**CANCER CAUSES AND TREATMENTS**

**ABSTRACT**:

Cancer is a genetic disorder that results from genetic or Epigenetic alterations in the somatic cells and has abnormal cell growth which may be spread to other body parts. In 2018, 18 million cancer was recorded globally in which 9.5 million cancer cases in men, 8.5 million Cases in women, and 9.6 deaths were also recorded in the same year.

In this review article, we try, To shed a light on various cancer-causing factors, type of cancer,sign or symptom of cancer, the treatments of cancer and problems related to cancer treatments. Nowadays, a lot of Research is going on precision medicine for a better future of cancer Treatments. The common therapies are given to patient’s chemotherapy, Radiation therapy, immunotherapy, surgery and hormone therapy and combinations of these therapies. Stem cell transplant is also the best therapy for cancer but it given after the common therapies to recover the patient from blood loss and help in making the patient healthy cancer is screened by different screening test and a number of treatments are now available these days such as gene therapy, chemotherapy, surgery, radiation therapy, immunotherapy etc. In future up to 2030 around 22.2 million cases are expected to be diagnosed for cancer.

**INTRODUCTION**:

 Cancer: Cancer is a disorder that results from genetic or epigenetic alterations in the somatic cells and has abnormal cell growth which may be spread to other body parts. They form a subset of neoplasm. The unregulated growth of cells in a group called neoplasm or tumor and they form a lump or mass and may be distributed diffusely.

Prevalence of Cancer All over the World: Worldwide Population Measures and Cancer Incidence and Mortality, Regions of the World, Estimates between 2005 and 2010.

 An estimated 12.66 million people were diagnosed with cancer across the world in 2008 (Table 1) 4]. This equates to around 188 cases for every 100,000 people (using the crude rate). The number of new cases ranged from 67,000 in Middle Africa to 3.72 million in Eastern Asia. As expected from the size of Asia’s population, the majority of cases (48%) occurred there [4, 5]. Just four cancer sites lung, female breast, colorectum and stomach – accounted for two-fifths (41%) of the world’s total (Figure One). The most common cancer sites in the UK are brcast, lung, colorectum and prostate; together, these sites accounted for more than half (54%) of the UK’s total in 2008 (4].

 Cancer incidence worldwide is more than a fifth higher in men than in women, with World age-standardized incidence rates of 204 and 165 per 100,000, respectively, in 2008 [4, 6]. Male incidence rates vary almost four-fold across the different regions of the world; in 2008, rates ranged from 88 per 100,000 in Middle Africa to 334 and 335 per 100,000 in Northern America and Western Europe, respectively.

**KEY FACTOR**

1. Globally about 9.6 million in 2018 deaths were estimated in cancer which represents the cancer is the second leading cause of deaths and about 1 in 6 deaths are due to cancer 4.
2. About 70% of deaths in middle- income and Low Countries are due to cancer 5.
3. The main and the most important cause of cancer is tobacco use, approximately 22% 10
4. There are also some infections that cause cancer, like Human papilloma Virus (HPV), are causes 25% of cancer in middle and low-income countries 11.
5. In 2017, solely twenty-sixths of low-income countries reported having pathology services usually obtainable within the public sector.
6. More than ninetieth of high-income countries reported treatment services square measure obtainable compared to but a half- hour of low-income countries

**TYPES OF CANCER:**

 **On the Basis of Tissue Effected:**

1. **Carcinomas** are characterized by cells that cover internal and external parts of the body such as lung, breast and colon cancer.
2. **Sarcomas** are characterized by cells that are located in bone, cartilage, fat, connective tissue, muscle and other supportive tissues.
3. **Lymphomas** are cancers that begin in the lymph nodes and immune system tissues.
4. **Leukemia's** are cancers that begin in the bone marrow and often accumulate in the bloodstream.
5. **Adenomas** are cancers that arise in the thyroid, the pituitary gland, the adrenal gland and other glandular tissues
6. **Central Nervous System Cancers**: Cancer that starts in brain tissues and spinal cord called “brain and spinal cord tumors”, and others pimary CNS lymphomas, vestibular Schwannomas, gliomas, pituitary adenomas, Primitive neuro-ectodermal tumors, Meningiomas, and vestibular schwannomas.
7. **Melanoma**: It starts in cells that become Melanocytes. These cells are specialized cells that make melanin, i.e., the pigment that gives the color to the skin. Mainly melanomas develop on the skin, but it can also develop in other pigmented tissue like an eye.

**Other Types of Tumors**:

1. **Germ Cell Tumors:** It is the type of tumor that starts in the cells which give rise to eggs or sperms. This can be occurring anywhere in the body and either malignant or benign.
2. **Neuroendocrine Tumors:** Neuroendocrine tumors form from cells that release hormones into the blood in response to a signal from the nervous system. It forms from those cells which release hormones in blood in response to signal from the nervous system. These tumors, which can create higher-than-normal amounts of hormones, will cause many various symptoms. It may be either benign or malignant.

**On the Basis of Organ Effected:**

1. Lung Cancer
2. Liver Cancer
3. Stomach Cancer
4. Cervical Cancer
5. Bladder Cancer
6. Esophageal Cancer
7. Non-Hodgkin Lymphoma
8. Cancers of the Lip and Oral Cavity
9. Nasopharyngeal Cancer
10. Kaposi Sarcoma

**SYMPTOMS AND SIGNS OF CANCER:**

**Early Symptoms:** At the earliest stage cancer gives no sign or symptoms by which we cannot indicate the disease. Moreover, the symptoms or signs are shown in harm condition.

**Some common symptoms that may occur with cancer are as follows:**

1. **Persistent Cough or Blood-Tinged Saliva:** If anyone is having cough from a month or blood in the mucus, then these are the sign of bronchitis or sinusitis, but they could be symptoms of neck, head or lung cancer.
2. **A Change in Bowel Habits:** It usually depends on the diet of a person and fluid intake. People with cancer felt that they need to have a bowel movement and also feel the same if they had if this symptom lasts more than a few days than it is a symptom of cancer. Mainly in cancer, there is continuous diarrhea.
3. **Blood in the Stool**: It is also the early symptom of cancer by which we can examine cancer. The evaluation includes colonoscopy etc.
4. **Unexplained Anemia:** People with low RBC in their blood from normal, then this condition is called anemia. Bowel cancer can cause iron- deficiency anemia. The evaluation includes X- ray studies or endoscopy of your lower and upper intestinal tracts.
5. **Breast Lump or Breast Discharge:** Most breast lumps are noncancerous tumors like cysts or adenomas, but all lumps are needed to check. The evaluation includes Ultrasound and x-ray study included MRI of the breast. Discharge from the breast is also the sign of cancer, and it is quite common, but not from only one nipple or bloody.
6. **Lumps in the Testicles:** Men with cancer have an uncomfortable or painless lump on a testicle.
7. **Change in Urination:** The symptoms are slow urine flow, frequent urination, change in bladder function or small amounts of urine, caused by a urinary infection in women or by an enlarged prostate gland in the mucus, then these are the sign of bronchitis or sinusitis, but they could be symptoms of neck, head or lung cancer.

**Late Symptoms**: These symptoms are depending on cancer type, location or where the cancer cells have spread.

1. Change in bowel or bladder habits
2. Obvious change in the size, color, shape, or thickness of a wart or mole
3. Indigestion or difficulty in swallowing
4. Change in size, shape, color or thickness of mole.
5. A sore throat that does not heal.
6. Hoarseness
7. Thickening or lump in the breast, testicles, or elsewhere

Other signs or symptoms may also alert you. These include the following:

1. Unexplained loss of weight or loss of appetite
2. Vomiting
3. Nausea
4. Fatigue
5. Unexplained low-grade fevers may be either persistent or not.
6. Recurring Infections
7. Pain in the bones and other body parts.

**CAUSES:**

 Cancer grows out of normal cells in the body. Normal cells multiply when the body needs them and die when the body doesn’t need them. Cancer appears to occur when the growth of cells in the body is out of control and cells divide too quickly. It can also occur when cells forget how to die.

There are many different kinds of cancer. Cancer can develop in almost any organ or tissue, such as the lung, colon, breast, skin, bones, or nerve tissue. There are many causes of cancer, including:

1. Benzene and other chemicals
2. Drinking excess alcohol
3. Environmental toxins, such as certain poisonous mushrooms and a type of poison that can grow on peanut plants (aflatoxins)
4. Excessive sunlight exposure
5. Genetic problems
6. Obesity
7. Viruses.

**DIAGNOSIS**

Screening: The term screening regular use of certain examinations or tests in people who do not have any symptoms of cancer, but are at high risk for developing certain types of cancer. For many types of cancer, progress in the area of cancer screening has offered promise for earlier detection, which often results in higher cure rates [9].

Types of Screening Tests:

Imaging Tests

Laboratory Tests

**Imaging tests**

**Mammograms**: A fact sheet that defines screening and diagnostic mammograms and outlines mammography screening guidelines. Discusses the benefits and some potential harms of screening mammograms.

**Computed Tomography (CT)**: Questions and Answers: A fact sheet that describes the CT scan procedure and technology and its uses in diagnosis and treatment.

**Laboratory Tests**

**Interpreting Laboratory Test Results:** A fact sheet that describes the role of screening and diagnostic laboratory tests. Includes a brief discussion of factors affecting the results.

Pap and HPV Testing A fact sheet that describes cervical cancer screening, which includes the Pap test and HPV testing. The fact sheet includes information about cervical cancer screening guidelines.

**Prostate-Specific Antigen (PSA) Test:** A fact sheet that describes the PSA screening test for prostate cancer and explains the benefits and limitations of the test.

**TREATMENT**

1. **Gene Therapy:** Several projects relating to gene for cancer are in the works. One of these projects as explained in the Chinese Medical Journal (2002) involves a team of researchers from shanghai Second Medical University successfully inserting gene into human tumor cells via a retrovirus [11]. Usually tumor cells. Contain antigens on its surface that can separate them from normal cells. Though analogous noncancerous cells also contain these antibodies, they do so on a much smaller level.
2. **Surgery**: Surgery can be used to diagnose, treat, or even help prevent cancer in some cases. Most people with cancer will have some type of surgery. It often offers the greatest chance for cure, especially if the cancer has not spread to other parts of the body.
3. **Chemotherapy**: Chemotherapy (chemo) is the use of medicines or drugs to treat cancer. The thought of having chemotherapy frightens many people. But knowing what chemotherapy is, how it works and what to expect can often help calm your fears.
4. **Radiation Therapy:** Radiation therapy uses high-energy particles or waves to destroy or damage cancer cells. It is one of the most common treatments for cancer, either by itself or along with other forms of treatment. Learn more about radiation therapy in this section.
5. **Targeted Therapy:** Targeted therapy is a newer type of cancer treatment that uses drugs or other substances to more precisely identify and attack cancer cells, usually while doing little damage to normal cells. Targeted therapy is a growing part of many cancer treatment regimens. Find out more about it here..
6. **Immunotherapy**: Immunotherapy is treatment that uses your body’s own immune system to help fight cancer. Get information about the different types of immunotherapy and the types of cancer they are used to treat.
7. **Hyperthermia**: The idea of using heat to treat cancer has been around for some time, but early attempts had mixed results. Today, newer tools allow more precise delivery of heat and hyperthermia is being studied for use against many types of cancer.
8. **Stem Cell Transplant (**Peripheral Blood, Bone Marrow and Cord Blood Transplants): Here we offer a review of bone marrow transplants and other types of stem cell transplants that are used to treat cancer. We outline what a transplant is like for most people and discuss some of the issues that come with it.
9. **Photodynamic Therapy:** Photodynamic therapy or PDT treatment that uses special drugs, called photosensitizing agents, along with light to kill cancer cells. The drugs only work after they have been activated or “turned on” by certain kinds of light.
10. **Lasers in Cancer Treatment:** Lasers, which are very powerful, precise beams of light, can be used instead of blades (scalpels) for very careful surgical work, including treating some cancers.
11. **Blood Product Donation and Transfusion:** Transfusions of blood and blood products temporarily replace parts of the blood when a person’s body can’t make its own or has lost them from bleeding.

 **SIDE EFFECTS OF VARIOUS CANCER TREATMENTS:**

**Chemotherapy**

1. Nausea and Vomiting : common the stomach lining and the brain’s vomiting center.
2. Hair Loss : Hair follicles are sensitive to chemotherapy.
3. Fatigue : Caused by anemia, metabolic changes, or the direct impact on energy levels.
4. Infection Risk : Lowered white blood cell counts reduce immunity.
5. Anemia : Reduced red blood cell counts cause fatigue and weakness.
6. Mouth Sores : Damage to the lining of the mouth and digestive tract.
7. Diarrhea or Constipation : Effects on the digestive system.
8. Peripheral Neuropathy : Nerve damage causing tingling or numbness in extremities.
9. Skin Changes : Rash, redness, or sensitivity.

**Radiation Therapy**

1. Skin Reactions : Redness, blistering, and peeling in the treated area.
2. Fatigue : Cumulative effect over the course of treatment.
3. Hair Loss : In the treated area.
4. Appetite Changes : Nausea and changes in taste.
5. Inflammation : Swelling or damage in treated organs (e.g., lungs, bladder).
6. Dry Mouth and Throat : Especially with head and neck cancers.
7. Difficulty Swallowing : Due to esophageal or throat inflammation.

**Surgery**

1. Pain : At the site of surgery.
2. Infection : Risk at the surgical site.
3. Scarring : Both external and internal.
4. Loss of Function : Depending on the organ or tissue removed.
5. Fatigue : Due to the body’s healing process.
6. Lymphedema : Swelling due to lymph node removal.

**Immunotherapy**

1. Flu-like Symptoms : Fever, chills, fatigue, and body aches.
2. Skin Reactions : Rash and itching.
3. Autoimmune Reactions : Inflammation and damage to organs such as lungs, liver, and intestines.
4. Hormonal Changes : Impact on glands like the thyroid or adrenal glands.

**Targeted Therapy**

1. Skin Issues : Rashes, dry skin, and sensitivity to sunlight.
2. Diarrhea : Due to effects on the digestive tract.
3. Liver Problems : Elevated liver enzymes.
4. Fatigue : Common side effect.
5. Blood Clotting Issues : Increased risk of bruising and bleeding.

**Hormone Therapy**

1. Hot Flashes : Common in treatments for breast and prostate cancers.
2. Mood Changes : Depression and anxiety.
3. Bone Thinning : Increased risk of osteoporosis.
4. Sexual Dysfunction : Reduced libido and other sexual issues.
5. Weight Gain : Hormonal changes impacting metabolism.

**Stem Cell Transplant**

1. Graft-versus-Host Disease (GVHD) : Donor cells attack recipient’s body.
2. Infection : High risk due to intense immunosuppression.
3. Organ Damage : Liver, kidneys, and heart can be affected.
4. Infertility : Due to high-dose chemotherapy or radiation.
5. PFatigue : Long-term effect post-transplant.

Each patient’s experience with these side effects can vary widely based on individual factors such as overall health, specific cancer type, and the exact treatment protocol used.

**Prevalence of Cancer:**

The Prevalence of a particular cancer is the number of persons in a defined population who have been diagnosed during a fixed time in the past with that type of cancer and who are still alive at the end of a given year. Usually given as a number and a proportion per 100,000 persons Almost 29 million people diagnosed with cancer within the five years previously were alive at the end of 2008.

Most were women after their breast cancer diagnosis (5.2 million), men and women after their colorectal cancer diagnosis (3.3 million) and men after their prostate cancer diagnosis (3.2 million).

**Future Trends:**

As the world’s population continues to grow and age, the burden of cancer will inevitably increase, even if current incidence rates remain the same. More than half of all cancers worldwide are already diagnosed in the developing countries and without intervention this proportion is predicted to rise in the coming decades.

It is estimated there will be almost 22.2 million new cases diagnosed annually worldwide by 2030. These projections are based on demographic changes in populations using UN figures along with crude assumptions about the likely trends in incidence rates for six cancers. Further details are available in the World Cancer factsheet.

Based solely on current estimated mortality rates for 2008 and population projections, it is estimated there will be over 13.2 million deaths from cancer.

In 2008, the World Health Organization (WHO) identified cancer as one of the four leading threats to human health and development (along with cardiovascular diseases, chronic respiratory diseases and diabetes). The WHO states that the global burden of cancer can be reduced and controlled by implementing three evidence-based strategies: preventing cancer from occurring in the first place.

**CONCLUSION**:

In this review paper cancer and treatments of cancer were illustrated in detail like sign or symptoms, diagnosing tests and how the cancer cause, spread, etc. The cancer treatments include surgery, immunotherapy, chemotherapy, target therapy, hormone therapy, radiation therapy, stem cell transplant, precision medicine. These therapies include many drugs, like antibiotics, which are mainly used in chemotherapies, different targeted systems to treat cancer directly like nanotechnology, microspheres, etc. Different radiations are used to treat cancer in radiation therapies that directly attack cancer cells. In hormone therapy, different hormones are used to treat cancer, mainly breast and prostate cancer which are caused by hormones. In immunotherapy, the immune system is making stronger to fight against the cancer cells by different drugs.

Out of these therapies, commonly therapies and a combination of therapies are used to treat cancer such as radiation therapy with surgery, hormone therapy with surgery, chemotherapy with immunotherapy, etc. But these therapies have different problems/side effects because cancer cell which are made from certain genetic changes and genetic changes different in different patients and cancers. After a lot of research about these therapies, scientists prefer precision medicines for the betterment of cancer treatment because in this therapy doctor knows all about the genetic information of cancer cells, then it makes the treatment quite easy and with the help of this information problems/side effects can be decreased.

**REFERENCES**

1. <http://www.cancer.gov/about-cancer/what-is-cancer>. Updated: Aug 11, 2019
2. Morris H: The Bradshaw Lecture on cancer and its origin; Delivered at the Royal College of Surgeons on December 9th. Br Med J 1903; 2: 1505-11.
3. Sitki-Copur M: State of cancer Research around the globe. Oncology Journal 2019; 33(5): 181-5.
4. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D and Bray F: Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer 2015; 136: E359-E386.
5. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA and Jemal A: Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Can J Clin 2018; 68: 394-24.
6. <http://gicr.iarc.fr>. Accessed April 23, 2019.
7. Forouzanfar MH, Afshin A, Alexander LT, Anderson HR, Bhutta ZA, Biryukov S and Charlson FJ: Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. The Lancet 2016; 388(10053): 1659-24.
8. Plummer M, de Martel C, Vignat J, Ferlay J,
9. Redmond DE: Tobacco and cancer: the first clinical report. 1761. N Engl J Med 1970; 282: 18-23.
10. Burnham JC: American physicians and tobacco use: two Surgeons General, 1929 and 1964. Bull Hist Med 1989; 63: 1-31.
11. K.B. Harikumar, S.T. Tharakan, O.S. Lai, B. Sung and B.B. Aggarwal, September 2008. Cancer is a preventable disease that requires major lifestyle changes. Pharm. Res., 25(9):2097-116.
12. Agarwal, S.P., Y.N. Rao and S. Gupta, 2002. Fifty years of cancer control in India, Ministry of health and family welfare Government of INDIA November.
13. [http://www.medicalnewstoday.com/info/cancer- oncology/](http://www.medicalnewstoday.com/info/cancer-%20oncology/)
14. Ferlay, J., H.R. Shin, F. Bray, D. Forman, C. Mathers and D.M. Parkin, 2008. Cancer Incidence and Mortality Worldwide. International Agency for Research on Cancer GLOBOCAN; 1.2.
15. World Population Prospects, U.N., 2009. The 2008 Revision. United Nations, Department of Economic and Social Affairs, Population Division.
16. Doll, R., P. Payne and J.A.H. Waterhouse, 1966. Cancer Incidence in Five Continents. Geneva UICC; pp: 1.
17. Moscow, J.A., K.H. Cowan, L. In Goldman and A.I. Schafer, 2011. Eds. Biology of cancer. Cecil Medicine. 24th ed. Philadelphia, Pa: Saunders Elsevier: chap., pp: 185.
18. Thun, M.J., A. Jemal, L. In Goldman and A.I. Schafer, 2011. Eds. Epidemiology of cancer. Cecil Medicine. 24th ed. Philadelphia, Pa: Saunders Elsevier: chap., pp: 183.
19. <http://news.cancerconnect.com/testing-> centre - <http://www.cancer.gov/cancertopics/screening/types>
20. 11. Tang, Y., Y. Li and G. Qian, 2002. Tumor cell-specific gene transfer with retroviral vectors displaying single chain antibody. Chin Med J. Jul; 115(7): 1064-9.