



Implantatstudie 2010

Quantitative und qualitative Elementanalyse
von Implantatoberflächen mit dem REM

REM Bilder und EDX-Analysen

Champions Kugelkopf (602480)

Stand: 09.09.2010

Projektverantwortlich:

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Leiter Oberflächenanalysen

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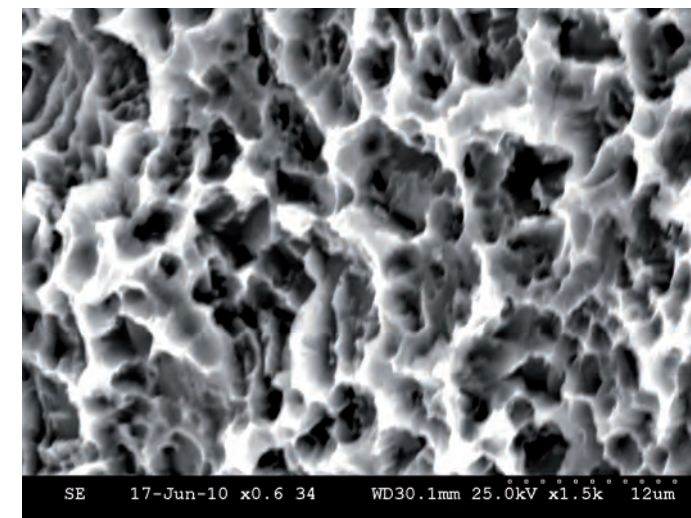
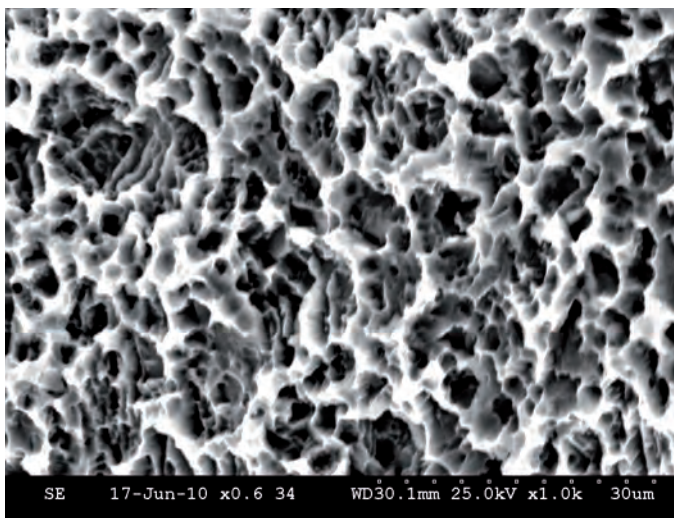
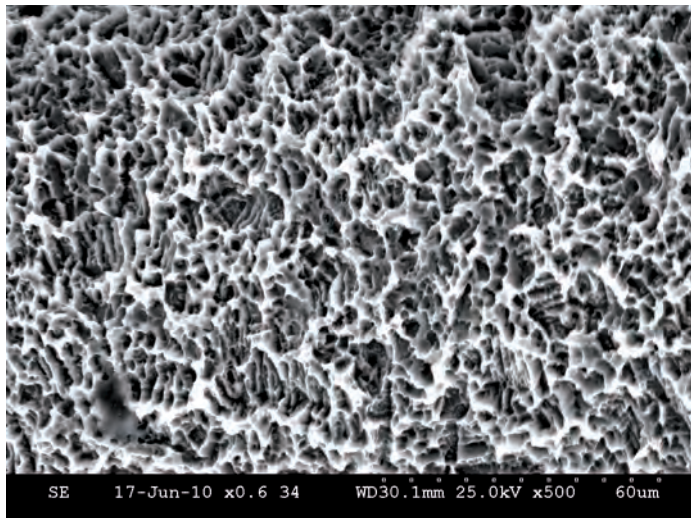
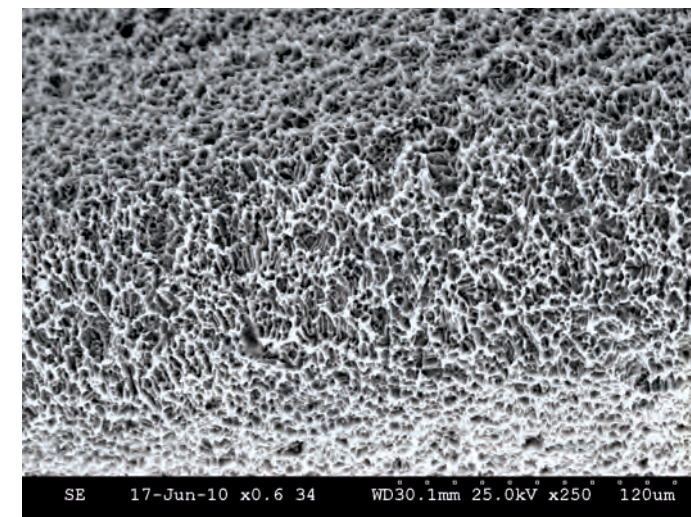
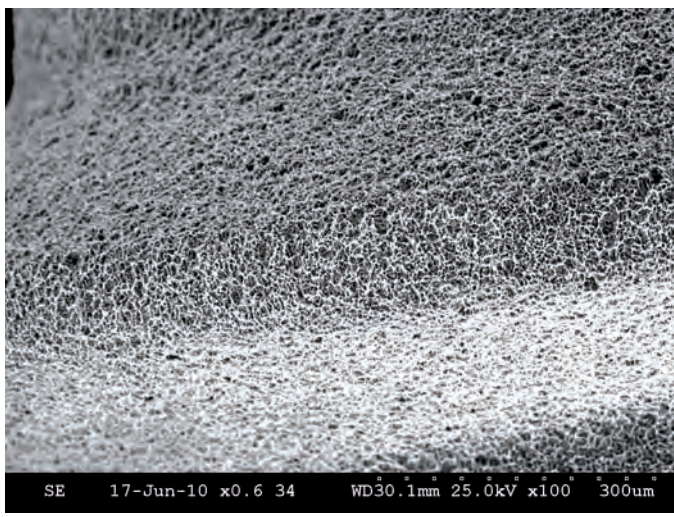
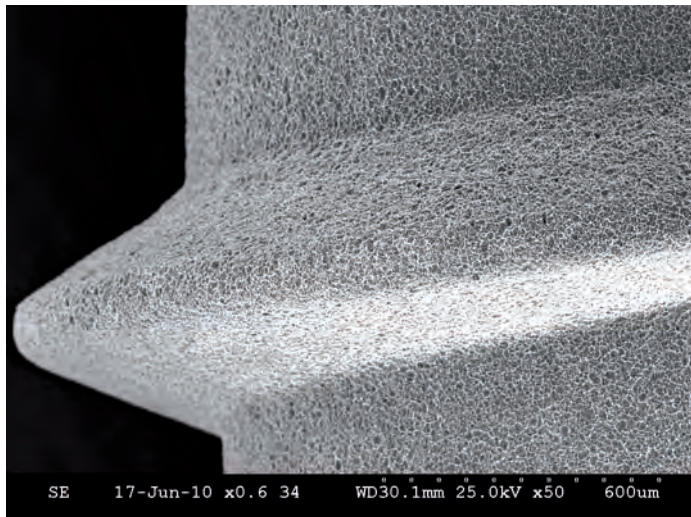
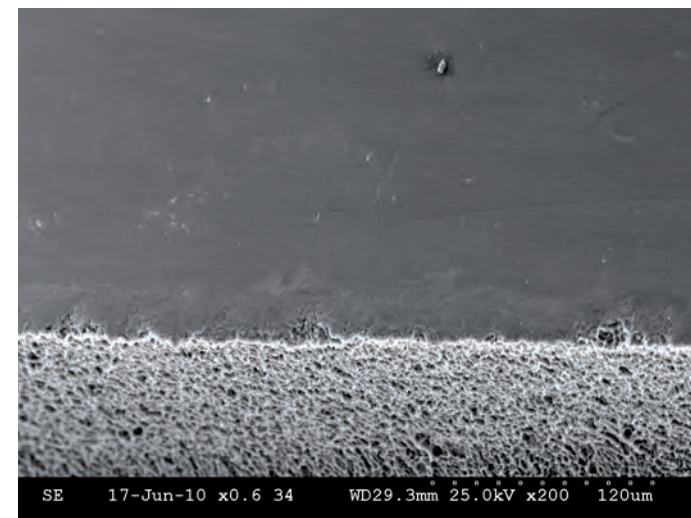
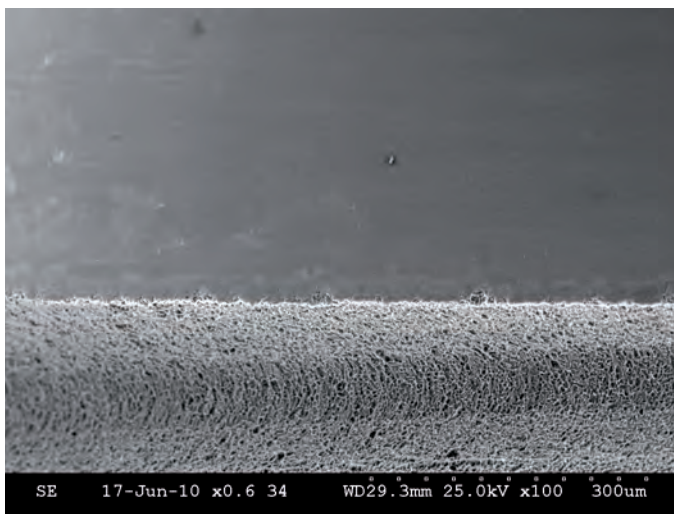
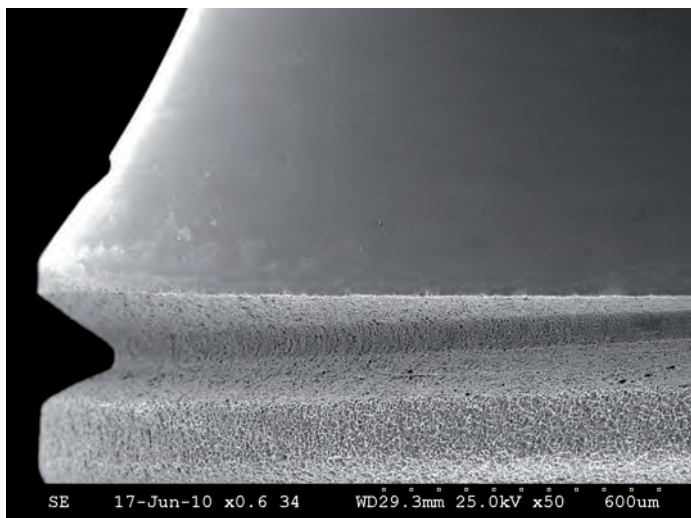
In Kooperation mit dem Q+R Ausschuss des BDIZ EDI
Bundesverband der implantologisch tätigen Zahnärzte in Europa

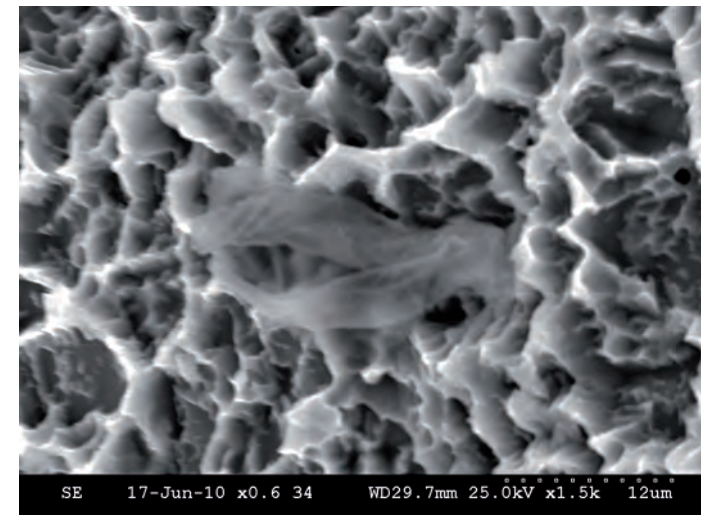
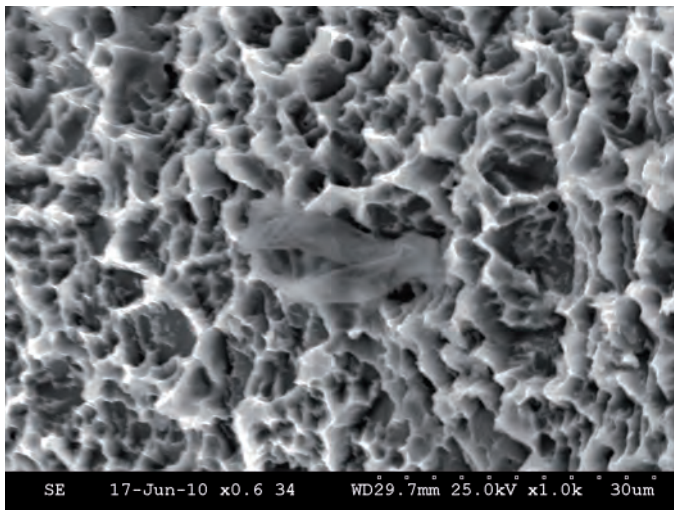
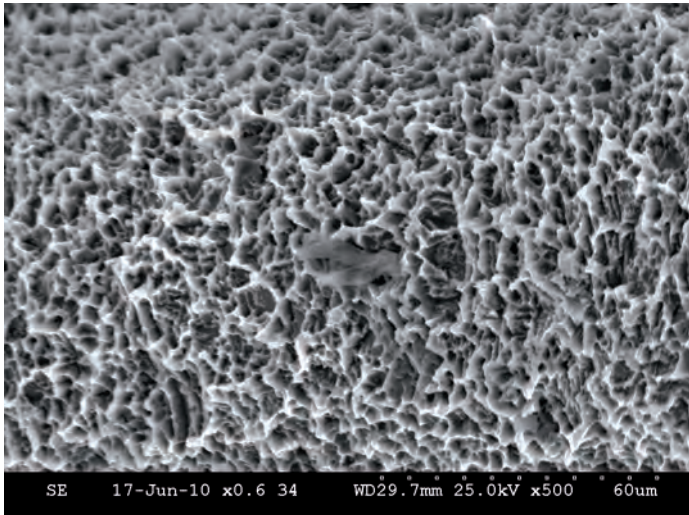
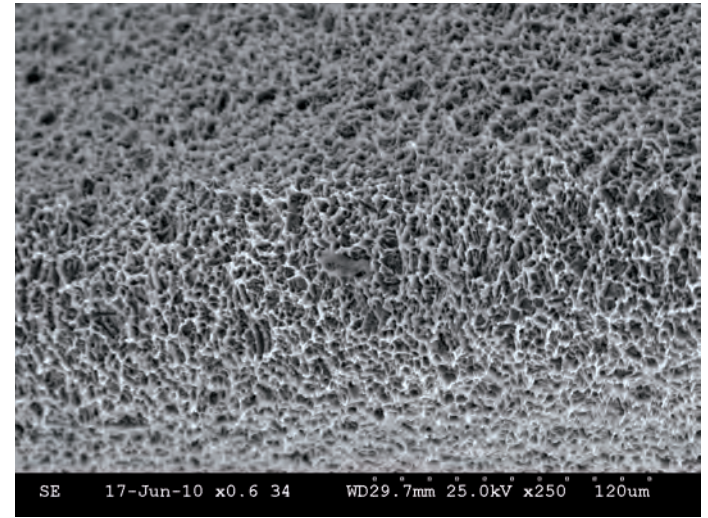
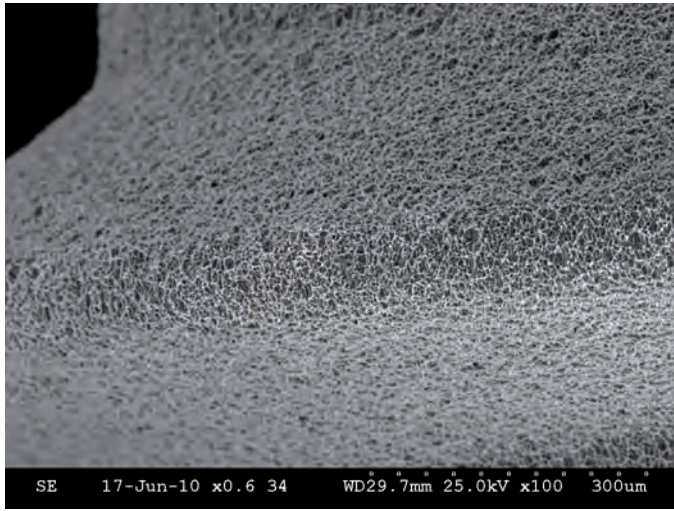
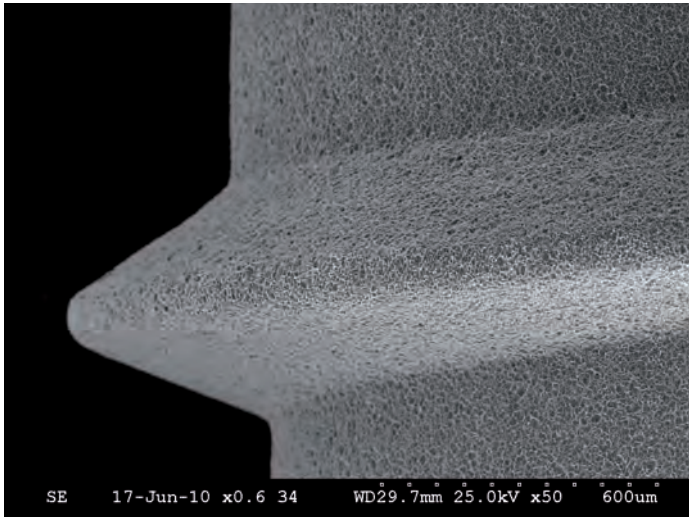
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REM Bilder - SE

Champions Kugelkopf (602480)



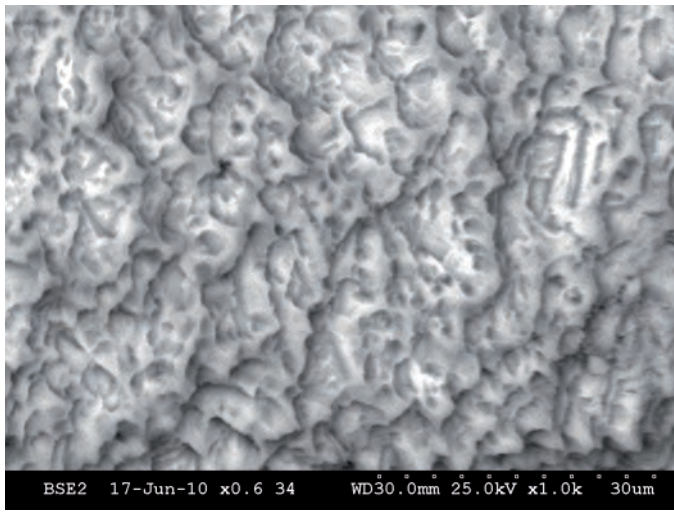
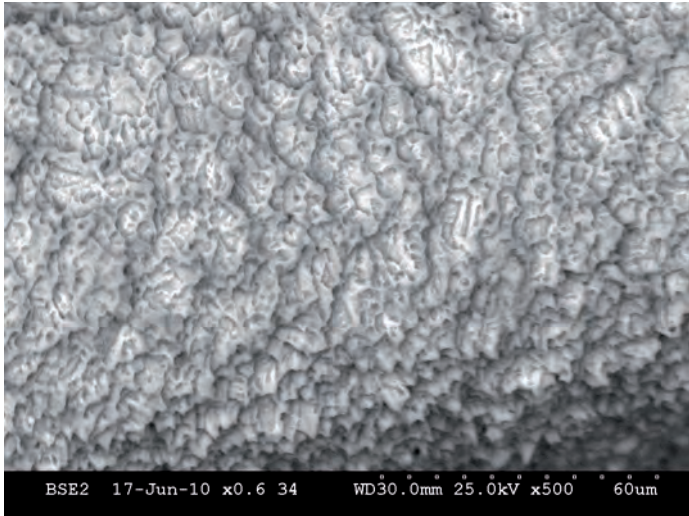
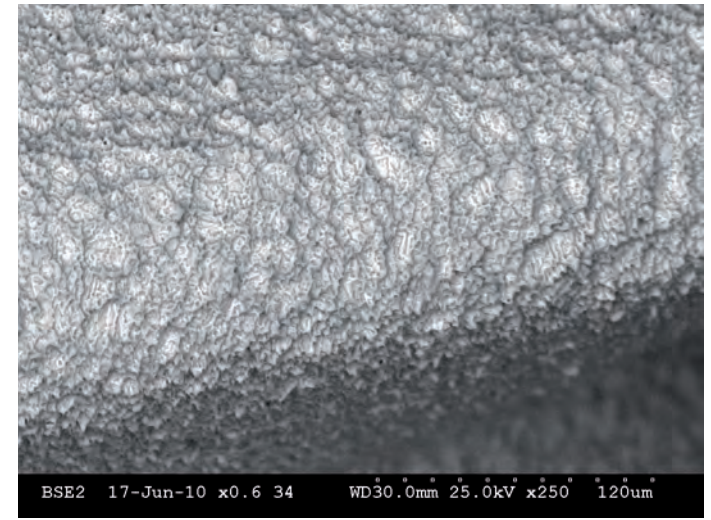
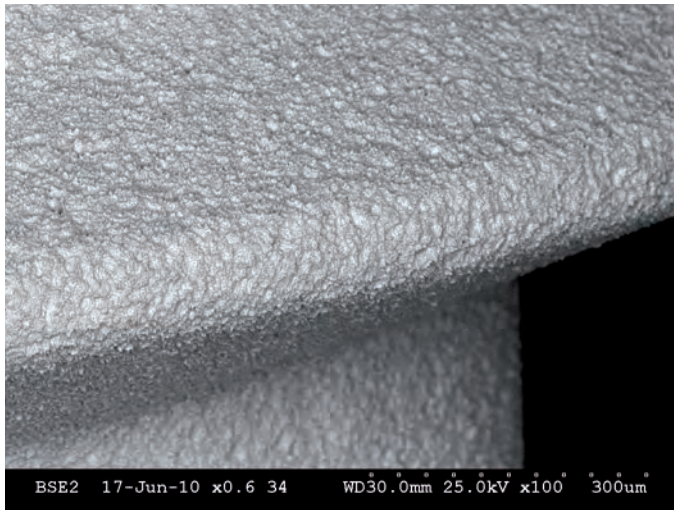
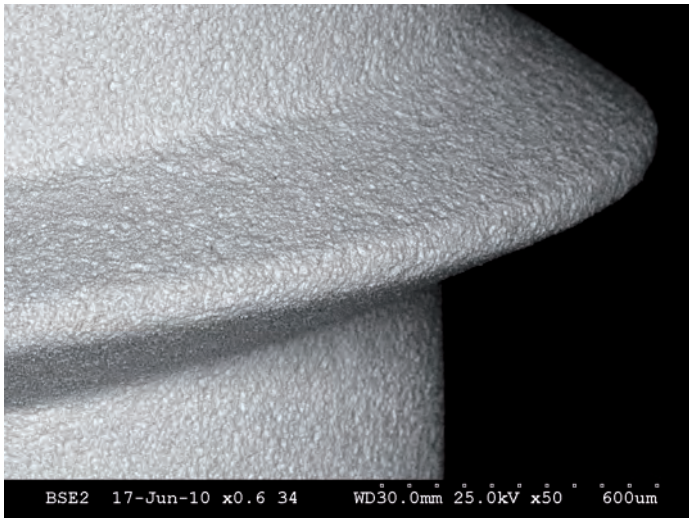


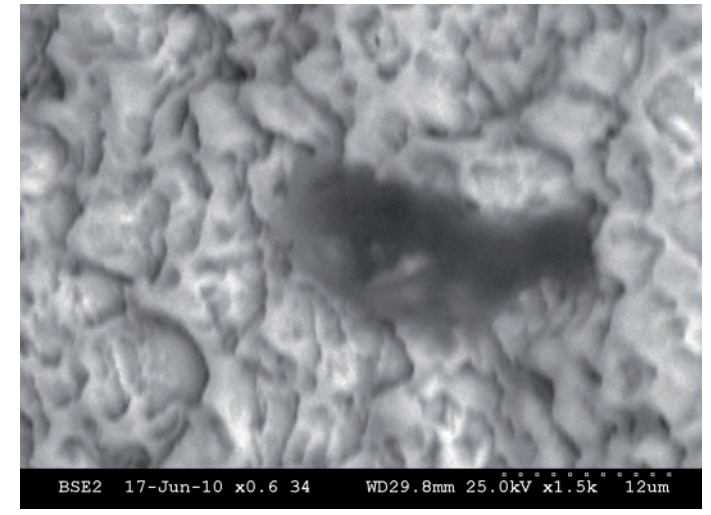
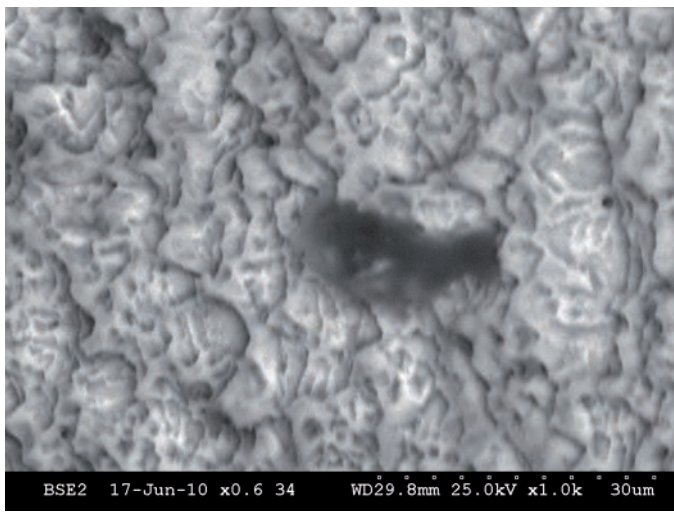
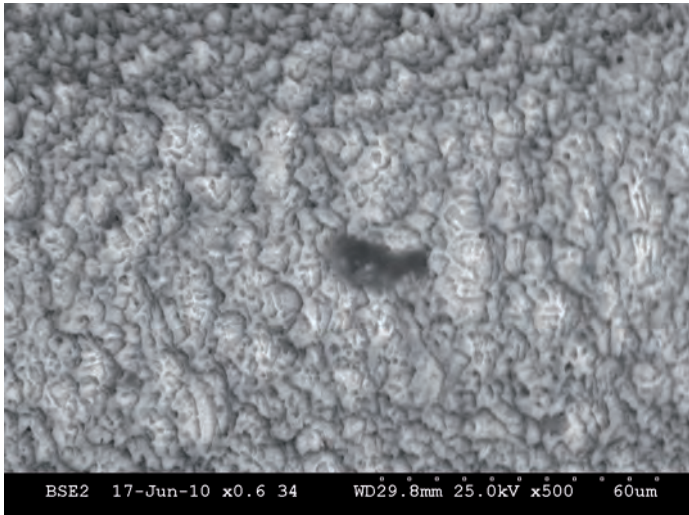
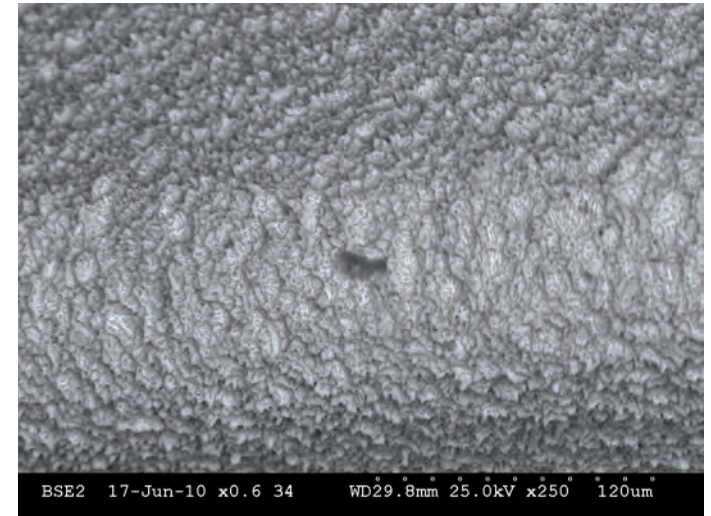
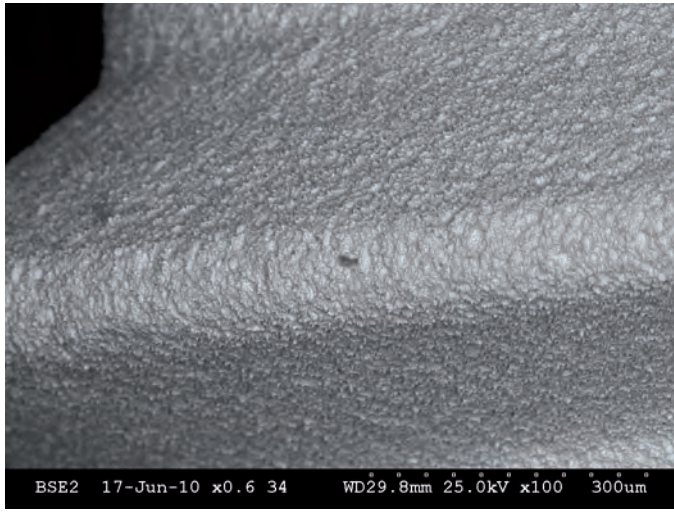
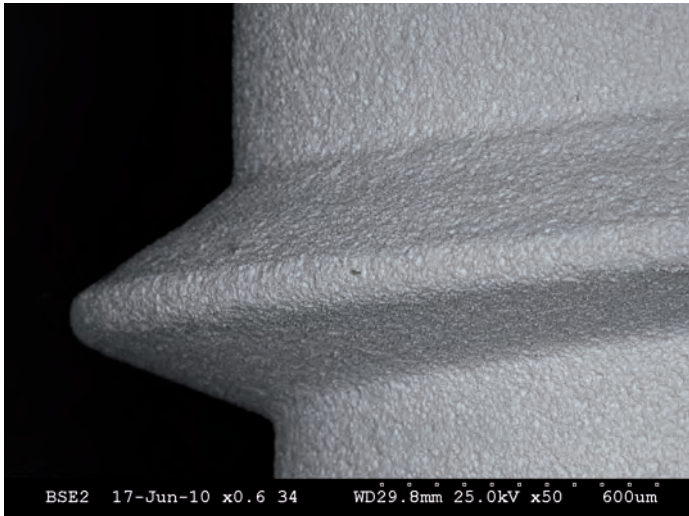
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REM Bilder - BSE

Champions Kugelkopf (602480)





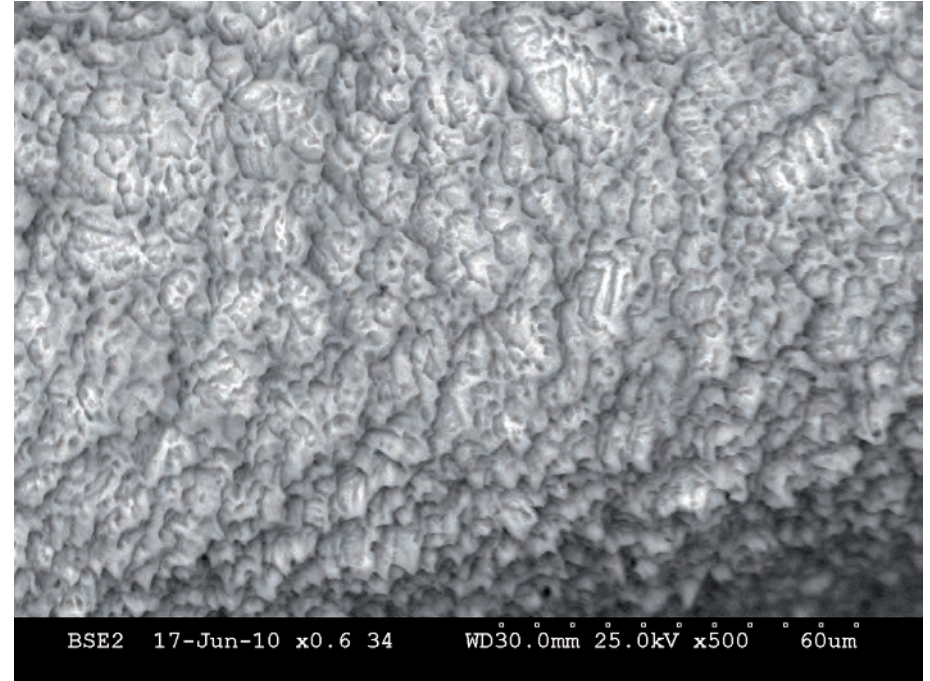
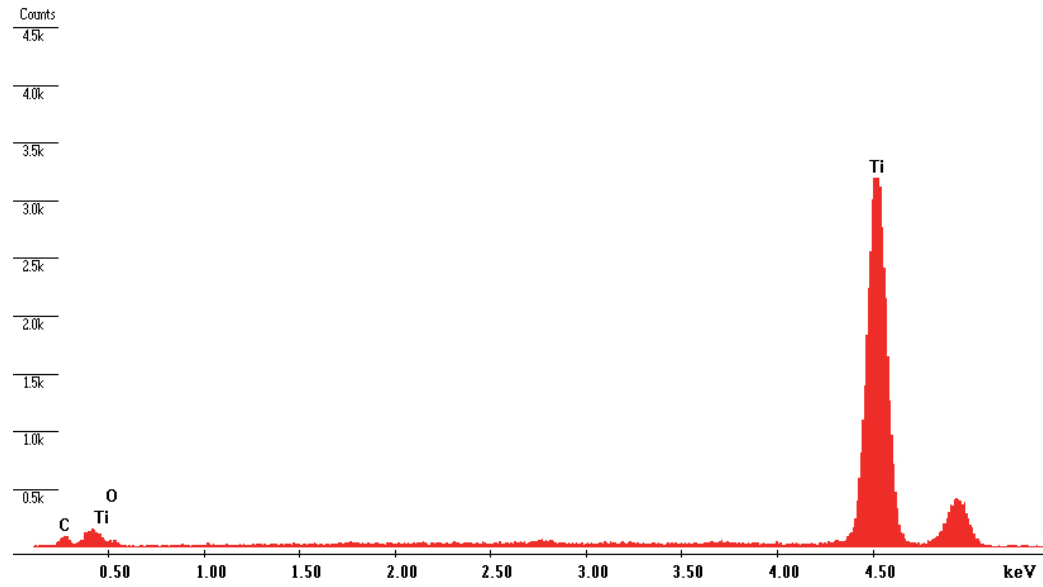
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EDX - Analyse

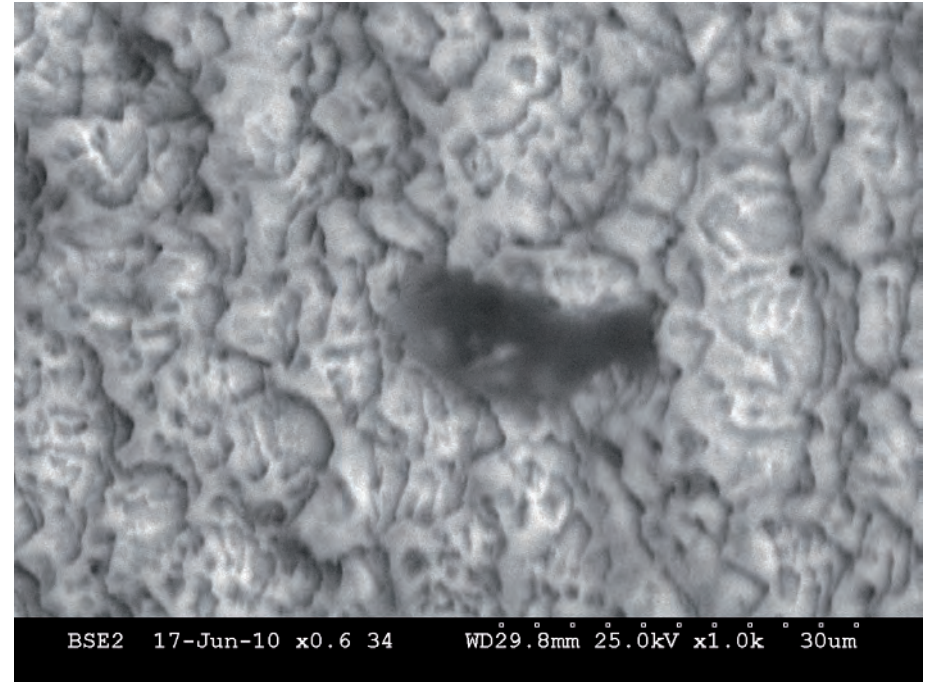
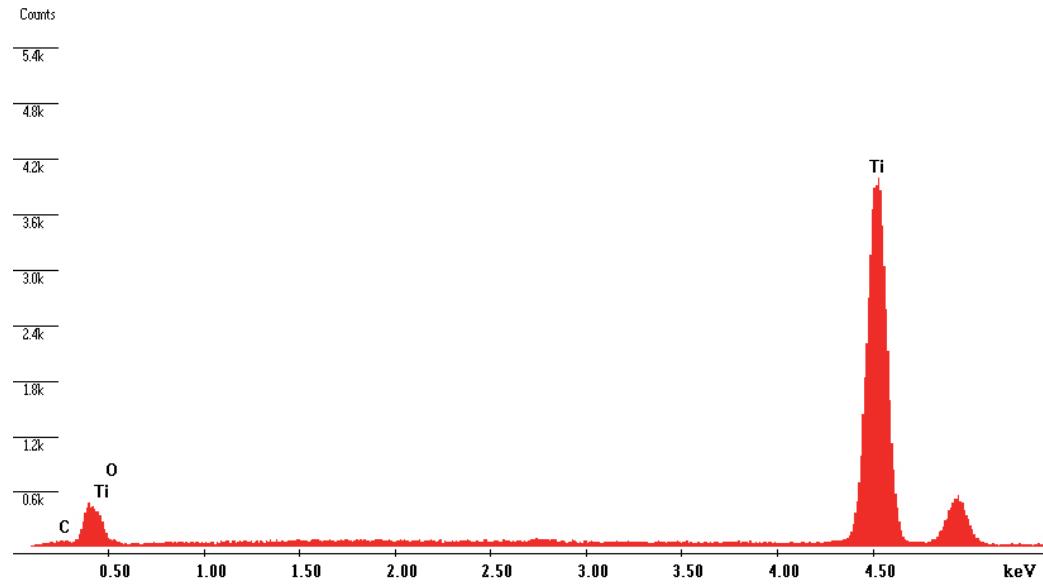
Champions Kugelkopf (602480)

Label A:



Element	Wt %	At %
O K	2.50	7.13
Ti K	97.50	92.87
Total	100.00	100.00

Label A:



Element	Wt %	At %
C K	10.18	7.13
O K	6.02	12.66
Ti K	83.80	58.84
Total	100.00	100.00

Histologic and histomorphometric evaluation of peri-implant bone subjected to immediate loading: an experimental study with *Macaca fascicularis*.

Romanos GE, Toh CG, Siar CH, Swaminathan D.

Johann Wolfgang University, Dental School Carolinum, Department of Oral Surgery, Frankfurt, Germany. Dr.G.E.Romanos@t-online.de

Abstract

PURPOSE: Immediately loaded splinted implants can become osseointegrated when they are placed in the anterior part of the mandible. The concept of immediate loading has not been well examined in the posterior mandible. The aim of this study was to evaluate the hard tissue reactions around immediately loaded implants placed in the posterior mandible in the monkey model.

MATERIALS AND METHODS: Six adult *M. fascicularis* monkeys were used in this study. Thirty-six Ankylos implants (Degussa Dental, Hanau-Wolfgang, Germany) were placed after extraction of the second premolar, first, and second molar teeth and complete healing of the sockets. Control (C) group implants were placed and, after osseointegration, were loaded for 1 month using temporary acrylic resin prostheses and later for 2 months using splinted metal crowns. In the contralateral region of the mandible, test (T) group implants were placed and loaded immediately with the same sequence as carried out for the C implants. After sacrifice of the animals, specimens were examined histologically and evaluated histomorphometrically.

RESULTS: All implants were osseointegrated. Compact, cortical bone in contact with the implant surface without any gaps or connective tissue formation was demonstrated.

DISCUSSION: Histomorphometric findings of the bone-implant-contacts showed no significant differences between the T and C group implants. Peri-implant mineralized bone areas presented statistically significant differences and showed a higher density of bone between the threads of immediately loaded implants ($P < .05$).

CONCLUSIONS: Immediately loaded splinted implants in the posterior mandible can become osseointegrated with a hard tissue peri-implant response similar to that of delayed loaded implants. Moreover, immediate loading seems to increase the ossification of the alveolar bone around endosseous implants.

PMID: 11858574 [PubMed - indexed for MEDLINE]

Histologic and histomorphometric evaluation of peri-implant bone subjected to immediate loading: an experimental study with *Macaca fascicularis*.

Romanos GE, Toh CG, Siar CH, Swaminathan D.

Johann Wolfgang University, Dental School Carolinum, Department of Oral Surgery, Frankfurt, Germany. Dr.G.E.Romanos@t-online.de

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PMID: 11858574 [PubMed - indexed for MEDLINE]

Treatment of advanced periodontal destruction with immediately loaded implants and simultaneous bone augmentation: a case report.

Romanos GE.

Department of Oral Surgery and Implantology, Dental School (Carolinum), Johann Wolfgang Goethe-University, Frankfurt, Germany.

Dr.G.E.Romanos@t-online.de

Abstract

BACKGROUND: Advanced periodontal destruction is often associated with extraction of the teeth. Oral rehabilitation in these cases may include the traditional prosthetic restoration or an implant-supported reconstruction. Immediately loaded implants present an alternative treatment modality using a bar in the anterior mandible, along with the placement of higher numbers of implants, which are connected with a fixed prosthetic reconstruction.

METHODS: This clinical case report presents the surgical and prosthetic rehabilitation in a patient who had lost all teeth due to advanced periodontal bone destruction. Six implants were placed in the upper and lower jaw each. Some implants required guided bone regeneration in conjunction with autologous bone grafting. All of the implants were connected with their abutments, and a temporary fixed restoration was placed immediately after surgery. The final metallo-ceramic-fixed reconstruction was cemented after 6 weeks of loading.

RESULTS: All of the implants were osseointegrated and showed no clinical signs of mobility or infection. Mobility values were evaluated during healing and were found to be reduced. Radiological findings showed a stable peri-implant bone level during the total 18-month loading observation period.

CONCLUSIONS: This case report presents an alternative treatment concept for the oral rehabilitation in a patient with advanced periodontal destruction. The concept of immediate loading of implants might provide a better opportunity to meet patient needs than more traditional treatment modalities.

PMID: 12666715 [PubMed - indexed for MEDLINE]

Peri-implant soft tissue integration of immediately loaded implants in the posterior macaque mandible: a histomorphometric study.

Siar CH, Toh CG, Romanos G, Swaminathan D, Ong AH, Yaacob H, Nentwig GH.

University of Malaya, Faculty of Dentistry, Department of Oral Pathology, Oral Medicine & Periodontology, Kuala Lumpur, Malaysia.

siarch@um.edu.my

Abstract

BACKGROUND: Today, one critical goal in implant placement is the achievement of optimal soft tissue integration. Reports thus far have demonstrated successful soft tissue preservation in delayed loaded implants placed in anterior jaws. The aim of this study was to histomorphometrically examine the soft tissues around immediately loaded implants placed in the macaque posterior mandible.

METHODS: Splinted crowns on screw-shaped titanium implants (8 mm length, 3.5 mm diameter) were utilized. Three implants each were placed in the premolar-molar edentulous mandibular segments of 6 adult monkeys (*Macaca fascicularis*); one side served as the control (delayed loading) and the other as the test sites (immediate loading). The animals were sacrificed after 3 months of loading. Histomorphometry of 6 soft tissue indices including the sulcus depth (SD), junctional epithelium (JE), connective tissue contact (CTC), biologic width ($BW = SD + JE + CTC$), DIM (distance between the implant top and coronal gingiva), and DIB (distance between the implant top and first implant-to-bone contact) was performed on non-decalcified sections.

RESULTS: No significant differences in the mean soft tissue scores (mm) between the test ($SD = 0.68 \pm 0.63$; $JE = 1.71 \pm 1.04$; $CTC = 1.51 \pm 1.14$; $DIM = 2.27 \pm 1.18$; $DIB = 1.32 \pm 1.21$; $BW = 3.9$) and control ($SD = 0.88 \pm 0.57$; $JE = 1.66 \pm 0.77$; $CTC = 1.24 \pm 0.92$; $DIM = 2.38 \pm 0.81$; $DIB = 1.19 \pm 0.91$; $BW = 3.78$) groups were observed ($P > 0.01$).

CONCLUSION: These findings suggest that the dimensions of the peri-implant soft tissues were within the biologic range and were not influenced by immediate functional loading or posterior location of the implants in the macaque mandible.

PMID: 12816287 [PubMed - indexed for MEDLINE]

Bone-implant interface around titanium implants under different loading conditions: a histomorphometrical analysis in the *Macaca fascicularis* monkey.

Romanos GE, Toh CG, Siar CH, Wicht H, Yacoob H, Nentwig GH.

Johann Wolfgang University, Dental School (Carolinum), Department of Oral Surgery and Implantology, Frankfurt, Germany.

Dr.G.E.Romanos@t-online.de

Abstract

BACKGROUND: Bone healing around endosseous dental implants is associated with peri-implant loading conditions. Therefore, the aim of this study was to evaluate histomorphometrically the bone response around unloaded, delayed, and immediately loaded implants with a progressive thread design that were placed in the posterior regions of the lower jaw in monkeys.

METHODS: Nine adult monkeys (*Macaca fascicularis*) were used in this study. After extraction of the second premolars and first and second molars in the mandible, the bone was allowed to heal for a period of 3 months. Forty-eight 8 mm long implants with a diameter of 3.5 mm were placed according to the following protocol. In two of the monkeys, six implants were placed and left to heal submerged for 3 months (group A). In seven monkeys, 21 implants were placed in one side of the mandible and loaded after 3 months of submerged healing (group B). The group B implants were loaded with temporary resin bridges at the same time as another 21 implants that were loaded immediately (group C) after placement in the contralateral side of the mandibles of the same monkeys. The occlusion of group B and C implants was checked for optimal relationship of the resin bridges that were replaced 1 month later with metal bridges and loaded for an additional 2 months. The group A animals were sacrificed after 3 months of submerged healing without loading; group B and C animals were sacrificed after 3 months of implant loading. Specimens were examined histologically and histomorphometrically.

RESULTS: All implants osseointegrated without presenting any gap in the metal-bone interface. Compact cortical bone was found in contact with the implant surfaces. Group A implants demonstrated in the interface cancellous bone with loose connective tissue. Group B and C implants showed a thick cortical plate with extensive bone trabeculae formation. There was a significant difference in bone-to-implant contact (BIC) between the various loading conditions. No significant difference ($P < 0.05$) was found between groups B and C. There was an increased area of bone (BA) within the threads as well as around the apices of group B and C implants.

CONCLUSIONS: Implant loading might have stimulated increased bone formation and thus may be a key factor in influencing positive osseointegration. In addition, immediately loaded implants may osseointegrate in a similar manner as delayed loaded implants.

PMID: 14653395 [PubMed - indexed for MEDLINE]

Surgical and prosthetic concepts for predictable immediate loading of oral implants.

Romanos GE.

New York University, College of Dentistry, Department of Implant Dentistry, NY, New York 10010, USA.

Abstract

Immediate loading of oral implants is an established concept for lower jaw restoration using four intraforaminal implants splinted together with a bar. There is a lot of misunderstanding in the literature and not exact definition of the term "immediate loading." Moreover, the number of implants to restore edentulous jaws is relatively high to compensate for the loading forces and dependent on the bone quality and quantity. This report presents the different surgical and prosthetic concepts for immediate loading to get long-term success in the upper and lower jaw. When the primary stability is adequate, only six implants may be loaded immediately after surgery, if the implants are splinted using a provisional fixed restoration. Using a number of six primary stable implants, it is possible to restore edentulous jaws independent on the clinical situation. This concept may be used successfully in the posterior part of the mandible when three implants are splinted with provisional crowns and loaded immediately. The biomechanical aspects, the implant design and surface seem to be of great importance for the long-term success in compromised and advanced surgical cases. In conclusion, immediate loading of oral implants may be successful if a primary stability as well as immobilization (splinting) immediately after surgery are taken care.

PMID: 15715376 [PubMed - indexed for MEDLINE]

Immediate loading with complete implant-supported restorations in an edentulous heavy smoker: histologic and histomorphometric analyses.

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Abstract

The clinical case presented is that of an edentulous female patient, a heavy smoker, who received implant-supported complete restorations in the maxilla and mandible using the immediate loading concept according to the Ankylos implant system. The patient received 12 commercially pure titanium (grade 2) Ankylos implants, 6 in the maxilla and 6 in the mandible. The implants were loaded immediately after surgery with temporary acrylic resin prostheses fabricated chairside using a prefabricated customized splint. The definitive ceramometal restorations were seated 4 months after surgery. Clinical and radiologic evaluation at 7 months after implant placement indicated functional bone anchorage of all implants, despite the patient being a smoker and having poor bone quality. The patient died 7 months after implant placement because of lung cancer; however, there was no known disease at the time of implant placement. After her death, the implants with the surrounding tissues were removed en bloc and examined histologically and histomorphometrically using undecalcified cut and ground sections. All implants were osseointegrated to some extent and surrounded by lamellar bone. However, around the upper, nonthreaded parts of the implants, much of the bone had been resorbed. In this region, fibrous connective tissue was in close contact with the titanium surface. Epithelial proliferation with pocket formation could not be observed in any of the implants. The histomorphometric evaluation of bone-implant contact in threads demonstrated a mean of approximately 51% of the available surface and a mean bone volume of approximately 52%, with a tendency toward greater contact and volume around the implants in the maxilla. If the nonthreaded cylindrical portions of the implants were included, mean bone-implant contact was 46% and mean bone volume was 47%.

PMID: 15839123 [PubMed - indexed for MEDLINE]

Histologic and histomorphometric findings from retrieved, immediately occlusally loaded implants in humans.

Romanos GE, Testori T, Degidi M, Piattelli A.

Department of Oral Surgery and Implantology, Dental School Frankfurt, Frankfurt, Germany. gr42@nyu.edu

Erratum in:

- J Periodontol. 2006 Feb;77(2):326.

Abstract

BACKGROUND: The immediate loading treatment concept can be successfully used in implant dentistry. Bone cells migrate onto the implant surface and establish a stable anchorage on the titanium surface. When implants are loaded immediately after surgery, there is a high long-term success rate of the implant-supported reconstruction. Based on histologic observations from different animal studies, the interface of immediately loaded implants can have a direct bone-to-implant connection without any fibrous tissue formation. Mature bone formation is dependent on the loading period. The aim of this study was to demonstrate a histologic analysis of retrieved, clinically stable immediately loaded implants with different implant designs and surfaces. An objective demonstration of the bone-implant interface was presented for the implant systems used.

METHODS: A total of 29 implants with different implant designs and surfaces were retrieved from patients who were treated with implants using an immediate loading protocol and fixed immediate restorations placed the same day after surgery. The loading period was between 2 and 10 months. The bone-implant interface was examined histologically and histomorphometrically.

RESULTS: A high bone-to-implant percentage of 66.8% (+/-8.9%) was found in the examined retrieved implants. Some marginal bone resorption was observed in the crestal part of the implants.

CONCLUSION: According to the present histologic and histomorphometric evaluation of retrieved, clinically stable implants, immediate occlusal loading can present a high level of bone-to-implant contact in humans.

PMID: 16274300 [PubMed - indexed for MEDLINE]

Immediate versus delayed functional loading of implants in the posterior mandible: a 2-year prospective clinical study of 12 consecutive cases.

Romanos GE, Nentwig GH.

Department of Periodontology and Implant Dentistry, College of Dentistry, New York University, New York, NY 10010, USA.

gr42@nyu.edu

Abstract

The aim of this investigation was to evaluate the clinical success of immediately loaded implants versus implants loaded in a delayed fashion in the posterior mandible. Three implants were placed distal to the canines bilaterally in the edentulous distal mandibular ridges of 12 patients. One side was randomly selected for placement of three implants (delayed loading; control sites) with a progressive thread design for submerged healing, and after 3 months the implants were exposed and loaded with provisional splinted crowns, which were replaced 6 weeks later by the definitive restorations. Three additional implants (immediately loaded; test sites), of the same size were placed in the contralateral side of the mandible. The test implants had abutments placed and were loaded immediately using the same protocol as the control implants. After a mean loading period of 25.3 months, the patients showed normal mean clinical values without significant differences ($P < 0.05$) for test and control implants, respectively, as follows: Plaque Index: 0.4 versus 0.8; Sulcus Bleeding Index: 0.5 versus 0.3; probing pocket depth: 1.9 mm versus 2.1 mm; width of keratinized mucosa: 2.5 mm versus 3.3 mm; Periotest value: -3.7 versus -3.2. Twenty-nine of the examined sites showed no bone loss. After 2 years of loading in the posterior mandible, test and control implants had the same prognosis.

PMID: 17073356 [PubMed - indexed for MEDLINE]

Calvarial versus iliac crest for autologous bone graft material for a sinus lift procedure: a histomorphometric study.

Crespi R, Vinci R, Capparè P, Gherlone E, Romanos GE.

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Abstract

PURPOSE: The aim of this study was to compare, through histomorphometric analysis, the use of donor autogenous bone graft from calvarial or iliac sources for maxillary sinus lift procedures.

MATERIALS AND METHODS: Sixteen patients requiring maxillary sinus augmentation were included in this study. One group of 10 patients was alternatively selected to receive autologous calvarial bone particles, and another group of 6 patients received autologous iliac bone particles. Five months after surgery, bone biopsy specimens were obtained at the time of implant procedure and analyzed through histomorphometry. To compare mean values between the calvarial and iliac crest groups, the Student t test was performed. The level for statistical significance was set at $P < .05$.

RESULTS: All patients completed the healing period following sinus augmentation procedure without complications. In the calvarial group, an average total bone volume (BV) of 73.4% \pm 13.1% was found. Nonvital bone constituted an average of 5.5% \pm 6.3% of the total tissue volume. The percentage of vital bone (VB) showed an average of 67.9% \pm 16.1%. In the iliac group, the average total bone volume was 46.6% \pm 17.4%, with an average of 12.6% \pm 7.7% of NVB and an average of 34.0% \pm 21.5% of VB. A significant difference was observed between calvarial and iliac bone grafts with respect to BV, VB, and NVB ($P < .05$).

CONCLUSION: From this present histomorphologic study, it might be concluded that grafted bone obtained from calvarial sources for sinus lift procedure presented a significantly higher degree of bone volume and vital bone volume in contrast to bone harvested from the iliac crest.

PMID: 17929512 [PubMed - indexed for MEDLINE]

Immediate occlusal loading of implants placed in fresh sockets after tooth extraction.

Crespi R, Capparè P, Gherlone E, Romanos GE.

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Abstract

PURPOSE: The aim of this study was to evaluate the clinical and radiographic outcome of dental implants immediately placed and loaded into fresh extraction sockets after 18 months.

MATERIALS AND METHODS: Twenty-seven patients, 15 women and 12 men, received a total of 160 implants; 150 were placed immediately after extraction. The sockets in the study had fully preserved walls, and 10 were placed in healed sites. Immediately after surgical procedure, all patients received the temporary prosthetic reconstruction in occlusion. Five months postsurgery, definitive metal-ceramic restorations were cemented on abutments. Follow-up visits were performed for the assessment of clinical parameters. Intraoral digital radiographic examinations were performed 3 and 18 months after implant placement.

RESULTS: Minor swelling of the gingival mucosa was observed, but no mucositis or flap dehiscence with suppuration were found. Mean marginal bone loss 1 year 18 months after immediate loading was 0.65 +/- 0.58 mm to the mesial side and 0.84 +/- 0.69 mm to the distal side in the maxilla and 1.13 +/- 0.51 mm mesially and 1.24 +/- 0.60 mm distally in the mandible. There was no difference between splinted and nonsplinted implants with respect to marginal bone loss. Discussion and

CONCLUSION: Within the limits of this clinical study, the results indicate that immediate loading of implants placed in immediate extraction sites can be carried out successfully. (Case Series)

PMID: 18271377 [PubMed - indexed for MEDLINE]

Clinical recommendations for avoiding and managing surgical complications associated with implant dentistry: a review.

Greenstein G, Cavallaro J, Romanos G, Tarnow D.

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Abstract

Proposing to place endosseous implants is an integral facet of dental treatment plans. Their insertion is usually associated with a low incidence of untoward events. However, despite careful planning, surgical complications can arise: infection, intraoral hemorrhage, wound dehiscence, postoperative pain, lack of primary implant stability, inadvertent penetration into the maxillary sinus or nasal fossa, sinus lift sequelae, neurosensory disturbances, injuries to adjacent teeth, tissue emphysema, and aspiration, or ingestion of surgical instruments. This article addresses some surgical complications associated with dental implant placement and discusses how to avoid and manage them when they occur.

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Immediate nonfunctional loading of single-tooth implants in the anterior maxilla following augmentation with freeze-dried cancellous block allograft: a case series.

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Abstract

PURPOSE: To assess the clinical effectiveness of immediate nonfunctional loading for single-tooth implants placed in the anterior maxilla following augmentation with cancellous freeze-dried block graft.

MATERIALS AND METHODS: The clinical outcomes of immediately nonfunctionally loaded implants up to 18 months after placement in the anterior maxilla were evaluated in 11 consecutive patients. Implants were immediately restored with unsplinted acrylic resin provisional crowns. Follow-up was monthly, and intraoral radiographs were obtained immediately after implant placement and at 6, 12, and 18 months. Survival rate and radiographic marginal bone loss were evaluated at 0, 6, 12, and 18 months. In the anterior maxilla, 12 implants were placed.

RESULTS: Marginal bone loss did not extend beyond the first thread up to 18 months follow-up, and the survival rate was 100%.

CONCLUSION: Within the limits of the present study, immediate nonfunctional loading for single-tooth implants placed in the anterior maxilla following augmentation with cancellous freeze-dried block graft seems a promising treatment alternative.

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Immediate versus delayed loading of dental implants placed in fresh extraction sockets in the maxillary esthetic zone: a clinical comparative study.

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Abstract

PURPOSE: The aim of this study was to report a clinical comparative assessment of crestal bone level change around single implants in fresh extraction sockets in the esthetic zone of the maxilla either immediately loaded or loaded after a delay.

MATERIALS AND METHODS: Forty patients were included in a prospective, randomized study. All patients required 1 tooth extraction (ie, 1 tooth with a hopeless prognosis) and were randomized into either the test group or the control group. Implants were positioned immediately after tooth extraction and were loaded immediately in the test group (20 implants) and after 3 months in the control group (20 implants). The implant site was prepared, with at least 4 mm of sound apical bone below the implant apex, and the coronal margin of the implant was placed at the buccal level of the bone crest. All implants were 13 mm long; 30 implants had a diameter of 5 mm, and 10 had a diameter of 3.75 mm. Radiographic examinations were made at baseline, at 6 months, and at 24 months. To compare the mean values between test and control group, a paired t test was performed (considered statistically significant at $P < .05$).

RESULTS: After a 24-month follow-up period, a cumulative survival rate of 100% was reported for all implants. The control group resulted in a mean mesial bone loss of 1.16 ± 0.32 mm and a mean distal bone loss of 1.17 ± 0.41 (mean bone loss, 1.16 ± 0.51 mm). The test group resulted in a mesial bone loss of 0.93 ± 0.51 mm and a distal bone loss of 1.1 ± 0.27 mm (mean bone loss, 1.02 ± 0.53 mm). No statistically significant difference between control and test groups ($P > .05$) was found.

CONCLUSION: The success rate and radiographic results of immediate restorations of dental implants placed in fresh extraction sockets were comparable to those obtained in delayed loading group.

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Immediate loading using cross-arch fixed restorations in heavy smokers: nine consecutive case reports for edentulous arches.

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Abstract

PURPOSE: Immediate loading of oral implants has been extensively documented in different clinical indications, but no studies on heavy smokers have been reported. The aim of this study was to evaluate the long-term success and the peri-implant soft and hard tissue conditions around immediately occlusal loaded implants in edentulous jaws of heavy smokers.

MATERIALS AND METHODS: Implants (progressive thread design and platform switching) were connected with their abutments and splinted immediately after surgery using cross-arch fixed temporary restorations. Provisional fixed prostheses had centric occlusal contacts and group function in the lateral movements of the mandible (immediate occlusal loading). Patients were advised to adhere to a soft diet for the first 6 to 8 weeks of healing to reduce excessive loading in the bone-implant interface. The definitive restorations were delivered 4 to 8 weeks after surgery and cemented temporarily to evaluate the peri-implant soft tissue condition after removal of the restoration. Clinical and radiographic indices were evaluated at the start of loading and at 3-month intervals after loading.

RESULTS: After a mean loading period of 33.7 +/- 19.0 months (range, 6 to 66 months), 1 implant was mobile. All clinical indices had values in normal ranges. The Periotest values decreased with time, indicating increased security of implants in bone. Crestal bone level was stable, with only 2 sites presenting minimal vertical bone loss and 6 presenting minimal horizontal bone loss. In all other sites no bone loss was observed. Results of this study demonstrated a long-term success (98.6%) of immediately loaded implants placed in occlusal function in smokers restored with fixed cross-arch implant-supported restorations.

CONCLUSIONS: This study showed that immediate loading of oral implants may be successful in heavy smokers under some circumstances.

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Basic research methods and current trends of dental implant surfaces.

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Abstract

Among dental implant design alterations, surface modifications have been by far the most investigated topic. Regarding implant surface research, the lack of hierarchical approaches relating *in vitro*, *in vivo*, clinical trials, and *ex vivo* analyses has hindered biomaterials scientists with clear informed rationale guidelines for implant surface design. This manuscript provides a critical hierarchical overview of the *in vitro*, laboratory *in vivo*, clinical, and *ex vivo* methodologies used to investigate the performance of novel biomaterials aiming to allow dental professionals to better evaluate the past, present, and future dental implant surface research. This manuscript also contains an overview of the commercially available surface texture and chemistry modifications including novel nanotechnology-based fabrication processes. Over the last decade, surface texturing has been the most utilized parameter for increasing the host-to-implant response. Recently, dental implant surfaces utilizing reduced length scale physico/chemical features (atomic and nanometric) have shown the potential to synergistically use both texture and the inclusion of bioactive ceramic components on the surface. Although surface modifications have been shown to enhance osseointegration at early implantation times, information concerning its long-term benefit to peri-implant tissues is lacking due to the reduced number of controlled clinical trials. Given the various implants/surfaces under study, the clinician should ask, founded on the basic hierarchical approach described for the *in vitro*, laboratory *in vivo* data, as well as the results of clinical studies to effectiveness before use of any dental implant.

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The incisive canal. Considerations during implant placement: case report and literature review.

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Abstract

In some patients the size and location of the incisive canal may affect treatment planning in the mandible. This case report addresses management of a patient with a large incisive canal, which prevented placement of a dental implant in the intraforaminal area of the mandible. Relevant anatomy is reviewed, treatment considerations are outlined, and potential consequences of inappropriate therapy in similar patients are discussed.

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Immediate functional loading in the maxilla using implants with platform switching: five-year results.

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Abstract

PURPOSE: Immediate loading in the maxilla is not a routinely recommended treatment concept; however, some clinical series have shown a high survival rate for nonfunctionally loaded implants. The purpose of this study was to demonstrate the prognosis for immediately loaded implants with a progressive thread design and platform switching placed in the maxilla with or without simultaneous augmentations using autogenous bone.

MATERIALS AND METHODS: Ninety implants were placed (six in each maxillary arch) in 15 patients. Immediately after surgery, the implants were loaded with a provisional acrylic resin prosthesis (immediate occlusal loading). Splinting of the implants with the provisional remained for 6 to 8 weeks of healing. In patients with augmented sites, a 3-month period of provisionalization was necessary to ensure implant stability; a soft/liquid diet was recommended for this intermediate transitional period. Definitive fixed restorations were then fabricated and delivered. Clinical and radiologic examinations of the implants were performed at various times.

RESULTS: After a mean loading period of 42.4 (+/- 19.15) months, only three failures were reported. This represented a survival rate of 96.66%. No complications, including inflammation or bone loss, were reported during the study period.

CONCLUSIONS: Based on these results, the immediate loading protocol in the maxilla can be used successfully when implant primary stability, cross-arch stabilization, and a soft diet for the initial stages of healing are considered.

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Impact of diabetes mellitus and glycemic control on the osseointegration of dental implants: a systematic literature review.

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Abstract

BACKGROUND: Implant treatment is an attractive substitute to traditional fixed/removable prosthetic appliances. In patients with diabetes, dental implant therapy has been considered a contraindication. Hyperglycemia augments the severity of periodontal disease, and glycemic control is an essential variable in determining the success of dental implants in subjects with diabetes. Subjects with well-controlled diabetes may not be significantly compromised and can have high dental implant success rates compared to individuals with poorly controlled diabetes. The focused questions addressed in this systematic review were as follows: Can patients with diabetes be good candidates for dental implant therapy? And how does hyperglycemia and glycemic control influence osseointegration?

METHODS: A systematic literature search of MEDLINE/PubMed articles published from 1982 up to and including July 2009 was independently performed by two investigators. In addition, reference lists of original and review articles were searched. The search strategy was to use the following terms in different combinations: dental implants, immediate implants, osseointegration, periodontal disease, diabetes, hyperglycemia, metabolic control, and glycemic control. The search included studies on humans and diabetes-induced animal models. The selection criteria included all levels of available evidence. Suitable variables included the implant survival rate among individuals with diabetes, effects of hyperglycemia and glycemic control on bone, and maintenance of dental implants in subjects with diabetes. Articles published only in the English language were considered, and unpublished data were not sought.

RESULTS: We initially identified 33 studies. Fifteen studies, which did not fulfill the selection criteria, were excluded. The included studies reported that poorly controlled diabetes negatively affects implant osseointegration; however, under optimal serum glycemic control, osseointegration can successfully occur in patients with diabetes. Animal studies have confirmed that osseointegration can be successfully achieved in insulin-controlled rats with diabetes, whereas in uncontrolled rats with diabetes, the bone-to-implant contact appears to decrease with time. The use of antiseptic mouthrinses and oral-hygiene maintenance helps in achieving a successful dental implant osseointegration in subjects with diabetes.

CONCLUSION: A successful dental implant osseointegration can be accomplished in subjects with diabetes with good metabolic control (serum glycemic level and hemoglobin A1c in normal range) in a similar manner as in subjects without diabetes.

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The role of primary stability for successful immediate loading of dental implants. A literature review.

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Abstract

OBJECTIVES: To assess the role of primary stability for successful immediate loading (IL) of dental implants.

DATA: Original articles studying the role of primary stability for successful immediate loading of dental implants were included. The reference lists of potentially relevant review articles were also sought.

SOURCES: The MEDLINE-PubMed databases were searched for appropriate articles addressing the objectives of the present study. Databases were searched from 1979 up to and including April 2010. The search was performed using a variety of keywords in different combinations. Articles published only in English language were included. Letters to the Editor, historical reviews and unpublished articles were not sought.

CONCLUSIONS: There is a significant biological response by the hard and soft tissues to IL of dental implants. Within the limitations of the present literature review, it is evident that the core issue to observe during IL is the establishment of a good implant primary stability. There is sufficient evidence to suggest that the degree of achieved primary stability during IL protocols is dependent on several factors including bone density and quality, implant shape, design and surface characteristics and surgical technique. Further research is required in situations, such as poor bone quality and quantity and multiple implants or augmentation procedures, which may challenge the attainment of primary stability during IL.

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Implant survival rate after oral cancer therapy: a review.

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Abstract

The overall impression regarding the success of dental implants (DI) in patients having undergone oral cancer therapy remains unclear. The aim of the present review study was to assess the implant survival rate after oral cancer therapy. Databases were explored from 1986 up to and including September 2010 using the following keywords in various combinations: "cancer", "chemotherapy", "dental implant", "oral", "osseointegration", "radiotherapy", "surgery" and "treatment". The eligibility criteria were: (1) original research articles; (2) clinical studies; (3) reference list of pertinent original and review studies; (4) intervention: patients having undergone radio- and chemotherapy following oral cancer surgery; and (5) articles published only in English. Twenty-one clinical studies were included. Results from 16 studies reported that DI can osseointegrate and remain functionally stable in patients having undergone radiotherapy following oral cancer surgery; whereas three studies showed irradiation to have negative effects on the survival of DI. Two studies reported that DI can osseointegrate and remain functionally stable in patients having undergone chemotherapy. It is concluded that DI can osseointegrate and remain functionally stable in patients having undergone oral cancer treatment.

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Biologic width and morphologic characteristics of soft tissues around immediately loaded implants: studies performed on human autopsy specimens.

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Abstract

BACKGROUND: Esthetics and the health of oral implants are based upon the soft tissue reaction and biologic width (BW).

METHODS: Twelve dental implants were placed in the maxilla and mandible of a patient who smoked. Permanent standard abutments and temporary restorations were immediately fixed in place during the surgery stage. The definitive restorations were placed 4 months after loading without removal of the original abutments. After 10 months, the patient died, and the implants were removed en block and processed for histology.

RESULTS: The BW in the maxilla was 6.5 +/- 2.5 mm, whereas in the mandible, it was 4.8 +/- 1.3 mm ($P = 0.017$). The sulcular epithelium (SE) in the maxilla was 2.7 +/- 0.8 mm, whereas in the mandible, it was 1.7 +/- 0.4 mm ($P < 0.001$). The junctional epithelium (JE) in the maxilla was 1.3 +/- 0.4 mm, whereas in the mandible, it was 1.5 +/- 0.5 mm ($P = 0.164$). The connective tissue (CT) in the maxilla was 2.5 +/- 1.3 mm, whereas in the mandible, it was 1.6 +/- 0.4 mm ($P = 0.006$). In the maxillary bone, the BW, SE, and CT were significantly longer than in the mandible, whereas for the JE, no statistically significant difference was observed.

CONCLUSION: The soft tissue organization around dental implants was different for upper and lower jawbones.

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Implant surface morphology and primary stability: is there a connection?

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Abstract

PURPOSE: : The aim was to review the influence of surface morphology on the primary stability of dental implants.

METHODS: : MEDLINE-PubMed databases were explored from 1991 up to and including April 2010 using different combinations of the following terms: "dental," "implant surface roughness," "immediate loading," "initial stability," "primary stability," and "osseointegration." Articles published only in English language were included and hand searching was also performed. Letters to the Editor and unpublished data were excluded.

RESULTS: : Ten studies (three clinical and seven experimental) were included according to the search databases. In six studies (three experimental and three clinical), the implant stability was measured at least after 4 weeks after implant insertion; and primary implant stability was recorded in four experimental studies, using the insertion and removal torque tests and resonance frequency analysis using implant stability quotient values.

CONCLUSION: : Rough-surfaced implants have significantly higher success rates compared with dental implants with smooth surfaces; however, the question "Is there a connection between implant surface roughness (microdesign) and primary stability?" remains unanswered.

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