



# Why do some individuals get cancer, but others do not? A review

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## Abstract

Cancer is becoming widely spread in recent years. It is considered one of the feared diseases that threaten human life. Cancer had many predisposing factors that include environmental, lifestyle and physiological factors that would contribute as a carcinogenesis. This current review aims to explain the etiology of cancer of either genetics or environmental causes.

**Keywords:** cancer, environmental factors, genetic factors

## 1. Introduction

In spite of the similarities between individual genetic systems, persons have different susceptibilities with regard to cancer. Cancer is considered one of the most common diseases around the world and the main cause of death. More than a million of individuals are afflicted with cancer worldwide and this number is expected to be increased to 11.4 million in 2030 (Koklesova *et al.*, 2020) [4]. Numerous factors are associated with cancer etiologies. These factors include, lifestyle habits, chemicals, and radiations. It was found that exposure to different levels of carcinogen, that would be resulted in cancer increased risks. Also, recent studies have stated that environmental agents cause carcinogens invasions, leading to an increase the risk of cancer (Ravi *et al.*, 2022) [10]. These agents are associated with induce alteration in signal pathways. In addition, it promotes DNA adduction, P53 activation combined with the elevation of free radicals that cause cell damage, resulting in inducing cancer (Koklesova *et al.*, 2020) [4]. On the other hand, genetic factors were found to stimulate cells, mutations and deletions, replication of DNA, affects the gene. However, at this factory produces the infrequent type of cancer (Ravi *et al.*, 2022) [10]. This review will show the possible collaboration between environment and gene factors to induce cancer.

## 2. Role of environmental factors in inducing cancer

Environmental factors as an important factor to cause cancer is undoubted. For instance, these factors have been extensively researched by Italian and English physicians, who are working in the community of interactional scientific, by which chemicals, physical and viruses have been considered relatively (Martínez-Reyes & Chandel, 2021) [7]. The capability of inducing cancer causing by the environmental factors was started when Muller was used the x-ray results to mutate a genome of *Drosophila melanogaster* (Lipsick, 2021) [3]. This finding pointed out numerous of mutations that were involved as predisposing factors to induce cancer. The

researcher used different cancer mechanisms such as methylation, and imprinting (Srivastava, 2022) [11].

Moreover, radiation can be defined as a particles or electromagnetic waves with high-speed energy. It was found that ionizing radiations that originates from radioactive materials and radon x-rays can induce cancer. Also, sunlight that contain ultraviolet (UV) radiation can associate with aging the skin, might be resulted in skin cancer. This means that contact to UV radiation and ionizing radiation can evidently trigger malignancy. As an example, cancer of skin that are not melanoma, which is dangerous form of skin cancer and certainly considers the most common kind of human growth and it can be caused through exposure to sun ultraviolet radiation. In addition, sun light as a powerful disinfecting agent and killer for bacteria that can encourage the genetic mutations via pyrimidine dimers, leads to interrupted DNA replication and transcription process, resulting in dying of the cells (Jones *et al.*, 2018) [2]. Some studies have been found that at low doses of radiation, any damage in the cells can repair quickly, in contrast, the cells may be undergone alter or die ultimately when they struggling to fix the high or moderate levels of damage. Thus, this type of changed cells will be converted into harmful kind of cells, cancerous or it's associated with other irregularities. There are many evidences to support this. One studies have been found that little contact to the radiation among hibakusha, the survivors were at danger of getting cancer development. Other studies were seen increasing the probability of cancer threat after treatment with a high dosage of radiation therapy. The same thing was found through exposure numerous sources of radiation. Ionizing radiations that are involve fluoroscopy, x-rays, nuclear medicine and also computed tomography (CT) can trigger the cancer by inducing cell damage (Jeong *et al.*, 2022) [1], resulting in increasing the mortality of cancer (Lopes *et al.*, 2022) [5].

In terms of chemicals, diet contains a greater proportion of chemicals that shows a serious role in development cancer in human. These chemicals behave according to the electrophilic

– nucleophilic reaction (Lopes *et al.*, 2022) <sup>[5]</sup>, by which a reception and donation mechanisms occurs involving pyrimidine and purine rings of deoxyribonucleic acid (DNA), leading to produce certain carcinogens.

### 3. Why peoples get different susceptibilities toward cancer?

Knowing cancer molecular basis proneness still one of the holy grails of cancer study and will develop the ability to stop and manage cancer. Susceptibility of cancer is a complex chromosomal feature, and a small number tumours are caused by a single gene mutation. The variances in responses among individuals to carcinogens were primarily originate at genetic polymorphisms. The expression of the liver cytochrome P450, which is the enzyme that produce through chemicals metabolism. It was found that such enzyme was higher 50 times lung tissues, explaining why cigarette smoker appear contrasting toward lung cancer (Madaminov *et al.*, 2021) <sup>[6]</sup>. Furthermore, numerous studies regarding cancer development illustrate how infectious agent reasons of cancers in human. The fact that retroviruses of RNA tumor viruses or DNA tumor viruses are often associated with blocked of tumor suppressor genes that caused by stimulating viral proteins. External factor account for two thirds of cancers cases in the US (Derks, 2021) <sup>[9]</sup>. These factors are able to damage DNA, and frequently accompanying with a vital increase in the rate of genetic mutations of mutational rate greater than usual (Lopes *et al.*, 2022) <sup>[5]</sup>. The external agents include lifestyle include alcohol consumption and cigarette smoke, diet, chemicals and UV light. A complex process involves the interaction between physical or chemical factors contribute to carcinogenesis and cell mutation. The mechanism has been included the formation of free radicals that are cause the cellular damage of macromolecular and imbalance between the antioxidant systems. In addition, the elevation of reactive oxygen species (ROS) can associate with induce the signal transduction pathway contributes the activation of transcription factors, like NRF2 and NF-KB. Which then result in alteration of gene expression (Miller *et al.*, 2019) <sup>[8]</sup>.

### 4. Conclusions

Cancer caused by many factors that are modified between genetic and environmental factors.

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