THE INSTITUTE FOR FUNCTIONAL MEDICINE®

Fermented Foods

People have been eating fermented foods since ancient times. Fermentation helps preserve foods while also creating good flavors, aromas, and textures. Plus, it offers potential nutrition and health benefits.

FERMENTED FOODS

- Cheese
- Kefir (fermented drink)
- Kimchi (Korean fermented vegetables)
- Kombucha tea
- Kvass (fermented beet drink)
- Miso (fermented soybean paste)
- Natto (fermented soybeans)
- Nutritional yeast
- Pickles
- Sauerkraut
- Sourdough bread
- Tempeh (a block of fermented soybeans)
- Yogurt

Note: If you are histamine-intolerant, fermented foods may trigger symptoms.

What Are Fermented Foods?

Fermented foods are those changed by the desired action of microbes, usually bacteria or yeast. A wide range of foods can be fermented, including milk (dairy or non-dairy), vegetables, beans, grains, fruits, meats, and fish.

Fermented foods aren't the same as probiotics, which are specific strains of live microbes with proven health benefits, like supporting your immune system or gut health. The microbes used to make fermented foods aren't necessarily probiotics, though many are.

Choosing fermented foods with "live and active cultures" may benefit you most. Some fermented foods, such as sourdough bread and shelf-stable sauerkraut, are heat processed. That destroys live microbial cultures. Still, fermentation itself changes foods in ways that could help you.

Health Benefits of Fermented Foods

The process of fermentation can transform foods to make them:

- **Simpler to digest.** Fermentation microbes make enzymes that help break down parts of food like protein and lactose (the natural sugar in milk).
- **More nutritious.** Some bacteria that ferment foods produce vitamins, including vitamin K, vitamin B12, and other B vitamins.
- **Easier to absorb.** Fermentation helps "free up" minerals and other healthy compounds (such as antioxidants) in foods so you can absorb them.
- **Higher in protective compounds.** When microbes ferment foods, they release byproducts that can fight inflammation and protect your cells.

Regularly eating nutritious fermented foods may reduce your risk of chronic conditions, including type 2 diabetes, heart disease, certain cancers, and dementia (like Alzheimer's). Yogurt is one of the best-studied fermented foods linked to a lower risk of chronic disease. Yogurt is also a good low-sodium option among fermented foods, many of which are made with salt. Generally, it is a good idea to include a variety of fermented foods three or more days per week as part of a health-promoting eating plan.

REFERENCES

1. Marco ML, Sanders ME, Gänzle M, et al. The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on fermented foods. *Nat Rev Gastroenterol Hepatol*. 2021;18(3):196-208. doi:10.1038/s41575-020-00390-5.
2. Şanlier N, Gökcen BB, Sezgin AC. Health benefits of fermented foods. *Crit Rev Food Sci Nutr*. 2019;59(3):506-527. doi:10.1080/10408398.2017.1383355.
3. Yang Q, Yao H, Liu S, Mao J. Interaction and application of molds and yeasts in Chinese fermented foods. *Front Microbiol*. 2022;12:664850. Published 2022 Apr 8. doi:10.3389/fmicb.2021.664850.
4. Küçükgöz K, Trząskowska M. Nondairy probiotic products: functional foods that require more attention. *Nutrients*. 2022;14(4):753. Published 2022 Feb 10. doi:10.3390/nu14040753.
5. Mai TT, Thi Thu P, Thi Hang H, et al. Efficacy of probiotics on digestive disorders and acute respiratory infections: a controlled clinical trial in young Vietnamese children. *Eur J Clin Nutr*. 2021;75(3):513-520. doi:10.1038/s41430-020-00754-9.
6. Shida K, Sato T, Iizuka R, et al. Daily intake of fermented milk with Lactobacillus casei strain Shirota reduces the incidence and duration of upper respiratory tract infections in healthy middle-aged office workers. *Eur J Nutr*. 2017;56(1):45-53. doi:10.1007/s00394-015-1056-1.
7. Dimidi E, Cox SR, Rossi M, Whelan K. Fermented foods: definitions and characteristics, impact on the gut microbiota and effects on gastrointestinal health and disease. *Nutrients*. 2019;11(8):1806. Published 2019 Aug 5. doi:10.3390/nu11081806.
8. Zamaratskaia G, Johansson DP, Junqueira MA, et al. Impact of sourdough fermentation on appetite and postprandial metabolic responses - a randomised cross-over trial with whole grain rye crispbread. *Br J Nutr*. 2017;118(9):686-697. doi:10.1017/S000711451700263X.
9. Nielsen ES, Garnås E, Jensen KJ, et al. Lacto-fermented sauerkraut improves symptoms in IBS patients independent of product pasteurisation - a pilot study. *Food Funct*. 2018;9(10):5323-5335. doi:10.1039/c8fo00968f.
10. Ibacache-Quiroga C, González-Pizarro K, Charifeh M, et al. Metagenomic and functional characterization of two Chilean kefir beverages reveals a dairy beverage containing active enzymes, short-chain fatty acids, microbial beta-amyloids, and bio-film inhibitors. *Foods*. 2022;11(7):900. Published 2022 Mar 22. doi:10.3390/foods11070900.
11. Alrosan M, Tan TC, Koh WY, Easa AM, Gammoh S, Alu'datt MH. Overview of fermentation process: structure-function relationship on protein quality and non-nutritive compounds of plant-based proteins and carbohydrates [published online ahead of print, 2022 Mar 10]. *Crit Rev Food Sci Nutr*. 2022;1-15. doi:10.1080/10408398.2022.2049200.
12. Chai KF, Voo AYH, Chen WN. Bioactive peptides from food fermentation: a comprehensive review of their sources, bioactivities, applications, and future development. *Compr Rev Food Sci Food Saf*. 2020;19(6):3825-3885. doi:10.1111/1541-4337.12651.
13. Melini F, Melini V, Luziatelli F, Ficca AG, Ruzzi M. Health-promoting components in fermented foods: an up-to-date systematic review. *Nutrients*. 2019;11(5):1189. Published 2019 May 27. doi:10.3390/nu11051189.
14. Castellone V, Bancalari E, Rubert J, Gatti M, Neviani E, Bottari B. Eating fermented: health benefits of LAB-fermented foods. *Foods*. 2021;10(11):2639. Published 2021 Oct 31. doi:10.3390/foods10112639.
15. Baruah R, Ray M, Halami PM. Preventive and therapeutic aspects of fermented foods. *J Appl Microbiol*. 2022;132(5):3476-3489. doi:10.1111/jam.15444.
16. Verni M, Verardo V, Rizzello CG. How fermentation affects the antioxidant properties of cereals and legumes. *Foods*. 2019;8(9):362. Published 2019 Aug 24. doi:10.3390/foods8090362.
17. Zhao YS, Eweys AS, Zhang JY, et al. Fermentation affects the antioxidant activity of plant-based food material through the release and production of bioactive components. *Antioxidants (Basel)*. 2021;10(12):2004. Published 2021 Dec 16. doi:10.3390/antiox10122004.
18. Fardet A, Rock E. In vitro and in vivo antioxidant potential of milks, yoghurts, fermented milks and cheeses: a narrative review of evidence. *Nutr Res Rev*. 2018;31(1):52-70. doi:10.1017/S0954422417000191.
19. SaeidiFard N, Djafarian K, Shab-Bidar S. Fermented foods and inflammation: a systematic review and meta-analysis of randomized controlled trials. *Clin Nutr ESPEN*. 2020;35:30-39. doi:10.1016/j.clnesp.2019.10.010.
20. Awwad SF, Abdalla A, Howarth FC, Stojanovska L, Kamal-Eldin A, Ayyash MM. Invited review: potential effects of short- and long-term intake of fermented dairy products on prevention and control of type 2 diabetes mellitus. *J Dairy Sci*. 2022;105(6):4722-4733. doi:10.3168/jds.2021-21484.
21. Zhang K, Bai P, Deng Z. Dose-dependent effect of intake of fermented dairy foods on the risk of diabetes: results from a meta-analysis. *Can J Diabetes*. 2022;46(3):307-312. doi:10.1016/j.jcjd.2021.09.003.
22. Sivamaruthi BS, Kesika P, Prasanth MI, Chaiyasut C. A mini review on antidiabetic properties of fermented foods. *Nutrients*. 2018;10(12):1973. Published 2018 Dec 13. doi:10.3390/nu10121973.
23. Giosuè A, Calabrese I, Vitale M, Riccardi G, Vaccaro O. Consumption of dairy foods and cardiovascular disease: a systematic review. *Nutrients*. 2022;14(4):831. Published 2022 Feb 16. doi:10.3390/nu14040831.
24. Byun MS, Yu OK, Cha YS, Park TS. Korean traditional Chungkookjang improves body composition, lipid profiles and atherogenic indices in overweight/obese subjects: a double-blind, randomized, crossover, placebo-controlled clinical trial. *Eur J Clin Nutr*. 2016;70(10):1116-1122. doi:10.1038/ejcn.2016.77.
25. Bellikci-Koyu E, Sarer-Yurekli BP, Karagozlu C, Aydin-Kose F, Ozgen AG, Buyuktuncer Z. Probiotic kefir consumption improves serum apolipoprotein A1 levels in metabolic syndrome patients: a randomized controlled clinical trial. *Nutr Res*. 2022;102:59-70. doi:10.1016/j.nutres.2022.02.006.
26. Sun J, Song J, Yang J, et al. Higher yogurt consumption is associated with lower risk of colorectal cancer: a systematic review and meta-analysis of observational studies. *Front Nutr*. 2022;8:789006. Published 2022 Jan 3. doi:10.3389/fnut.2021.789006.
27. Liang Z, Song X, Hu J, et al. Fermented dairy food intake and risk of colorectal cancer: a systematic review and meta-analysis. *Front Oncol*. 2022;12:812679. Published 2022 May 25. doi:10.3389/fonc.2022.812679.
28. Zhang K, Dai H, Liang W, Zhang L, Deng Z. Fermented dairy foods intake and risk of cancer. *Int J Cancer*. 2019;144(9):2099-2108. doi:10.1002/ijc.31959.
29. Shabbir U, Tyagi A, Ham HJ, Elahi F, Oh DH. Effect of fermentation on the bioactive compounds of the black soybean and their anti-Alzheimer's activity. *Front Nutr*. 2022;9:880361. Published 2022 May 13. doi:10.3389/fnut.2022.880361.
30. Cannavale CN, Mysonhimer AR, Bailey MA, Cohen NJ, Holscher HD, Khan NA. Consumption of a fermented dairy beverage improves hippocampal-dependent relational memory in a randomized, controlled cross-over trial [published online ahead of print, 2022 Mar 13]. *Nutr Neurosci*. 2022;1-10. doi:10.1080/1028415X.2022.2046963.
31. Kumar MR, Azizi NF, Yeap SK, et al. Clinical and preclinical studies of fermented foods and their effects on Alzheimer's disease. *Antioxidants (Basel)*. 2022;11(5):883. Published 2022 Apr 29. doi:10.3390/antiox11050883.
32. Handajani YS, Turana Y, Yogiara Y, et al. Tempeh consumption and cognitive improvement in mild cognitive impairment. *Dement Geriatr Cogn Disord*. 2020;49(5):497-502. doi:10.1159/000510563.