

## **Probiotika in der Prävention und Therapie parodontaler Erkrankungen**

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- [1] Chapple ILC, Mealey BL, Van Dyke TE, Bartold PM, Dommisch H, Eickholz P, Geisinger ML, Genco RJ, Glogauer M, Goldstein M, Griffin TJ, Holmstrup P, Johnson GK, Kapila Y, Lang NP, Meyle J, Murakami S, Plemons J, Romito GA, Shapira L, Tatakis DN, Teughels W, Trombelli L, Walter C, Wimmer G, Xenoudi P, Yoshie H. Periodontal health and gingival diseases and conditions on an intact and a reduced periodontium: Consensus report of workgroup 1 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol*. 2018 Jun;89 Suppl 1:S74-S84.
- [2] Paster BJ, Olsen I, Aas JA, Dewhirst FE. The breadth of bacterial diversity in the human periodontal pocket and other oral sites. *Periodontol 2000* 2006;42(1):80-87.
- [3] Keijser BJ, Zaura E, Huse SM, van der Vossen JM, Schuren FH, Montijn RC, ten Cate JM, Crielaard W. Pyrosequencing analysis of the oral microflora of healthy adults. *J Dent Res*. 2008 Nov;87(11):1016-20.
- [4] Meyle J, Chapple I. Molecular aspects of the pathogenesis of periodontitis. *Periodontol 2000*. 2015 Oct;69(1):7-17.
- [5] Smiley CJ, Tracy SL, Abt E, Michalowicz BS, John MT, Gunsolley J, Cobb CM, Rossmann J, Harrel SK, Forrest JL, Hujoel PP, Noraian KW, Greenwell H, Frantsve-Hawley J, Estrich C, Hanson N. Systematic review and meta-analysis on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts. *J Am Dent Assoc*. 2015 Jul;146(7):508-24.
- [6] Jordan AR & Micheelis W (Hrsg.). (2016). Fünfte Deutsche Mundgesundheitsstudie-(DMS V) Deutscher Zahnärzte Verlag DÄV.
- [7] Socransky SS, Haffajee AD, Cugini MA, Smith C, Kent RL Jr. Microbial complexes in subgingival plaque. *J Clin Periodontol*. 1998 Feb;25(2):134-44.
- [8] Colombo AP, Boches SK, Cotton SL, Goodson JM, Kent R, Haffajee AD, Socransky SS, Hasturk H, Van Dyke TE, Dewhirst F, Paster BJ. Comparisons of subgingival microbial profiles of refractory periodontitis, severe periodontitis, and periodontal health using the human oral microbe identification microarray. *J Periodontol*. 2009 Sep;80(9):1421-32.
- [9] Rescala B, Rosalem W Jr, Teles RP, Fischer RG, Haffajee AD, Socransky SS, Gustafsson A, Figueredo CM. Immunologic and microbiologic profiles of chronic and aggressive periodontitis subjects. *J Periodontol*. 2010 Sep;81(9):1308-16.
- [10] Roberts FA, Darveau RP. Microbial protection and virulence in periodontal tissue as a function of polymicrobial communities: symbiosis and dysbiosis. *Periodontol 2000*. 2015 Oct;69(1):18-27.
- [11] Bartold PM, Van Dyke TE. Periodontitis: a host-mediated disruption of microbial homeostasis. *Unlearning learned concepts*. *Periodontol 2000*. 2013 Jun;62(1):203-17.
- [12] Hajishengallis G. Periodontitis: from microbial immune subversion to systemic inflammation. *Nat Rev Immunol*. 2015 Jan;15(1):30-44.

- [13]Rams TE, Degener JE, van Winkelhoff AJ. Antibiotic resistance in human chronic periodontitis microbiota. *J Periodontol* 2014 Jan;85(1):160-169.
- [14]Veloo ACM, Seme K, Raangs E, Rurenga P, Singadji Z, Wekema-Mulder G, van Winkelhoff AJ. Antibiotic susceptibility profiles of oral pathogens. *Int J Antimicrob Agents* 2012;40:450-454.
- [15]Mahasneh SA, Mahasneh AM. Probiotics: A Promising Role in Dental Health. *Dent J (Basel)*. 2017 Sep 27;5(4).
- [16]Metchnikoff E (1907): *The prolongation of life. Optimistic studies.* London; Butterworth-Heinemann.
- [17]Vandenplas Y, Huys G, Daube G. Probiotics: an update. *J Pediatr (Rio J)*. 2015 Jan-Feb;91(1):6-21.
- [18]Selle K, Klaenhammer TR. Genomic and phenotypic evidence for probiotic influences of *Lactobacillus gasseri* on human health. *FEMS Microbiol Rev*. 2013 Nov;37(6):915-35.
- [19]Hillman JD, Socransky SS, Shivers M. The relationships between streptococcal species and periodontopathic bacteria in human dental plaque. *Arch Oral Biol*. 1985;30(11-12):791-795.
- [20]Hillman JD, Shivers M. Interaction between wild-type, mutant and revertant forms of the bacterium *Streptococcus sanguis* and the bacterium *Actinobacillus actinomycetemcomitans* in vitro and in the gnotobiotic rat. *Arch Oral Biol*. 1988;33(6):395-401.
- [21]Herrero ER, Slomka V, Bernaerts K, Boon N, Hernandez-Sanabria E, Passoni BB, Quirynen M, Teughels W. Antimicrobial effects of commensal oral species are regulated by environmental factors. *J Dent*. 2016 Apr;47:23-33.
- [22]Teughels W, Kinder Haake S, Sliepen I, Pauwels M, Van Eldere J, Cassiman JJ, Quirynen M. Bacteria interfere with *A. actinomycetemcomitans* colonization. *J Dent Res*. 2007a Jul;86(7):611-7.
- [23]Teughels W, Newman MG, Coucke W, Haffajee AD, Van Der Mei HC, Haake SK, Schepers E, Cassiman JJ, Van Eldere J, van Steenberghe D, Quirynen M. Guiding periodontal pocket recolonization: a proof of concept. *J Dent Res*. 2007b Nov;86(11):1078-82.
- [24]Nackaerts O, Jacobs R, Quirynen M, Rober M, Sun Y, Teughels W. Replacement therapy for periodontitis: pilot radiographic evaluation in a dog model. *J Clin Periodontol*. 2008;35(12):1048-1052.
- [25]Ben Taheur F, Kouidhi B, Fdhila K, Elabed H, Ben Slama R, Mahdouani K, Bakhrouf A, Chaieb K. Anti-bacterial and anti-biofilm activity of probiotic bacteria against oral pathogens. *Microb Pathog*. 2016 Aug;97:213-20.
- [26]Samot J, Badet C. Antibacterial activity of probiotic candidates for oral health. *Anaerobe*. 2013 Feb;19:34-8.
- [27]Jones SE, Versalovic J. Probiotic *Lactobacillus reuteri* biofilms produce antimicrobial and anti-inflammatory factors. *BMC Microbiol*. 2009 Feb 11;9:35. doi: 10.1186/1471-2180-9-35.

- [28]Gupta G. Probiotics and periodontal health. *J Med Life*. 2011 Nov 14;4(4):387-94.
- [29]Haukioja A, Yli-Knuuttila H, Loimaranta V, Kari K, Ouwehand AC, Meurman JH, Tenovou J. Oral adhesion and survival of probiotic and other lactobacilli and bifidobacteria in vitro. *Oral Microbiol Immunol*. 2006 Oct;21(5):326-32.
- [30]Hajishengallis G. Immunomicrobial pathogenesis of periodontitis: keystones, pathobionts, and host response. *Trends Immunol*. 2014 Jan;35(1):3-11.
- [31]Bron PA, van Baarlen P, Kleerebezem M. Emerging molecular insights into the interaction between probiotics and the host intestinal mucosa. *Nat Rev Microbiol*. 2011 Nov 21;10(1):66-78.
- [32]Campeau JL, Salim SY, Albert EJ, Hotte N, Madsen KL. Intestinal epithelial cells modulate antigen-presenting cell responses to bacterial DNA. *Infect Immun*. 2012 Aug;80(8):2632-44.
- [33]Vivekananda MR, Vandana KL, Bhat KG. Effect of the probiotic *Lactobacilli reuteri* (Prodentis) in the management of periodontal disease: a preliminary randomized clinical trial. *J Oral Microbiol*. 2010 Nov 2;2(1):5344.
- [34]Ince G, Gürsoy H, İpçi ŞD, Cakar G, Emekli-Alturfan E, Yılmaz S. Clinical and Biochemical Evaluation of Lozenges Containing *Lactobacillus reuteri* as an Adjunct to Non-Surgical Periodontal Therapy in Chronic Periodontitis. *J Periodontol*. 2015 Jun;86(6):746-54.
- [35]Tekce M, Ince G, Gursoy H, Dirikan İpci S, Cakar G, Kadir T, Yılmaz S. Clinical and microbiological effects of probiotic lozenges in the treatment of chronic periodontitis: a 1-year follow-up study. *J Clin Periodontol*. 2015 Apr;42(4):363-72.
- [36]Teughels W, Durukan A, Ozcelik O, Pauwels M, Quirynen M, Haytac MC. Clinical and microbiological effects of *Lactobacillus reuteri* probiotics in the treatment of chronic periodontitis: a randomized placebo-controlled study. *J Clin Periodontol*. 2013 Nov;40(11):1025-35.
- [37]Penala S, Kalakonda B, Pathakota KR, Jayakumar A, Koppolu P, Lakshmi BV, Pandey R, Mishra A. Efficacy of local use of probiotics as an adjunct to scaling and root planing in chronic periodontitis and halitosis: A randomized controlled trial. *J Res Pharm Pract*. 2016 Apr-Jun;5(2):86-93.
- [38]Kozlovsky A, Gordon D, Gelernter I, Loesche WJ, Rosenberg M. Correlation between the BANA test and oral malodor parameters. *J Dent Res*. 1994 May;73(5):1036-42.
- [39]Gruner D, Paris S, Schwendicke F. Probiotics for managing caries and periodontitis: Systematic review and meta-analysis. *J Dent*. 2016 May;48:16-25.
- [40]Martin-Cabezas R, Davideau JL, Tenenbaum H, Huck O. Clinical efficacy of probiotics as an adjunctive therapy to non-surgical periodontal treatment of chronic periodontitis: a systematic review and meta-analysis. *J Clin Periodontol*. 2016 Jun;43(6):520-30.
- [41]Ikram S, Hassan N, Raffat MA, Mirza S, Akram Z. Systematic review and meta-analysis of double-blind, placebo-controlled, randomized clinical trials using probiotics in chronic periodontitis. *J Investig Clin Dent*. 2018 Mar 31:e12338. [Epub ahead of print]

- [42] Morales A, Gandolfo A, Bravo J, Carvajal P, Silva N, Godoy C, Garcia-Sesnich J, Hoare A, Diaz P, Gamonal J. Microbiological and clinical effects of probiotics and antibiotics on nonsurgical treatment of chronic periodontitis: a randomized placebo- controlled trial with 9-month follow-up. *J Appl Oral Sci.* 2018 Jan 18;26:e20170075.
- [43] GUM® PerioBalance®: Anwendungsprotokoll – Leitfaden für das Praxisteam ([http://www.gum-professionell.de/fileadmin/uploads/Blog\\_PDFS/GUM\\_PerioBalance\\_USAGE\\_PROTOCOL2017.pdf](http://www.gum-professionell.de/fileadmin/uploads/Blog_PDFS/GUM_PerioBalance_USAGE_PROTOCOL2017.pdf), letzter Zugriff am 15.07.2018)
- [44] Szkaradkiewicz AK, Stopa J, Karpiński TM. Effect of oral administration involving a probiotic strain of *Lactobacillus reuteri* on pro-inflammatory cytokine response in patients with chronic periodontitis. *Arch Immunol Ther Exp (Warsz).* 2014 Dec;62(6):495-500.
- [45] Kuru BE, Laleman I, Yalnızoğlu T, Kuru L, Teughels W. The Influence of a *Bifidobacterium animalis* Probiotic on Gingival Health: A Randomized Controlled Clinical Trial. *J Periodontol.* 2017 Nov;88(11):1115-1123.
- [46] Slawik S, Staufenbiel I, Schilke R, Nicksch S, Weinspach K, Stiesch M, Eberhard J. Probiotics affect the clinical inflammatory parameters of experimental gingivitis in humans. *Eur J Clin Nutr.* 2011 Jul;65(7):857-63.
- [47] Sabatini S, Lauritano D, Candotto V, Silvestre FJ, Nardi GM. Oral probiotics in the management of gingivitis in diabetic patients: a double blinded randomized controlled study. *J Biol Regul Homeost Agents.* 2017 Apr-Jun;31(2 Suppl 1):197-202.
- [48] Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: Framework and proposal of a new classification and case definition. *J Periodontol.* 2018 Jun;89 Suppl 1:S159-S172.
- [49] Simon MC, Strassburger K, Nowotny B, Kolb H, Nowotny P, Burkart V, Zivehe F, Hwang JH, Stehle P, Pacini G, Hartmann B, Holst JJ, MacKenzie C, Bindels LB, Martinez I, Walter J, Henrich B, Schloot NC, Roden M. Intake of *Lactobacillus reuteri* improves incretin and insulin secretion in glucose-tolerant humans: a proof of concept. *Diabetes Care.* 2015 Oct;38(10):1827-34.
- [50] Mobini R, Tremaroli V, Ståhlman M, Karlsson F, Levin M, Ljungberg M, Sohlin M, Bertéus Forslund H, Perkins R, Bäckhed F, Jansson PA. Metabolic effects of *Lactobacillus reuteri* DSM 17938 in people with type 2 diabetes: A randomized controlled trial. *Diabetes Obes Metab.* 2017 Apr;19(4):579-589.