

## Does Milk Cause Cancer?

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**Myth:** Does drinking bovine milk contribute to cancer? Bovine milk contains lactose and insulin-like growth factor-1 (IGF-1), which some patients believe was the cause of their malignancies.

**Answer:** Humans have had a dietary relationship with milk from ruminant animals for thousands of years. Research shows that cow, sheep, goat, buffalo, and camel milk has been a staple of the human diet for about 8,000 years, and cheese-making for about 4,000 years (Haug, Hostmark, & Harstad, 2007; Huth, DiRienzo, & Miller, 2006; Kennelly & Bell, n.d.). Bovine milk composition is fairly consistent but can change based on lactation stage, breed, and environmental factors (Eddleman, 2007; Kennelly & Bell). The average composition of commercially available bovine milk is 3.4% protein, 4.7% lactose, 3.8% fat, and 0.71% ash. Lactose is the only significant sugar produced by mammals (Eddleman). Milk fat is composed of more than 400 fatty acids, the majority of which is glycerol. The remaining fats contain phospholipids and cholesterol (Kennelly & Bell). Saturated fatty acids and polyunsaturated fats are present in milk fat, conjugated linoleic acid, estrogen, IGF-1, and pesticides (Haug et al.; Zhang & Kesteloot, 2005). Because of high liposolubility, organochlorine pesticides can be found in foods, notably bovine milk. Gas chromatography has confirmed the presence of several organochlorines in bovine milk, including lindane, mirex, DDT, aldrin, and heptachlor epoxide (Armendariz, de Ciriza, & Farre, 2004).

The 2006 Dietary Guidelines for Americans (Huth et al., 2006) recommended three servings of milk products per day to enhance nutrition and bone health. Milk consumption outside the United

States varies based, in part, on lactose tolerance (Szilagyi, Nathwani, Vinoluroff, Correa, & Shrier, 2006).

### Lactose Digestion

Lactose intolerance plays a role in the body's defense against colorectal cancer. Undigested lactose in the colon promotes bacteria growth (lactobacilli and bifidobacteria), whereas people who digest lactose lose the potentially beneficial growth. Szilagyi et al. (2006) performed a meta-analysis of milk consumption studies that focused on lactose-tolerant and -intolerant populations. The results showed that Asian populations with low lactose tolerance and low dairy consumption generally receive the same protective effect from dairy as North Americans, Australians, and Northeastern Europeans who had an average lactose tolerance coupled with high dairy consumption. The analysis also found statistically insignificant protective effects from lactose intolerance in central and southern Europeans and South Americans with mid-level dairy consumption with no effect on polyp formation (Szilagyi et al.).

Lactose-tolerant populations ingest higher amounts of calcium. Calcium may have a protective effect against colorectal cancer by inhibition on mucosal hyperproliferation, precipitation of bile salts, or stimulation of lactobacilli that may interfere with pathogen colonization (Szilagyi et al., 2006). The protective effects of calcium may be attributed to the binding of secondary bile acids

and the ionization of fatty acids. Studies of calcium and vitamin D derived from dairy and supplemental calcium on subjects in the United States, Sweden, Canada, and Australia found protective effects against colorectal cancer through reduction in epithelial cell proliferation and restoration of normal cell differentiation-associated properties. The Harvard School of Public Health (Ma et al., 2001), however, reported two large prospective studies in the United States (Nurses Health Study and the Health Professionals Follow-Up Study) that showed a reduced risk of distal but not proximal colon cancer (Huth et al., 2006). Additionally, the Women's Health Initiative randomly assigned 36,282 women to placebo versus calcium and vitamin D groups and did not find a protective effect against colorectal cancer (Stein & Colditz, 2007).

Lactose breaks down into galactose, which may increase the risk of ovarian cancer by elevating gonadotropin concentrations, leading to proliferation of ovarian epithelium, or by directly exerting toxic effects on oocytes (Larsson, Bergkvist, & Wolk, 2004) (see Figure 1). A prospective population-based study of 61,084 Swedish women by Larsson et al. (2004) showed a strong increase in ovarian cancer risk for serous subtype tumors and a weak, possibly nonexistent risk for other tumors. Larsson, Wolk, Brismar, and Wolk (2005) discussed a meta-analysis of 21 studies that found no connection between ovarian cancer and dairy consumption, as well as three

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