

Immunologische Grundlagen der Titan-induzierten Periimplantitis

1. Agrup, G.: Sensitization induced by patch testing. *Br J Dermatol* 80:631-4 (1968)
2. Algan, S.M., Purdon, M., Horowitz, S.M.: Role of tumor necrosis factor alpha in particulate-induced bone resorption. *J Orthop Res* 14(1):30-5 (1996)
3. Baskettler, D.A., Whittle, E., Monk, B.: Possible allergy to complex titanium salt. *Contact Dermatitis* 42:310-1 (2000)
4. Baumann, B., Rolf, O., Jakob, F., Goebel, S., Sterner, T., Eulert, J., Rader, C.P.: Synergistic effects of mixed TiAlV and polyethylene wear particles on TNFalpha response in THP-1 macrophages. *Biomed Tech* 51(5-6):360-6 (2006)
5. Brune, D.: Metal release from dental biomaterials. *Biomaterials* 7:163-75 (1986)
6. Burian, B., Wimmer, M.A., Kunze, J., Sprecher, C.M., Pennekamp, P.H., von Engelhardt, L.V., Diedrich, O., Kraft, C.N.: Systemic spread of wear debris--an in-vivo study. *Z Orthop Ihre Grenzgeb* 144(5):539-44 (2006)
7. Carlsson, A.S., Magnusson, B., Möller, H.: Metal sensitivity in patients with metal-to-plastic total hip arthroplasties. *Acta Orthop Scand* 51:57-62 (1980)
8. Catelas, L.: In vitro induction of macrophage cytokine release by ceramic and polyethylene particles. 44th Annual meeting, Orthopaedic Research Society, NewOrleans, Louisiana (1998)
9. Dörner, T., Haas, J., Loddenkemper, C., von Baehr, V., Salama, A.: Implant-related inflammatory arthritis. *Nat Clin Pract Rheumatol* 2(1):53-6 (2006)
10. Eis, D.: Qualitätssicherung beim Lymphozytentransformationstest – *Bundesgesundheitsblatt* 51: 1070-6 (2008)
11. Feloutzis, A., Lang, N.P., Tonetti, M.S., Bürgin, W., Brägger, U., Buser, D., Duff, G.W., Kornman, K.S.: IL-1 gene polymorphism and smoking as risk factors for peri-implant bone loss in a well-maintained population. *Clin Oral Implants Res* 14:10-7 (2003)
12. Friskin, K.W., Dandie, G.W., Lugowski, S., Jordan, G.: A study of titanium release into body organs following the insertion of single threaded screw implants into the mandibles of sheep. *Aust Dent J* 47:214-7 (2002)
13. Gruica, B., Wang, H.Y., Lang, N.P., Buser, D.: Impact of IL-1 genotyp and smoking status on the prognosis if osseointegrated implants. *Clin Oral Implants Res* 15(4): 393–400 (2004)
14. Hallab, N.: Metal sensitivity in patients with orthopedic implants. *J. Clin Rheumatol* 7:215-8 (2001)
15. Huang, H.H., Chiu, Y.H., Lee, T.H., Wu, S.C., Yang, H.W., Su, K.H., Hsu, C.C.: Ion release from NiTi orthodontic wires in artificial saliva with various acidities. *Biomaterials* 24:3585-92 (2003)
16. Ingham, E., Fisher, J.: The role of macrophages in osteolysis of total joint replacement. *Biomaterials* 26:1271-86 (2005)
17. Jacobi-Gresser, L., Huesker, K., Schuett, S.: Genetic and immunological markers predict titanium implant failure - a retrospective study. *J Oral Maxillofac Surg* submitted june 2011
18. Jansson, H., Hamberg, K., De Bruyn, H., Bratthall, G.: Clinical consequences of IL-1 genotype on early implant failures in patients under periodontal maintenance. *Clin Implant Dent Relat Res* 7(1): 51–59 (2005)
19. Kaufman, A.M., Alabre, C.I., Rubash, H.E., Shanbhag, A.S.: Human macrophage response to UHMWPE, TiAlV, CoCr, and alumina particles: analysis of multiple cytokines using protein arrays. *J Biomed Mater Res A* 84(2):464-74 (2008)
20. Laine, M. L., Leonhardt, A., Roos-Jansäker, A. M., Pena, A. S., V. Winkelhoff, A. J., Winkel, E. G., Renvert, S.: IL1RN gene polymorphism is associated with peri-implantitis. *Clin Oral Implants Res* 17(4): 380–385 (2006)

21. Lindemann, M., Rietschel, F., Zabel, M., Grosse-Wilde, H.: Detection of chromium allergy by cellular in vitro methods. *Clin Exp Allergy* 38:1468-75 (2008)
22. Matthew, I.R., Frame, J.W., Browne, R.M., Millar, B.G.: In vivo surface analysis of titanium and stainless steel miniplates and screws. *Int J Oral Maxillofac Surg* 25:463-8 (1996)
23. Merkel, K.D., Erdmann, J.M., McHugh, K.P., Abu-Amer, Y., Ross, F.P., Teitelbaum, S.L.: Tumor necrosis factor-alpha mediates orthopedic implant osteolysis. *Am J Pathol* 154:203-10 (1999)
24. Montes, C.C., Pereira, F.A., Thomé, G., Alves, E.D., Acedo, R.V., de Souza, J.R., Melo, A.C., Trevilatto, P.C.: Failing factors associated with osseointegrated dental implant loss. *Implant Dent* 16(4):404-12 (2007)
25. Montes, C.C., Alvim-Pereira, F., de Castilhos, B.B., Sakurai, M.L., Olandoski, M., Trevilatto, P.C.: Analysis of the association of IL1B (C+3954T) and IL1RN (intron 2) polymorphisms with dental implant loss in a Brazilian population. *Clin Oral Implants Res* 20(2):208-17 (2009)
26. Nakashima, Y., Sun, D.H., Trindade, M.C., Maloney, W.J., Goodman, S.B., Schurman, D.J., Smith, R.L.: Signaling pathways for tumor necrosis factor-alpha and interleukin-6 expression in human macrophages exposed to titanium-alloy particulate debris in vitro. *J Bone Joint Surg Am* 81:603-15 (1999)
27. Nuevo-Ordóñez, Y., Montes-Bayón, M., Blanco-González, E., Paz-Aparicio, J., Raimundez, J.D., Tejerina, J.M., Peña, M.A., Sanz-Medel, A.: Titanium release in serum of patients with different bone fixation implants and its interaction with serum biomolecules at physiological levels. *Anal Bioanal Chem* DOI: 10.1007/s00216-011-5232-8 (2011)
28. Peralta, D.G., Chapman, R.J., Gelfand, J.A., Callahan, M.V., Adams, D.F., Lie, T.: Relative production of IL-1 beta and TNF alpha by mononuclear cells after exposure to dental implants. *J Periodontol.* 63:426-30 (1992)
29. Rader, C.P., Sterner, T., Jakob, F., Schütze, N., Eulert, J.: Cytokine response of human macrophage-like cells after contact with polyethylene and pure titanium particles. *J Arthroplasty* 14:840-8 (1999)
30. Rakshit, D.S., Lim J.T., Ly, K., Ivashkiv, L.B., Nestor, B.J., Sculco, T.P., Purdue, P.E.: Involvement of complement receptor 3 (CR3) and scavenger receptor in macrophage responses to wear debris. *J Orthop Res* 24:2036-44 (2006)
31. Schuh, A., Thomas, P., Kachler, W., Göske, J., Wagner, L., Holzwarth, U., Forst, R.: Allergic potential of titanium implants, *Orthopade* 34:327-8 (2005)
32. Shimpuku H, Nosaka Y, Kawamura T, Tachi Y, Shinohara M, Ohura K: Genetic polymorphisms of the interleukin-1 gene and early marginal bone loss around endosseous dental implants. *Clin Oral Implants Res* 14(4): 423–429, 2003
33. Solar RJ, Pollack SR, Korostoff E. In vitro corrosion testing of titanium surgical implant alloys: an approach to understanding titanium release from implants. *J Biomed Mater Res*. 1979;13:217-50
34. Soysa NS, Alles N. NF-kappaB functions in osteoclasts. *Biochem Biophys Res Commun*. 2009;378:1-5
35. Sterner T, Schütze N, Saxler G, Jakob F, Rader CP: Effects of clinically relevant alumina ceramic, zirconia ceramic and titanium particles of different sizes and concentrations on TNF-alpha release in a human macrophage cell line. *Biomed Tech* 49(12):340-4, 2004
36. Swiontkowski MF, Agel J, Schwappach J, McNair P, Welch M.J Cutaneous metal sensitivity in patients with orthopaedic injuries., *Orthop Trauma*. 2001;15:86-9
37. Thomas P, Bandl WD, Maier S, Summer B, Przybilla B. Hypersensitivity to titanium osteosynthesis with impaired fracture healing, eczema, and T-cell hyperresponsiveness in vitro: case report and review of the literature. *Contact Dermatitis*. 2006 ;55:199-202
38. Torgersen S, Gjerdet NR, Erichsen ES, Bang G. Metal particles and tissue changes adjacent to miniplates. A retrieval study. *Acta Odontol Scand*. 1995; 53:65-71.

39. Tuan RS, Lee FY, T Konttinen Y, Wilkinson JM, Smith RL What are the local and systemic biologic reactions and mediators to wear debris, and what host factors determine or modulate the biologic response to wear particles? *Implant Wear Symposium 2007 Biologic Work Group.* J Am Acad Orthop Surg. 2008;16 Suppl 1:S42-8.
40. Wataha J. Materials for endosseous dental implants J Oral Rehabil.23; 79-90, 1996
41. Wei X, Zhang X, Zuscik MJ, Drissi MH, Schwarz EM, O'Keefe RJ. Fibroblasts express RANKL and support osteoclastogenesis in a COX-2-dependent manner after stimulation with titanium particles. *J. Bone Miner Res.* 2005 ;20:1136-48
42. Weingart D, Steinemann S, Schilli W, Strub JR, Hellerich U, Assemacher J, Simpson J. Titanium deposition in regional lymph nodes after insertion of titanium screw implants in maxillofacial region. *Int J Oral Maxillofac Surg.* 1994;23:450-2
43. Wennerberg A, Ide-Ektessabi A, Hatkamata S, Sawase T, Johansson C, Albrektsson T, Martinelli A, Södervall U, Odelius H. Titanium release from implants prepared with different surface roughness. *Clin Oral Implants Res.* 2004 ;15:505-12.
44. Willert HG, Buchhorn GH, Hess T. The significance of wear and material fatigue in loosening of hip prostheses. *Orthopäde.* 1989;18:350-69
45. Xing Z, Schwab LP, Alley CF, Hasty KA, Smith RA. Titanium particles that have undergone phagocytosis by macrophages lose the ability to activate other macrophages. *J Biomed Mater Res B Appl Biomater.* 2008; 85:37-41