

Cancer – A Fear

Anamika Saha^{1*}, Gourab Biswas²

¹M.Pharm. Student, Department of Pharmaceutical Biotechnology, Calcutta Institute of Pharmaceutical Technology and AHS, Howrah, India

²M.Pharm. Student, Department of Pharmaceutical Chemistry, Netaji Subhash Chandra Bose Institute of Pharmaceutical, Chakdah, India

Abstract: A disease which is characterized by the development of abnormal cells that divide uncontrollably and are capable to infiltrate and destroy normal body tissue. The invasion of these cells from one part of the body to another is called metastasis. It is caused due to by loss of control of cellular growth. Cancer cells are medically known as “Malignant”.

Keywords: Metastasis, benign tumour, malignancy, haemopoietic cells.

1. Introduction

Cancer is basically an uncontrolled division or proliferation of cells without any differentiation. In this condition, body cells losses growth control and spread to other organs and healthy tissues & cells of the body one by one, finally leading to death. A few years ago, people were afraid of the term “Cancer”. But nowadays medical science has been improved with advanced technologies that have made this disease curable to some extent if early detected. It is absolutely recoverable in the first few stages depending on the type and site of infection. But it can also be life threatening if diagnosed at late stage ,when metastasis had already been spread into hale lymph and other organs too. Cancer on the outer surface of the body can be occurred in the form of rashes or tumour. Though forming a tumour isn’t always a sign of concern. Tumour may be both Benign and malignant. Sometimes cancer also occur in the inner parts including critical organs, which becomes difficult for a patient to feel and thereby leading to late diagnosis.

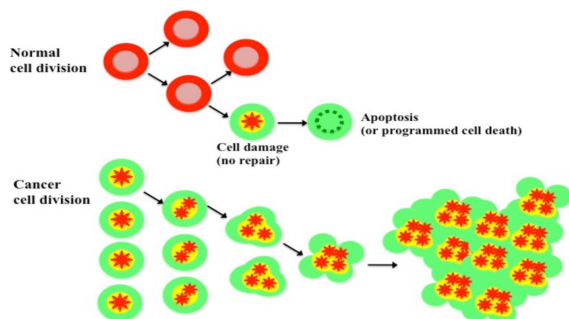


Fig. 1.

Some of the common characteristics of cancer cells are:

- i. Divide cells repeatedly without control.
- ii. Non-communicable, as it losses its property of contact inhibition.

- iii. Due to repeated cell division, it forms a mass of cells forming ball like structure called tumour.

2. Types of Tumour

As previously mentioned, tumour is one of the initial and primary symptoms of cancer on body surface which may be of two types:

Benign Tumour: This is the normal tumour cell that grows due to some abnormal cell growth but doesn’t invade and infect nearby tissues, cells or other parts of the body. These cells grow slowly and have distinct borders. Patient should not be worried about this since it’s non-problematic and can be cured even by homeopathic treatment. But doctor consultation is required if tumour forms on the vital structures such as nerves, veins or blood vessels. A major sign of this is it may cause pain which is the unique feature and differentiate it from malignant cell. It can be caused due to environmental toxins, genetics, infection or inflammation.

Malignant tumour:

The word malignant means Cancer. Hence, the cancerous cells are known as “Malignant cells” and the phenomenon of formation of malignant cells are malignancy. Malignant tumour refers to the cells carrying malignant properties. This tumour spread to other sites of the body through blood stream or lymphatic system. The formation of the cluster of mutated cells doesn’t cause pain in its initial stage. A painless lymph symptomize malignancy, when in primary stages. Later ,it may cause pain or soreness.

Table 1	
Benign Tumour	Malignant tumour
Non-cancerous tumour	Cancer causing tumour
No metastasis and invasion	Spreads to other healthy parts causing metastasis
Stops growing in size after certain time	Indefinite growth
Less dangerous and fatal	More dangerous and fatal

3. Types of Cancer

- i. Carcinoma: Cancer of epithelial tissues. e.g. Skin cancer.
- ii. Melanoma: Cancer of colour causing pigment of skin (Melanocytes)
- iii. Sarcoma: Cancer of mesodermal tissue
- iv. Leukemia and lymphoma: Cancer of haemopoietic

*Corresponding author: sahaanamika780@gmail.com

cells (Blood cells) e.g. Blood cancer.

4. Causes of Cancer

Mainly cancer can occur through two ways. One is 'hereditary', another one is 'sporadic'.

If any patient, suffering from a cancer, have family history of that specific cancer, is known as hereditary.

If any patient, who is suffering from a cancer, does not have any history of that disease of his/her ancestors, then it is called sporadic cancer.

Cancer is mainly rapid cell division, which happens basically in an uncontrolled manner and it gradually leads to tumor formation.

Basic reason of cancer is change in DNA variant and DNA damage; most of which are due to environmental, lifestyles or various behavioral exposures and very minute part of cancer (7%) happen due to inherited changes in DNA variant.

Cancer can occur due to various reasons:

- a) *Aging*: Aging is a very important risk factor for formation of cancer. As a person is gradually getting older day by day, he or she becomes more vulnerable to cancer.
- b) *Family History*: Family history of cancer is another important risk factor. Various types of cancer (e.g.-breast cancer) may occur due to changes in DNA variant, which patients inherit from their family members such as colon cancer. A good example of hereditary colon cancer is Familial adenomatous polyposis (FAP).
- c) *Tobacco*: Consumption of different types of tobacco (e.g.-cigarettes, chewing tobacco) may lead to formation of different types of cancers like; lung, larynx, mouth, esophagus, bladder, throat etc. Smoking is responsible for more than 85% of all lung cancers and 30% of all deaths. Passive smokers can also increase 5% risk of cancer.
- d) *Alcohol*: Consumption of alcohol can lead to formation of cancer (3.6% of all human cancers). World Health Organization (WHO) has marked alcohol as group-1-carcinogen. The risk of getting a cancer disease is 35% higher for drinkers with simultaneous smoking habits.
- e) *Sunlight and Ionizing radiation*: Ultraviolet (UV) radiation, which comes from the sun, sunlamps and tanning booth. This radiation is very harmful for human body. It causes senescence of skin, that can eventually lead to skin cancer. The UV light from sun and tanning can cause fatal damages to our skin, such as; benign, pigmentation, discoloration, freckles, sunburn, cancers (Basal cell carcinoma, Squamous carcinoma and Melanoma) and destruction of elastin and collagen proteins. Skin damages could be reduced and/or prevented by:
 1. Avoiding direct sunlight exposure between 10.00 a.m. and 3.00 p.m.
 2. Apply sun protection factor cream (SPF-50) 30 minutes before exposure to

sunlight.

3. Proper use of clothing to cover body areas from sunlight and use of sunglasses with UV protection.
- f) *Organic and inorganic chemicals*: There are more than 100,000 chemical elements in our environment in which 30,000 of them have been analyzed. From these analyzed ones, 27 of them proved to be carcinogenic. People having specific jobs like; painting, construction, pesticide and petroleum workers possess an increased risk of cancer. Different studies have shown that cancer can be caused due to exposure to asbestos, benzene, benzdine, cadmium, nickel, arsenic, radon, vinyl chloride in the workplace.
- g) *Virus and bacteria*: Infectious micro-organisms are responsible for causing nearly about 18% of all cancer cases. Generally, cancer cases, caused by various types of infections, are much greater in developing nations like; India (26%) than in developed nations like; USA (8%). Some of the examples are,
 1. Human papillomaviruses (HPVs): Cervical cancer is mainly caused by HPV infection.
 2. Hepatitis B and Hepatitis C viruses: These two are highly responsible for causing liver cancer.
 3. Human T-cell leukemia/lymphoma virus-1 (HTLV-1): The chance of getting lymphoma and leukemia of a person gets highly increased due to infection with HTLV-1.
 4. Human immunodeficiency virus (HIV): HIV is responsible for AIDS. This HIV infection highly increases the risk of lymphoma and Kaposi's sarcoma.
- h) *Hormone Therapy*: Estrogen and progesterin are the two hormones that may be responsible for increasing the risk of breast and uterus cancers; also heart attack, stroke, or blood clots.
- i) *Diet and Obesity*: People who possess a poor diet and do not have much physical activity, are vulnerable to several diseases. Obese people generally have a higher risk of coronary heart disease, stroke, high blood pressure, diabetes, and various types of cancers like esophagus, breast, uterus, colon, rectum and prostate. Fat tissue produces a high amount of estrogen, which is responsible for increasing risk of cancers.
- j) *Air and Water pollution*: Various biological, biochemical, and atmospheric particles cause damages to our living environment. As a result, air and water get polluted.

Air pollution is highly responsible for respiratory infections, cardiac diseases and lung cancer. Air pollution occurs due to various reasons like; particulate matter, damaged ozone (O₃),

nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon dioxide (CO₂), carbon monoxide (CO), ammonia (NH₃), radioactive decay of radon gas (Rn), methane (CH₄), hydrofluorocarbons (HFCs) and chlorofluorocarbons (CFCs). Worldwide almost 3.5 million deaths occur due to both indoor and outdoor pollutions.

Water gets polluted due to different reasons:

1. Micro-organism infection: bacteria, viruses, protozoa
2. Acids, salts, toxic metals which cause death of aquatic life.
3. Nutrients like water soluble nitrates and phosphates
4. Several organic compounds like; oil, plastics, detergents, chloroform, petroleum etc.

5. Detection

Cancer can be detected by a number of methods. Some of the methods are:

- i. Bone & bone marrow test
- ii. Histopathological study or biopsy
- iii. Computed tomography
- iv. Radiography
- v. Resonance imaging
- vi. Monoclonal antibody

6. Treatment

Surgery: The malignant cells are cut and removed by Surgery to resist metastasis.

Radiation therapy: A poisonous radiation is given in high dose to destroy the defective cells by burning and shrinking it

Chemo therapy: Powerful harmful chemicals are used to treat cancer. These drugs results in side effects like hair fall, anaemia.

Immunotherapy: In this treatment, immunity is increased by injecting some biological modifiers.

Cancer in biotechnology:

From biotechnology aspects, mutation is the main cause of cancer.

There are certain sequences in our genes that are generally carried by heredity which determines our morphological and genotypic characteristics. But when a segment of sequence or a particular base is altered, mutation occurs. Due to mutation, a number of defectiveness can be found within the body leading to physiological abnormalities. Among these abnormalities, one is cancer. In the same times, biotechnology can be a medication to cancer. Immunotherapies and small molecules that target specific mutations in tumour DNA, to generally modified viruses that deliver cancer fighting agents.

Cancer in Chemistry: Our human body have a general defense mechanism to protect us against all types of detrimental exposures, in which cancer-causing elements (carcinogens) are also included. When any type of foreign material enters our human body, it often faces a procedure, from which our body can decide to take it inside or not. This procedure is known as metabolism. There are three types of carcinogens present in our body based upon how a chemical or foreign material is treated, or metabolized. These carcinogens are as following:

1. Chemicals that is capable to form cancer (direct acting carcinogens),
2. Chemicals that is not capable to form cancer generally unless they are converted upon metabolism (procarcinogens) and
3. Chemicals that have no capability of causing cancer by themselves but they can cause cancer by acting with other chemicals (cocarcinogen).

Basically, unrepaired DNA cell damage is the reason of causing cancer.

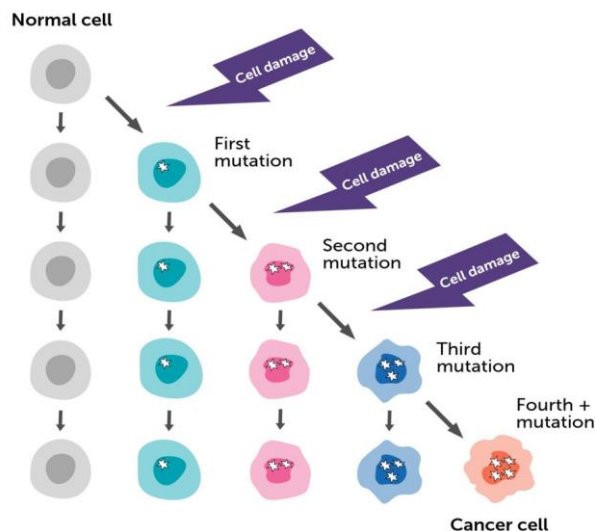


Fig. 2.

Cancer Clusters: When many people in a particular geographic area have cancer of same types or related cancers over a definite span, more than generally expected; then it is called cancer cluster. If the cancer found is normally rare, then clusters can be suspected. Examples includes- skin cancer in farmers, bladder cancer in dye workers, who are generally exposed to aniline compounds.

7. Conclusion

Cancer is a very important and recent topic, the whole world is dealing with. In recent days, many campaigns are being organized, World's Cancer Day is emphasized to grow awareness among people. The symptoms of cancer are so normal that one cannot even expect that this dangerous disease is nesting inside the body. So, it is always advisable to consult doctors even if it is mild and casual symptoms, so that it can be detected in early stages and can be treated properly.

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