

Cancer: disease, drugs and diets – an opinion

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Received date: April 06, 2026

Accepted date: April 13, 2026

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Editorial

Cancer is possibly the most dreaded among significant illnesses due to the agony of life from diagnosis to death [1]. The conversion of normal cells into cancer by carcinogens (man-made chemical or naturally occurring, e.g., aflatoxin) proceeds in three steps [2,3]. The first step is the initiation, followed by the second promotion step, and the third progression step [4]. The complete initiation phase can occur in a brief span, potentially just minutes. It is the period needed for the carcinogen to be ingested, absorbed into the bloodstream, and delivered to cells. Upon entering our cells, most carcinogens do not directly trigger the cancer process. Initially, they need to be transformed into more reactive products, facilitated by essential enzymes. These carcinogenic substances subsequently attach strongly to the DNA of the cell, creating carcinogen-DNA complexes, also known as adducts. If not repaired or eliminated, carcinogen-DNA adducts can disrupt the genetic functions of the cell. However, nature is clever. These adducts are capable of repair, and the majority of them are fixed quite rapidly [5]. Nonetheless, if they stay in position during cell division to create new daughter cells, genetic damage happens, and this fresh genetic defect (or mutation) is transmitted to all subsequently formed cells. The original cancer cells will not develop and increase in number unless the appropriate conditions are present. This is one of the most significant aspects of the second phase, promotion. Promotion can be reversed, contingent upon whether the initial cancer growth receives the appropriate conditions to develop. This is the point at which specific dietary elements gain significant importance. Cancer development can be stimulated by some nutrients present in our diets [6]. These cancer promoting nutrients are called promoters. Promoters and anti-promoters ratio determine the progression steps. When anti-promoters dominate cancer growth diminishes or halts. The significant value of this reversibility cannot be exaggerated. The third phase, progression, starts when a group of advanced cancer cells continue to grow until they inflict their ultimate harm. A growing cancer tumor can escape from its original location in the body and infiltrate nearby or faraway tissues. When cancer exhibits these lethal characteristics, it is deemed malignant. When it truly separates from its original home and roams, it is spreading. The last phase of cancer leads to death.

In 2022, reports of cancer worldwide showed around twenty million new cases and 9.7 million deaths. In 2025, 2 million additional cases as predicted by the US. Different types of cancer show different numbers of cases: 2.5 million lung cancer, 2.3 million breast cancer, 1.9 million colorectal cancer, 1.5 million prostate cancer, and 970,000 cases of stomach cancer, globally [7]. Up to 2025, a range from 300 to 600 anti-cancer drugs grouped in including surgery, chemotherapy, radiation, targeted therapies, immunotherapies, and hormone treatments, monoclonal antibodies, cellular treatment/CART-cells, a range of novel agents, has been approved by US FDA [8]. Cancer treatment is a high priced treatment ranging from thousands to \$100,000. The variations in the treatment cost mainly depend on cancer type and stage [9,10].

It's highly probable that we are exposed to various carcinogens in our daily lives, but the development of complete tumors depends on whether they promote tumor growth or not. Studies indicated that nutrition plays a significantly larger role in managing cancer promotion than the amount of the initiating carcinogen [11]. Additionally, it is well established that nutrients from animal-derived foods promote tumor growth, whereas nutrients from plant-derived foods reduced tumor growth. The time has come and continues to be for investigating the impact of nutrition, lifestyle, and illness.

The way patients live encompasses their diet, their daily habits, and the contents of their blood and urine [12,13]. There are numerous superior ways to live, and to die.

Mixed function oxidase processes drugs and various chemicals, whether beneficial or harmful to the body. Enzyme activity could be easily modified simply by changing the level of protein intake. Low-protein diets diminish tumors by (i) decreasing the entry of carcinogens into the cell, (ii) slowing the rate of cell multiplication, (iii) inducing several changes within the enzyme complex to lower its activity, (iv) reducing the levels of essential components of related enzymes, (v) forming fewer carcinogen-DNA adducts, (vi) significantly lowering tumor initiation, and (vii) the development of foci (precursor groups of cells that evolve into tumors) was nearly entirely reliant on the amount of protein consumed, irrespective of the carcinogen intake [14]. Low-protein diets enhance the burning off of calories, thus leaving less calories for body weight gain and perhaps also less for tumor growth as well. Thus, for live: What to Eat and How to Eat.

When a very low-fat diet (high-plant food diet) is followed, a slightly increased proportion of calories is expended as heat instead of being stored as body fat [15]. An infection or excessive consumption of polyunsaturated fats may lead oxygen to change its behavior as an oxidant or free radical [16]. The aging of our organs and various other ailments are damaged by free radicals, along with other factors. These free radicals once formed in our body are inescapable. Antioxidants are the chemicals found in fruits, vegetables, and grains, can protect us from the free radicals [17]. Supplemental forms of vitamins and antioxidants are not beneficial as plant-based foods, as these have certain phytochemicals (like indoles, polyphenols, and flavonoids) that supplements lack. The presence of these phytochemicals is essential for the optimal activity of vitamins and antioxidants [18,19].

The UV rays from the sun convert a precursor substance in our skin into vitamin D. As long as we receive sufficient sunlight, this is all vitamin D required. The vitamin D produced in our skin subsequently moves to our liver, where it is stored as vitamin D metabolite. This transformation is accelerated by liver enzymes. When necessary, a portion of the liver's storage form of vitamin D is sent to the kidneys, where an additional enzyme transforms it into a supercharged vitamin D metabolite, namely 1,25 D (approximately 1,000 times more effective than storage vitamin D). This 1,25 D carries out the majority of vitamin D's essential functions within our body. Adequate vitamin D reserve can only be maintained by sufficient sunbath. And this will protect our body cells from developing diseases. Production of 1,25 D is suppressed by animal protein and excessive calcium (found in milk) [20]. The cause of higher rates of breast cancer, prostate cancer (consuming dairy and meat), and colon cancer (consuming low-fiber diet, animal foods have no fiber) in the populations of northern hemisphere region is due to this reason [21,22].

A high level of IGF-1 promotes cancer progression, especially advanced-stage prostate cancer, with a 5.1 times increased risk associated with very high blood levels of IGF-1. The activity of IGF-1 is amplified by low blood concentration of 1,25 D, leading to increased cell formation while inhibiting the removal of old cells, which contributes to cancer onset. This risk can be mitigated through a plant-based, high nutritive diet, which also enhances the health of those affected [23].

Deaths from breast cancer and cervical cancer are also associated with dietary fat, blood cholesterol (a component of animal-based food and does not exist in plant-based food), estrogen, and testosterone [24]. A regular diet of meat, milk, and fats stimulates high levels of estrogen and other reproductive hormones, including testosterone [25]. A plant-based diet reduced estrogen levels in premenopausal women [26].

No gene, no cancer. No gene, no life. Breast cancer is inherited by BRCA-1 and BRCA-2. Women with these genes certainly face high risks for breast cancer [27]. About 1–3% colon cancer is inherited. The genes are MLH-1, MLH-2, MSH-6, AND EPCAM or FAP [28]. Aggressive form of prostate cancer is linked with BRCA-1, BRCA-2, ATM, and CHEK-2 genes [29]. The inherited genes for liver cancer are HFE and SERPINA-1 [30]. Further, the expression of a gene (good or bad, cancerous) requires optimal environment, otherwise remain sleeping. And nutrition and diet creates that environment.

As nutrients are mainly accountable for the beneficial effects of food, plant-based foods contain significantly higher levels of antioxidants, fiber, and minerals compared to animal-based foods. In reality, animal products lack many of these nutrients almost entirely. Significantly higher levels of cholesterol, fat, and vitamins A, D and B12 are present in non-processed animal-based foods. A little cholesterol, high protein, and minimal or no antioxidants and dietary fiber are also present in processed animal-based foods. Excessive intake of vitamin A and D is harmful. This can be managed by precursors of these vitamins i.e. β -carotene and sunlight, respectively. The amounts and time of requirement of these are regulated by our body from their precursors. For B12, our intestinal micro-biota produced it in required amount and also stores it in sufficient amounts. Plant-based (nuts and seeds) fats and proteins are distinct as they have health benefits. They are also joined by several intriguing antioxidant compounds. Thus, by appropriate diets, lifestyle and environment (within body and around the body), we can live long without cancer or with cancer (sleeping form).

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