

Cancer, Its Types And Management

Muhammad Usama

1st year MBBS, Islamabad Medical and Dental College, Islamabad Pakistan

Key Points

- Cancerous cells are characterized by the potential to grow abnormally, invade adjacent tissues and spread to other distant parts of the body.
- Lung, Breast, Prostate, Colorectal and Ovarian Cancer causes the most Cancer deaths each year
- Most chronic cancers cannot be cured, but some can be controlled for months or even years.

Introduction

Cancer is the leading cause of death in the World. Factors which increase the patient survival rate include: Timely diagnosis, effective treatment and extensive care. In 2018, it was estimated that 18.1 million people were diagnosed with cancer, and approximately 9.6 million people died from it worldwide. Globally, countries are divided into three categories based on their development index: high/very high, medium and low. A thorough survey revealed that in countries with a low development index, cancer incidence amounted to 4% and the resultant mortality was recorded up to 5%. Medium development index countries had a 16% cancer incidence and 20% cancer mortality and the remaining figures were seen in high or very high development index countries¹.

Causes

In the environment, there are multiple cancer and mutation causing compounds, known as carcinogens; such as environmental pollution, residence, lifestyle and use of multiple pharmaceutical drugs. Once these substances are absorbed into the body, they interact with the DNA bases in the cells and lead to formation of DNA adducts. The body's protective mechanism responds and most of these adducts are repaired by different cellular processes. However, the remaining, unrepaired adducts cause disruption in the DNA replication process and may result in production of

mutated genes. This ultimately results in the instability of genome and promotes oncogenesis.² Recent studies have revealed many new causes of cancer, such as pharmaceuticals, ultraviolet radiations, bacteria, fungi, parasites, hormones, alcohol, salted fish, tobacco, wood dust, and certain herbs. Other additional causes of cancer include an excess of beta carotene, low intake of fiber diets, red or processed meat, poor Exclusive Breast Feeding (EBF), increased adult height, obesity, sedentary lifestyles etc.³

Types

- Breast cancer is the most common cancer in women worldwide. Timely diagnosis, effective treatment and affordable care is required for the survival of the affected women. When the treatment is coupled with timely treatment and care with effective follow up, then there will be significant reductions in the mortality of Breast cancer.⁴
- Lung cancer is the most common cause of mortality in the world. It is a frequently diagnosed malignancy. Cancer of this type has a heterogeneous nature and is divided into two classes for convenience. The first one is small cell lung cancer (SCLC) and second is non-small cell lung cancer (NSCLC). Besides the irregular expression of various signaling steps and mutant genes, cancer of the lungs is also correlated with

down regulation of expression of non-coding RNAs, which include both long noncoding RNAs (lncRNAs) and microRNAs.⁵

- Prostate cancer is one of the most commonly diagnosed cancers in males and also commonly treated within radiation oncology departments. The number of patients receiving radiation therapy for prostate cancer continues to increase; this therapy is now used routinely for the definitive treatment of any localized and locally advanced disease. Other used of radiation therapy include oligometastatic-directed radiation therapy, adjuvant and salvage treatment postoperatively, and the treatment of primary, low-volume metastatic diseases.⁶
- Colorectal Cancer is accompanied by change in genetic and epigenetic nature of the large gut. It is also because of infiltration of inflammatory cells between the interstitial cells. Microenvironment may also affect infiltration, with subsequent effects on tumor genesis, proliferation and metastasis. Metabolites in the cancer microenvironment can trigger inflammatory cells to instigate chronic inflammatory responses, which may leads to Colorectal cancer recurrence.⁷
- Ovarian cancer usually leads to a late diagnosis and thus, poor prognosis. Therefore, improved methods are needed for its early detection. Additional biomarkers are aimed to be identified and incorporated into longitudinal models by many recent studies. Their main purpose is to improve the performance of CA125 as a first-line screening test for ovarian cancer.⁸

Possible Treatment

Genomic instability is one of the most pervasive characteristics of tumors cells and is probably the combined effect of DNA damage, tumor-specific DNA repair defects, and a failure to stop or stall the cell cycle before the damaged DNA is passed on to the daughter

cells. Although these processes drive genomic instability and ultimately the disease process, they also provide therapeutic opportunities. A better understanding of the cellular response to DNA damage will not only expand our knowledge of cancer development but also help to refine the classification as well as the treatment options available for the disease.⁹ Cancer management mainly involves surgery, radiotherapy and chemotherapy. The most commonly used cancer therapies over the past century include chemotherapy and radiotherapy methods. Among these, radiotherapy is widely and the most predominantly method, prior to surgery and other treatment procedures. It is defined as the application of radiation for clinical cancer treatment, including external-beam radiation and local radioactive seed implants, all with the purpose of killing cancer cells or controlling cancer cell proliferation.¹⁰



Source: Cancer treatment infographics in colorful color and isolated vector object (Shutterstock)

References

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