MILK

Nutritious by nature

The science behind
the health and nutritional impact
of milk and dairy foods

Cancer

Based on a comprehensive review of the scientific literature, the World Cancer Research Fund report on diet and cancer concludes there is strong evidence that dairy foods are likely to protect against colorectal cancer. There is also limited evidence that consuming dairy foods might decrease the risk of premenopausal breast cancer. Although a protective effect of milk and milk products on bladder cancer and postmenopausal breast cancer has been indicated, the evidence is inconclusive. The evidence suggesting an increased risk of prostate cancer with higher consumption of dairy products is limited.
Several plausible mechanisms exist whereby constituents of the dairy matrix, either individually or in combination, may be involved in protective effects including calcium, lactoferrin, conjugated linoleic acid (CLA), sphingolipids, vitamin K2, probiotics and vitamin D (in fortified dairy).

Both protective and negative associations with dairy foods and cancer have been suggested by epidemiological studies. The relationship between diet and cancer risk is complex and pooled analysis of data is necessary before a reliable picture emerges. Even then, most common cancers are multifactorial, generally resulting from several causative factors and the impact of individual foods or food groups, either positive or negative, may be relatively small. The World Cancer Research Fund (WCRF) together with the American Institute for Cancer Research (AICR) systematically analyses the worldwide scientific literature on the relationship between food, nutrition, physical activity and cancer. The reports produced include an assessment of the strength of the evidence and the mechanisms which may be involved.

Colorectal Cancer

There is strong evidence that consuming dairy products decreases the risk of colorectal cancer (cancer of the colon and rectum, sometimes referred to as bowel cancer). Meta-analyses consistently report a reduced risk with higher intakes of milk and dairy foods. The latest WCRF/AICR Report (2017) concludes that consumption of dairy foods probably protects against colorectal cancer, and rates the level of evidence as 'strong'[1]. The report estimates a 13% decreased risk of colorectal cancer per 400g of dairy consumed a day. A significant dose-response relationship was also noted with milk: a 6% decreased risk of colorectal cancer per 200g of milk consumed a day.

The protective association is observed in European populations, as well as North American. For example, results from the European Prospective Investigation into Cancer and Nutrition (EPIC) which included data from over 477,000 men and women from ten European countries showed that higher intakes of milk, cheese, yogurt and total dairy products (and dietary calcium from dairy sources) were all associated with reduced colorectal cancer risk[2].

Bladder Cancer

It has been suggested that milk intake may have a protective effect on bladder cancer. However, according to the 2015 WCRF report, evidence for an association is inconsistent and no conclusions could be drawn[3]. A meta-analysis in 2011 showed a decreased risk of bladder cancer with a high intake of milk, while another in the same year found no association between dairy intake and bladder cancer risk[4, 5].

Breast cancer

The most recent WCRF/AICR report (2017) concludes that there is limited, but generally consistent, evidence that consumption of dairy products may decrease the risk of premenopausal breast cancer[6]. A dose response meta-analysis conducted as part of the report estimated a 5% reduced risk of breast cancer per 400g of dairy foods consumed a day. Evidence for an association between dairy intake and risk of postmenopausal breast cancer was inconclusive.

Prostate cancer

The 2014 WCRF report concluded that the evidence of an association between dairy intake and increased risk of prostate cancer is limited[7,8]. The evidence for total dairy product intake showed an increased risk per 400g a day, but the relationship was unclear and not significant when stratified by prostate cancer type. For diets high in calcium, WCRF also concludes that the evidence suggesting an increased risk of prostate cancer is limited7. On this basis, dairy is not part of the WCRF dietary recommendations concerning prostate cancer risk[7].

Other cancers

In relation to other cancer types including ovarian, endometrial, lung and pancreatic cancers, WCRF reports and recent meta-analyses suggest no association with dairy intake[9]. In Europe and the United States, there is some suggestion that total dairy product intake may reduce the risk of gastric cancer[10].

Potential dairy matrix mechanisms

Dairy foods contain several components which may have anti-cancer properties. The effect of milk, or other dairy foods, in reducing colorectal cancer risk is likely to be mediated, at least in part, by their **calcium** content. Plausible mechanisms include calcium's ability to bind secondary bile acids and free fatty acids in the gut lumen which can otherwise have a toxic effect on the cells of the colon, and to reduce abnormal proliferation of colonic epithelial cells[11]. Similarly, animal studies have shown that a high calcium intake also inhibits hyper-proliferation of mammary glands and has inhibitory effects on breast cancer cells[12]. Indeed, a 2016 meta-analysis reports a dose-response relationship between calcium intake and reduced breast cancer risk[13].

There is evidence too that other components of the dairy matrix may be involved along with calcium in protective effects. For example, the relation between dietary calcium and a lower risk of colorectal cancer in the EPIC study was evident for dairy sources of calcium only[14]. Similarly, in a prospective cohort of Swedish men, control for total calcium intake in the analysis lessened but did not eliminate the beneficial effect of milk[15].

Other constituents of milk and milk products which may have anti-carcinogenic properties include **vitamin D** (in fortified dairy), **lactoferrin** (a protein in cows' milk), **menaquinones** (a class of **vitamin K** compounds of which cheese is an important dietary source) and **probiotic** bacteria in fermented products such as yogurt[16-20]. In addition, the fatty acids **conjugated linoleic acid** (CLA) and **butyric acid**, and components of the membrane which encloses the fat droplets in milk (milk fat globule membrane; MFGM) such as **sphingolipids** and particularly sphingomyelin, are thought to have anti-cancer effects[16, 20-22]. With respect to CLA, data from the Swedish Mammography Cohort found intakes of CLA could partly explain the relation between high-fat dairy food and lower colorectal cancer incidence observed in this study[23]. However, in relation to other cancers, including breast cancer, although promising from in vitro and animal work, the evidence for CLA from human studies is limited[24]. The mechanisms by which dairy constituents may reduce cancer risk are not mutually exclusive and there may be interaction within the dairy matrix to produce the beneficial effects.

Research on the role of specific dairy products and dairy constituents, and possible interactions between them in the matrix will help clarify our understanding of the relationship between dairy and cancer risk. Nevertheless, from the available data there is good evidence that milk reduces the risk of colon cancer. In addition, milk and milk products may also be associated with a reduced risk of premenopausal breast cancer and possibly bladder cancer. Consumption of milk and dairy foods as part of a healthy dietary pattern fits with guidance on cancer prevention[25].

Milk nutritious by nature - nutrient richness **- an important part of European dietary guidelines**

Cancer

1. World Cancer Research Fund International/American Institute for Cancer Research. Continuous Update Project Report: Diet, Nutrition, Physical Activity and Colorectal Cancer. 2017. Available at: wcrf.org/colorectal-cancer-2017. http://www.wcrf.org/sites/default/files/CUP%20Colorectal%20Report_2017_Digital.pdf (accessed 07/09/17).

2. Aune D et al. Dairy products and colorectal cancer risk: a systematic review and meta-analysis of cohort studies. Ann Oncol. 2012; 23: 37-45.

3. World Cancer Research Fund International/American Institute for Cancer Research. Continuous Update Project report: Diet, nutrition, physical activity and bladder cancer. 2015. http://www.wcrf.org/sites/default/files/Bladder-Cancer-2015-Report.pdf (accessed 10/12/2016).

4. Mao QQ et al. Milk consumption and bladder cancer risk: a meta-analysis of published epidemiological studies. Nutr Cancer. 2011; 63: 1263-1271.

5. Li F et al. Milk and dairy consumption and risk of bladder cancer: a meta-analysis. Urology. 2011; 78: 1298-1305.

6. World Cancer Research Fund / American Institute for Cancer Research. Continuous Update Project Report. Food, Nutrition, Physical Activity and Breast Cancer. 2017. http://www.wcrf.org/sBreast-Cancer-2017 (accessed5/07/2017).

7. World Cancer Research Fund International/American Institute for Cancer Research Continuous Update Project Report: Diet, Nutrition, Physical Activity, and Prostate Cancer. 2014. http://www.wcrf.org/sites/default/files/Prostate-Cancer-2014-Report.pdf (accessed 10/11/2016).

8. Aune D et al. Dairy products, calcium, and prostate cancer risk: a systematic review and meta-analysis of cohort studies. Am J Clin Nutr. 2015; 101: 87-117.

9. World Cancer Research Fund International/American Institute for Cancer Research Continuous Update Project findings and reports. http://www.wcrf.org/int/research-we-fund/continuous-update-project-findings-reports (accessed 13/12/2016).

10. Guo Y et al. Dairy consumption and gastric cancer risk: a meta-analysis of epidemiological studies. Nutr Cancer. 2015; 67: 555-568.

11. Lamprecht SA & Lipkin M. Cellular mechanisms of calcium and vitamin D in the inhibition of colorectal carcinogenesis. Ann N Y Acad Sci. 2001; 952: 73-87.

12. Chen P et al. Meta-analysis of vitamin D, calcium and the prevention of breast cancer. Breast Cancer Res Treat. 2010; 121: 469-477.

13. Hidayat K et al. Meta-analysis of vitamin D, calcium intake and breast cancer risk: meta-analysis of prospective cohort studies. Br J Nutr. 2016; 116: 158-166.

14. Murphy N et al. Consumption of dairy products and colorectal cancer in the European Prospective Investigation into Cancer and Nutrition (EPIC). PLoS One. 2013; 8: e72715.

15. Larsson SC et al. Calcium and dairy food intakes are inversely associated with colorectal cancer risk in the Cohort of Swedish Men. Am J Clin Nutr. 2006; 83: 667-673.

16. Pufulete M. Intake of dairy products and risk of colorectal neoplasia. Nut Res Rev. 2008; 21: 56-67.

17. Fleet JC (2006) Dairy consumption and the prevention of colon cancer: is there more to the story than calcium? Am J Clin Nutr. 83; 527-528.

18. Nimptsch K et al. Dietary vitamin K intake in relation to cancer incidence and mortality: results from the Heidelberg cohort of the European Prospective Investigation into Cancer and Nutrition (EPIC-Heidelberg). Am J Clin Nutr. 2010; 91: 1348-1358.

19. Duarte DC et al. The effect of bovine milk lactoferrin on human breast cancer cell lines. J Dairy Sci. 2011; 94: 66-76.

20. Lampe JW. Dairy products and cancer. J Am Coll Nutr. 2011; 30: 464S–470S.

21. Parodi PW. Milk fat in human nutrition. Aust J Dairy Technol. 2004; 59: 3-59.

22. Kritchevsky D. Antimutagenic and some other effects of conjugated linoleic acid. Br J Nutr. 2000; 83: 459-465.

23. Larsson SC et al. High-fat dairy food and conjugated linoleic acid intakes in relation to colorectal cancer incidence in the

Swedish Mammography Cohort. Am J Clin Nutr. 2005; 82: 894-900.

24. Arab A et al. The effects of conjugated linoleic acids on breast cancer: A systematic review. Adv Biomed Res. 2016; 5: 115.

25. World Cancer Research Fund International. Cancer Prevention & Survival. Summary of global evidence on diet, weight, physical activity & what increases or decreases your risk of cancer. May 2017 edition. http://www.wcrf.org/sites/default/files/CUP%20Summary%20Report%20May17.pdf (accessed 22/07/17).

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