

LACTOBACILLUS ACIDOPHILUS NCFM®

In the following documents, different strain designations for the same strain may appear as the chronology of the organism is published. NCFM, NCK56, NCK45, N2, RL8KR, RL8KS and RL8K are essentially identical strains, as indicated by identical chromosomal DNA fragment patterns. N2 was selected by Marschall Products from NCFM as a smooth, bile resistant colony. RL8KS was selected similarly in Dr. Todd Klaenhammer's laboratory from parent culture RL8K. NCK45 is a Klaenhammer laboratory designation for NCFM and NCK56 is a Klaenhammer laboratory designation for NCFM/N2. The history of the strain NCFM is reviewed in detail in Sanders & Klaenhammer, 2001. The strain is deposited at the ATCC under number 700396.

In vitro trials

Probiotic selection, survival, stability

- Morovic W, Roper JM, Smith AB, Mukerji P, Stahl B, Rae JC, Ouwehand AC. 2017. Safety evaluation of HOWARU® Restore (*Lactobacillus acidophilus* NCFM, *Lactobacillus paracasei* Lpc-37, *Bifidobacterium animalis* subsp. *lactis* Bi-04 and *Bifidobacterium lactis* Bi-07) for antibiotic resistance, genomic risk factors and acute toxicity. Food Chem Toxicol. Nov 1;110: 316-324. doi: 10.1016/j.fct.2017.10.037.
Also listed under Animal trials/Safety.
- Forssten SD, Ouwehand AC. 2017. Simulating colonic survival of probiotics in single-strain products compared to multi-strain products. Microbial Ecology in Health and Disease. Volume 28, Issue 1.
- Calderini E, Celebioglu HU, Villarroel J, Jacobsen S, Svensson B, Pessione E. 2017. Comparative proteomics of oxidative stress response of *Lactobacillus acidophilus* NCFM reveals effects on DNA repair and cysteine de novo synthesis. Proteomics. Jan 3.
- Klindt-Toldam S, Larsen SK, Saaby L, Olsen LR, Svenstrup G, Müllertz A, Knöchel S, Heimdal H, Nielsen DS, Zielnińska D. 2016. Survival of *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* HN019 encapsulated in chocolate during *in vitro* simulated passage of the upper gastrointestinal tract. LWT-Food Sci Technol. Jul 25.
- Medvedova A, Mancuskova T, Valik L. 2016. Growth of *Lactobacillus acidophilus* NCFM in dependence on temperature. Acta Alimentaria 45(1): 104-111.
- Sulek K, Frandsen HL, Smedsgaard J, Skov TH, Wilcks A, Licht TR. 2012. Metabolic footprint of *Lactobacillus acidophilus* NCFM at different pH. Metabolomics, 8(2), 244-252.
- Ng EW, Yeung M, Tong PS. 2010. Effects of yogurt starter cultures on the survival of *Lactobacillus acidophilus*. Int J Food Microbiol. 145: 169-175.
- O'Flaherty SJ, Klaenhammer TR. 2010. Functional and Phenotypic Characterization of a Protein from *Lactobacillus acidophilus* involved in Cell Morphology, Stress Tolerance and Adherence to Intestinal cells. Microbiology. 156: 3360-3367.
- Weiss G, Jespersen L. 2010. Transcriptional Analysis of Genes Associated with Stress and Adhesion in *Lactobacillus acidophilus* NCFM during the Passage through an *in vitro* Gastrointestinal Tract Model. J Mol Microbiol Biotechnol. 18: 206-214.
- Goh YJ, Klaenhammer TR. 2010. Functional roles of aggregation-promoting-like factor in stress tolerance and adherence of *Lactobacillus acidophilus* NCFM. Appl Environ Microbiol. 2010 Jun 18.
- Guo Z, Wang J, Yan L, Chen W, Liu X M, Zhang H P. 2009. *In vitro* comparison of probiotic properties of *Lactobacillus casei* Zhang, a potential new probiotic, with selected probiotic strains. LWT Food Sci Technol. 42: 1640-1646.

12. Modzelewska-Kapituła M, Kłębukowska L, Kornacki K, Łukaszuk W. 2009. The evaluation of usefulness of potentially probiotic lactobacillus strains as components of industrial starter cultures. *Pol J Natur Sc.* 24: 254-262.
13. Moslehi-Jenabian S, Gori K, Jespersen L. 2009. AI-2 signaling is induced by acidic shock in probiotic strains of *Lactobacillus* spp. *Int J Food Microbiol.* 135: 295-302.
14. Mäkeläinen H, Forssten S, Olli K, Granlund L, Rautonen N, Ouwehand AC. 2009. Probiotic lactobacilli in a semi-soft cheese survive in the simulated human gastrointestinal tract. *Int Dairy J.* 19: 675-683.
15. Haukioja A, Söderling E, Tenovuo J. 2008. Acid production from sugars and sugar alcohols by probiotic lactobacilli and bifidobacteria *in vitro*. *Caries Res.* 42: 449-453.
16. Duong T, Barrangou R, Russell WM, Klaenhammer TR. 2006. Characterization of the *tre* locus and analysis of trehalose cryoprotection in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 72: 1218-1225.
Also listed under Genomics.
17. Azcarate-Peril MA, Altermann E, Hoover-Fitzula RL, Cano RJ, Klaenhammer TR. 2004. Identification and inactivation of genetic loci involved with *Lactobacillus acidophilus* acid tolerance. *Appl Environ Microbiol.* 70: 5315-5322.
18. Yeung PS, Kitts CL, Cano R, Tong PS, Sanders ME. 2004. Application of genotypic and phenotypic analyses to commercial probiotic strain identity and relatedness. *J Appl Microbiol.* 97: 1095-104.
Also listed under Genomics.
19. Gilliland SE, Reilly SS, Kim GB, Kim HS. 2002. Viability during storage of selected probiotic lactobacilli and bifidobacteria in a yogurt-like product. *J Food Sci.* 67: 3091-3095.
20. Moser SA, Savage DC. 2001. Bile salt hydrolase activity and resistance to toxicity of conjugated bile salts are unrelated properties in lactobacilli. *Appl Environ Microbiol.* 67: 3476-3480.
21. Broadbent JR, Oberg CJ, Wang H, Wei L. 1997. Attributes of the heat shock response in three species of dairy *Lactobacillus*. *System Appl Microbiol.* 20: 12-19.
22. Hughes DB, Hoover DG. 1995. Viability and enzymatic activity of bifidobacteria in milk. *J Dairy Sci.* 78: 268-276.
23. Neuman E, Ferreira CLLF. 1995. *Lactobacillus acidophilus* as dietary adjunct: *in vitro* susceptibility to gastric juice, bile salts, lysozyme and chemotherapeutic agents. *Rev Microbiol.* 26: 59-65.
24. Conway PL, Gorbach SL, Goldin BR. 1987. Survival of lactic acid bacteria in the human stomach and adhesion to intestinal cells. *J Dairy Sci.* 70: 1-12.
25. Klaenhammer TR, Kleeman EG. 1981. Growth characteristics, bile sensitivity and freeze damage in colonial variants of *Lactobacillus acidophilus*. *Appl Environ Microbiol.* 41: 1461-1467.
26. Wright CT, Klaenhammer TR. 1981. Calcium-induced alteration of cellular morphology affecting the resistance of *Lactobacillus acidophilus* to freezing. *Appl Environ Microbiol.* 41: 807-815.

Immune System Modulation

1. O'Flaherty S, Klanhammer TR. 2016. Multivalent chromosomal expression of the *Clostridium botulinum* serotype A neurotoxin heavy chain antigen and *Bacillus anthracis* protective antigen in *Lactobacillus acidophilus*. *Appl Environ Microbiol.* Aug 5.
2. Amar Y, Rizzello V, Cavaliere R, Campana S, De Pasquale C, Barberi C, Oliveri D, Pezzino G, Costa G, Meddah AT, Ferlazzo G, Bonaccorsi I. 2015 Divergent signaling pathways regulate IL-12 production induced by different species of Lactobacilli in human dendritic cells. *Immunol Lett.* 2015 May 11;166(1): 6-12.
3. Cousin FJ, Foligné B, Deutsch SM, Massart S, Parayre S, Le Loir Y, Boudry G, Jan G. 2012. Assessment of the probiotic potential of a dairy product fermented by *Propionibacterium freudenreichii* in piglets. *J Agric Food Chem.* 2012 Aug 15;60(32): 7917-27. doi: 10.1021/jf302245m. Epub 2012 Aug 3.
4. Zadeh M, Khan MW, Goh YJ, Selle K, Owen JL, Klaenhammer T, Mohamadzadeh M. 2012. Induction of intestinal pro-inflammatory immune responses by lipoteichoic acid. *J Inflamm (Lond).* Mar 16;9: 7.

5. Lv X, Man C, Han L, Wang M, Zhang G, Liu Y, Yang S, Xue Y, Jiang Y. 2011. [Expression of PTX3 gene in Caco-2 cells treated with *Lactobacillus acidophilus* NCFM]. *Wei Sheng Wu Xue Bao*. 51: 554-60. [Chinese]
6. Gad M, Ravn P, Soeborg D, Jensen K, Ouwehand AC and Jensen S. 2011. Regulation of the IL-10/IL-12 axis in human dendritic cells with probiotic bacteria. *FEMS Immunol. Med Microbiol*. 63: 93-107.
7. Mohamadzadeh M, Pfeiler EA, Brown JB, Zadeh M, Gramarossa M, Managlia E, Bere P, Sarraj B, Khan MW, Pakanati KC, Ansari MJ, O'Flaherty S, Barrett T, Klaenhammer TR. 2011. Microbes and Health Sackler Colloquium: Regulation of induced colonic inflammation by *Lactobacillus acidophilus* deficient in lipoteichoic acid. *Proc Natl Acad Sci USA*. 2011 Jan 31. *Also listed under Animal trials*.
8. Saber R, Zadeh M, Pakanati KC, Bere P, Klaenhammer T, Mohamadzadeh M. 2011. Lipoteichoic acid-deficient *Lactobacillus acidophilus* regulates downstream signals. *Immunotherapy*. 3: 337-347.
9. Duersteler M, Novak K, Davis E, Smith A, Rehberger T. 2010. Immunomodulatory effects of *Lactobacillus plantarum* and *Lactobacillus acidophilus* strains on a rat intestinal epithelial cell line. *The Journal of Immunology*, 2010, 184, 137.21
10. Weiss G, Rasmussen S, Zeuthen LH, Nielsen BN, Jarmer H, Jespersen L, Frøkiær H. 2010. *Lactobacillus acidophilus* induces virus immune defence genes in murine dendritic cells by a Toll-like receptor-2-dependent mechanism. *Immunology*. 131: 268-281.
11. Weiss G, Rasmussen S, Nielsen Fink L, Jarmer H, Nøhr Nielsen B, Frøkiær H. 2010. *Bifidobacterium bifidum* actively changes the gene expression profile induced by *Lactobacillus acidophilus* in murine dendritic cells. *PLoS One* 5: e11065.
12. Schmidt EGW, Claesson HM, Jensen SS, Ravn P, Kristensen NN. 2009. Antigen-presenting cells exposed to *Lactobacillus acidophilus* NCFM, *Bifidobacterium bifidum* BI-98 and BI-504 reduce regulatory T cell activity. *Inflamm Bowel Dis*. Available online, DOI 10.1002/ibd.21068.
13. Wang M, Zhang G, Han X, Yao L, Zhou Y, Jiang Y. 2009. Expression profile analysis of intestinal Caco-2 cells treated with *Lactobacillus acidophilus* NCFM. *Wei Sheng Wu Xue Bao*. 49: 1247-52. [Chinese]
14. Zoumpopoulou G, Tsakalidou E, Dewulf J, Pot B, Grangette. 2009. Differential crosstalk between epithelial cells, dendritic cells and bacteria in a co-culture model. *Int J Food Micro*. 131: 40-51.
15. Konstantinov SR, Smidt H, de Vos WM, Bruijens SCM, Singh SK, Valence F, Molle D, Lortal S, Altermann E, Klaenhammer TR, van Kooyk Y. 2008. S layer protein A of *Lactobacillus acidophilus* NCFM regulates immature dendritic cell and T cell functions. *PNAS*. 105: 19473-19478. *Supporting information: www.pnas.org/cgi/content/short/0810305105 Also listed under Animal trials*.
16. Putaala H, Salusjärvi T, Nordström M, Saarinen M, Ouwehand AC, Bech-Hansen E, Rautonen N. 2008. Effect of four probiotic strains and *Escherichia coli* O157:H7 on tight junction integrity and cyclo-oxygenase expression. *Res Microbiol*. 159: 692-698.
17. Sokol H, Pigneur B, Watterlot L, Lakhdari O, Bermúdez-Humarán LG, Gratadoux JJ, Blugeon S, Bridonneau C, Furet JP, Corthier G, Grangette C, Vasquez N, Pochart P, Trugnan G, Thomas G, Blottière HM, Doré J, Marteau P, Seksik P, Langella P. 2008. *Faecalibacterium prausnitzii* is an anti-inflammatory commensal bacterium identified by gut microbiota analysis of Crohn disease patients. *PNAS*. 105: 16731-16736.

Urogenital Applications

1. Reid G. 2000. Investigation of the properties of *Lactobacillus acidophilus* NCFM as a possible probiotic for the urogenital tract. *International Dairy Journal* 10: 415-419.

Lactose Digestion

1. Do Carmo AP, De Oliveira MN, Da Silva DF, Castro SB, Borges AC, De Carvalho AF, De Moraes CA. 2012. Genes involved in lactose catabolism and organic acid production during growth of *Lactobacillus delbrueckii* UFV H2b20 in skimmed milk. *Benef Microbes*. 3: 23-32. (NCFM as reference genome).
2. Azcarate-Peril MA, Tallon R, Klaenhammer TR. 2009. Temporal gene expression and probiotic attributes of *Lactobacillus acidophilus* during growth in milk. *J Dairy Sci*. 92: 870-886. *Also listed under Product functionality*.

3. Nielsen JW, Gilliland SE. 1992. The lactose hydrolyzing enzyme from *Lactobacillus acidophilus*. *Cult Dairy Prod J*. 27: 20-28.

Antipathogenic/antitoxic activity

1. Zhao L, Zhao H, Sana S, Zhang X, Zhang B. 2017. Screening lactic acid bacteria strains with ability to bind di-n-butyl phthalate via Turbiscan technique. *Antonie van Leeuwenhoek, June*, Volume 110, Issue 6, pp 759–769.
2. Zhao BB, Meng J, Zhang QX, Kang TT, Lu RR. 2017. Protective effect of surface layer proteins isolated from four *Lactobacillus* strains on hydrogen-peroxide-induced HT-29 cells oxidative stress. *Int J Biol Macromol*. 102: 76-83.
3. Meng J, Zhang QX, Lu RR. 2017. Surface layer protein from *Lactobacillus acidophilus* NCFM inhibit intestinal pathogen-induced apoptosis in HT-29 cells. *Int J Biol Macromol*. 96: 766-774.
4. Forssten SD, R yhti H, Hibberd AA, Ouwehand AC. 2015. The effect of polydextrose and probiotic lactobacilli in a *Clostridium difficile*-infected human colonic model. *Microb Ecol Health Dis*. Oct 13; 26: 27988.
5. Moslehi-Jenabian S, Vogensen FK, Jespersen L. 2011. The quorum sensing luxS gene is induced in *Lactobacillus acidophilus* NCFM in response to *Listeria monocytogenes*. *Int J Food Microbiol*. 149(3): 269-73.
6. Collado MC, Meriluoto J, Salminen S. 2007. Role of commercial probiotic strains against human pathogen adhesion to intestinal mucus. *Letters in Appl Microbiol*. 45: 454-460.
7. Dobson AE, Sanozky-Dawes RB, Klaenhammer TR. 2007. Identification of an operon and inducing peptide involved in the production of lactacin B by *Lactobacillus acidophilus*. *J Appl Microbiol*. 103: 1766-1778.
8. Glass MD, Courtney PD, LeJeune JT, Ward LA. 2004. Effects of *Lactobacillus acidophilus* and *Lactobacillus reuteri* cell-free supernatants on *Cryptosporidium* viability and infectivity *in vitro*. *Food Microbiol*. 21: 423-429.
9. Foster JC, Glass MD, Courtney PD, Ward LA. 2003. Effect of *Lactobacillus* and *Bifidobacterium* on *Cryptosporidium parvum* oocyst viability. *Food Microbiol*. 20: 351-357.

10. Kim EA, Baick SC, Chung WH. 2002. A study on growth inhibition of *Escherichia coli* and *Salmonella typhimurium* by lactic acid bacteria. *J Animal Sci Technol*. 44: 491-498.

11. Kim YH, Ahn YT, Jang YH, Kim HU. 2000. Study on the growth inhibition of *Bacillus cereus* by lactobacilli. *J Animal Sci and Technol*. 42: 331-338.
12. Allison GE, Klaenhammer TR. 1996. Functional analysis of the gene encoding immunity to lactacin F, *lafI* and its use as a *Lactobacillus*-specific, food-grade genetic marker. *Appl Environ Microbiol*. 62: 4450-4460.
13. Barefoot SF, Chen YR, Hughes TA, Bodine AB, Shearer MY, Hughes MD. 1994. Identification and purification of a protein that induces production of the *Lactobacillus acidophilus* bacteriocin lactacin B. *Appl Environ. Microbiol*. 60: 3522-3528.
14. Barefoot SF, Nettles CG, Chen YR. 1994. Lactacin B, a bacteriocin produced by *Lactobacillus acidophilus*. In *Bacteriocins of lactic acid bacteria*, L. De Vuyst and E. J. Vandamme (ed.). Blackie Academic and Professional, London, pp. 353-376.
15. Klaenhammer TR, Fremaux C, Ahn C, Milton K. 1992. Molecular biology of bacteriocins produced by *Lactobacillus*. In *Bacteriocins and Lactic Acid Bacteria*. Hoover D, Steenson L (eds). Academic Press, NY, pp. 151-180.
16. Nettles CG. 1992. Purification and amino acid composition of the *Lactobacillus acidophilus* bacteriocin, lactacin B. Ph.D. dissertation. Clemson University, Clemson, SC.
17. Ferreira CL, Gilliland SE. 1988. Bacteriocin involved in premature death of *Lactobacillus acidophilus* NCFM during growth at pH 6. *J Dairy Sci*. 71: 306-315.
18. Barefoot SF, Klaenhammer TR. 1984. Purification and characterization of the *Lactobacillus acidophilus* bacteriocin lactacin B. *Antimicrob Agents Chemotherapy* 26: 328-334.
19. Barefoot SF, Klaenhammer TR. 1983. Detection and activity of lactacin B, a bacteriocin produced by *Lactobacillus acidophilus*. *Appl Environ Microbiol*. 45: 1808-1815.
20. Gilliland SE, Speck ML. 1977. Antagonistic action of *Lactobacillus acidophilus* toward intestinal and foodborne pathogens in associative cultures. *J Food Protect*. 40: 820-823.

Cholesterol Lowering

1. Noh DO, Gilliland SE. 1993. Influence of bile on cellular integrity and beta-galactosidase activity of *Lactobacillus acidophilus*. *J Dairy Sci.* 76: 1253-1259.
2. Walker DK, Gilliland SE. 1993. Relationships among bile tolerance, bile salt deconjugation and assimilation of cholesterol by *Lactobacillus acidophilus*. *J Dairy Sci.* 76: 956-961.
3. Gilliland SE, Walker DK. 1990. Factors to consider when selecting a culture of *Lactobacillus acidophilus* as a dietary adjunct to produce a hypocholesterolemic effect in humans. *J Dairy Sci.* 73: 905-911.
4. Gilliland SE, Nelson CR, Maxwell C. 1985. Assimilation of cholesterol by *Lactobacillus acidophilus*. *Appl Environ Microbiol.* 49: 377-381.
Also listed under Animal trials.

Prebiotic Utilization

1. Thongaram T, Hoeflinger JL, Chow J, Miller MJ. 2017. Human milk oligosaccharide consumption by probiotic and human-associated bifidobacteria and lactobacilli. *J Dairy Sci* 100: 1–9 <https://doi.org/10.3168/jds.2017-12753>.
2. Celebioglu HU, Olesen SV, Prehn K, Lahtinen SJ, Brix S, Abou Hachem M, Svensson B. 2017. Data regarding the growth of *Lactobacillus acidophilus* NCFM on different carbohydrates and recombinant production of elongation factor G and pyruvate kinase. Data in Brief, Volume 14, Pages 118-122.
Also listed under Genomics.
3. Celebioglu HU, Olesen SV, Prehn K, Lahtinen SJ, Brix S, Abou Hachem M, Svensson B. 2017. Mucin- and carbohydrate-stimulated adhesion and subproteome changes of the probiotic bacterium *Lactobacillus acidophilus* NCFM. *Journal of Proteomics.* Volume 163, 23 June 2017, Pages 102-110.
Also listed under Adherence.
4. Thongaram, T, Hoeflinger JL, Chow, J, Miller MJ. 2017. Prebiotic Galactooligosaccharide Metabolism by Probiotic Lactobacilli and Bifidobacteria. *Journal of Agricultural and Food Chemistry.* Volume 65, Issue 20, 24 May, Pages 4184-4192.

5. van Zanten GC, Sparding N, Majumder A, Lahtinen SJ, Svensson B, Jacobsen S. 2015. The Differential Proteome of the Probiotic *Lactobacillus acidophilus* NCFM Grown on the Potential Prebiotic Cellobiose Shows Upregulation of Two β -Glycoside Hydrolases. *Biomed Res Int.* 2015;2015: 347216.
6. Knudsen A, van Zanten GC, Jensen SL, Forssten FD, Saarinen M, Lahtinen SJ, Bandsholm O, Svensson B, Jespersen L and Blennow A. 2013. Comparative fermentation of insoluble carbohydrates in an *in vitro* human feces model spiked with *Lactobacillus acidophilus* NCFM. *Starch/Stärke* 65: 346–353.
7. Vignsnaes LK, Nakai H, Hemmingsen L, Andersen JM, Lahtinen SJ, Rasmussen LE, Hachem MA, Petersen BO, Duus JØ, Meyer AS, Licht TR, Svensson B. 2013. *In vitro* growth of four individual human gut bacteria on oligosaccharides produced by chemoenzymatic synthesis. *Food Funct.* 4: 784-793.
8. Sims IM, Ryan JL, Kim SH. 2014. *In vitro* fermentation of prebiotic oligosaccharides by *Bifidobacterium lactis* HN019 and *Lactobacillus* spp. *Anaerobe* 25: 11-17.
9. Andersen JM, Barrangou R, Hachem MA, Lahtinen SJ, Goh YJ, Svensson B, Klaenhammer TR. 2012. Transcriptional Analysis of Prebiotic Uptake and Catabolism by *Lactobacillus acidophilus* NCFM. *PLoS One.* 2012;7(9): e44409.
10. Maher AH, Fredslund F, Andersen JM, Jonsgaard Larsen R, Majumder A, Ejby M, Van Zanten G, Lahtinen SJ, Barrangou R, Klaenhammer T, Jacobsen S, Coutinho PM, Lo Leggio L and Birte Svensson. 2012. Raffinose family oligosaccharide utilisation by probiotic bacteria: insight into substrate recognition, molecular architecture and diversity of GH36 α -galactosidases. *Biocatalysis and Biotransformation,* 2012; Early Online: 1-10.
11. Møller MS, Fredslund F, Majumder A, Nakai H, Poulsen JC, Lo Leggio L, Svensson B, Abou Hachem M. 2012. Enzymology and structure of the GH13_31 glucan 1,6- α -glucosidase that confers isomaltooligosaccharide utilisation in the probiotic *Lactobacillus acidophilus* NCFM. *J Bacteriol.* 2012 Jun 8.

12. van Zanten GC, Knudsen A, Røytiö H, Forssten S, Lawther M, Blennow A, Lahtinen SJ, Jakobsen M, Svensson B, Jespersen L. 2012. The effect of selected synbiotics on microbial composition and short-chain Fatty Acid production in a model system of the human colon. *PLoS One*. 2012;7(10): e47212.
13. Saarinen MT, Lahtinen SJ, Sørensen JF, Tiihonen K, Ouwehand AC, Rautonen N; Morgan A. 2012. Treatment of Bran Containing Bread by Baking Enzymes; Effect on the Growth of Probiotic Bacteria on Soluble Dietary Fiber Extract *in vitro*. *Bioscience, Biotechnology and Biochemistry*. 76: 6, 1135-1139.
14. Andersen JM, Barrangou R, Abou Hachem M, Lahtinen S, Goh YJ, Svensson B, Klaenhammer TR. 2011. Transcriptional and functional analysis of galactooligosaccharide uptake by *lacS* in *Lactobacillus acidophilus*. *Proc Natl Acad Sci USA*. 108: 17785-17790.
15. Majumder A, Sultan A, Jersie-Christensen RR, Ejby M, Schmidt BG, Lahtinen SJ, Jacobsen S, Svensson B. 2011. Proteome reference map of *Lactobacillus acidophilus* NCFM and quantitative proteomics towards understanding the prebiotic action of lactitol. *Proteomics*. 11: 3470-3481.
16. Mäkeläinen H, Saarinen M, Stowell J, Rautonen N and Ouwehand AC. 2010. Xylo-oligosaccharides and lactitol promote the growth of *Bifidobacterium lactis* and *Lactobacillus* species in pure cultures. *Beneficial Microbes* 1: 139-148.
17. Mäkiyuokko H, Forssten S, Saarinen A, Ouwehand A, Rautonen N. 2010. Synbiotic effects of lactitol and *Lactobacillus acidophilus* NCFM in a semi-continuous colon fermentation model. *Beneficial Microbes*. In press.
18. Nakai H, Dilokpimol A, Hachem MA, Svensson B. 2010. Efficient one-pot enzymatic synthesis of α -(1 \rightarrow 4)-glucosidic disaccharides through a coupled reaction catalysed by *Lactobacillus acidophilus* NCFM maltose phosphorylase. *Carbohydrate Research* 345(8): 1061-4.
19. Nakai H, Petersen BO, Westphal Y, Dilokpimol A, Abou Hachem M, Duus JØ, Schols HA, Svensson B. 2010. Rational engineering of *Lactobacillus acidophilus* NCFM maltose phosphorylase into either trehalose or kojibiose dual specificity phosphorylase. *Protein Eng Des Sel*. 23: 781-787.
20. Mäkeläinen H, Hasselwander O, Rautonen N, Ouwehand AC. 2009. Panose, a new prebiotic candidate. *Lett Appl Microbiol*. 49: 666-672.
21. Nakai H, Baumann MJ, Petersen BO, Westphal Y, Schols H, Dilokpimol A, Hachem MA, Lahtinen SJ, Duus JO, Svensson B. 2009. The maltodextrin transport system and metabolism in *Lactobacillus acidophilus* NCFM and production of novel α -glycosides through reverse phosphorylation by maltose phosphorylase. *FEBS J*. 276: 7353-7365.
22. Huebner J, Wehling R, Hutkins RW. 2007. Functional activity of commercial prebiotics. *Int Dairy J*. 17: 770-775.
23. Barrangou R, Azcarate-Peril MA, Duong T, Connors SB, Kelly RM, Klaenhammer T. 2006. Global analysis of carbohydrate utilization by *Lactobacillus acidophilus* by cDNA microarrays. *PNAS*. 103: 3816-3821.
24. Barrangou R, Altermann E, Hutkins R, Cano R, Klaenhammer TR. 2003. Functional and comparative genomic analyses of an operon involved in fructooligosaccharide utilization by *Lactobacillus acidophilus*. *PNAS*. 100: 8957-8962.
25. Kaplan H, Hutkins RW. 2000. Fermentation of fructooligosaccharides by lactic acid bacteria and bifidobacteria. *Appl Environ Microbiol*. 66: 2682-2684.

Adherence

- Celebioglu HU, Olesen SV, Prehn K, Lahtinen SJ, Brix S, Abou Hachem M, Svensson B. 2017. Mucin- and carbohydrate-stimulated adhesion and subproteome changes of the probiotic bacterium *Lactobacillus acidophilus* NCFM. *Journal of Proteomics*. Volume 163, 23 June 2017, Pages 102-110.
Also listed under Prebiotic utilization.
- Celebioglu HU, Prehn K, Lahtinen S, Brix S, Hachem MA, Svensson B. 2016. Modification of adhesion and surface proteome by carbohydrates and mucin – supplemented growth of probiotic bacterium *Lactobacillus acidophilus* NCFM. Conference paper 2016 Jun.

3. Celebioglu HU, Ejby M, Majumder A, Købler C, Goh YJ, Thorsen K, Schmidt B, O'Flaherty S, Abou Hachem M, Lahtinen SJ, Jacobsen S, Klaenhammer TR, Brix S, Mølhave K, Svensson B. 2016. Differential proteome and cellular adhesion analyses of the probiotic bacterium *Lactobacillus acidophilus* NCFM grown on raffinose - an emerging prebiotic. *Proteomics* 16(9): 1361-75.

Also listed under In vitro trials/Enzyme characterization and proteomics.

4. Han L, Man C, Lv X, Wang M, Zhang G, Liu Y, Jiang Y. 2011. (*Lactobacillus acidophilus* NCFM affects host adhesion-related gene expression after adhering to host.) Wei Sheng Wu Xue Bao. 51: 609-14. [Chinese]

5. Buck BL, Azcarate-Perlin MA, Klaenhammer TR. 2009. Role of autoinducer-2 on the adhesion ability of *Lactobacillus acidophilus*. *J Appl Microbiol.* 107: 269-279.

6. Collado MC, Meriluoto J, Salminen S. 2008. Adhesion and aggregation properties of probiotic and pathogen strains. *Eur Food Res Technol.* 226: 1065-1073.

7. Haukioja A, Yli-Knuutila H, Loimaranta V, Kari K, Ouwehand AC, Meurman JH, Tenovuo J. 2006. Oral adhesion and survival of probiotic and other lactobacilli and bifidobacteria *in vitro*. *Oral Microbiol Immunol* 21: 326-332.

8. Buck BL, Altermann E, Svingerud T, Klaenhammer TR. 2005. Functional analysis of putative adhesion factors in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 71: 8344-8351.

9. Greene JD, Klaenhammer TR. 1994. Factors involved in adherence of lactobacilli to human Caco-2 cells. *Appl Environ Microbiol.* 60: 4487-4494.

10. Hood SK, Zottola EA. 1987. Electron microscopic study of the adherence properties of *Lactobacillus acidophilus*. *J Food Sci.* 52: 791-805.

11. Kleeman E.G, Klaenhammer TR. 1982. Adherence of *Lactobacillus* species to human fetal intestinal cells. *J Dairy Sci.* 65: 2063-2069.

Toxin Removal

1. Halttunen T, Finell M, Salminen S. 2007. Arsenic removal by native and chemically modified lactic acid bacteria. *Int J Food Microbiol.* 120: 173-178.

2. Nybom SM, Salminen SJ, Meriluoto JA. 2007. Removal of microcystin-LR by strains of metabolically active probiotic bacteria. *FEMS Microbiol Lett.* 270: 27-33.

Oxalate degradation

1. Turroni S, Vitali B, Bendazzoli C, Candela M, Gotti R, Federici F, Pirovano F, Brigidi P. 2007. Oxalate consumption by lactobacilli: evaluation of oxalyl-CoA decarboxylase and formyl-CoA transferase activity in *Lactobacillus acidophilus*. *J Appl Microbiol.* 103: 1600-1609.

2. Azcarate-Peril MA, Bruno-Barcena JM, Hassan HM, Klaenhammer TR. 2006. Transcriptional and functional analysis of oxalyl-coenzyme A (CoA) decarboxylase and formyl CoA transferase genes from *Lactobacillus acidophilus*. *Appl Environ Microbiol.* 72: 1891-1899.

Reactive oxygen species (ROS) production

1. Hougaard AB, Pindstrup H, Arneborg N, Andersen ML, Skibsted LH. 2016. Free radical formation by *Lactobacillus acidophilus* NCFM is enhanced by antioxidants and decreased by catalase. *Food Res Int.* 79: 81-87.

2. Hougaard AB, Arneborg N, Andersen ML, Skibsted LH. 2013. ESR spin trapping for characterization of radical formation in *Lactobacillus acidophilus* NCFM and *Listeria innocua*. *J Microbiol Methods.* 94: 205-212.

Genomics

1. Wang Y, Ryu BH, Yoo W, Lee CW, Kim KK, Lee JH, Kim TD. 2017. Identification, characterization, immobilization and mutational analysis of a novel acetyltransferase with industrial potential (LaAcE) from *Lactobacillus acidophilus*. *Biochimica et Biophysica Acta (BBA) - General Subjects*, October, <https://doi.org/10.1016/j.bbagen.2017.10.008>.

2. Celebioglu HU, Olesen SV, Prehn K, Lahtinen SJ, Brix S, Abou Hachem M, Svensson B. 2017. Data regarding the growth of *Lactobacillus acidophilus* NCFM on different carbohydrates and recombinant production of elongation factor G and pyruvate kinase. *Data in Brief.* Volume 14, Pages 118-122.

Also listed under Prebiotic utilization.

3. Johnson BR, O'Flaherty S, Goh YJ, Carroll I, Barrangou R, Klaenhammer TR. 2017. The S-layer associated serine protease homolog prtX impacts cell surface-mediated microbe-host interactions of *Lactobacillus acidophilus* NCFM. *Frontiers in Microbiology* Volume 8, Issue JUN, Article number 01185.
Also listed under Animal trials/Safety.
4. Selle K, Goh YJ, Johnson BR, O'Flaherty S, Andersen JM, Barrangou R, Klaenhammer TR. 2017. Deletion of lipoteichoic acid synthase impacts expression of genes encoding cell surface proteins in *Lactobacillus acidophilus*. *Frontiers in Microbiology* Volume 8, Issue APR, Article number 553.
5. Johnson BR, Klaenhammer TR. 2016. AcMB is an S-layer associated β -N-acetylglucosaminidase and functional autolysin in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 2016 Jul 15.
6. Hymes JP, Johnson BR, Barrangou R, Klaenhammer TR. 2016. Functional analysis of an S-layer-associated fibronectin-binding protein in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 2016 Apr 18; 82(9): 2676-85.
7. Palomino MM, Allievi MC, Fina Martin J, Waehner PM, Prado Acosta M, Sanchez Rivas C, Ruzal SM. 2015. Draft Genome Sequence of the Probiotic Strain *Lactobacillus acidophilus* ATCC 4356. *Genome Announc.* 2015 Jan 15;3(1). pii: e01421-14.
8. Falentin H, Cousin S, Clermont D, Creno S, Ma L, Chuat V, Loux V, Rüdiger P, Bizet C, Bouchier C. 2013. Draft Genome Sequences of Five Strains of *Lactobacillus acidophilus*, Strain CIP 76.13T, Isolated from Humans, Strains CIRM-BIA 442 and CIRM-BIA 445, Isolated from Dairy Products and Strains DSM 20242 and DSM 9126 of Unknown Origin. *Genome Announc.* 2013 Aug 22;1(4). doi: pii: e00658-13.
9. Stahl B, Barrangou R. 2013. Complete Genome Sequence of Probiotic Strain *Lactobacillus acidophilus* La-14. *Genome Announc.* 2013 Jun 20;1(3).
10. Altermann E, Klaenhammer TR. 2011. Group-specific comparison of four lactobacilli isolated from human sources using differential blast analysis. *Genes Nutr.* 6: 319-340.
11. Capozzi V, Arena MP, Crisetti E, Spano G, Fiocco D. 2011. The hsp 16 Gene of the Probiotic *Lactobacillus acidophilus* Is Differently Regulated by Salt, High Temperature and Acidic Stresses, as Revealed by Reverse Transcription Quantitative PCR (qRT-PCR) Analysis. *Int J Mol Sci.* 12: 5390-5405.
12. Douglas GL, Klaenhammer TR. 2011. Directed chromosomal integration and expression of the reporter gene, gusA3, in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 77: 7365-7471.
13. Duong T, Miller MJ, Barrangou R, Azcarate-Peril MA, Klaenhammer TR. 2010. Construction of vectors for inducible and constitutive gene expression in *Lactobacillus*. *Microb Biotechnol.* 4: 357-367.
14. Barinov A, Loux V, Hammani A, Nicolas P, Langella P, Ehrlich D, Maguin E, van de Guchte M. 2009. Prediction of surface exposed proteins in *Streptococcus pyogenes*, with a potential application to other Gram-positive bacteria. *Proteomics* 9: 61-73.
15. Goh YJ, Azcarate-Peril MA, O'Flaherty S, Durmaz E, Valence F, Jardin J, Lortal S, Klaenhammer TR. 2009. Development and Application of a *uwp*-Based Counterselective Gene Replacement System for the Study of the S-Layer Protein SlpX of *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 75: 3093-3105.
16. Innocentin S, Guimaraes V, Miyoshi A, Azevedo V, Langella P, Chatel JM, Lefevre F. 2009. *Lactococcus lactis* expressing either *Staphylococcus aureus* fibronectin-binding protein A or *Listeria monocytogenes* internalin A can efficiently internalize and deliver DNA in human epithelial cells. *Appl Environ Microbiol.* 75: 4870-4878.
17. O'Sullivan O, O'Callaghan J, Sangrador-Vegas A, McAuliffe O, Slattery L, Kaleta P, Callanan M, Fitzgerald GF, Ross RP, Beresford T. 2009. Comparative genomics of lactic acid bacteria reveals a niche-specific gene set. *BMC Microbiol.* 9: 50.
18. Pfeiler EA, Klaenhammer TR. 2009. The role of transporter proteins in bile tolerance in *Lactobacillus acidophilus*. *Appl Environ Microbiol.* 75: 6013-6016.

19. Berger B, Pridmore RD, Barretto C, Delmas-Julien F, Schreiber K, Arigoni F, Brüssow H. 2007. Similarity and differences in the *Lactobacillus acidophilus* group identified by polyphasic analysis and comparative genomics. *J Bacteriol.* 189: 1311-1321.
20. Pfeiler EA, Azcarate-Peril MA, Klaenhammer TR. 2007. Characterization of a novel bile-inducible operon encoding a two-component regulatory system in *Lactobacillus acidophilus*. *J Bacteriol.* 189: 4624-4634.
21. Duong T, Barrangou R, Russell WM, Klaenhammer TR. 2006. Characterization of the *tre* locus and analysis of trehalose cryoprotection in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 72: 1218-1225.
Also listed under Probiotic selection, survival, stability.
22. Altermann E, Russell WM, Azcarate-Peril MA, Barrangou R, Buck BL, McAuliffe O, Souther N, Duong T, Callanan M, Lick S, Hamrick A, Cano R, Klaenhammer TR. 2005. Complete genome sequence of the probiotic lactic acid bacterium *Lactobacillus acidophilus* NCFM. *PNAS.* 102: 3609-3612.
23. Azcarate-Peril MA, McAuliffe O, Altermann E, Lick S, Russell WM, Klaenhammer TR. 2005. Microarray analysis of a two-component regulatory system involved in acid resistance and proteolytic activity in *Lactobacillus acidophilus*. *Appl Environ Microbiol.* 71: 5794-5804.
24. McAuliffe O, Cano R, Klaenhammer TR. 2005. Genetic analysis of two bile salt hydrolase activities in *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol.* 71: 4925-4929.
25. Altermann E, Buck BL, Cano R, Klaenhammer TR. 2004. Identification and phenotypic characterization of the cell-division protein CdpA. *Gene* 342: 198-197.
26. Bruno-Barcena JM, Andrus JM, Libby SL, Klaenhammer TR, Hassan HM. 2004. Expression of a heterologous manganese superoxide dismutase gene in intestinal lactobacilli provides protection against hydrogen peroxide toxicity. *Appl Environ Microbiol.* 70: 4702-4710.
27. Yeung PSM, Kitts CL, Cano R, Tong PS, Sanders ME. 2004. Application of genotypic and phenotypic analyses to commercial probiotic strain identity and relatedness. *J Appl Microbiol.* 97: 1095-1104.
Also listed under Probiotic selection, survival, stability.
28. Elkins CA, Moser SA, Savage DC. 2001. Genes encoding bile salt hydrolases and conjugated bile salt transporters in *Lactobacillus johnsonii* 100-100 and other *Lactobacillus* species. *Microbiology* 147: 3403-3412.
29. Russell WM, Klaenhammer TR. 2001. An efficient system for directed integration into the *Lactobacillus acidophilus* and *Lactobacillus gasseri* chromosome via homologous recombination. *Appl Environ Microbiol.* 67: 4361-4364.
30. Kullen M, Klaenhammer TR. 1999. Identification of the pH-inducible, proton-translocating F1F0-ATPase (*atpBEFHAGDC*) operon of *Lactobacillus acidophilus* by differential display: gene structure, cloning and characterization. *Mol Microbiol.* 33: 1152-1161.
31. Walker DC, Klaenhammer TR. 1996. Electrotransformation of *Lactobacillus acidophilus* group A1. *FEMS Microbiol Lett.* 138: 233-237.
32. Kumar R, Garg SK, Singh DT, Singh SP, Mital BK. 1994. Evidence for the presence of plasmids in four therapeutically important strains of *Lactobacillus acidophilus*. *Lett Appl Microbiol.* 19: 188-191.
33. Luchansky JB, Tennant MC, Klaenhammer TR. 1991. Molecular cloning and DNA polymorphisms in *Lactobacillus acidophilus* and *Lactobacillus gasseri*. *J Dairy Sci.* 74: 3293-3302.

Enzyme characterization and proteomics

- DiMarzio M, Rusconi B, Yennawar NH, Eppinger M, Patterson AD, Dudley EG. 2017. Identification of a mouse *Lactobacillus johnsonii* strain with deconjugase activity against the FXR antagonist T- β -MCA. *PLOS One*, September, <https://doi.org/10.1371/journal.pone.0183564>.
- Klotz C, O'Flaherty S, Goh YJ, Barrangou R. 2017. Investigating the effect of growth phase on the surface-layer associated proteome of *Lactobacillus acidophilus* using quantitative proteomics. *Front. Microbiol.* doi: 10.3389/fmicb.2017.02174.
- Celebioglu HU, Svensson B. 2017. Exo- and surface proteomes of the probiotic bacterium *Lactobacillus acidophilus* NCFM. *Proteomics*. Volume 17, Issue 11, June 2017, Article number 1700019.

4. Jeffery CJ. 2017. Keeping good friends close – The surface and secreted proteomes of a probiotic bacterium provide candidate proteins for intestinal attachment and communication with the host. *Proteomics*. Volume 17, Issue 11, June, Article number 1700112. Commentary about Celebioglu & Svensson 2017.

5. Møller MS, Goh YJ, Rasmussen KB, Cypryk W, Celebioglu, HU, Klaenhammer TR, Svensson B, Hachem MA. 2017. An extracellular cell-attached pullulanase confers branched α -glucan utilization in human gut *Lactobacillus acidophilus*. *Applied and Environmental Microbiology*. Volume 83, Issue 12, Article number e00402-17.

6. Celebioglu HU, Ejby M, Majumder A, Købler C, Goh YJ, Thorsen K, Schmidt B, O’Flaherty S, Abou Hachem M, Lahtinen SJ, Jacobsen S, Klaenhammer TR, Brix S, Mølhave K, Svensson B. 2016. Differential proteome and cellular adhesion analyses of the probiotic bacterium *Lactobacillus acidophilus* NCFM grown on raffinose - an emerging prebiotic. *Proteomics* 16(9): 1361-75.
Also listed under In vitro trials/Adherence.

7. Johnson B, Selle K, O’Flaherty S, Goh YJ, Klaenhammer T. 2013. Identification of Surface-Layer Associated Proteins (SLAPs) in *Lactobacillus acidophilus* NCFM. *Microbiology* 159(Pt 11): 2269-82.

8. Majumder A, Cai L, Ejby M, Schmidt BG, Lahtinen SJ, Jacobsen S, Svensson B. 2012. Two-dimensional gel-based alkaline proteome of the probiotic bacterium *Lactobacillus acidophilus* NCFM. *Proteomics*. 12: 1006-1014.

9. Fredslund F, Abou Hachem M, Jonsgaard Larsen R, Gerd Sørensen P, Coutinho PM, Lo Leggio L, Svensson B. 2011. Crystal Structure of α -Galactosidase from *Lactobacillus acidophilus* NCFM: Insight into Tetramer Formation and Substrate Binding. *J Mol Biol*. 412: 466-480.

Animal trials

Probiotic selection, survival, stability

1. Call EK, Goh YJ, Selle K, Klaenhammer TR, O’Flaherty S. 2015. Sortase-deficient lactobacilli: effect on immunomodulation and gut retention. *Microbiology*. 2015 Feb;161(Pt 2): 311-21.
Also listed under Immune system modulation.

2. Kaplan CW, Astaire JC, Sanders ME, Reddy BS, Kitts CL. 2001. 16S Ribosomal DNA Terminal Restriction Fragment Pattern Analysis of Bacterial Communities in Feces of Rats Fed *Lactobacillus acidophilus* NCFM. *Appl Environ Microbiol*. 67: 1935-1939.

3. Gilliland SE, Speck ML, Morgan CG. 1975. Detection of *Lactobacillus acidophilus* in feces of humans, pigs and chickens. *Appl Microbiol*. 30: 541-545.
Also listed under Human trials/Gastrointestinal ecology.

Safety

1. Morovic W, Roper JM, Smith AB, Mukerji P, Stahl B, Rae JC, Ouwehand AC. 2017. Safety evaluation of HOWARU® Restore (*Lactobacillus acidophilus* NCFM, *Lactobacillus paracasei* Lpc-37, *Bifidobacterium animalis* subsp. *lactis* BI-04 and *Bifidobacterium lactis* Bi-07) for antibiotic resistance, genomic risk factors and acute toxicity. *Food Chem Toxicol*. Nov 1;110: 316-324. doi: 10.1016/j.fct.2017.10.037.

Also listed under In vitro trials/Probiotic selection, survival, stability.

2. Johnson BR, O’Flaherty S, Goh YJ, Carroll I, Barrangou R, Klaenhammer TR. 2017. The S-layer associated serine protease homolog prtX impacts cell surface-mediated microbe-host interactions of *Lactobacillus acidophilus* NCFM. *Frontiers in Microbiology* Volume 8, Issue JUN, Article number 01185.

Also listed under In vitro genomics.

3. Sahay B, Ge Y, Colliou N, Zadeh M, Weiner C, Mila A, Owen JL, Mohamadzadeh M. 2015. Advancing the use of *Lactobacillus acidophilus* surface layer protein A for the treatment of intestinal disorders in humans. *Gut Microbes*. 2015 Nov 2;6(6): 392-7.

4. Daniel C, Poiret S, Goudercourt D, Dennin V, Leyer G, Pot B. 2006. Selecting lactic acid bacteria for their safety and functionality by use of a mouse colitis model. *Appl Environ Microbiol*. 72: 5799-5805.

5. Wagner R, Warner T, Robert L, Farmer J and Balish E. 1997. Colonization of congenitally immunodeficient mice with probiotic bacteria. *Infect Immun*. 65: 3345-3351.

Gastrointestinal ecology

1. Swanson KS, Grieshop CM, Flickinger EA, Bauer LL, Chow J, Wolf BW, Garleb KA, Fahey, Jr., GC. 2002.

Fructooligosaccharides and *Lactobacillus acidophilus* modify gut microbial populations, total tract nutrient digestibilities and fecal protein catabolite concentrations in healthy adult dogs. *J Nutr.* 132: 3721-3731.

Also listed under Synbiotic.

Lactose digestion

1. Rao DR, Alabi SO, Chawan CB. 1991. Temporal changes of lactase activity in the gastrointestinal tract of rats fed yogurt and sweet acidophilus milk. *Milchwissenschaft* 46: 219-222.

Immune system modulation

1. Call EK, Goh YJ, Selle K, Klaenhammer TR, O'Flaherty S. 2015. Sortase-deficient lactobacilli: effect on immunomodulation and gut retention. *Microbiology.* 2015 Feb;161(Pt 2):311-21.

Also listed under Probiotic selection, survival, stability.

2. Li L, Jiang YJ, Yang XY, Liu Y, Wang JY, Man CX. 2014. Immunoregulatory effects on Caco-2 cells and mice of exopolysaccharides isolated from *Lactobacillus acidophilus* NCFM. *Food Funct.* 12: 3261-8.

3. Liu F, Wen K, Li G, Yang X, Kocher J, Bui T, Jones D, Pelzer K, Clark-Deener S, Yuan L. 2014. Dual Functions of *Lactobacillus acidophilus* NCFM at The Intermediate Dose In Protection Against Rotavirus Diarrhea In Gnotobiotic Pigs Vaccinated With A Human Rotavirus Vaccine. *J Pediatr Gastroenterol Nutr.* 58(2): 169-176. [Page numbering is 169-176 in article but 171-8 in pubmed]

4. Kim Y, Mylonakis E. 2012. Caenorhabditis elegans Immune Conditioning with the Probiotic Bacterium *Lactobacillus acidophilus* Strain NCFM Enhances Gram-Positive Immune Responses. *Infect Immun.* 80: 2500-2508.

5. Khan MW, Zadeh M; Bere P; Gounaris E; Owen J; Klaenhammer T; Mohamadzadeh M. 2012. Modulating Intestinal Immune Responses by Lipoteichoic Acid-deficient *Lactobacillus acidophilus*. *Immunotherapy.* 2012;4(2): 151-161.

6. Mohamadzadeh M, Pfeiler EA, Brown JB, Zadeh M, Gramarossa M, Managlia E, Bere P, Sarraj B, Khan MW, Pakanati KC, Ansari MJ, O'Flaherty S, Barrett T, Klaenhammer TR. 2011. Microbes and Health Sackler Colloquium: Regulation of induced colonic inflammation by *Lactobacillus acidophilus* deficient in lipoteichoic acid. *Proc Natl Acad Sci USA.* 15: 4623-4630.

Also listed under In vitro trials.

7. Petersen ER, Claesson MH, Schmidt EG, Jensen SS, Ravn P, Olsen J, Ouwehand AC, Kristensen NN. 2011. Consumption of probiotics increases the effect of regulatory T cells in transfer colitis. *Inflamm Bowel Dis.* Apr 14.

8. Saber R, Zadeh M, Pakanati KC, Bere P, Klaenhammer T, Mohamadzadeh M. 2011. Lipoteichoic acid-deficient *Lactobacillus acidophilus* regulates downstream signals. *Immunotherapy.* 2011 Mar;3(3): 337-347.

9. Wen K, Li G, Bui T, Liu F, Li Y, Kocher J, Lin L, Yang X, Yuan L. 2011. High dose and low dose *Lactobacillus acidophilus* exerted differential immune modulating effects on T cell immune responses induced by an oral human rotavirus vaccine in gnotobiotic pigs. *Vaccine.* 30: 1198-1207.

10. Zeuthen LH, Fink LN, Metzдорff SB, Kristensen MB, Licht TR, Nellemann C, Frøkiaer H. 2010. *Lactobacillus acidophilus* induces a slow but more sustained chemokine and cytokine response in naïve foetal enterocytes compared to commensal *Escherichia coli*. *BMC Immunol.* 11: 2.

11. Chen CC, Chiu CH, Lin TY, Ning Shi H, Walker WA. 2009. Effect of probiotics *L. acidophilus* on *C. rodentium colitis*: the role of dendritic cells. *Pediatr Res.* 65: 169-175.

12. Mohamadzadeh M, Duong T, Sandwick SJ, Hoover T, Klaenhammer TR. 2009. Dendritic cell targeting of *Bacillus anthracis* protective antigen expressed by *Lactobacillus acidophilus* protects mice from lethal challenge. *PNAS.* 106: 4331-4336.

13. Cai M, Cui A, Huang Q, Huang JK. 2008. Animal studies on enhancement of immune function by dietary probiotic supplementation of *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* Bi-07. *J Microecol* 20: 17-19. [Chinese]

14. Konstantinov SR, Smidt H, de Vos WM, Bruijens SCM, Singh SK, Valence F, Molle D, Lortal S, Altermann E, Klaenhammer TR, van Kooyk Y. 2008. S layer protein A of *Lactobacillus acidophilus* NCFM regulates immature dendritic cell and T cell functions. PNAS. 105: 19473-19478.

Supporting information: www.pnas.org/cgi/content/short/0810305105
Also listed under *In vitro trials*.

15. Foligné B, Nutten S, Grangette C, Dennin V, Goudercourt D, Poiret S, Dewulf J, Brassart D, Mercenier A, Pot B. 2007. Correlation between *in vitro* and *in vivo* immune modulatory properties of lactic acid bacteria. World J Gastroenterol. 13: 236-243.

16. Foligné B, Zoumpopoulou G, Dewulf J, Ben Younes A, Chareyre F, Sirard JC, Pot B, Grangette C. 2007. A key role of dendritic cells in probiotic functionality. PLoS ONE 2: e313.

17. Chen CC, Louie S, Shi HN, Walker WA. 2005. Preinoculation with the probiotics *Lactobacillus acidophilus* early in life effectively inhibits murine *Citrobacter rodentium* colitis. Pediatric Res. 58: 1185-1191.

18. Foligné B, Grangette C, Pot B. 2005. Probiotics in IBD: mucosal and systemic routes of administration may promote similar effects. Gut 54: 727-728.

19. Wagner RD, Dohnalek M, Hilty M, Vazquez-Torres A, Balish E. 2000. Effects of probiotic bacteria on humoral immunity to *Candida albicans* in immunodeficient *bg/bg-nu/nu* and *bg/bg-nu/+* mice. Rev Iberoam Micol. 17: 55-59.

20. Wagner RD, Pierson C, Warner T, Dohnalek M, Hilty M, Balish E. 2000. Probiotic effects of feeding heat-killed *Lactobacillus acidophilus* and *Lactobacillus casei* to *Candida albicans*-colonized immunodeficient mice. J Food Prot. 63: 638-644.

21. Tejada-Simon MV, Lee JH, Ustunol Z, Pestka JJ. 1999. Ingestion of yogurt containing *Lactobacillus acidophilus* and *Bifidobacterium* to potentiate immunoglobulin A responses to cholera toxin in mice. J Dairy Sci. 82: 649-660.

Carbohydrate, bile acid, vitamin metabolism

1. Roager HM, Sulek K, Skov K, Frandsen HL, Smedsgaard J, Wilcks A, Skov TH, Villas-Boas SG, Licht TR. 2014. *Lactobacillus acidophilus* NCFM affects vitamin E acetate metabolism and intestinal bile acid signature in monoclonized mice. Gut Microbes. May-Jun;5(3): 296-303.

Protective effect against colitis

1. Macho Fernandez E, Valenti V, Rockel C, Hermann C, Pot B, Boneca IG, Grangette C. 2011. Anti-inflammatory capacity of selected lactobacilli in experimental colitis is driven by NOD2-mediated recognition of a specific peptidoglycan-derived muropeptide. Gut. 60: 1050-1059. Erratum in: Gut. 2011 Oct;60(10): 1444. Fernandez, Elise Macho [corrected to Macho Fernandez, Elise].

2. Macho Fernandez E, Pot B, Grangette C. 2011. Beneficial effect of probiotics in IBD: Are peptidoglycan and NOD2 the molecular key effectors? Gut Microbes. 2011 Sep 1;2(5). [Article addendum to Fernandez et al., 2011]

3. Grangette C, Macho-Fernandez E, Pot B. 2011. Anti-inflammatory capacity of lactobacilli peptidoglycan: mucosal and systemic routes of administration promote similar effects - The Authors' reply. Gut. 2011 Dec 2. [Letter]

4. Matuchansky C. 2011. Anti-inflammatory lactobacilli: strain specificity. Gut. 2011, Aug 16. [Letter]

Anti-carcinogenic activity

1. Chen CC, Lin WC, Kong MS, Shi HN, Walker WA, Lin CY, Huang CT, Lin YC, Jung SM, Lin TY. 2011. Oral inoculation of probiotics *Lactobacillus acidophilus* NCFM suppresses tumour growth both in segmental orthotopic colon cancer and extra-intestinal tissue. Br J Nutr. 30: 1-12.

2. Varcoe JJ, Krejcarek G, Busta F, Brady L. 2003. Prophylactic feeding of *Lactobacillus acidophilus* NCFM to mice attenuates overt colonic hyperplasia. J Food Prot. 66: 457-65.

3. Rao CV, Sanders ME, Indranie C, Simi B, Reddy BS. 1999. Prevention of colonic preneoplastic lesions by the probiotic *Lactobacillus acidophilus* NCFM in F344 rats. Int J Oncol. 14: 939-944.

4. Goldin BR, Gorbach SL. 1984. Alterations of the intestinal microflora by diet, oral antibiotics and *Lactobacillus*: decreased production of free amines from aromatic nitro compounds, azo dyes and glucuronides. J Nat Cancer Instit. 73: 689-695.

5. Goldin BR, Gorbach SL. 1984. The effect of oral administration of *Lactobacillus* and antibiotics on intestinal bacterial activity and chemical induction of large bowel tumors. Dev. Indus. Microbiol. 25: 139-150.

Also listed under *Human trials*

6. Goldin BR, Gorbach SL. 1980. Effect of *Lactobacillus acidophilus* dietary supplements on 1, 2-dimethylhydrazine dihydrochloride-induced intestinal cancer in rats. *J Nat Cancer Instit.* 64: 263-265.
7. Goldin B, Gorbach SL. 1977. Alterations in fecal microflora enzymes related to diet, age, *Lactobacillus* supplements and dimethylhydrazine. *Cancer* 40: 2421-2426.

Antipathogenic activity

1. Wagner RD, Warner T, Roberts L, Farmer J, Dohnalek M, Hilty M, Balish E. 1998. Variable biotherapeutic effects of *Lactobacillus acidophilus* isolates on orogastric and systemic candidiasis in immunodeficient mice. *Rev Iberoam Micol.* 15: 271-276.
2. Wagner RD, Pierson C, Warner T, Dohnalek M, Farmer J, Roberts L, Hilty M, Balish E. 1997. Biotherapeutic effects of probiotic bacteria on candidiasis in immunodeficient mice. *Infect Immun.* 65: 4165-4172.

Cholesterol lowering

1. Gilliland SE, Nelson CR, Maxwell C. 1985. Assimilation of cholesterol by *Lactobacillus acidophilus*. *Appl Environ Microbiol.* 49: 377-381.
Also listed under In vitro trials.

Anti-pain/analgesic

1. Rousseaux C, Thuru X, Gelot A, Barnich N, Neut C, Dubuquoy L, Dubuquoy C, Merour E, Gebous K, Chamaillard M, Ouwehand A, Leyer G, Carcano D, Colombel JF, Ardid D, Desreumaux P. 2007. *Lactobacillus acidophilus* modulates intestinal pain and induces opioid and cannabinoid receptors. *Nat Med.* 13: 35-37.

Antioxidant activity

1. Byun JR, Baik YJ, Yoon YH. 2004. Effects of feeding *Lactobacillus* spp. on the level of cell glutathione sulphhydryl and immunoglobulin M in ICR mice. *Asian-Aust J Animal Sci.* 17: 415-419.

Synbiotic

1. Tagliari E, Campos AC, Costa-Casagrande TA, Salvalaggio PR. 2017. The impact of the use of symbiotics in the progression of nonalcoholic fatty liver disease in a rat model. *ABCD Arq Bras Cir Dig Original Article* 30(3): 211-215. DOI: /10.1590/0102-6720201700030011.

2. Alves CC, Waitzberg DL, de Andrade LS, dos Santos Aguiar L, Reis MB, Guanabara CC, Júnior OA, Ribeiro DA, Sala P. 2017. Prebiotic and Synbiotic Modifications of Beta Oxidation and Lipogenic Gene Expression after Experimental Hypercholesterolemia in Rat Liver. *Front. Microbiol.*, October, <https://doi.org/10.3389/fmicb.2017.02010>.

3. Miao J, Lang C, Kang Z, Zhu H, Wang S, Li M. 2016. Oral administration of fermented milk supplemented with synbiotics can influence the physiological condition of Wistar rats in a dose-sensitive and sex-specific manner. *Biosci Microbiota Food Health.* 2016; 35(2): 89-96.

4. Swanson KS, Grieshop CM, Flickinger EA, Bauer LL, Chow J, Wolf BW, Garleb KA, Fahey Jr., GC. 2002. Fructooligosaccharides and *Lactobacillus acidophilus* modify gut microbial populations, total tract nutrient digestibilities and fecal protein catabolite concentrations in healthy adult dogs. *J Nutr.* 132: 3721-3731.
Also listed under Gastrointestinal ecology.

Obesity

1. Forssten SD, Korczyńska MZ, Zwijsen RM, Noordman WH, Madetoja M, Ouwehand AC. 2013. Changes in satiety hormone concentrations and feed intake in rats in response to lactic acid bacteria. *Appetite.* 2013 Jul 11;71C: 16-21.
2. Muccioli GG, Naslain D, Bäckhed F, Reigstad CS, Lambert DM, Delzenne NM, Cani PD. 2010. The endocannabinoid system links gut microbiota to adipogenesis. *Mol Syst Biol.* 6: 392.

Human clinical studies

Safety

1. Cox AJ, West NP, Horn PL, Lehtinen MJ, Koerbin G, Pyne DB, Lahtinen SJ, Fricker PA, Cripps AW. 2014. Effects of probiotic supplementation over 5 months on routine haematology and clinical chemistry measures in healthy active adults. *Eur J Clin Nutr.* 2014 Jul 23.

Gastrointestinal ecology

1. Hibberd AA, Lyra A, Ouwehand AC, Rolny P, Lindegren H, Cedgård L, Wettergren Y. 2017. Intestinal microbiota is altered in patients with colon cancer and modified by probiotic intervention. *BMJ Open Gastro* 4: e000145. doi: 10.1136/bmjgast-2017-000145.

2. Irwin C, Khalesi S, Cox AJ, Grant G, Davey AK, Bulmer AC, Desbrow B. 2017. Effect of 8-weeks prebiotics/probiotics supplementation on alcohol metabolism and blood biomarkers of healthy adults: a pilot study. *European Journal of Nutrition* pp 1–12.
Also listed under Synbiotic.
3. Forssten S, Evans M, Wilson D, Ouwehand AC. 2014. Influence of a probiotic mixture on antibiotic induced microbiota disturbances. *World J Gastroenterol.* 2014 Sep 7;20(33): 11878-85.
Also listed under Antibiotic associated diarrhea.
4. Ouwehand AC, Bruggencate SJ, Schonewille AJ, Alhoniemi E, Forssten SD, Bovee-Oudenhoven IM. 2014. *Lactobacillus acidophilus* supplementation in human subjects and their resistance to enterotoxigenic *Escherichia coli* infection. *Br J Nutr.* 2014 Feb;111(3): 465-73.
5. van Zanten GC, Krych L, Röytiö H, Forssten S, Lahtinen SJ, Al-Soud WA, Sørensen S, Svensson B, Jespersen L, Jakobsen M. 2014. Synbiotic *Lactobacillus acidophilus* NCFM and cellobiose does not affect human gut bacterial diversity but increases abundance of lactobacilli, bifidobacteria and branched-chain fatty acids: a randomized, double-blinded cross-over trial. *FEMS Microbiol Ecol.* 2014 Aug 7.
6. Björklund M, Ouwehand AC, Forssten SD, Nikkilä J, Tiihonen K, Rautonen N, Lahtinen SJ. 2011. Gut microbiota of healthy elderly NSAID users is selectively modified with the administration of *Lactobacillus acidophilus* NCFM and lactitol. *Age (Dordr).* 2011 Aug 19.
7. Lahtinen SJ, Forssten S, Aakko J, Granlund L, Rautonen N, Salminen S, Viitanen M, Ouwehand AC. 2011. Probiotic cheese containing *Lactobacillus rhamnosus* HN001 and *Lactobacillus acidophilus* NCFM modifies subpopulations of fecal lactobacilli and *Clostridium difficile* in the elderly. *Age (Dordr).* 2011 Jan 25.
8. Larsen N, Vogensen FK, Gøbel R, Michaelsen KF, Al-Soud WA, Sørensen SJ, Hansen LH, Jakobsen M. 2010. Predominant genera of fecal microbiota in children with atopic dermatitis are not altered by intake of probiotic bacteria *Lactobacillus acidophilus* NCFM and *Bifidobacterium animalis* subsp. *lactis* Bi-07. *FEMS Microbiol Ecol.* 2010 Nov 25.
Also listed under Allergy treatment.
9. Engelbrektson AL, Korzenik JR, Pittler A, Sanders ME, Klaenhammer TR, Leyer G, Kitts CL. 2009. Probiotics to minimize the disruption of faecal microbiota in healthy subjects undergoing antibiotic therapy. *J Med Microbiol.* 58: 663-670.
10. Engelbrektson AL, Korzenik JR, Sanders ME, Clement B, Leyer G, Klaenhammer TR, Kitts CL. 2006. Analysis of treatment effects on the microbial ecology of the human intestine. *FEMS Microbiol Ecol.* 57: 239–250.
11. Sui J, Leighton S, Busta F, Brady L. 2002. 16S ribosomal DNA analysis of the faecal lactobacilli composition of human subjects consuming a probiotic strain *Lactobacillus acidophilus* NCFM. *J Appl Microbiol.* 93: 907-912.
12. Varcoe J, Zook C, Sui J, Leighton S, Busta F, Brady L. 2002. Variable response to exogenous *Lactobacillus acidophilus* NCFM consumed in different delivery vehicles. *J Appl Microbiol.* 93: 900-906.
13. Gilliland SW, Speck ML, Nauyok, Jr, CF, Giesbrecht FG. 1978. Influence of consuming nonfermented milk containing *Lactobacillus acidophilus* on fecal flora of healthy males. *J Dairy Sci.* 61: 1-10.
14. Gilliland SE, Speck ML, Morgan CG. 1975. Detection of *Lactobacillus acidophilus* in feces of humans, pigs and chickens. *Appl Microbiol.* 30: 541-545.
Also listed under Animal trials/Probiotic selection, survival, stability.

Small bowel bacterial overgrowth

1. Dunn SR, Simenhoff ML, Ahmed KE, Gaughan WJ, Eltayeb BO, Fitzpatrick MED, Emery SM, Ayres JW, Holt KE. 1998. Effect of oral administration of freeze-dried *Lactobacillus acidophilus* on small bowel bacterial overgrowth in patients with end stage kidney disease: reducing uremic toxins and improving nutrition. *Int Dairy J.* 8: 545-553.
2. Simenhoff ML, Dunn SR. 1996. Altered gut flora in uremia. *J Renal Nutr.* 6: 68-74.
3. Simenhoff ML, Dunn SR, Zollner GP, Fitzpatrick MED, Emery SM, Sandine WE, Ayres JW. 1996. Biomodulation of the toxic and nutritional effects of small bowel bacterial overgrowth in end-stage kidney disease using freeze-dried *Lactobacillus acidophilus*. *Mineral and Electrolyte Metab.* 22: 92-96. [Strain LBA = NCFM]

Synbiotic

1. Gelardi M, De Luca C, Taliente S, Fiorella ML, Quaranta N, Russo C, Ciofalo A, Macchi A, Mancini M, Rosso P, Seccia V, Guagnini F, Ciprandi G. 2017. Adjuvant treatment with a symbiotic in patients with inflammatory non-allergic rhinitis. *J Biol Regul Homeost Agents*. Jan-Mar;31(1): 201-206.
2. Irwin C, Khalesi S, Cox AJ, Grant G, Davey AK, Bulmer AC, Desbrow B. 2017. Effect of 8-weeks prebiotics/probiotics supplementation on alcohol metabolism and blood biomarkers of healthy adults: a pilot study. *European Journal of Nutrition* pp 1-12.
Also listed under Gastrointestinal ecology.
3. Magro DO, de Oliveira LM, Bernasconi I, Ruela Mde S, Credidio L, Barcelos IK, Leal RF, Ayrizono Mde L, Fagundes JJ, Teixeira Lde B, Ouwehand AC, Coy CS. 2014. Effect of yogurt containing polydextrose, *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* HN019: a randomized, double-blind, controlled study in chronic constipation. *Nutr J*. 2014 Jul 24;13: 75.
Also listed under Gastrointestinal functionality
4. Waitzberg DL, Logullo LC, Bittencourt AF, Torrinhas RS, Shiroma GM, Paulino NP, Teixeira-da-Silva ML. 2013. Effect of synbiotic in constipated adult women – A randomized, double-blind, placebo-controlled study of clinical response *Clin Nutr*. 32: 27-33.
5. Wang S, Zhu H, Lu C, Kang Z, Luo Y, Feng L, Lu X. 2012. Fermented milk supplemented with probiotics and prebiotics can effectively alter the intestinal microbiota and immunity of host animals. *J Dairy Sci*. 95(9): 4813-4822.
6. Ouwehand AC, Tiihonen K, Saarinen M, Putaala H, Rautonen N. 2009. Influence of a combination of *Lactobacillus acidophilus* NCFM and lactitol on healthy elderly: intestinal and immune parameters. *Br J Nutr*. 101: 367-375.
7. Schrezenmeir J, Heller K, McCue M, Llamas C, Lam W, Burow H, Kindling-Rohracker M, Fischer W, Sengespeik HC, Comer GM, Alarcon P. 2004. Benefits of oral supplementation with and without synbiotics in young children with acute bacterial infections. *Clin Ped*. 43: 239-249.

8. Fisberg M, Maulén-Radován IE, Tormo R, Carrascoso MT, Giner CP, Martín FA, et al. 2002. Effect of oral nutritional supplementation with or without synbiotics and sickness and catch-up growth in preschool children. *Int Pediatr*. 17: 216-222.

9. Swanson KS, Grieshop CM, Flickinger EA, Bauer LL, Wolf BW, Chow J, Garleb KA, Williams JA, Fahey Jr, GC. 2002. Fructooligosaccharides and *Lactobacillus acidophilus* modify bowel function and protein catabolites excreted by healthy humans. *J Nutr*. 132: 3042-3050.

Immune system enhancement

1. Ibrahim F, Ruvio S, Granlund L, Salminen S, Viitanen M, Ouwehand AC. 2010. Probiotics and immunosenescence: cheese as a carrier. *FEMS Immunol Med Microbiol*. 59: 53-59.
2. Paineau D, Carcano D, Leyer G, Darquy S, Alyanakian MA, Simoneau G, Bergmann JF, Brassart D, Bornet F, Ouwehand AC. 2008. Effects of seven potential probiotic strains on specific immune responses in healthy adults: a double-blind, randomized, controlled trial. *FEMS Immunol Med Microbiol*. 53: 107-13.

Allergy treatment

1. Gobel R, Larsen N, Molgaard C, Jakobsen M, Michaelsen KF. 2010. Probiotics to young children with atopic dermatitis: A randomized placebo-controlled trial. *Int J Prob Preb*. 5: 53-60.
2. Larsen N, Vogensen FK, Gøbel R, Michaelsen KF, Al-Soud WA, Sørensen SJ, Hansen LH, Jakobsen M. 2010. Predominant genera of fecal microbiota in children with atopic dermatitis are not altered by intake of probiotic bacteria *Lactobacillus acidophilus* NCFM and *Bifidobacterium animalis* subsp. *lactis* Bi-07. *FEMS Microbiol Ecol*. 2011 75: 482-496.
Also listed under Gastrointestinal ecology.
3. Ouwehand AC, Nermes M, Collado MC, Rautonen N, Salminen S, Isolauri E. 2009. Specific probiotics alleviate allergic rhinitis during the birch pollen season. *World J Gastroenterol*. 15: 3261-3268.

Anti-carcinogenic activity

1. Goldin BR, Gorbach SL. 1984. The effect of milk and *Lactobacillus* feeding on human intestinal bacterial enzyme activity. *Amer J Clin Nutr.* 39: 756-761.
2. Goldin BR, Gorbach SL. 1984. The effect of oral administration of *Lactobacillus* and antibiotics on intestinal bacterial activity and chemical induction of large bowel tumors. *Dev Indus Microbiol.* 25: 139-150.
Also listed under Animal trials.
3. Goldin BR, Swenson L, Dwyer J, Sexton M, Gorbach S. 1980. Effect of diet and *Lactobacillus acidophilus* supplements on human fecal bacterial enzymes. *J Natl Cancer Instit.* 64: 255-261.

Cholesterol lowering

1. Thompson LU, Jenkins DJA, Amer MAV, Reichert R, Jenking A, Kamulsky J. 1982. The effect of fermented and unfermented milks on serum cholesterol. *Amer J Clin Nutr.* 36: 1106-1111.

Insulin sensitivity

1. Andreasen AS, Larsen N, Pedersen-Skovsgaard T, Berg RM, Møller K, Svendsen KD, Jakobsen M, Pedersen BK. 2010. Effects of *Lactobacillus acidophilus* NCFM on insulin sensitivity and the systemic inflammatory response in human subjects. *Br J Nutr.* 104: 1831-1838.

Improved lactose digestion

1. Mustapha A, Jiang T, Savaiano DA. 1997. Improvement of lactose digestion by humans following ingestion of unfermented acidophilus milk: Influence of bile sensitivity, lactose transport and acid tolerance of *Lactobacillus acidophilus*. *J Dairy Sci* 80: 1537-1545. [Strain LA-1 = NCFM]
2. Montes RG, Bayless TM, Saavedra JM, Perman JA. 1995. Effect of milks inoculated with *Lactobacillus acidophilus* or a yogurt starter culture in lactose-maldigesting children. *J Dairy Sci.* 78: 1657-1664.
3. Lin MY, Savaiano D, Harlander S. 1991. Influence of nonfermented dairy products containing bacterial starter cultures on lactose maldigestion in humans. *J Dairy Sci.* 74: 87-95.

4. McDonough FE, Hitchins AD, Wong NP, Wells P, Bodwell CE. 1987. Modification of sweet acidophilus milk to improve utilization by lactose-intolerant persons. *Am J Clin Nutr.* 45: 570-574.

5. Savaiano DA, Abou El Anouar DAG, Smith DE, Levitt MD. 1984. Lactose malabsorption from yogurt, pasteurized yogurt, sweet acidophilus milk and cultured milk in lactase-deficient individuals. *Amer J Clin Nutr.* 40: 1219-1223.

6. Kim GS, Gilliland SE. 1983. *Lactobacillus acidophilus* as a dietary adjunct for milk to aid lactose digestion in humans. *J Dairy Sci.* 66: 959-966.

7. Newcomer AD, Park HS, O'Brien PC, McGill DB. 1983. Response of patients with irritable bowel syndrome and lactase deficiency using unfermented acidophilus milk. *Amer J Clin Nutr.* 38: 257-263.

8. Payne DL, Welsh JD, Manion CV, Tsegaye A, Herd LD. 1981. Effectiveness of milk products in dietary management of lactose malabsorption. *Amer J Clin Nutr.* 34: 2711-2715.

General health

1. Barker AK, Duster M, Valentine S, Hess T, Archbald-Pannone L, Guerrant R, Safdar N. A randomized controlled trial of probiotics for *Clostridium difficile* infection in adults (PICO). *Journal of Antimicrobial Chemotherapy*, Volume 72, Issue 11, 1 November, Pages 3177-3180, <https://doi.org/10.1093/jac/dkx254>.

2. West NP, Horn PL, Pyne DB, Warren HS, Asad S, Cox AJ, Lahtinen SJ, Lehtinen MJ, Fricker PA, Cripps AW, Fazekas de St Groth B. 2016. Probiotic supplementation has little effect on peripheral blood regulatory T cells. *J Allergy Clin Immunol.* 2016 Aug 20.

3. Benor S, Marom R, Ben Tov A, Domany KA, Zaidenberg-Israeli G, Dollberg S. 2014. Probiotic supplementation in mothers of very low birth weight infants. *Am J Perinatol* 31(6): 497-504.

4. West NP, Horn PL, Barrett S, Warren HS, Lehtinen MJ, Koerbin G, Brun M, Pyne DB, Lahtinen SJ, Fricker PA, Cripps AW. 2014. Supplementation with a single and double strain probiotic on the innate immune system for respiratory illness. *e-SPEN Journal* 9: e178-e184.

5. West NP, Horn PL, Pyne DB, GebSKI VJ, Lahtinen SJ, Fricker PA, Cripps AW. 2014. Probiotic supplementation for respiratory and gastrointestinal illness symptoms in healthy physically active individuals. *Clin Nutr* 33(4): 581-7.

6. Leyer GJ, Li S, Mubasher ME, Reifer C, Ouwehand AC. 2009. Probiotic effects on cold and influenza-like symptom incidence and duration in children. *Pediatrics*. 124: e172-e179.

Also listed under Synbiotic: Fisberg et al. 2004 and Schrezenmeier et al. 2002.

Antibiotic associated diarrhea

1. Forssten S, Evans M, Wilson D, Ouwehand AC. 2014. Influence of a probiotic mixture on antibiotic induced microbiota disturbances. *World J Gastroenterol*. 20(33): 11878-85.

Also listed under Gastrointestinal ecology.

2. Ouwehand AC, DongLian C, Weijian X, Stewart M, Ni J, Stewart T, Miller LE. 2014. Probiotics reduce symptoms of antibiotic use in a hospital setting: a randomized dose response study. *Vaccine*. 32(4): 458-63.

Gastrointestinal functionality

1. Sadrin S, Sennoune SR, Gout B, Marque S, Moreau J, Grillasca J, Pons O, Maixent JM. 2017. *Lactobacillus acidophilus* versus placebo in the symptomatic treatment of irritable bowel syndrome: The LAPIBSS randomized trial. *Cellular and Molecular Biology Volume 63, Issue 9, Pages 122-131. Presentation of the trial design.*

2. Lyra A, Hillilä M, Huttunen T, Männikkö S, Taalikka M, Tennilä J, Tarpila A, Lahtinen S, Ouwehand AC, Veijola L. 2016. Irritable bowel syndrome symptom severity improves equally with probiotic and placebo. *World J Gastroenterol*. Dec 28;22(48): 10631-10642.

3. Ludidi S, Jonkers DM, Koning CJ, Kruimel JW, Mulder L, van der Vaart IB, Conchillo JM, Masclee AA. 2014. Randomized clinical trial on the effect of a multispecies probiotic on visceroperception in hypersensitive IBS patients. *Neurogastroenterol Motil*. May; 26(5):705-14.

4. D'Souza B, Slack T, Wong SW, Lam F, Muhlmann M, Koestenbauer J, Dark J, Newstead G. 2015. Randomized controlled trial of probiotics after colonoscopy. *ANZ J Surg*. Jul 17.

5. Magro DO, de Oliveira LM, Bernasconi I, Ruela Mde S, Credidio L, Barcelos IK, Leal RF, Ayrizono Mde L, Fagundes JJ, Teixeira Lde B, Ouwehand AC, Coy CS. 2014. Effect of yogurt containing polydextrose, *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* HN019: a randomized, double-blind, controlled study in chronic constipation. *Nutr J*. Jul 24;13:75.

Also listed under Synbiotic.

6. Ringel-Kulka T, Goldsmith JR, Carroll IM, Barros SP, Palsson O, Jobin C, Ringel Y. 2014. *Lactobacillus acidophilus* NCFM affects colonic mucosal opioid receptor expression in patients with functional abdominal pain - a randomised clinical study. *Aliment Pharmacol Ther*. 2014 May 22. doi: 10.1111/apt.12800.

7. Ringel-Kulka T, Palsson OS, Maier D, Carroll I, Galanko JA, Leyer G and Ringel Y. 2011. Probiotic Bacteria: Probiotic Bacteria *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* Bi-07 Versus Placebo for the Symptoms of Bloating in Patients With Functional Bowel Disorders-a Double-blind Study. *J Clin Gastroenterol*. 45: 518-525.

8. Faber S. 2006. Response to a comment on “The use of probiotics in the treatment of irritable bowel syndrome”. *Altern Ther Health Med*. 12: 17. [Correspondence]

9. Faber S, Rigden S, Lukaczer D. 2005. The use of probiotics in the treatment of irritable bowel syndrome: two case reports. *Altern Ther Health Med*. 11: 60-62.

10. Heiser CR, Ernst JA, Barrett JT, French N, Schutz M, Dube MP. 2004. Probiotics, soluble fiber and L-Glutamine (GLN) reduce nelfinavir (NFV) – or lopinavir/ritonavir (LPV/r)-related diarrhea. *J Int Assoc Physicians AIDS Care (Chic Ill)*. 3: 121-129.

11. Faber SM. 2003. Are probiotics useful in irritable bowel syndrome? *J Clin Gastroenterol*. 37: 93-94.

12. Lukaczer D. Evaluating the Effects of Specialized Nutritional Support, Including strain-certified *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* BI-07, in a Patient with Irritable Bowel Syndrome. (Case study #1150). San Clemente (CA): Metagenics, Inc.

See file “metagenics search ncfm” – Several case studies exist, but not all available in full text. No 1150 available. [Case studies]

Oral health

1. Miyazima TY, Ishikawa KH, Mayer M, Saad S, Nakamae A. 2017. Cheese supplemented with probiotics reduced the *Candida* levels in denture wearers-RCT. Oral Dis. Mar 27. doi: 10.1111/odi.12669.

Product functionality

1. Fan S, Breidt F, Price R, Pérez-Díaz I. 2017. Survival and Growth of Probiotic Lactic Acid Bacteria in Refrigerated Pickle Products. Journal of Food Science, 82: 167-173. doi: 10.1111/1750-3841.13579.

2. Parussolo G, Busatto RT, Schmitt J, Pauletto R, Schons PF, Ries EF. 2017. Synbiotic ice cream containing yacon flour and *Lactobacillus acidophilus* NCFM. LWT - Food Science and Technology, Volume 82, 1 September 2017, Pages 192-198, <https://doi.org/10.1016/j.lwt.2017.04.049>.

3. Kulkarni S, Haq SF, Samant S, Sukumaran S. 2017. Adaptation of *Lactobacillus acidophilus* to Thermal Stress Yields a Thermotolerant Variant Which Also Exhibits Improved Survival at pH 2. Probiotics and Antimicrobial Proteins, Pages 1-11.

4. Aljewicz M, Cichosz G. 2017. Influence of probiotic (*Lactobacillus acidophilus* NCFM, *L. paracasei* LPC37 and *L. rhamnosus* HN001) strains on starter cultures and secondary microflora in Swiss- and Dutch-type cheeses. Journal of Food Processing and Preservation.

5. Mai V, Waugh S, Byrd D, Simpson D, Ukhanova M. 2016. Novel encapsulation improves recovery of probiotic strains in fecal samples of human volunteers. Appl Microbiol Biotechnol. Oct 28.

6. Jiang Y, Zheng Z, Zhang T, Hendricks G, Guo M. 2016. Microencapsulation of *Lactobacillus acidophilus* NCFM using polymerized whey proteins as wall material. Int J Food Sci Nutr. 67(6): 670-7.

7. Li S, Gong G, Ma C, Liu Z, Cai J. 2016. Study on the influence of tea extract on probiotics in skim milk: from probiotics propagation to metabolite. J Food Sci. 2016 Jul 6.

8. Aljewicz M, Cichosz G, Nalepa B, Bielecka M. 2016. The effect of milk fat substitution with palm fat on lactic acid bacteria counts in cheese-like products. LWT – Food Sci Technol. 2016 Mar; 66: 348-354.

9. Li S, Ma C, Guang-Yu G, Liu Z, Chang C, Xu Z. 2016. The impact of onion juice on milk fermentation by *Lactobacillus acidophilus*. LWT – Food Sci Technol. 2016 Jan; 65: 543-548.

10. Zarić DB, Bulatović ML, Rakin MB, Krunic TŽ, Lončarević IS, Pajind BS. 2016. Functional, rheological and sensory properties of probiotic milk chocolate produced in a ball mill. RSC Adv. 2016; 6: 13934-13941.

11. Aljewicz M, Cichosz G. 2015. Protective effects of *Lactobacillus* cultures in Dutch-type cheese-like products. LWT - Food Science and Technology Volume 63, Issue 1, September 2015, Pages 52-56.

12. Senz M, van Lengerich B, Bader J, Stahl U. 2015. Control of cell morphology of probiotic *Lactobacillus acidophilus* for enhanced cell stability during industrial processing. Int J Food Microbiol. 192: 34-42.

13. Aljewicz M, Siemianowska E, Cichosz G, Tońska E. 2014. The effect of probiotics (*Lactobacillus rhamnosus* HN001, *Lactobacillus paracasei* LPC-37 and *Lactobacillus acidophilus* NCFM) on the availability of minerals from Dutch-type cheese. J Dairy Sci. 2014 Jun 6. pii: S0022-0302(14)00403-2.

14. Sohail A, Turner MS, Coombes A, Bhandari B. 2013. The Viability of *Lactobacillus rhamnosus* GG and *Lactobacillus acidophilus* NCFM Following Double Encapsulation in Alginate and Maltodextrin. Food and Bioprocess Technology October 2013, Volume 6, Issue 10, pp 2763-2769 25 Jul 2012

15. Altamirano-Fortoul R, Moreno-Terrazas R, Quezada-Gallo A, Rosell CM. 2012. Viability of some probiotic coatings in bread and its effect on the crust mechanical properties. Food Hydrocolloids 29: 166e174.

16. do Espírito Santo AP, Perego P, Converti A, Oliveira MN. 2012. Influence of milk type and addition of passion fruit peel powder on fermentation kinetics, texture profile and bacterial viability in probiotic yoghurts. LWT - Food Science and Technology 47 393e399.

17. Kolakowski and Pawlikowska. 2012. Kefir as a probiotic delivery vehicle. Milchwissenschaft 67: 2.

18. Mingruo G, Zheng Z, Zhang T, Jiang Y. 2012. Whey protein based microencapsulation for protection of *Lactobacillus acidophilus* in yogurt. The FASEB Journal. 26: 1027.1

19. Sohail A, Turner MS, Prabawati EK, Coombes AG, Bhandari B. 2012. Evaluation of *Lactobacillus rhamnosus* GG and *Lactobacillus acidophilus* NCFM encapsulated using a novel impinging aerosol method in fruit food products. *Int J Food Microbiol.* 157: 162-166.

20. Saarinen MT, Lahtinen SJ, Sørensen JF, Tiihonen K, Ouwehand AC, Rautonen N & Morgan A. 2012. Treatment of Bran Containing Bread by Baking Enzymes; Effect on the Growth of Probiotic Bacteria on Soluble Dietary Fiber Extract *in vitro*. *Bioscience, Biotechnology and Biochemistry*, 76: 6, 1135-1139

21. Sohail A, Turner MS, Coombes A, Bostrom T, Bhandari B. 2010. Survivability of probiotics encapsulated in alginate gel microbeads using a novel impinging aerosols method. *Int J Food Microbiol.* 145: 162-168.

22. Azcarate-Peril MA, Tallon R, Klaenhammer TR. 2009. Temporal gene expression and probiotic attributes of *Lactobacillus acidophilus* during growth in milk. *J Dairy Sci.* 92: 870-886.

Also listed under In vitro lactose digestion.

23. Ding WK, Shah NP. 2009. Effect of various encapsulating materials on the stability of probiotic bacteria. *J Food Sci.* 74(2): M100-7.

24. Sreekumar R, Al-Attabi Z, Deeth HC, Turner MS. 2009. Volatile sulfur compounds produced by probiotic bacteria in the presence of cysteine or methionine. *Lett Appl Microbiol.* 48: 777-782.

25. Liu M, Nauta A, Francke C, Siezen RJ. 2008. Comparative Genomics of Enzymes in Flavor-Forming Pathways from Amino Acids in Lactic Acid Bacteria. *Appl Environ Microbiol.* 74: 4590-4600.

26. Ding WK, Shah NP. 2007. Acid, bile and heat tolerance of free and microencapsulated probiotic bacteria. *J Food Sci.* 72: M446-M450.

27. Jenkins JK, Courtney PD. 2003. *Lactobacillus* growth and membrane composition in the presence of linoleic or conjugated linoleic acid. *Can J. Microbiol.* 49: 51-57.

28. Lee KW, Baick SC, Chung WH, Kim HW. 2003. Structural observation of microencapsulated *Lactobacillus acidophilus* by optical and scanning electron microscopy. *Food Sci Biotechnol.* 12: 13-17.

29. Sanders ME, Walker DC, Walker KM, Aoyama K, Klaenhammer TR. 1996. Performance of commercial cultures in fluid milk applications. *J Dairy Sci.* 79: 943-955. [Strain LH1 = NCFM]

Reviews

1. Stenman LK, Burcelin R, Lahtinen S. 2015. Establishing a causal link between gut microbes, body weight gain and glucose metabolism in humans – towards treatment with probiotics. *Benef Microbes.* 7: 11-22.

2. Lahtinen SJ, Davis E, Ouwehand AC. 2012. *Lactobacillus* species causing obesity in humans: where is the evidence? *Benef Microbes.* 3(3): 171-4.

3. Pyne DB, West NP and Cripps AW. 2013. Probiotics and Immune Response to Exercise. *American Journal of Lifestyle Medicine* 7: 51-59. [Review]

4. Shmueli H, Domniz N and Cohen D. 2013. Probiotics in the Prevention of Colorectal Cancer. 2013. *Curr Colorectal Cancer* 9: 31–36.

5. Bron PA, van Baarlen P, Kleerebezem M. 2012. Emerging molecular insights into the interaction between probiotics and the host intestinal mucosa. *Nat Rev Microbiol.* 10: 66-78.

6. Douglas GL, Goh YJ and Laenhammer TR. 2011. Integrative Food Grade Expression System for Lactic Acid Bacteria. *Methods Mol Biol.* 765: 373-378.

7. Shanahan F. 2011. Molecular mechanisms of probiotic action: it's all in the strains! *Gut Online*, April 20th 2011.

8. Ouwehand AC, Lahtinen SJ. 2009. *Lactobacillus acidophilus* NCFM. In *Handbook of probiotics and prebiotics*. Lee YK, Salminen SJ (eds). Wiley & Sons, New Jersey, 2nd edition, pp. 447-449.

9. Bernardeau M, Vernoux JP, Henri-Dubernet S, Guéguen M. 2008. Safety assessment of dairy microorganisms: the *Lactobacillus* genus. *Int J Food Microbiol.* 126: 278-85.

10. Philipp S, Ouwehand AC. 2008. Overview of prophylactic studies on probiotics. Reduction of incidence and duration of disease. *NutraFoods.* 7: 45-50.

11. Nichols AW. 2007. Probiotics and athletic performance: a systematic review. *Curr Sports Med Rep.* 2007 Jul;6(4): 269-73. [Review]

12. Bernardeau M, Guguen M, Vernoux JP. 2006. Beneficial lactobacilli in food and feed: long-term use, biodiversity and proposals for specific and realistic safety assessments. *FEMS Microbiol Rev.* 30: 487-513.
13. Donaldson MS. 2004. Nutrition and Cancer: A review of the evidence for an anti-cancer diet. *Nutr J.* 3: 1-21.
14. Brassart D. 2003. *L. acidophilus* NCFM: Functional properties of a unique probiotic strain. IDF Seminar on Aroma and Texture of Fermented Milk, Kolding, Denmark (06/2002). International Dairy Federation special issue. n° 1: 36-143.
15. Drisko JA, Giles CK, Bischoff BJ. 2003. Probiotics in health maintenance and disease prevention. *Altern Med Rev* 8: 143-155.
16. Klaenhammer T, Altermann E, Arigoni F, Bolotin A, Breidt F, Broadbent J, Cano R, Chaillou S, Deutscher J, Gasson M, van de Guchte M, Guzzo J, Hartke A, Hawkins T, Hols P, Hutkins R, Kleerebezem M, Kok J, Kuipers O, Lubbers M, Maguin E, McKay L, Mills D, Nauta A, Overbeek R, Pel H, Pridmore D, Saier M, van Sinderen D, Sorokin A, Steele J, O'Sullivan D, de Vos W, Weimer B, Zagorec M, Siezen R. 2002. Discovering lactic acid bacteria by genomics. *Antonie van Leeuwenhoek* 82: 29-71.
17. Sanders ME, Klaenhammer TR. 2001. The scientific basis of *Lactobacillus acidophilus* NCFM functionality as a probiotic. *J Dairy Sci.* 84: 319-331.
18. Kullen MJ, Klaenhammer TR. 2000. Genetic modification of intestinal lactobacilli and bifidobacteria. *Curr Issues Mol Biol.* 2: 41-50.
19. Hove H, Norgaard H, Mortensen PB. 1999. Lactic acid bacteria and the human gastrointestinal tract. *Eur J Clin Nutr.* 53: 339-350.
20. Klaenhammer TR, Kullen MJ. 1999. Selection and design of probiotics. *Intl J Food Micro.* 50: 45-57.
21. Reid G. 1999. The scientific basis for probiotic strains of *Lactobacillus*. *Appl Environ Microbiol.* 65: 3763-3766.
22. Klaenhammer TR. 1998. Functional activities of *Lactobacillus* probiotics: Genetic mandate. *Int Dairy J.* 8: 497-505.
23. Schauss AG. 1990. *Lactobacillus acidophilus*: method of action, clinical application and toxicity data. *J Adv Med.* 3: 163-178.
24. Klaenhammer TR. 1982. Microbiological considerations in the selection and preparation of *Lactobacillus* strains for use as dietary adjuncts. *J Dairy Sci.* 65: 1339-1349.

News articles

1. Schwobe J, Warfsmann N. 2010. Probiotic auch für UHT-Produkte? *Deutsche Milchwirtschaft* 4: 117-118.
2. Anonymous. 2009. Combined effects of *Lactobacillus Acidophilus* NCFM and lactitol on intestinal and immune in health elderly. *Nutr Res Newsl* 28 (3): 4-1.
3. Society for Applied Microbiology. 2005. Bugs CV. *Microbiologist* (June): 36.
4. Krishnakumar V, Gordon IR. 2001. Probiotics: challenges and opportunities. (digestive disorder preventative research) (statistical data included). *Dairy Ind. Int.* 66 (2): 38.

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