

Understanding the Main Causes of Cancer: A Comprehensive Overview

Allen Robert

Department of Oncology, University of California, Los Angeles, United States

Corresponding Author*

Allen Robert

Department of Oncology, University of California, Los Angeles, United States

E-mail: allenrobertres@gmail.com

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Abstract

Cancer is a leading cause of death worldwide, affecting millions of people across all demographics. The development of cancer is a multifactorial process influenced by genetic, environmental, and lifestyle factors. This article explores the main causes of cancer, delving into genetic mutations, carcinogens, lifestyle choices such as diet, smoking, and physical activity, and environmental exposures like radiation and pollutants. It aims to provide an in-depth understanding of how these factors interplay in the onset of cancer, as well as potential preventive measures. By recognizing the primary causes of cancer, we can work toward better prevention, earlier detection, and improved treatment outcomes.

Keywords: Cancer • Genetic mutations • Carcinogens • Smoking • Diet • Environmental exposures • Prevention • Radiation

Introduction

Cancer remains one of the most formidable health challenges globally, with millions of new cases diagnosed every year and a significant number of deaths attributed to various forms of this disease. According to the World Health Organization (WHO), cancer is the second leading cause of death worldwide, accounting for nearly 10 million deaths annually. This complex group of diseases arises when abnormal cells in the body grow uncontrollably, invade nearby tissues, and often metastasize to other parts of the body [1].

Understanding the causes of cancer is crucial in the battle against it. While there is no single cause of cancer, various factors are known to contribute to the risk of developing the disease. The primary causes of cancer can be classified into genetic factors, environmental influences, lifestyle choices, and exposure to carcinogens. This article explores these causes, highlighting the intricate web of risk factors that lead to cancer development [2,3].

The Main Causes of Cancer

Genetic mutations

Cancer begins at the cellular level when genetic mutations cause normal cells to become cancerous. These mutations can occur in two main types of genes: oncogenes and tumor suppressor genes. Oncogenes promote cell division, while tumor suppressor genes act as the brakes that prevent

uncontrolled cell growth. When mutations activate oncogenes or disable tumor suppressor genes, cells divide uncontrollably, leading to tumor formation.

There are two types of mutations linked to cancer: inherited (germline) mutations and acquired (somatic) mutations. Inherited mutations are passed down from parents to offspring and account for about 5%-10% of cancers. For example, mutations in the BRCA1 and BRCA2 genes significantly increase the risk of breast and ovarian cancers.

Acquired mutations, on the other hand, develop over a person's lifetime due to various environmental and lifestyle factors. These mutations are not inherited but result from DNA damage caused by carcinogens, radiation, and other influences. Understanding these mutations is key to developing treatments, as targeted therapies aim to correct or exploit specific genetic abnormalities in cancer cells [4].

Carcinogens

Carcinogens are substances that can cause or promote cancer by damaging the DNA within cells. They can be chemical, physical, or biological in nature. Prolonged exposure to carcinogens can lead to genetic mutations, contributing to the onset of cancer.

Tobacco smoke: One of the most well-known carcinogens is tobacco smoke, which contains thousands of chemicals, including at least 70 known to cause cancer. Smoking is the leading cause of lung cancer and contributes to cancers of the mouth, throat, bladder, pancreas, and more. According to the American Cancer Society, smoking accounts for about 30% of all cancer deaths in the U.S.

Alcohol: Excessive alcohol consumption is another significant risk factor. Alcohol is metabolized into acetaldehyde, a toxic compound that damages DNA and impairs the body's ability to repair cells. This increases the risk of developing cancers of the liver, breast, mouth, throat, and oesophagus.

Radiation: Exposure to certain types of radiation, such as Ultraviolet (UV) radiation from the sun and ionizing radiation from medical imaging, can also lead to cancer. UV radiation is a primary cause of skin cancer, including melanoma, while ionizing radiation has been linked to various cancers, including thyroid and leukemia.

Pollutants: Environmental pollutants, such as asbestos, benzene, and certain pesticides, are known carcinogens. For instance, asbestos fibres, once inhaled, can cause lung inflammation and lead to mesothelioma, a type of cancer affecting the lining of the lungs. Similarly, exposure to benzene, commonly found in industrial emissions, is linked to leukemia.

Lifestyle factors

While genetic predispositions and environmental exposures are significant, lifestyle factors play a pivotal role in cancer risk. Some of the key lifestyle choices that influence cancer risk include:

Diet: Dietary habits have a profound impact on cancer development. A diet high in processed foods, red meats, and unhealthy fats has been associated with increased risks of colorectal, pancreatic, and breast cancers. Conversely, diets rich in fruits, vegetables, and whole grains are linked to lower cancer risks. Antioxidants and phytochemicals found in plant-based foods can help protect cells from DNA damage and reduce inflammation.

Physical activity: Lack of physical activity is another risk factor for cancer, particularly for colorectal, breast, and endometrial cancers. Regular exercise helps maintain a healthy weight, improves immune function, and reduces inflammation—all of which contribute to lowering cancer risk.

Obesity: Obesity is a significant risk factor for several types of cancer, including breast, endometrial, colorectal, and kidney cancers. Excess body fat produces inflammatory compounds and hormones like estrogen, which can promote the growth of cancer cells [5].

Smoking and alcohol use: In addition to smoking's role in cancer, alcohol use can act synergistically with tobacco to increase the risk of cancers, particularly of the mouth, throat, and oesophagus. Limiting alcohol consumption and avoiding smoking are crucial preventive measures.

Environmental exposures

The environment in which individuals live and work plays a crucial role in cancer risk. Factors such as pollution, workplace hazards, and geographical location can significantly increase exposure to carcinogens.

Air pollution: Polluted air, both outdoors and indoors, is a growing concern in cancer prevention. Particulate matter, nitrogen oxides, and volatile organic compounds in polluted air can damage lung cells and increase the risk of lung cancer.

Occupational hazards: Certain occupations expose workers to higher levels of carcinogens. For example, workers in industries that involve asbestos, chemicals, or radiation are at a higher risk of developing specific types of cancer, such as mesothelioma or leukemia.

Radiation exposure: People exposed to radiation through their work, medical procedures, or environmental contamination (e.g., nuclear accidents) have an increased risk of developing cancer. Minimizing unnecessary radiation exposure is important for cancer prevention.

Conclusion

Cancer is a multifactorial disease with complex origins, encompassing genetic, environmental, and lifestyle factors. While some causes, such as inherited genetic mutations, are beyond individual control, many others, including exposure to carcinogens, lifestyle choices, and environmental factors, are modifiable. By understanding the main causes of cancer,

individuals, healthcare providers, and policymakers can work together to reduce cancer risks through prevention, education, and early detection.

Preventive measures such as maintaining a healthy diet, avoiding tobacco and excessive alcohol, engaging in regular physical activity, and minimizing exposure to environmental carcinogens can significantly reduce the risk of developing cancer. Additionally, early detection through screening programs can lead to better treatment outcomes and potentially save lives. The fight against cancer continues, and with advances in research and prevention strategies, we can make strides toward reducing the global cancer burden.

Ultimately, understanding the main causes of cancer is crucial for individuals to make informed decisions about their health and for society to implement effective public health strategies aimed at reducing the incidence of this devastating disease.

References

1. Zhang, Wenjuan, et al. "The etiology of Bell's palsy: a review." *J Neurol.* 267 (2020): 1896-1905.
2. Hohman, Marc H., and Tessa A. Hadlock. "Etiology, diagnosis, and management of facial palsy: 2000 patients at a facial nerve center." *Laryngoscope* 124.7 (2014): E283-E293.
3. Mezni, Essia, et al. "Facial palsy after administration of immune checkpoint inhibitors: case report, literature review and clinical care management." *Front Immunol.* 15 (2024): 1375497.
4. Zhu, Jianhong, et al. "Facial palsy induced by immune checkpoint blockade: A systematic analysis of clinical trials and a pharmacovigilance study of postmarketing data." *Int Immunopharmacol.* 125 (2023): 111184.
5. Marini, Alessandro, et al. "Neurologic adverse events of immune checkpoint inhibitors: a systematic review." *Neurology* 96.16 (2021): 754-766.