and during tooth extraction.

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