



## Impact of Milk Based Products in Carcinogenesis and Breast Cell Proliferation

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### Editorial

Milk and milk products, being an essential part of human nutrition are documented as part of a healthy diet since ages. Milk is viewed as the only foodstuff comprising nearly all components essential for human nutrition. It is epitomized as the best source of dietary fats, proteins and essential minerals like calcium, phosphorus, magnesium, potassium and vitamins like thiamin, riboflavin, pantothenic acid, cobalamin and fat soluble vitamins *i.e.* A, D, E and K.

The consumption of milk and milk products fluctuate significantly among the populations. Consumption patterns are driven by culture, religious convictions, accessibility, affordability and genetic variability in the capacity to tolerate lactose. In developed nations, substantial amounts of dairy products are associated with the high-quality markers of diet. Usual consumption of milk is approximated to be 109 kg/capita worldwide but it varies greatly in different regions of the world. Although milk is nutritionally significant due to its requirement for growth and development in infants and sustaining nutrient needs in adults but high consumption of milk especially in adults can result in numerous health problems. Attributed to the consumption of milk and milk products is the risk of development of different cancers mainly breast cancer. Epidemiological studies have indicated that dairy products have potential roles in breast carcinogenesis.

Cancer is predominantly known as a group of diseases caused by cellular malfunction since the cancerous cells lack regular programming. They grow and replicate out of control and also do not perform any physiological function. These cancerous cells clump together forming tumors and interfere with body functions. Furthermore, cancerous cells mostly metastasize to other parts of body disrupting regular functions causing severe clinical complications. Among non-communicable diseases, cancer is the leading cause of mortality worldwide subsequent to cardiovascular diseases.

Breast cancer is one of the most frequently occurring cancers. It is initiated by cellular mutations in breast tissue causing DNA damage. Messages from DNA regulate the cell cycle and once DNA damage occurs the cells are unable to repair it and start growing abnormally often forming a clump of tissues. The tumor grows abnormally thus invading the surrounding tissues infects them ultimately. Breast cancer is the second leading cause of death among females. About 1 in 8 of the women worldwide is affected. Approximately 12% of the women in US develop belligerent breast cancer in their lifetime.

Diet is an important determinant and proper diet can significantly prevent development of cancer. Milk and milk products have many deleterious compounds along with protective ones. Calcium and vitamin D in milk are metabolically interrelated and together they influence breast carcinogenesis through various mechanisms. They enhance cellular proliferation and reduce cell differentiation.

Furthermore, recombinant Bovine Growth Hormone (rBGH) is injected to cows to arouse milk production. Presence of rBGH stimulates production of another hormone known as Insulin Like Growth Factor-I (IGF-I). IGF-I is normally present in milk bound to a protein and is involved in swift growth. Due to rBGH, this hormone is produced in more quantity and in unbound form. In unbound form IGF-I is an accelerator of breast cancer. It causes changes in cell cycle and some oncogenes like *c-fos* leading to tumorigenesis.

In most parts of the world, nonetheless, dairy cattle continue to produce milk during pregnancy. High levels of estrogen and progesterone are present in milk produced by pregnant cows. These hormones stimulate the growth of both breast cells and hormone receptor positive breast cancer cells. About 2 out of 3 breast cancers are hormone receptor positive. The cells have receptors

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that attach hormone estrogen or progesterone causing ER-positive cancers or PR-positive cancers, respectively.

Incidence of breast cancer is increasing worldwide with increasing morbidity and mortality for which lifestyle and dietary factors are important determinants. High milk consumption is one the potent risk factors in breast carcinogenesis while, to reduce the risk of breast cancer some dietary modifications are essential. Consumption of

milk or milk products should be no more than 2-3 servings/day in any form. The consumption of low fat milk from non-pregnant cattle is promoted that should be organically grown and is free of rBGH. Although, the consumption of fruits, vegetables and whole grains are encouraged as a source of micro and macronutrients. Further, females should undergo regular screening of breasts for early diagnosis and treatment of breast cancer.