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DIET, BODY IMMUNE AND OTHER FACTORS ASSOCIATED WITH PREVENTION AND TREATMENT OF CANCER: A REVIEW

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ABSTRACT: Cancer is a group of diseases that involves abnormal cell growth with the potential to invade other parts of the body. Patients suffering from cancer have a significantly lower intake of a healthy diet. According to recent studies, by increasing the immune system, it helps to improve or prevent cancer. Using synthetic fertilizers and pesticides contaminate our food and environment, but the green revolution made India independent. Being obese or overweight may increase cancer risk and growth, but a healthy diet and exercise are enough to cure obesity. Nature has been provided many essential sources that are being utilized in prevention as well as treatment of cancer. Alcohol activates the cellular changes that make tumor cells spread, also tobacco is the leading cause of cancer, but by Rehabs and medication, risk of cancer can be reduced. Cancer can be medicated by various herbal medicines like turmeric, green tea, etc.

INTRODUCTION: Cancer is a scientific term for diseases in which cells abnormally¹. Divide without control and can invade nearby tissue. Cancer cells can also spread to other parts of the body through blood and lymph. Cancer cannot be distinguished as one disease. It is a group of more than 100 different and distinctive diseases. There are several main types of cancer “carcinoma” is cancer that begins in the skin or in tissues that line or cover internal organs. Sarcoma” is cancer that begins in the bone, cartilage, fat, muscle, blood vessel, or other connective or supportive tissue. Central nervous system cancers are cancers that begin in the tissues of the brain². Food being the basic necessity of the human body affects each and every cell of the body equally³.

Diet affects over 50% of the occurrence of the disease. For about 40% of cancer that occurs annually throughout the world⁴. The immune system is a critical regulator of a tumor, which inhibits the tumor development, growth, invasion and metastasis immunotherapy has explained impressive outcomes for some patients with cancer we discuss escape mechanism exploited by cancer and present strategies for applying the knowledge to improving the efficacy of cancer immunotherapy⁵.

Understanding the Mechanism:

How does the Mechanism Works: Every cell having certain characteristics enzymes required to form sugar molecules for creating a surface protein in the cell. This whole process is known as glycosylation. These enzymes shift the position depending upon the health of the cell. In healthy cells, it is located in the golgi apparatus, *i.e.*, a type of the membrane system inside the cell. In carcinogenic cells, these enzymes are located in the endoplasmic reticulum.

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During the formation of these proteins, they flow through both these membranes, where the enzymes act as a bridge to connect sugar chains to proteins before being positioned onto the surface of the cell.

These Positioning of the Sugar Molecules to The Protein by the Enzymes Take Place as:

- ❖ In the cancer cell and healthy cells, the enzymes are located into a different part of the cell, as quoted as" Steen fort.
- ❖ This concludes that having a long, complex sugar chain attached to a surface protein, while cancer cell gets short and simple ones attached to surface protein ^{7, 8}.

TABLE 1: COMPARISON OF CANCER RATES IN INDIA AND THE UNITED STATES ^{6, 14}

Cancer rates	India		United States	
	Male	Female	Male	Female
Except skin	99.0	104.4	361.4	283.2
Oral	12.8	7.5	6.3	3.7
Esophagus	7.6	5.1	4.9	1.4
Stomach	5.7	2.8	7.3	3.6
Lung	9.0	2.0	58.6	34.0
Colon/rectum	4.7	3.2	40.6	30.7
Breast	-	19.1	-	91.4
Ovary	-	4.9	-	10.6
Cervix	-	30.7	-	7.8
Endometrial	-	1.7	-	15.5
Prostate	4.6	-	104.3	-
Liver	2.3	2.0	4.2	1.7
Bladder	3.2	0.7	23.4	5.4
Kidney	1.2	0.5	11.2	6.0
Melanoma	0.3	0.2	4.2	1.7

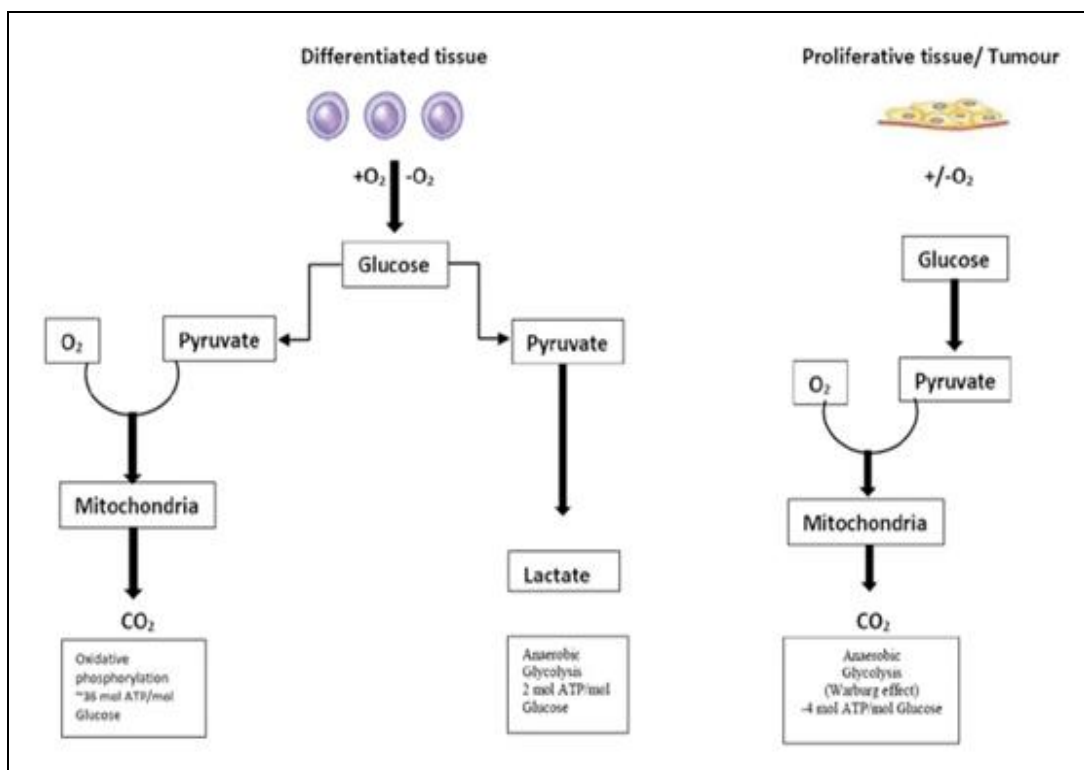


FIG. 1: SCHEMATIC DIAGRAM OF AEROBIC GLYCOLYSIS IN CANCER COMPARED WITH NORMAL CELL⁹

Food That Promotes the Growth of Cancer Cells:

1. Sugar and Refined Crabs: Higher levels of blood sugar, glucose, insulin are cancer risk factors. Insulin has been shown to stimulate cell division,

supporting the growth and spread of cancer cells, making them more difficult to eliminate. They also cause an inflammatory sensation in the body *e.g.*, sugary drinks-soft drinks, sweetened ice tea, juice flavored drinks ¹³.

TABLE 2: POSSIBLE DIETARY OTHER FACTORS ASSOCIATED WITH CANCER IN INDIA

	Decreases risk	Increases risk
Oral cancer	Diet high in vegetables and fruits ²⁶ fish, egg	Betel quid chewing ²⁵ reverse smoking ²⁷
Esophageal cancer	Diet high in vegetables ²⁸	Betel quid chewing ²⁸ chilies ²⁹ salted tea ²⁹
Endometrial cancer	Diet high in vegetables and fruits, a diet high in carotenoids ³⁰	High body mass index ³⁰
Cervical cancer	Vitamin C and E ³⁰	Tobacco use ³⁰
Ovarian cancer	Diet high in fish ³⁰	Saturated fat intake ³⁰
Breast cancer	Diet high in vegetables and fruits ²⁵	Saturated fat ³⁰
Stomach cancer	Green tea, turmeric ³¹ cumin, basil ³² tapioca ³³	Dried fish ³¹ spicy food ³³

Processed Meat: It is considered as carcinogenic by the international agency for the research of cancer (IARC) it basically refers to meat that has been treated to preserve flavor by undergoing salting or smoking. Several reviews that combine results from multiple studies found that the evidence linking unprocessed red meat to cancer is weak and inconsistent, e.g., processed meat-hotdogs, salami, pepperoni ¹⁰.

3. Dairy Products: High dairy consumption may, in certain patients, increase the risk of the "prostate cancer" theories suggest that due to increased intake of calcium, increase the chance of cancer level in the cell, e.g., ice cream and milkshakes ¹¹.

Effects of Chemical Fertilizers and Pesticides on Human Health: Agrochemicals, too, do have an ill effect on the health of farmers and labours. It may be considered as a powerful weapon or magic bullet in developing countries, but it has its downside too. They hazardous to the human endocrine and immune system and promote developing cancer. These fertilizers and pesticides get access to the human body and thereby get into the bloodstream proving highly carcinogenic effects. When these are sprayed on the farmland, they get transmitted directly or indirectly into vegetables and directly enter in human and livestock bodies. Organophosphates pesticides used in vegetables gradually get deposited into the human body and has a strong link with cancer. Organophosphates pesticides such as diazinon, are those type of pesticides that works by damaging enzyme in the body is called as acetylcholinesterase.

This enzyme is critical for controlling the immune system. Lack of this enzyme leads to delay detection of cancer symptoms and increases the overall culture growth. Diazinon is mostly associated with ovarian cancer (RR = 1.87, 95%) (1-1.07 to 3.43). It is also linked to childhood cancer, such as soft tissue sarcomas leukemia and cancer of the brain. Prolonged exposure to pesticides like chlorpyrifos raises the risk of lung cancer. Regard with food grains. The green revolution made India Independent, but indiscriminate use of synthetic fertilizer and pesticides contaminated our food and environment ¹².

TABLE 3: LIST OF NATURAL PESTICIDES ³⁶

S. no.	List of natural pesticides
1	Neem oil
2	pyrethrum
3	Rotenone
4	Eucalyptus oil
5	Hubner

Risk Associated with Obesity: Obesity increases the risk of about seven types of cancer: colorectal, kidney, pancreatic, postmenopausal breast, endometrial, gallbladder, and oesophageal cancer are called adenocarcinoma ¹⁶. Diseases such as hypothyroidism, insulin resistance, polycystic ovary syndrome, and Cushing syndrome are also contributors to obesity.

According to BMI, seven most common of obesity is physical inactivity, overeating, genetics, a high diet of simple carbohydrates, frequency of eating, medications, and psychological factors ¹⁵.

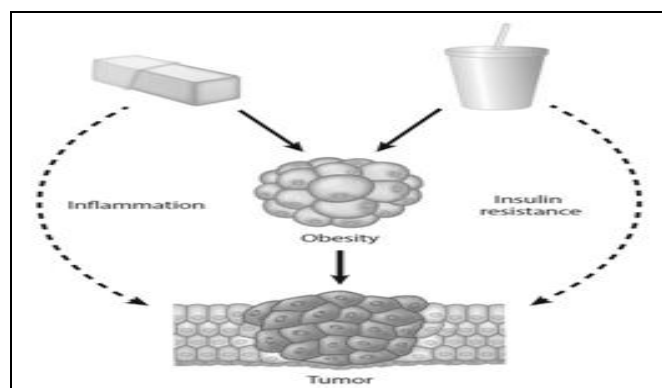


FIG. 2: VICIOUS CYCLE: AN ILLUSTRATION OF HOW FATTY AND SURGERY FOODS, SUCH AS BUTLER AND SODA, CAN FUEL OBESITY, INFLAMMATION AND INSULIN RESISTANCE- POTENTIALLY FEEDING CANCERS CREDIT: WEILL CORNELL MEDICAL COLLEGE ¹⁷

TABLE 4: COMPARISON OF RISK FACTORS CANCER INDIA AND UNITED STATES ^{6, 18, 20}

	India	United States
Physical activity	Not available	23.5%
Obesity	M: 3% F: 14%	M: 20% F: 23%
Energy intake	M: 1812 F: 1395	M: 2517 F: 1764
Dietary fat intake	24-27%	30%
Carbohydrate intake	60%	50%
Protein intake	13%	15%

Risk Associated with Alcohol Consumption: Research shows that being alcohol consumption can lead to over the seven different types of cancer in the body. It generally risk of the mouth cancer,

oesophageal cancer, laryngeal cancer, breast cancer, bowel cancer, liver cancer. Alcohol actually gets all over the body by flowing through the blood and thus damaging all the body.

Risks Associated with Tobacco Consumption:

Tobacco is a leading cause of cancer and death from cancer. Tobacco causes a type of cancer, including cancer of the lungs, mouth, esophagus, throat, bladder, stomach, liver, pancreas, kidney, colon, rectum, and cervix, as well as acute myeloid leukemia.

Risks Associated with Cohesive Smoking and Drinking:

Firstly, this calculation is based on the cohesive effect of smoking and drinking on the healthy and affected body. Cohesively doing both increases the risk of cancer by four times.

Improving understanding of other risk factors should not come at the price of reducing the perceived danger of smoking, because there is no other risk factor that is as bad as smoking and drinking both ²¹.

Risk Associated with the Immune System: The immune system blocks foreign particles from destroying the bodily systems. It protects against bacteria, parasites, and viruses.

Two different functional divisions work together under this process. However, transformed cancer cells are able to avoid destruction done by the immune system by reducing their expression of tumor antigens.

The research shows that there is a presence of increased incidents of cancer of characteristic cancers in immune-suppressed patients with AIDS. This includes the lymphoma, kopasi sarcoma anal carcinoma, cervical carcinoma.

It is seen for certain individuals that receive immune-suppressive drugs have an increases incidence of the immune system affecting cancers, which are common in the breast, lungs, and colon.

Tumor antigens are located in the tumor cell are mainly tumor-specific transplantation antigens.

These Tumour Agents are four Types;

- Those are encoded by genes.

- Those are encoded by deviate forms of normal genes.
- Those typically expressed at an earlier stage.
- Those expressed at a later stage.

However, the innate for cancer helps to curb the diseases but also has a certain adverse effect on the immune system. Although the results are not completely consistent, these therapies prove to the immunosuppressive. An example is given breast carcinoma survivors receiving chemotherapies significantly T and B cells.

The platinum included in the chemotherapy reduces the number of alveolar macrophages. A drug like fludarabine used in hematologic used in cancers produces profound depilation in this T cell.

Radiotherapy on Immune System: Radiotherapy indeed is a life-saving option for cancer survivors, but it also has an adverse effect on the immune system.

It has shown to have significantly reduced normal killer cell (NK) activity in breast carcinoma survivors and colorectal carcinoma survivors. Radiotherapy also indicates a significant decrease in the total number of lymphocyte cells, and it is a proliferation in response to mitogenic stimulation.

Surgery on Immune System: Surgery also has proved to another cancer treatment modality to suppress the function of the immune system.

This impaired function includes monocytes phagocytises, antigen presentation, and superoxide release. There is a case of reduction in NK cells within two-three weeks of surgery.

The ability of the body to produce such a new cell is also hampered several. Due to limited research in the change in the immune system function during or after anticancer therapy such as complication or risk of recurrence, there are several important cancer outcomes.

Primary studies suggest the idea of the immune-suppressive effect on the human body. Certain studies show magnitude if a decrease in the number of neutrophils and lymphocytes occurring during chemotherapy ²².

TABLE 5: MICRONUTRIENTS AND ANTIOXIDANTS²³

Micronutrients and antioxidant	Diet
Omega 3s	Coldwater fish (salmon, sardines, fresh tuna, halibut) walnuts, flaxseed, soya bean & canola oils, brussels sprouts, kale, spinach
Antioxidants	Oranges, cantaloupe, papaya, apples, berries, sweet potato, broccoli, carrots, spinach, kale, bell peppers, asparagus, onions, garlic, beets, red/yellow spices
Zinc	Legumes (beans), 100 percent whole wheat, beef, pork, chicken, spinach, oysters, yogurt, pumpkin seeds, cashews, dark chocolate, mushrooms, fortified cereals
Iron	Red meat, dark-green vegetables (spinach, collard greens), fortified cereals, slow-cooked beans, artichokes, blackstrap molasses, tofu, quinoa, prunes
Vitamin D	Fortified dairy & soy foods, sunlight, tuna, salmon, fortifies foods (orange juice, cereals). Smaller amounts in beef and egg yolks

Prevention:

- The research found that 30 to 40% of all cancers worldwide are because of dietary factors lack of physical activity, including obesity. This can be prevented by a healthy diet, exercise, healthy weight maintained.
- Appropriate safety precaution in term of pesticides and fertilizers, that use of pesticides showing less toxic effect,
- Use fewer chemicals, including pesticides and fertilizers. Instead of this, we should use organic fertilizers. bbb all cancers caused by tobacco use, smoking cigarette, and heavy use of alcohol can be prevented by Rehab therapy or using medication like disulfiram for alcohol and nicotex for tobacco and cigarette .
- By increasing the immune system, it will be helpful to fight against the cancer cells²⁴.

Herbal Medication:

- ❖ Turmeric contains curcumin, a spice that harvested from the root of the rhizomes belonging to the ginger family (*curcuma longa*), which used for the prevent cancer³⁴.

- ❖ The leaves of camellia contain antioxidants, which help to reduce cancer in different ways.
- ❖ According to a recent study found that tea can shrink tumors and reduces tumor growth. Both green and black tea contains antioxidants, which have prevented cancer³⁵.

CONCLUSION: The systemic review suggest that appropriate inclusions of a healthy diet and immune enhancement to our routine can prevent disease like cancer, leading cause of death worldwide, it is very appealing to the thing that increases of a healthy diet and immune by supplement could be a simple remedy, by using the natural pesticides, avoiding cohesive consumption of alcohol and smoking can help to prevent cancer. Increasing your intake in a healthy diet could be very simple, inexpensive, effective health insurance.

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