

LITERATUR

Ausgabe: Implantologie Journal 5/20 & 7+8/20

Thema: Biologische GBR und Keramikimplantate

Autoren: Dr. med. dent. Karl Ulrich Volz, Dr. med. dent. Stephanie Vergote, Dr. med. dent. Rebekka Hueber, Dr. med. dent. Josephine Tietje, Schweiz; Dr. med. dent. Tobias Wilck, Prof. Dr. Dr. Dr. Shahram Ghanaati, Deutschland

-
1. Fischer J, Benic G, Fischer Carolin. Zirkonoxidimplantate - wieso, weshalb, warum [Internet]. 2016. Available from: https://www.zmk-aktuell.de/fachgebiete/implantologie/story/zirkonoxidimplantate--wieso-weshalb-warum__4830.html
 2. Hisbergues M, Vendeville S, Vendeville P. Zirconia: Established facts and perspectives for a biomaterial in dental implantology. *J Biomed Mater Res Part B Appl Biomater.* 2009;88(2):519–29. doi:10.1002/jbm.b.31147
 3. Roehling S, Astasov-Frauenhoffer M, Hauser-Gerspach I, Braissant O, Woelfler H, Waltimo T, Kniha H, Gahlert M. In Vitro Biofilm Formation on Titanium and Zirconia Implant Surfaces. *J Periodontol.* 2017;88(3):298–307. doi:10.1902/jop.2016.160245
 4. Holländer J, Lorenz J, Stübinger S, Hölscher W, Heidemann D, Ghanaati S, Sader R. Zirconia Dental Implants: Investigation of Clinical Parameters, Patient Satisfaction, and Microbial Contamination. *Int J Oral Maxillofac Implants.* 2016;31(4):855–64. doi:10.11607/jomi.4511
 5. Rimondini L, Cerroni L, Carrassi A, Torricelli P. Bacterial colonization of zirconia ceramic surfaces: an in vitro and in vivo study. *Int J Oral Maxillofac Implants.* 2002;17(6):793–8.
 6. Scarano A, Piattelli M, Caputi S, Favero GA, Piattelli A. Bacterial adhesion on commercially pure titanium and zirconium oxide disks: an in vivo human study. *J Periodontol.* 2004;75(2):292–6. doi:10.1902/jop.2004.75.2.292
 7. Kajiwara N, Masaki C, Mukaibo T, Kondo Y, Nakamoto T, Hosokawa R. Soft tissue biological response to zirconia and metal implant abutments compared with natural tooth: microcirculation monitoring as a novel bioindicator. *Implant Dent.* 2015;24(1):37–41. doi:10.1097/ID.000000000000167
 8. Cionca N, Hashim D, Mombelli A. Zirconia dental implants: where are we now, and where are we heading? *Periodontol 2000.* 2017;73(1):241–58. doi:10.1111/prd.12180

9. Torgersen S, Gjerdet NR, Erichsen ES, Bang G. Metal particles and tissue changes adjacent to miniplates. A retrieval study. *Acta Odontol Scand.* 1995;53(2):65–71. doi:10.3109/00016359509005948
10. Voggenreiter G, Leiting S, Brauer H, Leiting P, Majetschak M, Bardenheuer M, Obertacke U. Immuno-inflammatory tissue reaction to stainless-steel and titanium plates used for internal fixation of long bones. *Biomaterials.* 2003;24(2):247–54. doi:10.1016/s0142-9612(02)00312-5
11. Peters K, Unger RE, Gatti AM, Sabbioni E, Tsaryk R, Kirkpatrick CJ. Metallic nanoparticles exhibit paradoxical effects on oxidative stress and pro-inflammatory response in endothelial cells in vitro. *Int J Immunopathol Pharmacol.* 2007;20(4):685–95. doi:10.1177/039463200702000404
12. Hamlet S, Ivanovski S. Inflammatory cytokine response to titanium chemical composition and nanoscale calcium phosphate surface modification. *Acta Biomater.* 2011;7(5):2345–53. doi:10.1016/j.actbio.2011.01.032
13. Andreiotelli M, Wenz HJ, Kohal R-J. Are ceramic implants a viable alternative to titanium implants? A systematic literature review. *Clin Oral Implants Res.* 2009;20 Suppl 432–47. doi:10.1111/j.1600-0501.2009.01785.x
14. Gahlert M, Roehling S, Sprecher CM, Kniha H, Milz S, Bormann K. In vivo performance of zirconia and titanium implants: a histomorphometric study in mini pig maxillae. *Clin Oral Implants Res.* 2012;23(3):281–6. doi:10.1111/j.1600-0501.2011.02157.x
15. Janner SFM, Gahlert M, Bosshardt DD, Roehling S, Milz S, Higginbottom F, Buser D, Cochran DL. Bone response to functionally loaded, two-piece zirconia implants: A preclinical histometric study. *Clin Oral Implants Res.* 2018;29(3):277–89. doi:10.1111/clr.13112
16. Koch FP, Weng D, Krämer S, Biesterfeld S, Jahn-Eimermacher A, Wagner W. Osseointegration of one-piece zirconia implants compared with a titanium implant of identical design: a histomorphometric study in the dog. *Clin Oral Implants Res.* 2010;21(3):350–6. doi:10.1111/j.1600-0501.2009.01832.x
17. Manzano G, Herrero LR, Montero J. Comparison of clinical performance of zirconia implants and titanium implants in animal models: a systematic review. *Int J Oral Maxillofac Implants.* 2014;29(2):311–20. doi:10.11607/jomi.2817
18. Roehling S, Schlegel KA, Woelfler H, Gahlert M. Zirconia compared to titanium dental implants in preclinical studies-A systematic review and meta-analysis. *Clin Oral Implants Res.* 2019;30(5):365–95. doi:10.1111/clr.13425
19. Thoma DS, Benic GI, Muñoz F, Kohal R, Sanz Martin I, Cantalapedra AG, Hämmerle CHF, Jung RE. Histological analysis of loaded zirconia and titanium dental implants: an experimental study in the dog mandible. *J Clin Periodontol.* 2015;42(10):967–75. doi:10.1111/jcpe.12453
20. Safiotti LM, Kotsakis GA, Pozhitkov AE, Chung WO, Daubert DM. Increased Levels of Dissolved Titanium Are Associated With Peri-Implantitis - A Cross-Sectional Study. *J Periodontol.* 2017;88(5):436–42. doi:10.1902/jop.2016.160524

21. Delgado-Ruiz R, Romanos G. Potential Causes of Titanium Particle and Ion Release in Implant Dentistry: A Systematic Review. *Int J Mol Sci.* 2018;19(11). doi:10.3390/ijms19113585
22. Apaza-Bedoya K, Tarce M, Benfatti CAM, Henriques B, Mathew MT, Teughels W, Souza JCM. Synergistic interactions between corrosion and wear at titanium-based dental implant connections: A scoping review. *J Periodont Res.* 2017;52(6):946–54. doi:10.1111/jre.12469
23. Fretwurst T, Nelson K, Tarnow DP, Wang H-L, Giannobile WV. Is Metal Particle Release Associated with Peri-implant Bone Destruction? An Emerging Concept. *J Dent Res.* 2018;97(3):259–65. doi:10.1177/0022034517740560
24. Berryman Z, Bridger L, Hussaini HM, Rich AM, Atieh M, Tawse-Smith A. Titanium particles: An emerging risk factor for peri-implant bone loss. *The Saudi Dental Journal.* 2019. doi:10.1016/j.sdentj.2019.09.008
25. Mombelli A, Hashim D, Cionca N. What is the impact of titanium particles and biocorrosion on implant survival and complications? A critical review. *Clin Oral Implants Res.* 2018;29 Suppl 1837–53. doi:10.1111/clr.13305
26. Olmedo D, Fernández MM, Guglielmotti MB, Cabrini RL. Macrophages related to dental implant failure. *Implant Dent.* 2003;12(1):75–80. doi:10.1097/01.id.0000041425.36813.a9
27. Olmedo DG, Paparella ML, Spielberg M, Brandizzi D, Guglielmotti MB, Cabrini RL. Oral mucosa tissue response to titanium cover screws. *J Periodontol.* 2012;83(8):973–80. doi:10.1902/jop.2011.110392
28. Wachi T, Shuto T, Shinohara Y, Matono Y, Makihiro S. Release of titanium ions from an implant surface and their effect on cytokine production related to alveolar bone resorption. *Toxicology.* 2015;3271–9. doi:10.1016/j.tox.2014.10.016
29. Lechner J, Noumbissi S, Baehr V v. Titanium implants and silent inflammation in jawbone—a critical interplay of dissolved titanium particles and cytokines TNF- α and RANTES/CCL5 on overall health? *EPMA J.* 2018;9(3):331–43. doi:10.1007/s13167-018-0138-6
30. Stocchero M, Jinno Y, Toia M, Ahmad M, Papia E, Yamaguchi S, Becktor JP. Intraosseous Temperature Change during Installation of Dental Implants with Two Different Surfaces and Different Drilling Protocols: An In Vivo Study in Sheep. *J Clin Med.* 2019;8(8). doi:10.3390/jcm8081198
31. Hämmerle CH, Karring T. Guided bone regeneration at oral implant sites. *Periodontol* 2000. 1998;17151–75. doi:10.1111/j.1600-0757.1998.tb00132.x
32. Inoda H, Yamamoto G, Hattori T. Histological investigation of osteoinductive properties of rh-BMP2 in a rat calvarial bone defect model. *J Craniomaxillofac Surg.* 2004;32(6):365–9. doi:10.1016/j.jcms.2004.06.003
33. Srouji S, Ben-David D, Lotan R, Riminucci M, Livne E, Bianco P. The innate osteogenic potential of the maxillary sinus (Schneiderian) membrane: an ectopic tissue transplant model simulating sinus lifting. *Int J Oral Maxillofac Surg.* 2010;39(8):793–801. doi:10.1016/j.ijom.2010.03.009

34. Srouji S, Kizhner T, Ben David D, Riminucci M, Bianco P, Livne E. The Schneiderian membrane contains osteoprogenitor cells: in vivo and in vitro study. *Calcif Tissue Int.* 2009;84(2):138–45. doi:10.1007/s00223-008-9202-x
35. Palma VC, Magro-Filho O, Oliveria JA de, Lundgren S, Salata LA, Sennerby L. Bone reformation and implant integration following maxillary sinus membrane elevation: an experimental study in primates. *Clin Implant Dent Relat Res.* 2006;8(1):11–24. doi:10.2310/j.6480.2005.00026.x
36. Cricchio G, Palma VC, Faria PEP, Oliveria JA de, Lundgren S, Sennerby L, Salata LA. Histological outcomes on the development of new space-making devices for maxillary sinus floor augmentation. *Clin Implant Dent Relat Res.* 2011;13(3):224–30. doi:10.1111/j.1708-8208.2009.00208.x
37. Khoury F, Hanser T. Langzeiterfahrung mit der funktionellen Rehabilitation des stark atrophierten Oberkiefers. *Inspiration & Insights Magazin [Internet]*. 2016. Available from: <http://www.dsi-mag.de/fallberichte/2016/12/khoury/>
38. Hernández-Alfaro F, Sancho-Puchades M, Guijarro-Martínez R. Total reconstruction of the atrophic maxilla with intraoral bone grafts and biomaterials: a prospective clinical study with cone beam computed tomography validation. *Int J Oral Maxillofac Implants.* 2013;28(1):241–51. doi:10.11607/jomi.2405
39. Cordaro L, Torsello F, Accorsi Ribeiro C, Liberatore M, Di Mirisola Torresanto V. Inlay-onlay grafting for three-dimensional reconstruction of the posterior atrophic maxilla with mandibular bone. *Int J Oral Maxillofac Surg.* 2010;39(4):350–7. doi:10.1016/j.ijom.2010.02.016
40. Lee H-G, Kim Y-D. Volumetric stability of autogenous bone graft with mandibular body bone: cone-beam computed tomography and three-dimensional reconstruction analysis. *J Korean Assoc Oral Maxillofac Surg.* 2015;41(5):232–9. doi:10.5125/jkaoms.2015.41.5.232
41. Acocella A, Bertolai R, Colafranceschi M, Sacco R. Clinical, histological and histomorphometric evaluation of the healing of mandibular ramus bone block grafts for alveolar ridge augmentation before implant placement. *J Craniomaxillofac Surg.* 2010;38(3):222–30. doi:10.1016/j.jcms.2009.07.004
42. Marianetti TM, Leuzzi F, Pelo S, Gasparini G, Moro A. J-Graft for Correction of Vertical and Horizontal Maxillary Bone Defects. *Implant Dent.* 2016;25(2):293–301. doi:10.1097/ID.0000000000000393
43. Aghaloo TL, Moy PK. Which hard tissue augmentation techniques are the most successful in furnishing bony support for implant placement? *Int J Oral Maxillofac Implants.* 2007;22 Suppl49–70.
44. Alérico FA, Bernardes SR, Fontão FNGK, Diez GF, Alérico JHS, Claudino M. Prospective tomographic evaluation of autogenous bone resorption harvested from mandibular ramus in atrophic maxilla. *J Craniofac Surg.* 2014;25(6):e543-6. doi:10.1097/SCS.0000000000001045
45. Gultekin BA, Bedeloglu E, Kose TE, Mijiritsky E. Comparison of Bone Resorption Rates after Intraoral Block Bone and Guided Bone Regeneration Augmentation for the

Reconstruction of Horizontally Deficient Maxillary Alveolar Ridges. *Biomed Res Int.* 2016;2016. doi:10.1155/2016/4987437

46. Coelho PG, Suzuki M, Marin C, Granato R, Gil LF, Tovar N, Jimbo R, Neiva R, Bonfante EA. Osseointegration of Plateau Root Form Implants: Unique Healing Pathway Leading to Haversian-Like Long-Term Morphology. *Adv Exp Med Biol.* 2015;881111–28. doi:10.1007/978-3-319-22345-2_7

47. Berglundh T, Abrahamsson I, Lang NP, Lindhe J. De novo alveolar bone formation adjacent to endosseous implants. *Clin Oral Implants Res.* 2003;14(3):251–62. doi:10.1034/j.1600-0501.2003.00972.x

48. Ghanaati S, Al-Maawi S, Herrera-Vizcaino C, Alves GG, Calasans-Maia MD, Sader R, Kirkpatrick CJ, Choukroun J, Bonig H, Mourão CFdAB. A Proof of the Low Speed Centrifugation Concept in Rodents: New Perspectives for In Vivo Research. *Tissue Eng Part C Methods.* 2018;24(11):659–70. doi:10.1089/ten.TEC.2018.0236

49. El Bagdadi K, Kubesch A, Yu X, Al-Maawi S, Orłowska A, Dias A, Booms P, Dohle E, Sader R, Kirkpatrick CJ, Choukroun J, Ghanaati S. Reduction of relative centrifugal forces increases growth factor release within solid platelet-rich-fibrin (PRF)-based matrices: a proof of concept of LSCC (low speed centrifugation concept). *Eur J Trauma Emerg Surg.* 2019;45(3):467–79. doi:10.1007/s00068-017-0785-7

50. Ghanaati S, Mourão C, Adam E, Sader R, Zadeh H, Al-Maawi S. The role of centrifugation process in the preparation of therapeutic blood concentrates: Standardization of the protocols to improve reproducibility. 2019;241. doi:10.4103/GFSC.GFSC_15_19

51. Mammoto A, Connor KM, Mammoto T, Yung CW, Huh D, Aderman CM, Mostoslavsky G, Smith LEH, Ingber DE. A mechanosensitive transcriptional mechanism that controls angiogenesis. *Nature.* 2009;457(7233):1103–8. doi:10.1038/nature07765