Compressive fatigue in titanium dental implants submitted to fluoride ions action.

Roselino Ribeiro AL, Noriega JR, Dametto FR, Vaz LG.

Department of Diagnosis and Surgery School of Dentistry at Araraquara, UNESP - São Paulo State University, Araraquara, São Paulo, Brazil.

Abstract

The aim of this study was to assess the influence of a fluoridated medium on the mechanical properties of an internal hexagon implant-abutment set, by means of compression, mechanical cycling and metallographic characterization by scanning electronic microscopy. Five years of regular use of oral hygiene with a sodium fluoride solution content of 1500 ppm were simulated, immersing the samples in this medium for 184 hours, with the solutions being changed every 12 hours. Data were analyzed at a 95% confidence level with Fisher's exact test. After the action of fluoride ions, a negative influence occurred in the mechanical cycling test performed in a servohydraulic machine (Material Test System-810) set to a frequency of 15 Hz with 100,000 cycles and programmed to 60% of the maximum resistance of static compression test. The sets tended to fracture by compression on the screw, characterized by mixed ruptures with predominance of fragile fracture, as observed by microscopy. An evidence of corrosion by pitting on sample surfaces was found after the fluoride ions action. It may be concluded that prolonged contact with fluoride ions is harmful to the mechanical properties of commercially pure titanium structures.

Fatigue and fluoride corrosion on Streptococcus mutans adherence to titanium-based implant/component surfaces.

Correa CB, Pires JR, Fernandes-Filho RB, Sartori R, Vaz LG.

Department of Dental Materials and Prosthodontics, UNESP-São Paulo State University, Araraquara, SP, Brazil.

Abstract

PURPOSE: The influence of fatigue and the fluoride ion corrosion process on Streptococcus mutans adherence to commercially pure Titanium (Cp Ti) implant/component set surfaces were studied. MATERIALS AND METHODS: Thirty Nobel implants and 30 Neodent implants were used. Each commercial brand was divided into three groups. Group A: control, Group B: sets submitted to fatigue (10(5) cycles, 15 Hz, 150 N), and Group C: sets submitted to fluoride (1500 ppm, pH 5.5) and fatigue, simulating a mean use of 5 years in the oral medium. Afterward, the sets were contaminated with standard strains of S. mutans (NTCC 1023) and analyzed by scanning electronic microscopy (SEM) and colony-forming unit counts (CFU/mL). RESULTS: By SEM, bacterial adherence was verified only in group C in both brands. By CFU/mL counts, S. mutans was statistically higher in both brands in group C than in groups A and B (p < 0.05, ANOVA). CONCLUSION: The process of corrosion by fluoride
ions on Cp Ti implant/component sets allowed greater S. mutans adherence than in the absence of corrosion and with the fatigue process in isolation.

⇒ Auch hier wird die Korrosionsverursachende Wirkung von Fluorid beobachtet, was die Str. Mutans Besiedlung begünstigen würde.


Influence of a fluoridated medium with different pHs on commercially pure titanium-based implants.

Sartori R, Correa CB, Marcantonio E Jr, Vaz LG.

Department of Periodontology, School of Dentistry at Araraquara, UNESP, Sao Paulo State University, Sao Paulo, Brazil.

Abstract

PURPOSE: The objective of this study was to assess the influence of a fluoride medium with different pHs on the corrosion resistance of three commercially pure titanium-based dental implant commercial brands, under scanning electron microscopy (SEM) and EDS. MATERIALS AND METHODS: Forty-two dental implants, from three commercial brands, were used. Five years of regular use of mouth rinsing, with NaF 1500 ppm content and two different pHs, were simulated by immersing the specimens into that medium for 184 hours. RESULTS: SEM and EDS analyses demonstrated no evidence of corrosion on the specimens' surfaces after being submitted to fluoride ions or incorporation of fluoride ions to the set surface. CONCLUSION: It was possible to conclude that both the fluoride concentration and the pH of the solutions did not exert any influence upon implant corrosion resistance

⇒ Im Gegensatz zu den anderen Artikeln wurde hier nur eine Verfärbung der Oberflächen festgestellt, keine Korrosion. Die Autoren führen dies eventuell auf unterschiedliche pH-Verhältnisse zurück.


Healing at fluoride-modified implants placed in wide marginal defects: an experimental study in dogs.

Abrahamsson I, Albouy JP, Berglundh T.

Department of Periodontology, The Sahlgrenska Academy at Göteborg University, Göteborg, Sweden. ingemar.abrahamsson@odontologi.gu.se

Abstract

OBJECTIVE: To study the healing at fluoride-modified implants placed in wide circumferential defects. MATERIAL AND METHODS: Six mongrel dogs were used. The mandibular premolars and first molars were extracted. Three months later four implants were placed in one side of the mandible of each dog. The control implants (MicroThread) had a TiOblast surface, while the test implants (OsseoSpeed) had a fluoride-modified surface. Two implants of each type were placed. The marginal 50% of the prepared canal was widened using step drills. Following installation a 1 mm wide gap occurred between the implant surface and the bone wall in the defect. All implants were submerged.
The installation procedure was repeated in the opposite side of the mandible 4 weeks after the first implant surgery. Two weeks later the animals were euthanized and block biopsies containing the implant and surrounding tissues were prepared for histological analysis. RESULTS: The histological analysis revealed that a significantly larger area of osseointegration was established within the defect at fluoride-modified implants than at implants with a TiOblast surface after 6 weeks of healing. Further, the degree of bone-to-implant contact within the defect area was larger at fluoride-modified implants than at the TiOblast implants. CONCLUSION: It is suggested that the fluoride-modified implant surface promotes bone formation and osseointegration.


The development of Ti alloys for dental implant with high corrosion resistance and mechanical strength.

Yamazoe J, Nakagawa M, Matono Y, Takeuchi A, Ishikawa K.

Department of Biomaterials, Faculty of Dental Science, Kyushu University, 3-1-1 Maidashi, Higashi-ku, Fukuoka, 812-8582, Japan.

Abstract

The corrosion behaviors of Ti and Ti-6Al-4V, Ti-6Al-7Nb, Ti-0.5Pt, Ti-6Al-4V-0.5Pt, and Ti-6Al-7Nb-0.5Pt alloys were examined using an electrochemical analyzer in artificial saliva containing 0.1 and 0.2% NaF at a pH of 4.0. The SEM observations revealed that the surfaces of the alloys containing 0.5 wt% Pt were not affected in fluoride-containing environments, whereas the surfaces of Ti, Ti-6Al-4V, and Ti-6Al-7Nb alloys were markedly rough. In artificial saliva containing 0.1% NaF at a pH of 4.0, the amounts of Ti dissolved from the Ti, Ti-6Al-4V, and Ti-6Al-7Nb alloys were about 50 times larger than those of the alloys containing 0.5 wt% Pt. The tensile strengths of the alloys containing 0.5 wt% Pt were equal to or higher than those of pure Ti or the alloys without Pt. The Ti-0.5Pt, Ti-6Al-4V-0.5Pt, and Ti-6Al-7Nb-0.5 alloys are expected to be useful in clinical dentistry as new Ti alloys with high corrosion resistance and mechanical strength.


Fluoride modification effects on osteoblast behavior and bone formation at TiO2 grit-blasted c.p. titanium endosseous implants.

Increasing bone formation at endosseous titanium implants may be achieved by modification of topographically enhanced surfaces. The aim of this study was to determine the effect of fluoride ion modification of TiO2 grit-blasted, c.p. titanium implants on osteoblastic differentiation and interfacial bone formation by parallel in vitro and in vivo investigations. Human mesenchymal stem cells (Osiris Therapeutics, Inc.) were cultured on TiO2 grit-blasted c.p. titanium disks with and without fluoride ion modification. Cell adhesion, proliferation, and osteoblastic gene expression was measured by scanning electron microscopy, tritiated-thymidine uptake into insoluble DNA, and reverse transcription polymerase chain reaction detection of mRNAs encoding collagen 1, osteopontin, bone sialoprotein, osteocalcin and BMP-2. After 24 h, there were no differences in cell adhesion among the surfaces tested. Fluoride-treated surfaces supported greater proliferation and increased bone sialoprotein and BMP-2 expression. Additionally, 12 TiO2 grit-blasted and 12 fluoride ion modified implants were placed randomly into medial and distal osteotomies prepared in the tibia of 300 g Sprague Dawley rats. After 21 days, the tibiae were harvested and 100 microm ground sections were examined by backscatter scanning electron microscopy. The bone-to-implant contact formed at TiO2 grit-blasted and fluoride-treated versus TiO2 grit-blasted surfaces was 55.45% versus 34.21% (p<0.027), respectively. Fluoride ion modification of the TiO2 grit-blasted surface enhanced osteoblastic differentiation in vitro and interfacial bone formation in vivo. This parallel in vitro and in vivo investigation demonstrates that fluoride ion modification enhanced osteoblastic differentiation and osseointegration merit careful investigation.

⇒ In dieser Studie wird auch der positive Effekt von Fluorid-modifizierten Oberflächen auf die frühen Phasen der Osseointegration beobachtet.


Amine fluoride/stannous fluoride and chlorhexidine mouthwashes as adjuncts to single-stage dental implants: a comparative study.

Horwitz J, Machtei EE, Zuabi O, Peled M.

Unit of Periodontology, Department of Oral & Maxillofacial Surgery, Rambam Medical Center, Haifa, Israel. j_horwitz@rambam.health.gov.il

Abstract

BACKGROUND: The growing popularity of non-submerged dental implants in recent years requires a greater emphasis on microbial plaque control. Chlorhexidine (CHX), the most commonly used mouthwash in implant surgery, is sometimes associated with tooth staining and alteration in taste perception. Amine fluoride/stannous fluoride (AmF/SnF2) mouthwash has been shown to have anti-infective properties; however, it has not been tested as an adjunct anti-infective means in non-
submerged dental implants. The purpose of this trial was to compare AmF/SnF2 and CHX mouthwashes as adjuncts to single-stage dental implants. METHODS: Thirty-three patients aged 34 to 79 (mean 54.30 +/- 8.69 SD) requiring dental implants were accepted into the study. Following comprehensive periodontal therapy patients received one to three non-submerged dental implants (maxilla: 17; mandible: 45; anterior: 3, posterior: 59). After surgery patients were given analgesics and antibiotics as well as 2,400 ml of coded mouthwash bottles previously randomized between the two above mentioned formulations. Clinical and radiographic parameters were recorded at baseline and 3 and 12 months post-surgery. RESULTS: Twelve-month survival rates were 100% and 92.9% for the AmF/SnF2 and CHX groups, respectively. Compliance was slightly higher in the AmF/SnF2 group (84.35% +/- 3.39% versus 78.15% +/- 4.59% SE) but statistically similar. There was no statistically significant difference between the AmF/SnF2 and CHX groups in staining index at 3 months (1.519 +/- 0.22 versus 1.457 +/- 0.24 SE) and patient subjective evaluation of the mouthwashes. Radiographic bone loss was 0.79 +/- 0.23 and 1 +/- 0.13 SE at 3 months and 1.06 +/- 0.13 and 1.27 +/- 0.25 at 12 months for the CHX and AmF/SnF2 groups, respectively; the difference was statistically insignificant (P = 0.388 and 0.504, respectively). CONCLUSION: Both CHX and AmF/SnF2 mouthwashes can be used post-surgically after one-stage implant surgery.

In dieser Studie wird die Verwendung von Aminfluorid/Zinnfluorid Mundspülösungen als Alternative zu CHX nach Implantation befürwortet.