



## EVOLUTION OF MICROBIAL FLORA IN PERIODONTAL POCKETS AND IN IMPLANTOGINGIVAL FURROWS

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### Basic Research Session – SIdP Research Forum 2015

Because of the association between periodontitis and peri-implantitis, it is essential that the dental hygienist intervene during implant rehabilitation from the preoperative phase up to the follow-up.

The aim of the work was to analyze the evolution of the periodontal and perimplant tissues subjected to causal therapy and periodontal disease condition through microbiological analysis. Further aim was to selected patients suffering of chronic periodontitis who wanted to undergo dental implant treatment and inform them of the medium and long-term predictability of implant failure. In fact, if bacteria that lead to the loss of natural teeth are present in specific quality and quantity, they are able to attack seal implant, cause inflammation, peri-implantitis and treatment failure.

It was recruited a sample of 14 patients with partial edentulism subjected to implant therapy. The patients were subjected to several withdrawals in the following rates: T0 (PCR testing is performed on natural teeth, in the deepest pocket, and after the collection of anamnesis and periodontal parameters, the patient is motivated to proper oral hygiene); T1 (PCR testing is performed on the same tooth, seven days before surgery and then the patient is subject to a professional oral hygiene treatment); T2 (PCR testing is performed on the same tooth and on the implant one month after placement. During the same session is done periodontal initial chart); T3 (PCR testing is performed on the same tooth and on the new implant, after three months since the prothesis placement and the patient is subjected to a professional oral hygiene and to the periodontal final chart). The PCR testing detected the presence of: *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Tannerella forsythia*, *treponema denticola*, *Fusobacterium nucleatum*, *Prevotella intermedia*.

In the examined sample, it was estimated that at periodontal level there had been significant reduction of the Red Complex, of *Fusobacterium nucleatum* and *Prevotella intermedia* between the withdrawal T0 and T1, and *Aggregatibacter actinomycetemcomitans* presented a reduction only after the withdrawal between T2 and T3. 7 of the observed implants had an increase of the Red Complex and *Fusobacterium nucleatum*. It was found a higher increase of bacteria on the tooth surface compared with the implant. It was found also a significant improvement of the periodontal indicators, the evaluation relating the Ramfjord six teeth and the comparison between the tooth and the implant.

These results highlighted the importance of motivation and instructions for proper oral hygiene at home in addition to professional oral hygiene and root planing. In fact, a significant improvement of the periodontal indicators and a total reduction of microbial flora periodontal was observed, while it occurred only in part on the implant surface. This difference may be due to non-cooperation of the patient, to the difficulty in cleaning of implant surfaces or to implant structure, which is different from natural tooth structure. Nevertheless it is essential that the Dental Hygienist participate during the implant rehabilitation, and the preoperative phase up to the maintenance over time through proper implant hygiene.



## THE REGENERATIVE POTENTIAL OF BONE TISSUE IN PATIENTS WITH GENERALIZED PERIODONTITIS, ANALYSIS AND ROLE FOR CLINICAL RESULTS

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### Basic Research Session – SIdP Research Forum 2015

Predictable regeneration of periodontal tissues became to be main goal of modern periodontal treatment and still among main scientific interest (Sculean A. et al., 2012; Cortellini P., Tonetti M. et al. 2009). Exactly regeneration of periodontal components, such as root cement and bone tissue can be guarantee of clinical success, providing tooth stability and long term functioning of natural occlusion. The more detailed knowledge of bone tissue condition in area of periodontal defect, it's regenerative potential, may be useful for development and provision into clinical practice of new treatment approaches for patients with moderate and severe generalized periodontitis. The data may be useful for tooth loss reduction and periodontal disease maintenance, enhancing social-economic demands.

To investigate the bone tissue regenerative potential (BTRP) in patients with moderate and severe generalized periodontitis (MSGP) in area of periodontal defect.

The jaw cancellous bone was investigated in 25 patients with MSGP (basic group) and in 10 patients with healthy periodontium (HP) (control group). Cloning of colony-forming fibroblast units (CFFU) of human jaws bone marrow was provided according to methodic of Fridenshtein O.Y. (1973) in modification of Astachova V.S. (1982). The cancellous bone was taken during flap operation according MIST, MPPT (Cortellini P., Tonetti M., 2007, 2009). In patients with HP – during extraction of vital intact teeth according to orthodontic, prosthodontic indications.

In 82% of cell cultures (in 27 from 33 cell cultures) of patients with MSGP the growth of colonies was absent, the effectiveness of CFFU cloning=0. Only in 6 occasions (18%) the growth of stromal fibroblasts was detected with cloning effectiveness of  $0,64 \pm 0,33$  (standard deviation of 1,86) among 105 nucleus-containing cells. Among 10 cell cultures in control group the growth of CFFU was detected in 20% but cloning effectiveness was  $11,2 \pm 7,1$  among 105 nucleus-containing cells (standard deviation of 15,9).

The data showed that BTRP in patients with MSGP in area of periodontal defect was highly reduced. The cloning effectiveness of CFFU in 17,5 times less comparing to the same score in patients with healthy periodontium. This data shows reasonability for further development of organ-saving procedures, reducing teeth loss in patients with MSGP. Necessity of new treatment approaches using new generations of medications should be additionally developed for clinical practice. The optimization of regenerative potential of the bone tissue in area of periodontal defect in patients with MSGP are among priorities.



## MICROBIOLOGICAL ANALYSIS IN PATIENTS AFFECTED BY GENERALISED AGGRESSIVE PERIODONTITIS: SAMPLING DESIGN AND ANTIBIOTIC RESISTANCES.

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### Basic Research Session – SIdP Research Forum 2015

Periodontal pathogens of patients with Generalised Aggressive Periodontitis (AgP) show a variable resistance to the most common antibiotic molecules. That's the reason why some of these patients are unresponsive to Full Mouth Disinfection protocol (FMD) in association with a systemic broad spectrum antibiotic therapy (Amoxicillin + Metronidazole).

The aim of this study was to create a sampling design and a microbiological protocol for the evaluation of subgingival bacterial flora of patients affected by AgP and its resistance to various antibiotics

Samples of subgingival plaque were obtained from the sites with the deepest Probing Pocket Defect (PPD) of 7 selected patients with AgP (two sites per patient). Samples have been collected after mechanical supragingival plaque removal, oral disinfection with Betadine, drying and isolation. A different sterile curette has been used for every single site, collecting plaque from the bottom of the pocket. The plaque has been cultured.

Initially, non-selective dishes were used (Blood agar, Chocolate agar) but without great results because of fast-growing microorganisms such as Viridans Streptococci.

From patient C, selective dishes have been used (Mac Conkey agar, BD Shaedler CNA agar, Shaedler-KV agar) looking for Gram - bacteria, Gram + cocci and Gram +/- anaerobs.

Additionally, a selective dish for yeasts has been used (Sabouraud-Gentamicin-Chloramphenicol-2-agar).

The following bacteria were been found: P. Aeruginosa, Bacteroides species, H. Alvei, Klebsiella species and an Actinobacillus (probably A. Actinomycetemcomitans).

They showed multiple resistance to the most common antibiotics. In particular all were resistant to Amoxicillin + clavulanic acid. Common periodontal pathogens weren't found.

Conclusion. There are many bacterial species not even considered in most of the studies that can co-operate in AgP pathogenesis. It's reasonable to take in consideration the multi-resistance to antibiotics of many periodontal pathogens, especially to antibiotics early taken. In particular, in the present study, two patients showed a history of recurrent periodontal abscesses treated with causal therapy in association with Amoxicillin + clavulanic acid without relevant benefits. After treating them with a protocol of FMD, successful results have been obtained, reinforcing the idea of the necessity of a focused therapy for each patient.



## PATIENT PERCEPTION: SIGNS AND SYMPTOMS OF PERIODONTAL DISEASE

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### Basic Research Session – SIdP Research Forum 2015

The relationship between oral health and the quality of life focuses on the importance of considering the mouth to be essential in satisfying human biological and social needs in terms of survival, socialization and self-fulfilment, and recognizing the mouth and its health as an integral part of the entire body and overall health. Periodontal disease (Pd) is one of the major oral health problems, and its symptoms can be significant from an individual's point of view. Cross-sectional studies have shown that the impact of oral health has a very important role on the quality of life in periodontal patients. However, clinical studies have mainly focused on therapeutic outcomes in terms of clinical parameters such as gain in probing attachment level (PAL) and decrease in probing pocket depth (PPD), while little attention has been paid to studying the impact of periodontal disease from patient perception and perspective. In particular only few articles focused on the relationship between patient perception of periodontal disease and its clinical signs and symptoms.

To evaluate the perception of Periodontal disease (Pd) and its possible impact on the overall health/social awareness.

240 Pd-affected subjects were consecutively enrolled. A three arms questionnaire comprehensive of i) 19 questions about self reported symptoms, ii) an Italian version of oral health impact profile (OHIP-14) and iii) 14 questions concerning the impact of periodontal disease on patient's general health and social aspects was given to each patient. The translated Italian version of OHIP-14 was validated as the original English version. The other questionnaires used in the present study were self-developed and were assessed in terms of validity and reliability. A full-mouth periodontal clinical examination was also collected. Clinical variables were analysed with ANOVA. Categorical data were analysed with Chi square test. Sensitivity and specificity were also calculated and multivariate logistic regression analysis was used to relate severity of Periodontal disease to the questionnaires.

The most prevalent symptoms were bleeding (49.2%), oral malodour (41.7%) and tooth mobility (38.4%). Severe-Pd was more likely associated with these symptoms ( $p < 0.05$ ) such as tooth mobility (OR = 3.49,  $p < 0.01$ ), which pooled together, show specificity of 91.2/81.2 for severe/mild Pd respectively. Quality of life diminishes according to the severity of the disease ( $p < 0.01$ ).

The impact on systemic health was reported by 70% of the subjects. 91% of the sample consider that Pd treatment may determine an improvement of quality of life. Severe-Pd patients show a higher concern about the transmissibility of the disease, its impact on social life and the influence of the disease on the quality of sleep ( $p < 0.05$ ).

Severe forms of Periodontal disease are associated with higher frequency of symptoms and inferior oral health-related quality of life and higher perception of systemic health.



## STUDYING THE POSSIBILITY OF USING COMBINATION OF BACTERIOPHAGES AND ANTISEPTICS

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### Basic Research Session – SIdP Research Forum 2015

The etiological role of periodontal pathogens in the development of inflammatory periodontal disease involves the use of antiseptics and antibiotics.

With all of these media the validity of their use has a number of drawbacks that can be expressed as a lack of effective action due to the increased frequency of microflora resistance to these drugs and the severity of side effects.

Using bacteriophage-based gel can reduce the amount of assigned antiseptics and their side effects.

Study possibility of using combination of bacteriophages and different antiseptics and assess their in vitro lytic activity.

Lytic activity of "Phagodent" gel bacteriophages applied in combination with antiseptics (0.05% and 0.2% chlorhexidine; 3% hydrogen peroxide; 0.01% miramistin; 2% dioxidine; octenisept) was evaluated.

Products under study were mixed with "Phagodent" gel in 1:1 ratio and incubated in thermostat; then bacteriophages were separated and titrated. Saline was used as a control. Bacteriophage lytic activity was determined by concentration of phage particles by means of standard titration in plaque-forming units per cubic centimeter (PFU/cm<sup>3</sup>). The tests were repeated three times.

Concentration of phage particles in control was  $3.6 \pm 0.6 \times 10^6$ . Their concentration in test specimens was:  $3.5 \pm 0.8 \times 10^6$  if 0.05% and 0.2% chlorhexidine solution and 0.01% miramistin solution were used;  $3.4 \pm 0.6 \times 10^5$  if 2% dioxidine was used; and 0 if 3% hydrogen peroxide and octenisept were used.

Majority of antiseptics (chlorhexidine, miramistin, dioxidine) don't have significant influence on bacteriophage lytic activity, thus they can be recommended for use in combination with "Phagodent" gel. Combination of gel and 3% hydrogen peroxide or octenisept cannot be recommended as these products fully inactivate lytic activity of bacteriophages.



## THE ROLE OF ANTIBODIES TO HEAT SHOCK PROTEINS IN PATHOGENESIS OF GENERALIZED PERIODONTITIS

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### Basic Research Session – SIdP Research Forum 2015

Endothelial dysfunction is an important factor in the development and progression of generalized periodontitis (GP), since the state of the endothelium in blood vessels determines their permeability to cells and bioactive molecules as well as the rheological properties of blood and regenerative potential of periodontal tissues affected by inflammatory process.

An important mechanism of endothelial dysfunction is autoimmune affection of stressed endothelial cells by antibodies to heat shock proteins associated with increasing levels of pro-inflammatory interleukins in blood.

The high level of homology between HSP of human beings and some periodontal microorganisms, these bacteria can be a source of sensibilization resulting in appropriate antibody formation. This mechanism determines the association and mutual impact of GP and systemic vascular diseases typical to comorbidities: systemic endothelial dysfunction causes the negative influence on periodontal tissues and chronization of GP, makes it refractory to treatment. In turn, the presence of periodontal infection may be a risk factor for atherosclerosis which influences its course.

To identify different types of anti-Hsp60 antibodies in serum of patients with GP and to determine the clinical factors which influence the content of these antibodies.

The study involved 63 patients with the mean age 38+15 years. Patients were divided into 2 groups: 33 patients with GP formed the main group, 30 patients with no signs of periodontal diseases were included to the control group. The levels of anti-Hsp60 antibodies in the serum were determined by ELISA. As the antigens recombinant protein GroEL of the *Escherichia coli* (prokaryotic homologue of human Hsp60) and human Hsp60 recombinant protein were used.

Statistical assessment of the obtained data was based on the use of Student's t test or  $\chi^2$  criterion. To study the associations between laboratory and clinical parameters Pearson's correlation coefficient was used.

It was found out that in patients of the main group the level of serum antibodies against prokaryotic Hsp60 was significantly higher than in the control group; it consisted  $0,66 \pm 0,27$  and  $0,415 \pm 0,3$  units, respectively ( $p < 0.05$ ). The average content of human Hsp60 antibodies in the main group was also higher than in the control and averaged  $0.35 \pm 0.19$  versus  $0.26 \pm 0.09$  units ( $p < 0.05$ ).

The positive correlation between the content of antibodies against human Hsp60 and prokaryotic Hsp60 was found. There was no significant correlation between the content of antibodies and the severity of GP, the presence of cardiovascular diseases, diseases of the gastrointestinal tract, and age of the patient. It was also found out that the results of GP conservative treatment assessed by the dynamics of periodontal indexes were significantly better ( $p < 0.05$ ) among patients with low levels of antibodies against human Hsp60.

The results of present study indicated the increasing levels of antibodies against human and prokaryotic Hsp60 in patients with GP, which can be considered as one of the mechanisms of chronization and progression of inflammatory and degenerative process in periodontal tissues.





## ACLASTA® IMPACT ON JAWBONE IN RATS

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### Basic Research Session – SIdP Research Forum 2015

Bisphosphonates (BPS) are gaining more and more importance in treatment of metabolic osteopathy and oncological diseases with bone metastasis. Nowadays there are many reports stating complications of bisphosphonate therapy and osteonecrosis is one of them.

Determine experimentally maximum tolerated dose that causes the risk of bisphosphonate-induced osteonecrosis of jawbones development.

Experiments were made in 30 female Wistar rats, aged 1 year, mean weight:  $399 \pm 0.2$ g. Rats were treated according to GLP protocol. Animals were divided into three groups. The 1st group (10 rats) was healthy control. In the 2nd group (10 rats) ovaries were removed and Aclasta (0.4 ml) was injected. In the 3rd group surgery was imitated and 0.4 ml of Aclasta was injected. One lower incisor was extracted in all rats from all groups. Animals were decapitated after 14 days and histology samples of jaw and femoral bones were prepared.

Two months after the injection half of the rats from the 2nd group developed coagulation osteonecrosis with subsequent development of chronic inflammation and partial resorption of bone. According to the results of morphological evaluation, extensive site of lower jaw necrosis was defined. Signs of bone loss of different extent were observed, that was more evident in compact bone. Cellular components and vessels were not detected in compact osteocyte-depleted bone and its canaliculi, only homogeneous eosinophilic mass of tissue debris were observed. Increased number of vessels, relatively numerous hysteocytes, and, to the lesser extent, neutrophils were detected in interosseous space. Bone elements with multiple resorption lacunae, increased number of osteocytes and signs of periosteocyte osteolysis.

Intravenous injection of 10fold zoledronic acid dose (0.4 ml/kg) led to jawbone osteonecrosis development in rats after ovariectomy.



# IN VIVO INVESTIGATION ON STEM CELLS ISOLATED FROM DENTAL PULP AND GINGIVAL TISSUES FROM PERIODONTALLY COMPROMISED TEETH

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## Basic Research Session – SIdP Research Forum 2015

Chronic periodontitis is a major cause of tooth loss and the teeth most commonly lost due to periodontal destruction are the maxillary molars.

Mesenchymal stem cells (MSCs), which consist of non-hemopoietic fibroblast-like cells, have been extensively studied over the last few years, due to their ability to self-renew and differentiate into multiple cell lineages.

Dental pulp stem cells (DPSCs) and Gingiva mesenchymal stem cells (GMSCs) are an attractive alternative of MSCs source, especially for their isolation simplicity compared with other more invasive harvesting methods. mainly for their easy harvest methods.

DPSCs and GMSCs harvested from healthy patient are able to produce mineralized matrix in vitro and lamellar bone in vivo. However, there is no current evidence of bone formation in vitro from MSCs collected from periodontally compromised teeth.

To evaluate if human MSCs harvested from the dental pulp and the gingiva of permanent teeth affected by severe periodontal disease present the same biologic characteristics and in vitro osteogenic differentiation potential of the MSCs harvested from healthy teeth.

Morphology, growth characteristics and the expression of surface epitopes of MSCs were studied.

The human MSCs cultures used in this study (n=5) were derived from the DPSCs or the GMSCs collected from molar teeth affected by chronic periodontitis with poor prognosis (group T).

As control, tissue samples were harvested from non-functional or impacted healthy third molars (n=5) (group K).

Before the tooth extraction, pulp vitality was confirmed, gingiva samples of 3x4mm were collected; dental pulp was obtained by using a sterile Gracey curette.

Single cell suspensions were cultured in  $\alpha$ -mem; subsequently, morphological observations, flow cytometry and Real-Time PCR have been performed to study the characteristics of the tissue samples. (M&M details are not shown as confidential)

From morphological observations, fibroblast-like cells were observed and their elongated shape is referable to MSCs.

The flow cytometry results showed the expression of human MSCs markers (CD29, CD146, SSEA-4) and no significant difference between pulp and gingiva samples of Group T and Group K; only the SSEA-4 test showed a reduced positivity in the control group pulp samples (CD29 – Group T: Pulp 93,74%, Gingiva 98,24% Vs Group K: Pulp 93,52%, Gingiva 96,50%; CD146 - Group T: Pulp 73,43%, Gingiva 47,19% Vs Group K: Pulp 84,35%, Gingiva 45,63%; SSEA-4 – Group T: Pulp 40,00%, Gingiva 42,27% Vs Group K: Pulp 23,13%, Gingiva 37,65%). Real-Time PCR showed slight positive results for the markers CD73, CD103 and c-Kit, while a high positive response was shown for the markers NANOG and OCT-4, without significant difference between the four groups.

These preliminary results confirm the existence of MSCs in the gingival and pulp samples harvested from periodontally compromised teeth. Further investigations on these MSCs teeth are needed to confirm their capability of differentiation in osteoblast-like cells in vitro and bone formation in vivo.





## STANOZOLOL AFFECTS BONE HEALING IN RAT CALVARIAL CRITICAL-SIZE DEFECTS

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### Basic Research Session – SIdP Research Forum 2015

Alveolar bone deficiency is a common finding of the clinical practice and may represent a central concern in planning an adequate oral rehabilitation, especially in the management of large defects. Combining osteoconductive scaffolds with bioactive molecules which could promote bone regeneration represents a field of growing interest in current research and many agents have been tested so far. Androgens play an important role in positive regulation of bone homeostasis. Stanozolol (ST) is a nonaromatizable synthetic steroid derived from dihydrotestosterone which combines high anabolic and low androgenic action. Recent studies showed that ST may promote osteoblastic growth and activity, accelerate wound healing, increase bone mineral density and improve bone mechanical properties. Also, local administration of ST has given encouraging results in the treatment of osteoarticular diseases.

The aim of this in vivo study was to assess the effects of Stanozolol combined to a demineralized bovine bone material (DBBM) scaffold in rat calvarial critical-size defects. To the best of our knowledge, this was the first study investigating the effects of local administration of anabolic steroids on bone regeneration.

Behind approval of the local Ethics Committee, bilateral critical-size defects (diameter: 5.0 mm) were surgically created on the parietal bone of 10 male Wistar rats aged 4 months. One blinded surgeon filled the defect on one side with DBBM+ST (test) and the contralateral with DBBM alone (control). One rat died intra-operatively, while the others healed uneventfully and no changes to their normal behaviour were noticed. At 1 month, animals were sacrificed with pentobarbital 150 mg/kg and a rectangular panel containing the original surgical defect area and the surrounding tissues was surgically removed. Samples were embedded in paraffin and serial slices were obtained with a rotative microtome in a plane parallel to the sagittal suture. Sections were stained with hematoxylin and eosin. Images were captured with a binocular optical microscope connected with digital camera. Extension of the defect (DE), new bone formation (NB), residual DBBM and fibrous tissue (FT) were quantified by a single trained operator. Data were analyzed by image analysis software (Image Pro-plus 4.0, Media Cybernetics, USA). Differences between groups were evaluated using Student's t- test for paired observations.

Qualitative histology revealed the presence of residuals of DBBM, dense connective tissue and calcified nodules in both test and control specimens. Histomorphometry revealed a significantly higher NB in DBBM+ST specimens compared to controls (25.9% ± 8.63% vs 16.19% ± 8.65% p<0.05).

Standing to our results, ST may enhance bone formation and accelerate bone healing at 1 month. Both from a biological and a clinical perspective, it is well known that the first healing period represents the most crucial as much as delicate phase: inflammation and revascularization occur and mesenchymal cells enter the grafted area to differentiate into osteogenic cells.

Hence, the effect of ST in optimizing the course of this process may provide relevant biological advantages with many clinical implications.



# INFLUENCES OF EXPERIENCE AND PROBE CONFIGURATION ON EXAMINER ALIGNEMENT AND ASSESSMENT: AN IN VITRO METROLOGICAL EVALUATION

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## Basic Research Session – SIdP Research Forum 2015

**Introduction:** Periodontal diagnosis exploits a measurement procedure known as periodontal probing. Every measure is related to the concept of uncertainty that, calculated with metrological methods, shows which factors are more critical. In periodontology, a measurement error can produce an erroneous diagnosis, influencing therapeutic decisions.

**Material and methods:** Adopting a novel dynamic calibration device that simulates periodontal tissue contraction during probing (named Periodontal Calibration Box, PCB), 89 operators (students with three levels of experience) were required to use three different types of periodontal probes (Marquis, Williams and UNC 15) in order to estimate their metrological performances and which factors affect most result uncertainty .

**Results:** 534 measurements were collected and analysed using kernel density estimation in order to determine the influence of two different factors (operator experience and probe configuration).

**Conclusions:** In vivo, alignment and assessment need operators with a good level of mastery of use of periodontal probes. This study shows how the use of an in vitro dynamic device such as the PCB enables to identify criticalities of the periodontal probing and to manage them.



## THE PERIODONTAL STATUS IN PATIENTS AFFECTED BY RHEUMATOID ARTHRITIS: AN EPIDEMIOLOGICAL STUDY. PRELIMINARY RESULTS

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### Basic Research Session – SIdP Research Forum 2015

Considerable evidence for a relationship between rheumatoid arthritis (RA) and periodontitis (P) is available. RA is an autoimmune disease whereas P has an infectious etiology. Both pathologies are chronic inflammatory disorders characterized by a deregulation of the host inflammatory response and may present with bursts of disease activity.

To assess the prevalence and severity of P in patients affected by RA and to determine their clinical and serological profiles.

Medical records of patients affected by RA from the outpatient rheumatology clinic of the University Hospital of Pisa were screened for inclusion and subjects were invited to participate and sign the informed consent. Included subjects underwent a full-mouth periodontal examination including probing depth, gingival recession, plaque index, bleeding on probing and a full rheumatological visit. RA disease activity was scored with DAS28. Serum analyses investigated levels of rheumatoid factor, anti-citrullinated protein antibodies, C-reactive protein, erythrocyte sedimentation rate and fibrinogen. Information concerning smoking, body mass index (BMI) and RA medical therapy (biological or disease-modifying antirheumatic drugs) was also collected.

Medical records of 162 RA patients were screened, 40 subjects refused to participate, 24 were excluded for the presence of autoimmune co-morbidities and 11 were edentulous. 87 subjects were finally included and accepted to sign the informed consent; 70 females and 17 males, mean age 57.7 (SD= 11.3). Over 52% of the sample, representing 46 subjects, had periodontitis, distributed as 47.6%, 28.5% and 23.8% of mild, moderate and severe periodontitis, respectively. No statistically significant differences in DAS28 ( $p=0.17$ ), BMI ( $p=0.96$ ), smoking habits ( $p=0.30$ ), RA medical therapy ( $p=0.38$ ) and serological tests were observed between P and periodontitis free (PF) RA subjects.

Among RA patients severe periodontitis prevalence was higher than literature data referring to RA free populations. Larger epidemiological studies are needed to better explore the association between RA and P.



## PATIENT PERCEPTION: SIGNS AND SYMPTOMS OF PERIODONTAL DISEASE

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240 Pd-affected subjects were consecutively enrolled. A three arms questionnaire comprehensive of i) 19 questions about self reported symptoms, ii) an Italian version of oral health impact profile (OHIP-14) and iii) 14 questions concerning the impact of periodontal disease on patient's general health and social aspects was given to each patient. The translated Italian version of OHIP-14 was validated as the original English version. The other questionnaires used in the present study was self-developed and was assessed in terms of validity and reliability. A full-mouth periodontal clinical examination was also collected. Clinical variables were analysed with ANOVA. Categorical data were analysed with Chi square test. Sensitivity and specificity were also calculated and multivariate logistic regression analysis was used to relate severity of Periodontal disease to the questionnaires.

The most prevalent symptoms were bleeding (49.2%), oral malodour (41.7%) and tooth mobility (38.4%). Severe-Pd was more likely associated with these symptoms ( $p < 0.05$ ) such as tooth mobility (OR= 3,49,  $p < 0,01$ ), which pooled together, show specificity of 91,2/81,2 for severe/mild Pd respectively. Quality of life diminishes according to the severity of the disease ( $p < 0.01$ ).

The impact on systemic health was reported by the 70% of the subjects. 91% of the sample consider that Pd treatment may determine an improvement of quality of life. Severe-Pd patients show a higher concern about the transmissibility of the disease, its impact on social life and the influence of the disease on the quality of sleep ( $p < 0.05$ ).

Severe forms of Periodontal disease are associated with higher frequency of symptoms and inferior oral health-related quality of life and higher perception of systemic health.



## STUDYING THE RELATIONSHIP OF PERIODONTITIS AND LIPID PROFILES

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### Basic Research Session – SIdP Research Forum 2015

High prevalence and severity of periodontal diseases necessitates research to study the risk factors of this disease, correlation with systemic diseases and planning effective preventive and therapeutic measures.

The relationship between periodontitis, cardiovascular risks and lipid profile.

109 patients with different cardiovascular risks participated in the study. There were 20 healthy patients (control), 25 with mild P, 34 with moderate P, 30 with severe P. different levels of cardiovascular risk. Peripheral blood lipids were studied. Periodontal tissue microhemocirculation was assessed with capillaroscopy. ANOVA was used for statistical analysis.

Analysis pairwise comparisons blood lipid profile showed elevated total cholesterol in patients with severe periodontitis compared with control ( $5,8 \pm 0,16$  mmol / l vs.  $5,3 \pm 0,2$  mmol/l,  $p = 0.04$ ), increased low-density lipoprotein (LDL) in patients with moderate periodontitis ( $4,1 \pm 0,17$  mmol/l) compared to patients with mild periodontitis ( $3,7 \pm 0,17$  mmol/l) ( $p = 0.05$ ) control of ( $3,6 \pm 0,2$  mmol / l,  $p = 0.03$ ). Apo B levels in patients with moderate ( $106,0 \pm 4,36$  mg / dl) and severe ( $106,3 \pm 4,37$  mg / dl) the degree of periodontal disease was significantly higher compared to the control ( $91,0 \pm 5,19$  mg / dl,  $p < 0,05$ ). Decrease in the average level of the APO LPA1 in patients with moderate periodontitis ( $166,0 \pm 5,33$  mg/ dl,  $p < 0,05$ ). Dyslipidemia was observed predominantly in patients with moderate periodontitis.

There is the association among periodontal disease and the levels of total cholesterol, LDL, HDL, APO B, POA LPA 1. Further research to assess the impact of periodontitis treatment on the structural-functional state of the vascular wall and prediction of cardiovascular disease (CVD) is necessary to clarify the possibility of using this parameter, as an independent risk factors of CVD.



## DIMENSIONAL ALTERATIONS OF THE GRAFTED AREA AT SITES UNDERGONE TRANSCRESTAL SINUS FLOOR ELEVATION IN COMBINATION WITH DEPROTEINIZED BOVINE BONE MINERAL OR A SYNTHETIC HYDROXYAPATITE IN A COLLAGEN MATRIX: A 24-MONTH RADIOGRAPHIC EVALUATION

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### Implant Session – SIdP Research Forum 2015

The 6-month results of a recent study demonstrated that the Smart Lift technique (Trombelli et al. 2008) may be effectively used for transcrestal sinus floor elevation (tSFE) when used in association with either deproteinized bovine bone mineral (DBBM) or a synthetic hydroxyapatite in a collagen matrix (S-HA).

The present study was performed to radiographically evaluate the dimensional alterations of the grafted area at 24 months following tSFE with the Smart Lift technique in association with DBBM or S-HA.

19 implant sites in 19 patients consecutively undergone tSFE with the Smart Lift technique in combination with DBBM (n=10) or S-HA (n=9) were included for analysis. On digitized radiographs related to post-surgery and 24-month visit, the extent of sinus lift (SL), the height of the graft apical to the implant apex (aGH), and the radiopaque area over the sinus floor (AREA) were assessed.

Immediately after surgery, SL and aGH were  $6.3 \pm 1.6$  mm and  $2.3 \pm 1.0$  mm, respectively, in DBBM group, while were  $6.8 \pm 1.8$  mm and  $2.6 \pm 1.3$  mm, respectively, in S-HA group. No significant differences in post-surgery SL, aGH and AREA were observed between groups. At 24 months, both groups showed a significant reduction in AREA ( $p < 0.01$ ) and a slight, non-significant reduction in aGH (DBBM group:  $-0.7 \pm 0.9$  mm; S-HA group:  $-0.4 \pm 1.0$  mm) compared to post-surgery, without inter-group differences.

Over a 24-month follow-up period following tSFE with the Smart Lift technique, sites grafted with DBBM and S-HA similarly showed a significant reduction in the grafted area.





## CLINICAL OUTCOMES OF SOCKET PRESERVATION AFTER TOOTH EXTRACTION USING BOVINE-DERIVED XENOGRAFT COLLAGEN AND COLLAGEN MEMBRANE. A SIX-MONTHS RANDOMIZED CONTROLLED CLINICAL TRIAL

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### Implant Therapy Session – SdP Research Forum 2015

Recent experimental studies showed that bovine-derived xenograft collagen placed into fresh extraction sockets seemed to preserve the dimension of alveolar bone.

To evaluate clinical changes of the alveolar sockets following application of bovine-derived xenograft collagen and collagen membrane vs. spontaneous healing, 6 months after tooth extraction.

20 patients with 20 fresh alveolar sockets were randomly allocated in test/control group. In test sites bovine-derived xenograft with 10% collagen was placed with collagen membrane. In control sites no regenerative procedures were performed. The following measurements were recorded: vertical distance from the CEJ of the adjacent teeth to the alveolar crest, horizontal alveolar width, thickness of buccal and lingual alveolar walls. After 6-months surgical re-entry was performed, vertical and horizontal measurements were repeated and implants were placed.

Statistically significant differences for vertical measurements, at buccal and oral aspect after surgical re-entry, were observed only in control group. Statistically significant different width was recorded between test and control group. Statistically significant differences between the two groups were observed in the vertical and horizontal changes of the alveolar crest when the initial buccal wall thickness was <1mm; no significant differences were recorded in case of an initial buccal wall thickness >1mm.

Although bone resorption occurred independently from the use of bovine-derived xenograft collagen and collagen membrane, socket preservation procedures could be recommended in case of thin buccal bone walls for an ideal implant placement.



## PATIENTS' EXPECTATIONS BEFORE AND AFTER IMPLANT THERAPY

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### Implant Therapy Session – SIdP Research Forum 2015

Patients' expectations may influence the perception of implant treatment. There is a paucity of reports comparing patient expectations and their post-treatment satisfaction. Compared with widespread investigations on dental implant survival and biologic parameters, patient-based outcomes of implant dentistry have been neglected for years and are now becoming more popular.

The aim of this descriptive clinical trial was to evaluate the patient's knowledge, compliance and consciousness level about dental implant therapy.

Fifty patients, each of whom displayed at least one implant were recruited for this study. All subjects filled a questionnaire (28 items) about the subjective level of information they received, satisfaction, pain and compliance. Fifteen questions dealt with the pre-surgical phase and thirteen questions with the post-surgical phase. All the patients underwent clinical and radiological evaluation.

The frequency of peri-implantitis and peri-implant mucositis were 28% and 40% of patients respectively. The 46% of patients did not know implant therapy complications, and the 36% thought implant's life was unlimited. Only 14% of participants went to their dentist at least three times a year during pre-surgical phase, while this percentage was 60% after implant surgery. The average of subjective satisfaction and pain level were 8,78 and 3,88 (VAS scale) respectively. The most important drawback was the high cost of implant therapy. Interdental brush was the most used tool to implant hygiene.

The insertion of osseointegrated implants seems to bring positive effects to patient's compliance probably for socio-economic factors. The Doctor-Patient communication should be improved also to prevent excessive expectations.



## CLINICAL AND RADIOGRAPHIC ANALYSIS OF IMPLANTS WITH A LASER-MICROTEXTURED COLLAR: A 5-YEARS, RETROSPECTIVE, CONTROLLED STUDY

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### Implant Therapy Session – SIdP Research Forum 2015

In recent years, one of the most important focuses in implant dentistry has been the influence of the implant collar surface on marginal bone loss (MBL) around implants.

To compare soft tissue conditions and marginal bone levels of implants with a Laser-Lok®-microtextured collar to implants with an resorbable blast textured (RBT) collar after a 5-years follow-up period.

Forty-five non-smoking and periodontally healthy patient, had received sixty-five implants. Implants were divided in two groups: thirty-four implants with a Laser-Lok®-microtextured collar (test group [TG]) and thirty-one implants with an RBT collar (control group [CG]). At baseline, the following parameters were assessed: the full-mouth plaque score, full-mouth bleeding score, number of sites with plaque, and the number of sites with bleeding on probing (BOP), probing depth (PD) and mucosal recession, these values are recorded at 5-years follow-up. The radiographic marginal bone loss (MBL) was calculated by subtracting the bone level at the time of crown insertion from the bone level at the 5-years follow-up.

After the five-years follow-up period an implant survival rate of 94% and of 90% was reported for the TG and the CG, respectively. No statistical differences were found between the study groups for presence of plaque (10.1% vs. 25%) or for number of sites with BOP (10.3% vs. 23%). The differences between both study groups were statistically significant for mean MBL ( $0.81 \pm 0.24$  vs.  $2.02 \pm 0.32$  mm), mean PD ( $2.32 \pm 0.44$  vs.  $4.25 \pm 0.87$  mm), and mean mucosal recession ( $0.16 \pm 0.3$  vs.  $0.22 \pm 0.3$  mm).

Within the limitations of this study, results suggest that the laser-microtextured implant collar surface may provide more favorable conditions for the attachment of hard and soft tissues, and reduce the level of MBL, PD, and soft tissue recession.



## RIDGE DIMENSIONS OF THE EDENTULOUS MANDIBLE IN POSTERIOR SEXTANTS: AN OBSERVATIONAL STUDY ON CONE BEAM CT ANALYSIS

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### Implant Therapy Session – SidP Research Forum 2015

The alveolar ridge resorption and remodeling is a process that occurs especially after tooth extraction and results in a decrease ridge dimension. Cone beam computerized tomography (CBCT) is a valid method to evaluate alveolar ridge horizontal and vertical dimensions of the edentulous patient.

to evaluate the ridge dimensions of edentulous mandibular posterior sextants by the use of CBCT radiographs.

cone beam computerized tomography (CBCT) scans of totally edentulous mandibles from 136 patients (69 males; mean age: 67.4 years, range 27 ÷ 92 years) were retrospectively included for analysis. At sites corresponding to the second premolar (site a) and the mesial and distal root of first molar (sites b and c, respectively), bone height (BH) was measured as the distance between the alveolar canal and the bone crest, and bucco-lingual bone width (BW) was measured at 1, 3, and 5 mm from the most coronal point of the bone crest.

Bone height (BH) decreased from site a ( $11.2 \pm 4.0$ ) to site c ( $10.3 \pm 3.3$ ) ( $p < 0.001$ ). Males showed a significantly higher BH compared to females at all sites ( $p < 0.001$ ), the mean difference being 2.79 mm. No significant impact of age on BH was found. BW increased from coronal to apical at all points ( $BW_{5mm} > BW_{3mm} > BW_{1mm}$ ). At all height levels (1, 3 and 5 mm), BW increased from mesial to distal ( $BW_c > BW_b > BW_a$ ). No significant impact of age and gender on BW was found.

In the posterior sextant of edentulous mandibles, BH decreased from mesial to distal, while BW showed an increase. Gender had a significant impact on BH, with males showing greater BH values compared to females.



## IMMEDIATE PLACEMENT OF FOUR UPPER INCISORS WITH SINGLE CROWNS RESTORATION: A FOUR YEARS CASE REPORT WITH CLINICAL AND RADIOGRAPHIC FOLLOW UP.

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### Implant Therapy Session – SIdP Research Forum 2015

In aesthetic areas, complications of implant therapy such as the appearance of subgingival graywash transparency or abutment/implant exposure may have serious implications for the patient's social life.

The aim of this study was to achieve aesthetically satisfying soft tissue contours in severely compromised teeth in the anterior region of the maxilla.

For a 37-years-old woman with localized advanced aggressive periodontitis at the four upper incisors, teeth extraction and immediate implant placement was proposed and accepted by the patient. Atraumatic surgery without flap elevation was performed and four plateau formed tapered implants with locking-taper connection were placed (Bicon LLC®, Boston, MA, USA). The immediate non-functional provisional restorations remained in situ for 6 months, and were then substituted by a segmented provisional restoration after complete maturation of peri-implant soft tissues. Bilateral connective tissues grafts were then performed to allow the insertion of four definitive single-crowns with an aesthetically natural looking emergence profile.

The patient underwent a 4 years follow-up examination. Morse taper connection implants in upper anterior immediate placement cases were effective to create a long lasting excellent clinical aesthetic result. All the implants showed good osseointegration, a good health of peri-implant soft-tissues with a pleasant aesthetic result.

The sloping shoulder implant design at crest level provided more space for interproximal bone growth, allowing to place four implants in close position and then to restore them with single crown to improve the hygiene and maintenance.



## HISTOLOGIC AND HISTOMORPHOMETRIC ASSESSMENT OF BONE FORMATION IN SINUS AUGMENTATION USING BIPHASIC BONE CERAMIC OR AUTOGENOUS BONE: A RANDOMIZED CONTROLLED CLINICAL TRIAL

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### Implant Therapy Session – SIdP Research Forum 2015

**Introduction:** The present study investigated the histologic and histomorphometric results from maxillary sinus augmentation with biphasic calcium phosphate (BCP) consisting of a mixture of 60% hydroxyapatite and 40% of  $\beta$ -tricalcium phosphate, and autogenous bone as bone-grafting materials.

**Material and methods:** A bilateral maxillary sinus floor elevation procedure was performed in ten patients using BCP (test group) and autogenous bone chips (control group).

At the time of procedure, one material was used in the left side and the other material was used in the right side, as determined by randomization. After a healing period of 6-8 months, implant sites were created and trephine cores harvested for histological and histomorphometric analyses of the grafted areas.

**Results:** The histological examination of biopsies showed BCP particles being interconnected by bridges of vital newly formed bone and in control group, the graft particles were roughly distinguishable from the newly formed bone. Histomorphometry demonstrated that the amount of newly formed bone in control group (36.8%) was significantly greater than in BCP (28.2) ( $P=0.0032$ ). BCP and autogenous bone cores revealed an average residual graft particles of 32.9% and 4.8%, respectively. The average percentage of soft tissue components was 38.9% in the BCP cores and 58.4% in the autogenous bone cores.

**Conclusion:** Based on the data presented in this study, BCP appeared to be osteoconductive and promotes new bone formation in maxillary sinus floor augmentation procedures.





## PREDICTORS OF GINGIVAL RECESSION FOLLOWING SURGICAL TREATMENT OF PERIODONTAL INTRAOSSEOUS DEFECTS WITH A SIMPLIFIED PROCEDURE

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### Periodontal Therapy Session – SIdP Research Forum 2015

The factors influencing the magnitude of the postoperative increase in gingival recession (REC) following the Single Flap Approach (SFA) (Trombelli et al. 2007, 2009) in the treatment of periodontal intraosseous defects are currently not known.

The present study was performed to evaluate the association of patient-related and site-specific factors as well as the adopted regenerative strategy with the change in buccal and interdental REC (bREC and iREC, respectively) observed at 6 months following treatment of intraosseous defects with the SFA.

Sixty-six patients contributing 74 intraosseous defects accessed with a buccal SFA were retrospectively selected for analysis. Defects had been left filled with a blood clot or treated with different regenerative strategies. Data were used for the construction of a logistic 3-level model (patient, defect and regenerative strategy), with the 6-month changes in bREC and iREC being regarded as the primary outcome variables.

The results indicated that: (i) a significant 6-month increase in bREC ( $-0.6 \pm 0.7$  mm) and iREC ( $-0.9 \pm 1.1$  mm) was observed; (ii) bREC change was significantly predicted by pre-surgery PPD and depth of osseous dehiscence at the buccal aspect; (iii) iREC change was significantly predicted by pre-surgery PPD and the regenerative strategy.

The 6-month increases in bREC and iREC following the Single Flap Approach are positively correlated with the defect-related PPD. Greater post-surgery bREC increases must be expected at sites where a deep buccal dehiscence is present. The combination of a xenograft and a bioactive agent seems to limit the increase in iREC following surgery.



## AN ALTERNATIVE TECHNIQUE OF PARTIAL EXTRACTION FOR PROSTETIC PURPOSES

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### Periodontal Therapy Session – SIdP Research Forum 2015

The so called “PET” ( Partial Exodontic Technique ) is an useful technique to recover mono- bi-radicular teeth with non sufficient clinical crown height alternatively to the more known “ surgical crown lenghtening”, “rapid orthodontic extrusion with fibrotomy”, “postextractive implant”. It shows some advantages that are reviewed. The PET simply consists in a surgical extrusion of a compromised tooth so to make it accessible to the reconstructive techniques after a rest period of 60 days.

It consists in a very delicate luxation, performed with thin extraction levers without traumatize nor the root neither the surrounding alveolar bone, followed by the extrusion and the fixation of the root in the new position.

After an adequate waiting time, the tooth regains his stability and can be treated with the normal reconstructive procedures.

The aims of this study are to demonstrate the utility and the advantages of the PET compared to the more known techniques mentioned above.

Are described some clinical cases treated with PET.

The success rates of PET are very high if the indications and the procedure are observed and its simplicity make PET to be preferred often to other well-known techniques.

The PET is a simple and effective option and certainly represents an additional possibility to be considered for the prosthetic treatment of teeth where, due to caries or fractures, the healthy dental margin is localized at a sub- or iuxta-gingival level.



## CHANGES IN CLINICAL PERIODONTAL PARAMETERS AND SUBGINGIVAL MICROBIAL COMMUNITY COMPOSITION IN ORTHODONTIC PATIENTS AFTER DEBONDING

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### Periodontal Therapy Session – SIdP Research Forum 2015

Although its role in improving oral hygiene maintenance by resolving crowding is well known, the orthodontic treatment with fixed appliances represents a potential threat for periodontal health due to plaque retention and it is still unclear whether periodontal conditions, including the composition of subgingival microflora, normalize after debonding. The composition of subgingival microflora during and after orthodontic treatment has been evaluated in several studies using culturing techniques, which are biased due to culturing difficulties in case of anaerobic species. Among culture-independent techniques, metagenomic high-throughput next generation sequencing is a very powerful technology as it targets the entirety of the genetic information contained in a biological sample and it is able to analyse complex bacterial communities including those representing subgingival microenvironment.

The aim of this prospective longitudinal observational study was to monitor patients' periodontal clinical parameters and the composition of subgingival microflora at debonding and 3 months after debonding.

11 patients (6 female, 5 male) aged  $17 \pm 7$  years who underwent fixed orthodontic treatment at the Department of Dental Science of the University of Trieste were included in the study. The following parameters were recorded at debonding (T0), when a professional hygiene was performed and oral hygiene instructions and motivation were provided, and at a 3 months follow-up (T1): O'Leary's Plaque Control Record (PI), Gingival index (GI) and Bleeding on probing (BOP). At the same time points, subgingival plaque samples were obtained from the buccal and palatal surfaces of left maxillary first molars. During sample processing, DNA was extracted, purified, quantified with NanoDrop and amplified by RT-PCR using bacterial primers targeting the 16S rRNA gene V1-V2 variable region. The obtained bacterial DNA was then sequenced using Ion Personal Genome Machine (PGM) and the obtained sequences were aligned using publicly available bioinformatics tools. Statistical analysis including paired Student's T-test and Wilcoxon's signed-rank test was performed using Microsoft Excel and IBM SPSS 22.0. UniFrac was used to measure phylogenetic distances among samples.

At T1, all periodontal clinical parameters improved compared to T0 (PI  $p < 0,01$ ; BOP  $p < 0,01$ ; GI  $p < 0,01$ ). After Multiple sequence alignment (MSA), 316075 Operational Taxonomic Units (OTUs) were detected at T0 and 167069 at T1, corresponding to 16 phyla, 28 classes, 58 orders, 106 families and 202 genera. At T0, periodontal pathogens genera *Aggregatibacter*, *Eikenella*, *Fusobacterium*, *Porphyromonas*, *Campylobacter*, *Prevotella*, and *Treponema* and cariogenic pathogens *Streptococcus*, *Veillonella*, *Lactobacillus*, *Bifidobacteriales*, *Actinomycineae* and *Peptostreptococcus* were detected. At T1, despite of clinical periodontal status improvement and overall OTUs reduction ( $p < 0,001$ ), a significant decrease was observed only in *Streptococcus* genera. UniFrac weighted analysis showed a clustering of samples at T0, showing that orthodontic appliances may contribute to the selection of a less heterogeneous microbiota, while in T1 the phylogenetic diversity seems to be higher.

The results of the present study show how aggressive periodontal and cariogenic bacteria can persist among the patients' subgingival microbial community even after the improvement of clinical periodontal conditions following the removal of fixed orthodontic appliances.



## EFFECTS OF TOPICAL ADMINISTRATION OF REDUCED COQ10 IN PATIENTS AFFECTED BY PLAQUE-INDUCED GINGIVITIS: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED CLINICAL TRIAL

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### Periodontal Therapy Session – SIdP Research Forum 2015

Oxidative stress plays an essential role in the pathogenesis of periodontal diseases. Ubiquinol (the reduced form of CoQ10) is a potent lipophilic antioxidant capable of regenerating other antioxidants such as tocopherol (Vitamin E) and ascorbate (Vitamin C). Recent studies have also revealed its function in gene expression involved in human cell signaling, metabolism and transport.

This was a double-blind randomized controlled clinical trial with the aim of evaluating the effects of the topical administration of Ubiquinol in patients affected by plaque-induced gingivitis.

Inclusion criteria: at least 18yrs-old patients, GI>1 in at least 6 sites of the treated arch.

Exclusion criteria: heavy smokers (>15 sig/die), patients with severe systemic diseases, patients assuming FANS, antibiotics or vitamins 7 days before the study or during it, patients with a past diagnosis of periodontitis, vegetarians and pregnant women.

A balanced random sequence, stratified by gender and with an allocation ratio of 1:1, was randomly created in Excel by the statistic of the study. Patients were included in the random sequence in the chronological order of their baseline visit.

Examiners, patients, biochemical analyzers and the statistic of the study were all blind to the assignment in the two arms of the study.

Twenty-four patients, subdivided into two groups, took part to the trial: the first group (12) received a reduced coenzyme Q10 gel and the second one (12) a placebo gel. Residual volume of gingival crevicular fluid (vGCF) as primary outcome of the study, GI, PII, the concentration of CoQ10 in the GCF (cCoQ10) and the Total Antioxidant Capacity of the GCF (TAC) were all collected at baseline and after two weeks of therapy.

The average cCoQ10 in GCF at baseline was 3,39+3,22 µg/µL.

In longitudinal analysis the vGCF decreased ( $p<0.05$ ) and the cCoQ10 increased ( $p<0.02$ ) only in the test group. PII decreased in both groups ( $p<0.05$ ), while GI and TAC has shown no variations ( $p>0.05$ ).

At the end of the treatment, the transversal analysis have shown a reduction of the vGCF ( $p<0.02$ ) and an increment of the cCoQ10 ( $p<0.05$ ) in the test group compared to control group, while there have been no disparities in the clinical parameters and for the TAC.

The CoQ10 in GCF, measured at baseline, is the first available value in the literature.

Results of this study show how the reduced form of CoQ10 in topical administration is absorbed by gingival tissues (proved by the increment of cCoQ10) and that this causes a reduction of the vGCF in patients affected by plaque-induced gingivitis. More studies, with a wider sample size, are needed to verify the effects on the clinical parameters.



## SIGNIFICANCE OF A SIMPLIFIED METHOD FOR PERIODONTAL RISK ASSESSMENT IN PREDICTING PERIODON TITIS RECURRENCE DURING SUPPORTIVE PERIODONTAL THERAPY: A RETROSPECTIVE COHORT STUDY

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### Periodontal Therapy Session – SIdP Research Forum 2015

Recently, we proposed a simplified method (UniFe; Trombelli et al. 2009) for periodontal risk assessment. The UniFE method needs to be validated in studies where patients with different periodontal status, history of periodontal treatment and compliance to supportive periodontal therapy (SPT) are long-term evaluated.

The present study was designed to evaluate the association between the individual periodontal risk profile, as calculated with UniFe, and the extent of periodontitis recurrence in a cohort of patients under SPT.

At 2 clinical centers, data were retrospectively obtained from the record charts of patients undergone active periodontal therapy (APT) and enrolled in a SPT program. Patient-related risk scores referred to the first visit following APT were calculated according to UniFe on a 5-point scale ranging from 1 (low risk) to 5 (high risk). Patients were grouped according to risk scores and compared for tooth loss as well as changes in radiographic bone levels and pocket probing depth (PPD) occurred during SPT.

109 patients (age range: 22-62 years) enrolled in a SPT program for a mean of  $5.6 \pm 2.2$  years were included in the study. After APT, 5, 6, 20, 65, and 13 patients showed a risk score of 1, 2, 3, 4 and 5, respectively. The mean number of teeth lost during SPT ranged from 0 to  $1.8 \pm 2.5$  teeth in patients with a risk score of 1 and 5, respectively ( $p = 0.041$ ). Mean bone loss and PPD increase during SPT were both  $\leq 0.50$  mm in all risk groups, without inter-group differences.

Within its limits, the present study indicates that risk assessment according to the UniFe method may help to identify patients at risk for tooth loss during SPT.



## PERIODONTAL SURGICAL APPROACH TO TREAT ODONTOGENIC MYXOMA IN THE ESTHETIC AREA OF MAXILLA: REPORT OF TWO CASES.

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### Periodontal Therapy Session – SIdP Research Forum 2015

The odontogenic myxoma, according to the guide lines of the World Health Organization (WHO), is classified as a benign tumor of ecto-mesenchymal origin which can present or not odontogenic epithelium . The hypothesis is due to the fact that it seems to derive from the dental papilla, even from the dental follicle or the periodontal ligament. The odontogenic origin seems to be confirmed by the site of its occurrence, being almost exclusively localized in the tissues supporting teeth, and occasionally associated with a lacking tooth eruption or the presence of odontogenic epithelium. Radiographically, the tumor appears as a uni or multi locular radiolucent lesion with well-defined margins and trabecular bones conferring to the lesion a characteristic aspect similar to a "bubble soap".

Aim of this report is to describe from clinical and histological point of view two cases of odontogenic myxoma occurring in the esthetic area of the maxilla and their treatment consisted in surgical excision followed by periodontal tissue regeneration techniques.

Two different patients came to visit at the Clinic of Dentistry and Maxillofacial Surgery of the University of Verona both presenting an asymptomatic lesion appeared few months earlier in the upper incisors area. At clinical examination, there was evidence of a rounded new formation of about 1cm diameter, hard-elastic to palpation, localized in the papilla between 1.1-2.1 and 1.1-1.2 respectively. The radiographic examination showed a mesial infrabony defect in the 1.1 in the first case and a distal infrabony defect at 1.1 in the second case with a probing depth respectively equal to 8 and 7 mm. After surgical excision of the lesions both defects were treated with Enamel Matrix Derivative in association with Bio-oss and connective tissue graft.

After 1-year, there was evidence of a good healing of soft and hard tissues without gingival recession or pathologic probing depth. Radiographic examination showed a complete filling of both defects. The histological examination confirmed that both lesions were odontogenic myxoma.

This periodontal surgical approach for the treatment of this kind of lesion seems to give excellent results in terms of soft and hard tissue healing without any pathology recurrence.





## STABILITY OF ROOT COVERAGE OUTCOMES AT SINGLE MAXILLARY GINGIVAL RESSION WITH LOSS OF INTERDENTAL ATTACHMENT: 3-YEAR EXTENSION RESULTS FROM A RANDOMIZED, CONTROLLED, CLINICAL TRIAL

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### Periodontal Therapy Session – SIdP Research Forum 2015

The presence of inter-dental loss of clinical attachment/bone has been traditionally considered a severe limitation in the attempt to obtain Complete Root Coverage (CRC). More recently few clinical studies reported successful outcomes in terms of root coverage also for this type of Recession.

The aim of this study was to assess the stability of root coverage outcomes 3 years after Connective Tissue Graft (CTG) plus Coronally Advanced Flap (CAF) or CAF alone at single maxillary gingival recession with interdental clinical attachment loss.

Twenty-four of the original 29 patients, 13 treated with CAF+CTG and 11 with CAF, were available for the 3-year follow-up. Measurements were performed by a blind and calibrated examiner. Outcome measures included complete root coverage (CRC), recession reduction (RecRed), Root coverage Esthetic Score (RES) and Keratinized Tissue (KT) Gain. Visual Analogue Scale (VAS) was used to evaluate patient satisfaction.

After 3 years, CAF+CTG resulted in better outcomes in terms of CRC ( $p=0.0054$ ) than CAF alone. No difference was detected in term of RecRed, RES score and VAS values. Furthermore, CAF+CTG was associated with higher KT gain than CAF at the last follow-up ( $p<0.0001$ ).

Root coverage outcomes in single gingival recession with interdental CAL loss are stable after 3 years. The application of CTG under CAF was associated with increased probability to obtain CRC than CAF alone at the final follow-up.



## USING OF OZONE-OXYGEN MIXTURE IN COMBINED TREATMENT OF ENDO-PERIO LESIONS

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### Periodontal Therapy Session – SIdP Research Forum 2015

The pulp and the periodontium have close anatomical and vascular pathways of communication. Presence of these pathways potentially provides possibility of formation endo-perio lesion. Microorganisms from oral cavity are an etiological factor of such lesions. Treatment of endo-perio lesion requires interdisciplinary interaction between endodontist and periodontologist. Ozone is useful addition to treatment protocol of endo-perio lesions because of wide antibacterial action and positive effect on local physiological processes.

to evaluate efficiency of ozone-oxygen mixture in combined treatment of endo-perio lesions Class 3a and Class 3b (Simon&Rotstein, 2004).

40 patients were divided into four groups (Test Class 3a; Test Class 3b; Control Class 3a; Control Class 3b). Treatment included RSP, antiinflammatory therapy. In test groups ozone-oxygen mixture (18 sec in periodontal pocket) was added. Clinical (PI, PBI, PD) and laboratory parameters (concentration (pg/ml) of IL-1 $\alpha$ , IL-1 $\beta$  in gingival fluid) were determined at baseline, 1, 3 and 6 months after treatment.

In Test Class 3a and Control Class 3a mean PD decreasing was significant (on 5.8 and 5.0 mm from baseline;  $p < 0.05$ ) respectively) one month after treatment, none needed periodontal surgery. In Test Class 3b and Control Class 3b mean PD and PBI decreasing were significant (on 5.7 and 4.0 mm; on 1.6 and 0.9 scores from baseline;  $p < 0.05$ ), respectively) six months after treatment. In Test Class 3b two (10%) patients needed periodontal surgery, in Control 3b – eight (35%). IL-1 $\alpha$  in Test Class 3a were significantly less than in Control Class 3a three (10.15 $\pm$ 2.687 versus 43.82 $\pm$ 10.76;  $p = 0.013$ ) and six months after treatment (5.9 $\pm$ 1.68 versus 14.33 $\pm$ 3.89;  $p = 0.0078$ ). In lesions Class 3b - no significance. IL-1 $\beta$  was significant as tendency ( $z = 3.725$ ) in Class 3a. In Class 3b – no significance ( $z = 1.663$ ).

Including of ozone-oxygen mixture in treatment protocol of endo-perio lesions allows: for Class 3a - to accelerate treatment effect, for Class 3b– to achieve successful result without periodontal surgery in more cases.



## AN ASSESSMENT OF CLINICAL EFFECTIVENESS OF MODIFIED FLAP OPERATION TECHNIQUE IN MODERATE AND SEVERE PERIODONTITIS.

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### Periodontal Therapy Session – SIdP Research Forum 2015

Increasing amount of patients with moderate and severe generalized periodontitis (MGP, SGP) with probing pocket depth (PPD) of 5-12 mm with on the average of 4-6 periodontal pockets (PP) per 1 sextant became to be reason for development of surgical technique, supplying solution for functional and aesthetic goals.

To assess clinical effectiveness of modified flap operation technique for MGP and SGP cases providing reduction of surgical invasiveness.

30 patients (28-64 y.o.) with MGP and SGP were observed and treated. PPD<sub>0</sub>=5-12 mm, intrabony periodontal defects with an intrabony component, interdental spaces > 2 mm. Periodontal status check-up included: Plaque Index (PI), Bleeding on Probing Index (BOP), Schour & Massler (PMA), PPD, Clinical Attachment Level (CAL), type of exudate in PP (PPE), Gingival recession (GR), panoramic X-ray. Depending on type of flap operation technique, patients were divided into 2 groups: test group -15 patients – modification of Modified Widman Flap (MWF) and control group -15 patients – traditional MWF. The presurgical preparation in both groups included manual and machined scaling, root planning. In test group an additional repeated laser curettage (2 procedures) was applied (diode laser, continuous regimen, 980 nm, 2 Watts) with tip insertion depth 2 mm. The indications for overpassing to surgical phase were: reduction of PI, PMA, BOP, PPD, PPE=0. The modification of flap operation in test group included: fixation of orthodontic buttons on involved and neighbouring to the defect zone teeth, combination of intrasulcular and horizontal incisions in base of interdental papillae and two vertical incisions (4-6 teeth per operating zone). Full thickness vestibular muco-periosteal flap exposition till muco-gingival junction. Ultrasonication of PP (1-2 min). Flap deepithelization by diode laser, grid-like osteotomy and corticotomy of bony pocket walls, ultrasonication (10 sec per each perforation). Bone pockets filled with «Emdogain» (according instruction), autogenous bone. Wound closure with modified single horizontal mattress suture, fixation of proximal thread ends by knots on 2 orthodontic buttons, 2 mm coronally repositioned flap to CEJ. Splinting by soft orthodontic chain with slight tension, protective dressing. Suture removal after 14 days. General therapy – analgetics, antiedematous medications, course – 5 days. Control observations on 5,7,14 day; 6,12 months.

The comparison of clinical results in both groups revealed enhancement of clinical condition in patients of test group. Elimination of general inflammatory reaction signs on 2-3 days earlier comparing to data from control group, sufficient wound closure, sutures tension saving and coronal flap reposition, absence of gingival recession during 14 days postoperation. After 12 months: PPD reduction on 2-3 mm, CAL reduction - 2 mm, PPE=0, BOP=0 and minimal gingival recession - PPD<sub>0</sub>=5-7 mm – GR=1-2 mm; PPD<sub>0</sub>≥7mm – GR=2-4 mm. In patients of control group after 12 months periodontal status was worse due to substantial increased recession: PPD<sub>0</sub>=5-7 mm - GR≥ 2-4 mm; PPD≥7 mm- GR≥ 4-5 mm.

Clinical approbation of modified minimally-invasive surgical operation in patients with moderate and severe GP has certain benefits comparing to traditional flap operation technique.



# PERIODONTAL HEALING OF MANDIBULAR SECOND MOLAR FOLLOWING THE EXTRACTION OF MANDIBULAR THIRD MOLAR. A BAYESIAN NETWORK META-ANALYSIS FOR THE IDENTIFICATION OF THE BEST SURGICAL TECHNIQUE

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## Periodontal Therapy Session – SIdP Research Forum 2015

**Aims:** To perform a systematic review and Bayesian network meta-analysis (NMA) of randomized controlled trials (RCTs) on effectiveness of surgical interventions for removal of mandibular third molar (M3M) on periodontal healing of adjacent mandibular second molar (M2M).

**Materials and Methods:** Medline, Cochrane and Embase databases were searched to identify RCTs up to 5 November 2014. Patients with M3Ms fully developed, unilaterally or bilaterally impacted, were considered. Outcomes were clinical attachment level gain (CALg) and probing pocket depth reduction (PPDr) with a follow-up longer or equal to 6 months.

**Results:** 16 RCTs were included and categorized in 4 groups investigating: regenerative/grafting procedures (10 RCTs); flap design (3 RCTs); type of suturing (1 RCT); and periodontal care of M2M (2 RCTs). Eleven studies were at high risk of bias. Guided tissue regeneration (GTR) with resorbable (GTRr) and non-resorbable (GTRnr) membrane, and GTRr with anorganic xenograft (GTRr+AX) resulted showed the highest mean ranking for CALg (2.99; 2.80; and 2.29, respectively) and PPDr (2.83; 2.52; and 2.77, respectively). GTRr+AX showed the highest probability of being the best treatment both for CALg (Pr=45%) and PPDr (Pr=32%).

**Conclusions:** GTR-based procedures with or without combined grafting therapies provide some adjunctive clinical benefit compared to standard non-regenerative/non-grafting procedures.



## DENTAL CARE IN PATIENTS WITH DIFFERENT PSYCHOLOGICAL CHARACTERISTICS

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### Peri-implant Therapy Session – SIdP Research Forum 2015

There is an inherent problem that individuals tend to find it difficult to remain highly motivated towards maintaining and improving their health.

The aim of the study is to create efficient programs for periodontal disease prevention with the account of patient's individual psychological status.

140 individuals participated in the study. The dental examination assessed dental status, oral hygiene index, periodontal index and a questionnaire inquiring about the patient's reasons for visiting the dentist. The following psychodiagnostic tests were performed: the Interpersonal Diagnosis of Personality, Big Five Personality Test, Rotter's Locus of Control Scale, Anxiety test after patient's informed consent.

The study found good agreement ( $p < 0,05$ ) between personality type (style interactions of personality) and attitude to personal dental health and prophylaxis.

Emotionally stable, extroverts with low levels of anxiety and prone to competitive style interactions were observed to have the highest rate of cooperation (readiness to comply with recommendations) ( $m = 6,0 \pm 1,4$ ;  $p < 0,05$ ), as well as the psychological resources (learning capability, openness to new experiences and readiness to perceive information), regularly follow dentist's recommendations, replace their toothbrush regularly and use foreign brands of toothpaste.

Patient's with responsible altruistic and aggressive-independent style of interactions are the second most compliant with the hygienic prescriptions, with high rates of cooperation and psychological resources. This type of patient visits their dentist on a regular basis. The patient's who are prone to distrust and are withdrawn (rebellious style) were found to have the lowest self-organization and self-control rates ( $m = 1,6 \pm 1,3$  и  $m = 1,0 \pm 0,5$ ) and psychological resources ( $m = 3,0 \pm 0,1$ ), rarely visit the dentist (as problems arise).

It is important for consultant physicians to select psychological and educational strategies and use an approach that takes into account a patient's individual personality traits in order to educate them in proper care of their teeth, motivate them for a healthier lifestyle, and have them adhere to medical recommendations and the rules of efficient dental care" behavior.



## SEM AND PROFILOMETRIC ANALYSES OF SMOOTH SURFACES OF TITANIUM IMPLANTS CLEANED WITH 3 INSTRUMENTATIONS

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### Peri-implant Therapy Session – SIdP Research Forum 2015

Dental implants require regular maintenance of smooth surfaces. It's crucial that the instrument used for clinic maintenance be able to remove ecosystems without causing damage to the implant surface. Several instrumentation may be useful for this maintenance, but studies of their effect are actually inconclusive.

This study compares the effect of cleaning treatment of titanium implants using low-vacuum scanning electron microscopy (LV-SEM) and white-light confocal (WLC) profilometry to analyze curved surfaces.

One sector of each titanium implants screwed to their abutments was left unprocessed (Us) or cleaned for 60 seconds, to simulate a single cleaning session, or for 180 seconds to simulate a series of sessions. Three types of instrumentation were randomly used on 60 implants: (Sc) stainless-steel Gracey curette; (Tc) titanium Langer curette; and (Pu) an ultrasonic device with the probe covered with a plastic tip. The morphology of the implant surfaces was analyzed by LV-SEM, without metal sputtering. Quantitative evaluations of the roughness of surfaces were then performed using a WLC-profilometer. The Kruskal-Wallis followed by the Dunn multiple comparison test were used in statistical comparisons.

The unprocessed surfaces showed the presence of thin transverse ridges and grooves, i.e. a polarized surface roughness, being substantially compromised after Sc instrumentation. Small surface alterations, increasing with time, were also recorded after Tc and Pu instrumentation, although to a lesser degree. The gap of the fixture-abutment connection appeared almost completely clean after Tc, clotted with titanium debris after Sc, and with plastic debris after Pu treatment. The mean roughness (Ra) was unchanged after Pu, increased after Sc and decreased after Tc treatment, when compared with Us, but without statistical significance. The Rz roughness parameter, calculated along the fixture X-axis, was significantly greater after Sc treatment when compared with Us, Tc and Pu, whereas the differences between Tc, Pu and Us were not significant. All Rz roughness parameters of Sc, Tc and Pu, calculated along the fixture Y-axis, resulted almost identical and significantly lower than that of Us.

Within the limitations of this study, a careful use of a titanium curette could produce a slight smooth surface alteration, particularly over prolonged treatments and may be more beneficial than the other treatments examined for stable ecosystem removal.





## IN VIVO EVALUATION OF GINGIVAL TISSUE REACTION TO COMPOSITE RESIN RESTORATION – A PILOT STUDY

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### Peri-implant Therapy Session – SIdP Research Forum 2015

Composite cements are extensively used to treat crown and dental neck defect. One of the most important problem to know the successful usability of these materials almost in the coronal part of dental root. No information exists about the behavior of human gingival tissue close to these kind of materials.

This study analyzes the reaction of the human gingival to composite build up performed in the dental neck area and the coronal part of the dental root.

In 8 healthy patients with almost one tooth jeopardized at the neck/root zone and requiring endodontic detoxification therapy, and after crown lengthening surgical procedure to restore the physiological length of the biological space, composite build up (Esthet.X®) was necessary to ensure marginal tissue stability and secure dental dam apposition. During the crown lengthening, 3 months after the Esthet.X® build up, the secondary flap was harvested, fixed in buffered 4% paraformaldehyde, ethanol dehydrated and methyl methacrylate embedded. Three micron section were obtained from biopsies and the intensity of inflammation was evaluated after Gomori trichrome or hematoxylin-eosin stain using a grade scale.

The corion showed an uneven distribution of inflammatory cells, both in gingival close to the Esthet. X® restored portion and the tooth hard tissues. The inflammation grade varied from severe to weak. The statistical analysis performed using the Mann-Whitney test did not show any significant difference in the gingival tissue close to the restoration or hard tissue surface.

Within the limitations of this pilot study, the results seem to indicate that use of this kind of composite does not so much alter greatly the gingival tissue, as the patient lifestyle or dental hygiene.



## INFLUENCE OF IMPLANT ABUTMENT MATERIAL ON THE BACTERIAL ACCUMULATION AND COLONIZATION. AN IN VITRO STUDY

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### Peri-implant Therapy Session – SIdP Research Forum 2015

Implant dentistry changed significantly over the years and success of osseointegration switched the attention to different aspects. In recent years, peri-implantitis became more and more analyzed as bone loss has been experienced around many different implants. As a result of multiple factors, prosthetic components have been included among the possible causes of peri-implant bone loss. In particular, different materials might have different impact on peri-implant soft tissue and on different pattern of bacterial plaque accumulation

The purpose of this laboratory research was to assess the bacterial colonization of the abutments and to determine which disinfectant system was more effective in reducing the bacterial contamination.

Four kind of pre-fabricated abutment were analyzed: 1) machined pure titanium abutment without anodization, 2) machined pure titanium abutment gold hue (anodized), 3) machined pure titanium abutment pink hue (anodized) and 4) zirconia abutment with titanium connector. Initially, sterile abutments were immersed for 5 minutes into separate bacterial suspension (*Staphylococcus haemolyticus*, *Streptococcus pyogenes* and *Escherichia coli*). All four abutments were contaminated with  $2 \times 10^6$  of each bacterial species suspension and compared under the following conditions: 1) no treatment, 2) 10 minutes washes with sterile water, 3) 10 minutes washed with chlorhexidine 0.05 %. Residual microbes were plated in blood-agar plates for 24-48 hrs. The microbial abatement was measured by observing microbial growth in each plate. All tests were repeated 3 times and data were statistically analyzed according to ANOVA and student t-test

Contaminated abutments without cleaning treatment showed a growth until the third quadrant of the culture plate. Water washing significantly reduced bacterial growth ( $p < 0,05$ ). Chlorhexidine washing completely prevented bacterial growth.

No statistically significant difference was found in terms of bacteria adhesion and growth between different groups of abutments employed.

All the abutments considered in the study displayed similar characteristics in regards to bacterial adhesion and growth. Low concentration of chlorhexidine efficiently prevented bacterial growth, regardless of the type of abutment considered.



## HOW IMPLANTOPLASTY MODIFIES PLAQUE ACCUMULATION. A PILOT STUDY

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### Peri-implant Therapy Session – SIdP Research Forum 2015

In treatment of peri-implant disease implantoplasty has been proposed to make the implant surface less attractive for bacteria plaque. This procedure includes removing the threads, smoothing and polishing the surface of the implant with rotatory instruments. It can be associated with different surgical approaches for the treatment of peri-implant defects such as access flap, resective and regenerative surgery.

The efficacy of implantoplasty in association with resective surgery has already been observed in a clinical trial, but it is still not clear how surface modification influences plaque adhesion.

Aim of this study was to assess the effects of implantoplasty on the amount and organization of bacteria plaque that adhere to the implant surface.

Two identical implants, one treated with implantoplasty and one untreated (with surface etched and coated with nano sized calcium phosphate particles), were fixed on the two sides of an occlusal bite. One volunteer wore the bite for five days without interruptions with the exception of the time required for meals and daily oral care; every twenty-four hours standardized photographs of the two implant surfaces were taken and the area covered by plaque was measured on both implants. At the end of the five days, implant surfaces were observed through a scanning electron microscope (SEM).

Quantitative evaluation evidenced that, after five days, the surface covered by plaque was 5.9 times less for implant treated with implantoplasty than for untreated implant.

SEM observation showed a significantly different organization due to the surface treatment: isolated corpuscles similar to bacteria were observed on the treated implant. Contrariwise, on the untreated implant an aggregate of particles that resembled biofilm was found.

Implantoplasty seems to reduce plaque adhesion and at the same time it influences plaque organization on implant surface; if these data will be confirmed through similar studies with larger samples, implantoplasty should be encouraged for the treatment of peri-implantitis. Further microbiological investigations are needed to identify which bacterial species are inhibited through surface modification.



## EFFICACY OF NON-SURGICAL AND SURGICAL THERAPY IN THE TREATMENT OF PERI-IMPLANTITIS: A SUB-GROUP META-ANALYSIS

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### Peri-implant Therapy Session – SIdP Research Forum 2015

Over the past decades the placement of dental implants has become a routine procedure in the oral rehabilitation of fully and partially edentulous patients. However, the number of patients/implants affected by peri-implant diseases is increasing.

We designed a systematic review and meta-analyses to assess the clinical performance of therapeutic approaches to peri-implantitis (PI) in terms of probing pocket depth reduction (PD) and bleeding on probing (BoP).

RCTs on PI treatment with at least 10 subjects per group and 6 months follow-up were included through electronic databases and hand-searched journals (until September 2014), according to PRISMA statement. Screening, data extraction, and quality assessment were conducted independently by two reviewers. PD and BoP were chosen as primary outcomes. Weighted means and forest plots were calculated overall and in sub-group analysis according to the treatment techniques.

14 trials meeting the inclusion criteria (9 non-surgical and 5 surgical, 427 patients). The overall weighted mean differences (WMD) for PD reduction related to PI were 0.71 (CI:[0.47, 0.95],  $p < 0.01$ ), respectively 0.68 mm (CI: [-0.09, 1.46],  $p < 0.085$ ) for non-surgical instrumentation, 0.73 mm (CI: [-0.54, 0.91],  $p < 0.001$ ) for Airflow instrumentation, 0.89 mm (CI: [0.56, 1.21],  $p < 0.001$ ) for laser application. Surgical therapy of PI showed an overall WMD for PD reduction of 2.18 (CI:[1.90, 2.46],  $p < 0.01$ ), respectively 3.63 mm (CI: [1.89, 5.37],  $p < 0.001$ ) for open flap debridement and 2.58 mm (CI: [2.35, 2.08],  $p < 0.001$ ) for guided bone regeneration.

The overall WMD for BoP reduction for surgical treatment was 47.16% (CI: [39.83, 54.48],  $p < 0.01$ ) and 37.62% (CI: [22.49, 52.84],  $p < 0.01$ ). Six (6) months after treatment reduction of PD and improvement of BOP is noted after both non-surgical and surgical treatment. Thus, data should be cautiously interpreted because the quality of the overall literature is limited.



## THE HUMAN OSTEOGENOUS PROGENITOR BONE-MARROW CELLS ACTIVITY UNDER ACTION OF “EMDOGAIN” (STRAUMANN), EX-VIVO STUDY

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The modern surgical techniques of periodontal treatment became to be minimally invasive ( Harrel S.K., Rees T.D. 1995; Cortellini P., Tonetti M. 2005, 2007, 2009; Zuhr O., Hürzeler M., 2012) basing on knowledge about complexity of periodontal tissues structure and aim to complete regeneration of lost periodontal tissues. Taking into consideration the specific demands during usage of “Amdogain” according instruction, some amount of the material and additional components, like EDTA, may contact with tooth root but also spread on the prepared bone surface of periodontal pocket. The detailed knowledge about material components influence on vital human bone cells may be useful for understanding of general regenerative tendency of bone tissue in area of periodontal pocket and for practical usage, excluding negative influence on vital periodontal cells, including human osteogenous progenitor bone cells.

To investigate the direct action of “Amdogain” on osteogenous progenitor cells - colony-forming fibroblast units (CFFU) of human bone-marrow ex vivo and to evaluate its osteoinductive properties.

Cloning of CFFU of human bone-marrow was provided according to methodic of Fridenshtein O.Y. (1973) in modification of Astachova V.S. (1982). The cancellous iliac bone was taken from healthy patients out of inflammatory and degenerative-dystrophic lesions. The 4 experimental series of CFFU cloning of human bone-marrow were provided: 1 group – with adding of etching gel “Pref-Gel”; 2 group – with adding of “Pref-Gel” with “Amdogain”; 3 – with adding of “Amdogain” only and 4 – without adding of any preparations (control). The action was evaluated according to cloning effectiveness of CFFU of human bone-marrow among 105 nucleus-containing cells. 9 experimental and 6 control colonies were cultivated.

In 1 and 2 groups the growth of stromal fibroblasts wasn't detected. The effectiveness of CFFU cloning=0. In 3 group in the mean 145 colonies of CFFU grew up with cloning effectiveness of  $15,10 \pm 0,95$ . In control group in the mean 120 colonies grew up. The cloning effectiveness was  $12,48 \pm 1,24$  among 105 nucleus-containing cells. Ad oculus the colonies from control and investigated groups weren't differ from each other.

“Pref-Gel” and combination of “Pref-gel” with “Amdogain” completely depresses proliferation and differentiation of CFFU in human bone-marrow ex vivo. “Amdogain” on 20,8% in comparison with control group, enhances amount of CFFU colonies in bone-marrow, increasing specific gravity of multilayer colonies, giving evidence about its osteoinductive properties.



## PREVALENCE AND INCIDENCE OF PERI-IMPLANT MUCOSITIS AND PERI-IMPLANTITIS IN FULL-ARCH FIXED RESTORATIONS SUPPORTED BY FOUR IMPLANTS. A RETROSPECTIVE STUDY WITH UP TO 10 YEARS OF FOLLOW-UP

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The use of a combination of two tilted and two axial implants to support full-arch restorations was validated in terms of implant survival rate in short and medium term. Nevertheless biological and technical complications were described. Late biological complications following dental implant therapy, consisting in peri-implant mucositis and peri-implantitis, nowadays are receiving increasing interest in the scientific literature. However recent reviews show that there is still lack of data about their epidemiology in different types of rehabilitations, and the high quality studies presented contrasting results.

The objective of this study was to evaluate the prevalence and incidence of peri-implant mucositis and peri-implantitis in immediate full-arch rehabilitations supported by two axial and two tilted implants.

Sixty-nine patients were included in the study. Each patient was treated with a fixed full-arch prosthesis supported by two mesial axial and two distal tilted implants to rehabilitate the maxilla, the mandible or both. Three-hundred thirty-six implants accounting for 84 restorations were placed. Patients were scheduled for follow up visits every 6 months in the first 2 years after surgery and yearly after.

In every follow up visit professional oral hygiene treatment was performed, detailed oral hygiene instructions were given to the patient and plaque index, bleeding index and probing depth were recorded. Peri-implant mucositis (BI > 1) and peri-implantitis (BI > 1, PD > 4 mm, detectable radiographic bone loss) were diagnosed.

The overall follow up range was from 1 to 10 years after surgery (mean 5.2 years). The prevalence of peri-implant mucositis varied from 0 to 7.14% of patients and from 0 to 5.06% of implants. Three patients presented peri-implantitis. The prevalence of peri-implantitis ranged between 0 and 4,55% of patients and between 0 and 3,81% of implants. One implant was lost due to peri-implantitis after 5 years from loading. No significant differences were found between smoker and no-smoker patients.

79,8 % of the considered rehabilitations were positioned in patients with history of periodontitis and 20,2 % in patients with no history of periodontitis. All patients that presented peri-implantitis had a history of periodontitis without a previous diagnosis of peri-implant mucositis

**The use of immediate loaded full-arch prosthesis supported by two mesial axial implants and two distal tilted implants is a viable rehabilitation option, considering the lower rate of peri-implant mucositis and peri-implantitis than it was found in literature.**

However a meticulous attention to the hygienic conditions and the adoption of a systematic follow up schedule is necessary.

Further long-term studies are needed in order to achieve a better understanding of risk factors for peri-implant mucositis and peri-implantitis and validate effective preventive and therapeutic protocols.