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**Research Paper**

# Cancer Is the Worst Health Challenge in 21st Century

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***ABSTRACT***
*Cancer is a complex disease caused by genetic abnormalities that result in uncontrolled cell growth and the formation of tumors. It is primarily driven by DNA damage and genomic instability. While there are numerous rumors and myths surrounding cancer, it is important to rely on accurate information. One well-established cause of cancer is tobacco smoke. Cigarettes, cigars, and pipe tobacco, made from dried tobacco leaves, contain various additives and flavorings. When these tobacco products are burned, they release a mixture of chemicals, with at least seventy of them being linked to cancer. Alcohol consumption is another factor that can contribute to cancer. Although alcohol is widely available and socially accepted in many societies, it belongs to the same class of drugs as heroin and cocaine. The potential harm caused by alcohol to the body, including its association with cancer, should not be underestimated. Exposure to asbestos fibers is yet another known cause of cancer. Inhaling these fibers can irritate and puncture lung cells, leading to the development of cancer. Ultraviolet (UV) radiation from sunlight is the primary cause of skin cancer. Excessive exposure to UV rays, especially without protection, increases the risk of developing skin cancer. It is essential to rely on reliable sources and scientific research when seeking information about cancer causes, prevention, and treatment. Ongoing advancements in cancer research and treatment continue to provide new insights and approaches to managing this disease.*
***Key Words:*** *Carcinogen, onco-virus, hereditary, oncology, etc.*

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## I. INTRODUCTION

1. Cancer is a term used to describe a group of diseases with shared risk factors. It encompasses various disorders where normal cells undergo alterations that lead to abnormal replication. This abnormal cell replication spreads throughout the body, causing harm. There are numerous factors that can contribute to abnormal cell replication. DNA plays a crucial role in regulating cell reproduction, just like in other biological processes. When a cell undergoes a change in its DNA, it is considered mutated. Most mutations have no harmful effects. However, if a mutation occurs in the DNA region that governs cell reproduction, it can cause the cell to replicate abnormally and pass on the mutation to its daughter cells through genetic information transfer. Cancer can be triggered by agents that induce DNA mutations. While a minority of cancers are caused by inherited genetic mutations, the majority are influenced by environmental, lifestyle, or behavioral factors. Cancer is not typically contagious among humans, but certain oncogenic viruses and cancer-causing microorganisms can contribute to its development. According to the World Health Organization (WHO), cancer claimed the lives of approximately 10 million people in 2020, making it the leading cause of death worldwide. Breast cancer, lung cancer, and colon cancer are among the most common types. Prior to the pandemic, cancer mortality rates were declining, but the COVID-19 crisis has led to significant backlogs in cancer detection and treatment. Nonetheless, ongoing medical advancements continue to support the global efforts against cancer.
2. Even before humans gained the technology to manufacture synthetic chemicals, there were naturally occurring substances that may cause cancer. Even if human industrial activity has the potential to enhance a person's exposure to naturally occurring carcinogens, this does not alter the fact that these carcinogens occur naturally in the environment. Even if we were somehow able to shield ourselves from 100 percent of the carcinogens, whether they were naturally occurring or the result of human activity, there is still a chance that we

could develop cancer. Cancer can develop even in the absence of other potentially dangerous factors. When a cell reproduces, it needs to manufacture copies of its DNA to pass on to the daughter cells that it creates. Even in the absence of any carcinogens, the process of DNA replication may nevertheless result in copy mistakes as a consequence of the random fluctuations that are inherent in all molecular movements. In this sense, DNA mutation is an inevitable consequence of the process of cell replication. There are many mutations that do not cause harm. There are even mutations that are advantageous to the species and help it evolve. On the other hand, mutations can sometimes result in cancer. Even without the intervention of man-made chemicals, cancer can develop due to the presence of naturally occurring carcinogens in the environment and the fact that mutation is an inevitable byproduct of the process of cell reproduction.[1]Tobacco, alcohol, arsenic, radon, ionizing radiation, and other carcinogens should all be avoided, along with other healthy lifestyle choices like eating more fruits and vegetables, getting regular exercise, being vaccinated, and wearing sunscreen. In this review article we will discuss the most evil health issue around the globe, so that anybody can learn more about the potential causes, suggestions, latest treatment advices of cancer, including its variability and general information about carcinogens and how genetics play a role in cancer.

## II. CAUSES OF CANCER

**3.** **Tobacco,** which is typically found in cigarettes and cigars, is derived from the leaves of the tobacco plant. Tobacco is known to contain over 50 cancer-causing compounds. Tobacco is the biggest cause of cancer that can be stopped. It has been discovered that it causes lung cancer in addition to malignancies of the mouth, lips, nose, sinuses, larynx, throat, esophagus, stomach, pancreas, kidney, bladder, uterus, cervix, colon/rectum, ovary, and blood.[2]

**4.** **Alcohol** (ethanol), a naturally occurring result of yeast fermenting sugar, is present in all foods that contain yeast, including overripe fruit and the sap of palm trees. It is commonly found in beverages like beer and wine. Mouth, throat, laryx, esophagus, liver, colon/rectum, and breast malignancies are known to be caused by alcohol. The Independent Scientific Committee on Drugs (ISCD) found that alcohol is the drug that causes society the most harm and damage. Cocaine, LSD, heroin, and tobacco were all defeated by alcohol. It should be noted that this does not equate to alcohol being more harmful to the body than these other drugs gram for gram. Alcohol actually causes the most overall harm to society when all behavioral impacts, including pain to the user and harm generated by the user, are considered. It should be evident that a drug's accessibility and legality have an impact on how much harm it can actually do. LSD may cause more brain damage per user than alcohol, but the relative difficulty of procuring LSD prevents it from causing as much harm to society as alcohol does. The study looked into crime, economic costs, drug dependency, and harm to one's health. The Centers for Disease Control projected that moderate and heavy drinking contributed to 75,754 fatalities in the United States in 2001. Cancer Research UK claims that alcohol promotes at least seven different types of cancer, including those of the mouth, throat, esophagus, larynx, breast, intestine, and liver. Additionally, alcohol has strong psychotropic effects that make it difficult for a person to stay safe and follow the law.[3]

**5.** **Hepatitis B** virus is a virus that can spread to people when they come in contact with infected body fluids. Sharing infected needles, engaging in unprotected sex, or giving birth can all lead to the transmission of hepatitis B virus (HBV) or hepatitis C virus (HCV). Transfusion-transmitted cases are extremely uncommon in the United States due to the rigorous screening of blood products for the presence of these viruses. In youngsters living in underdeveloped nations, hepatitis B is sometimes spread through extended contact with infected family members. Once again, HBV is more likely to induce symptoms like a fever and a yellowing of the skin and eyes. Nonetheless, full recovery from HBV infection is common within a few months. In adults, only very few individuals become chronic carriers, and is increasing their danger of developing liver cancer. Infected infants and young children are more likely to develop into lifelong carriers. However, HCV is much less likely to manifest clinically. However, persistent HCV infections are much more common and are a major risk factor for liver damage and malignancy.[4]Worldwide, HBV and HCV infection are the leading cause of chronic liver disease and liver cancer. Cirrhosis of the liver, which is caused by these illnesses, is the leading cause of cancer mortality worldwide.

**6.** **Arsenic** is a chemical element that occurs naturally in a wide variety of minerals. In areas of the world where arsenic levels in the environment are high, natural arsenic is known to seep into groundwater, polluting water supplies utilized by humans. Arsenic's potential to cause cancer has been assessed by multiple authoritative bodies based on the current evidence. The International Agency for Research on Cancer (IARC) functions under the WHO. One of its major goals is to find out what causes cancer. Arsenic trioxide and other inorganic arsenic

compounds are categorized as "elements" by IARC. Human studies conclusively link arsenic exposure to an increased risk of developing several types of cancer, including lung, bladder, skin, kidney, liver, and prostate.[5]

**7.** **Asbestos** is a naturally occurring silicate material that is composed of several tiny, strong fibers and which is shaped like needles. Because its small size and hard, needle-like structure enable it to damage cells rather than its chemical makeup, asbestos is classified as a mechanical carcinogen rather than a chemical carcinogen. Small, rigid, needle-like fibers found in all minerals are suspected to be carcinogenic. Lung, pleural, laryngeal, and ovarian malignancies have all been linked to asbestos exposure. It is a rare mineral that, when separated, forms pliable fibers. Microscopic asbestos fibers are extremely difficult for the human body to process and eliminate after ingestion or inhalation. The fibers lodge themselves in the vulnerable tissue near the lungs or the belly. The fibers irritate the skin and induce inflammation, which harms cells and DNA over time. Abnormal cell development and cancer can result from genetic alterations caused by DNA damage. Mesothelioma and lung cancer are just two of the many forms of cancer that asbestos exposure can cause.[6]The World Health Organization (WHO) estimates that half of all cases of work-related cancer are caused by asbestos. Asbestos can also cause cancer if it is inhaled or ingested.

**8.** **Cosmic rays** are high-energy particles that come from supernovae outside of our solar system. The earth's atmosphere protects us somewhat from cosmic rays. People who spend significant time in aircraft are less protected from cosmic rays and solar radiation due to the atmosphere's lack of a protective ozone layer. Those rays are streams of high-energy particles (mostly protons or atomic nuclei) traveling through space at very close to the speed of light. They come from the Sun, other parts of our galaxy, and even other galaxies entirely. Some of the secondary particles created when cosmic rays collide with Earth's atmosphere make it to the ground, but the vast majority is reflected back into space by Earth's magnetic and solar shields.[7]The earth is continually being rained down by cosmic rays, each of which possesses sufficient energy to ionize the atoms that makeup living cells and hence has the potential to cause cancer.

**9.** **Helicobacter pylori**, also known as H pylori, are a 'spiral-shaped bacterium that grows in the mucus layer that coats the inside of the human stomach.' It has been identified as a cause of stomach cancer.

**10.** **Solar radiation** contains ultraviolet rays, which are harmful to epidermis cells. Additionally, tanning beds emanate ultraviolet radiation. Sunlight's ultraviolet rays are the primary factor in the development of skin cancer. The two most frequent kinds of skin cancer, basal cell, and squamous cell, are almost always located in areas of the body that get the most sun. Sun exposure is also linked to the risk of melanoma, a more deadly but less frequent form of skin cancer, but possibly not as strongly. Some artificial UV sources have also been linked to an increased risk of skin cancer. 'Ultraviolet (UV) radiation' is defined as 'a type of electromagnetic radiation emitted by the sun and man-made sources such as tanning beds and welding torches.'[8]It is well established that skin cancer can be caused by exposure to UV light over an extended period of time.

**11.** **Human papillomavirus (HPV)** has been linked to roughly 70% of cervical cancer cases. Cancers of the vulva, vagina, penis, oropharynx, and anus have also been linked to HPV. HPV family consists of over 200 viruses, some of which are transmitted through genital, oral, or genital intercourse. HPV varieties that are spread through sexual contact can be divided into two categories: low risk and high-risk. Within a few months to a few years of initiating sexual activity, nearly everyone becomes infected with HPV. About 50% of these are caused by high-risk HPV types. Cancers caused by HPV are a considerably larger problem on a global scale. About 5% of all malignancies are caused by high-risk HPVs, and about 570,000 women and 60,000 men are diagnosed with an HPV-related malignancy each year. In low and middle-income countries, where screening tests and treatment of early cervical cell alterations are not easily accessible, cervical cancer is one of the most common malignancies and a primary cause of cancer-related fatalities.[9]

**12.** **Lead** is a naturally occurring chemical element found in rocks, dirt, plants, and even mammals. Lead is a solid metal at room temperature and most people are exposed to it by inhalation or ingestion. Although there is not yet conclusive evidence, it is likely that lead promotes lung cancer and stomach cancer.[10]

**13.** **Radon** is a naturally occurring radioactive chemical element formed when radium decays in aqueous environments such as soil and rocks. Radon is a radioactive gas that accumulates in low-lying areas, including basements. In its rapid decay, radon emits extremely small radioactive particles. Inhaling these radioactive particles can cause harm to the lung tissue. Lung cancer is the only type of cancer that has been linked to inhaling radon over the long term. It has been hypothesized that radon exposure increases the risk of leukemia in both

adults and children, however the evidence is inconclusive.[11] Radon eventually breaks down into various radioactive isotopes, all of which eventually also break down and release ionizing radiation. It is well-established that radon can lead to lung cancer.

## III. HOW TO REDUCE THE RISK OF CANCER

14. A risk factor is any aspect of our environment that raises the probability that we will contract a disease. Risk factors vary among various cancer types. It is possible to modify some risk factors, such as smoking. Some risk variables, such as a person's age or genetic profile, are fixed. Having one or more risk factors does not guarantee that we will develop the disease, though. It's also possible that some persons who contract the illness have no predisposing conditions at all. Hepatocellular carcinoma (HCC) is an aggressive form of liver cancer that can be caused by a number of different reasons. Hepatocellular carcinoma is more common in men than in women. Fibrolamellar HCC, on the other hand, primarily affects females. Cirrhosis can be a result of hereditary metabolic disorders.

15. According to the WHO, Over one-third of cancer deaths globally may be preventable by avoiding identified risk factors.[12]Again, 'Common environmental factors that lead to cancer deaths include exposure to different chemical and physical agents (smoking causes 25–30% of cancer deaths), environmental pollutants, diet and obesity (30–35%), infections (15–20%), and radiation (both ionizing and non-ionizing, up to 10%). At least in part, these factors work by changing how genes in cells work. Most of the time, cancer needs a lot of these kinds of genetic changes to happen.'[13] Aging has been regularly and continuously acknowledged as a significant element to consider when assessing the risk factors for the development of specific cancers. Many of the genetic and cellular alterations that contribute to cancer's genesis compound with age.

16. Hereditary hemochromatosis is a condition in which an abnormally high amount of iron is absorbed from the diet and accumulates in various organs and tissues, most notably the liver. Cirrhosis and liver cancer can develop when iron accumulates to dangerous levels in the liver. Cirrhosis, which is associated with an increased risk of liver cancer, is a common consequence of heavy alcohol use in the United States. Liver cancer risk rises in smokers. The risk is lowest for former smokers and highest for current smokers compared to people who have never smoked. A higher likelihood of developing liver cancer is associated with extreme obesity. The reason for this is likely because it can promote fatty liver disease and cirrhosis. Patients with type 2 diabetes who also have other risk factors, such as severe alcohol use and/or chronic viral hepatitis, are more likely to develop liver cancer. People with type 2 diabetes are more likely to be overweight or obese, both of which are associated with an increased risk of developing liver problems.[14] There are few suggestions and advices have been given below; those will help everybody to reduce the risk of cancer.

a. We should stop or reduce alcohol and tobacco use.[15] It will obviously help to lower our risk of cancers and life-threatening other diseases.

b. We need to avoid and treat hepatitis B and C diseases. To protect against hepatitis and liver cancer, the HBV vaccine is recommended by the US Centers for Disease Control and Prevention (CDC) for all children and adults under the age of 59, as well as those above the age of 59 who are at risk. HCV cannot be prevented with a vaccination. In order to protect unvaccinated individuals from contracting HCV or HBV, it is necessary to have a firm grasp of how these illnesses manifest. Hepatitis infection was also commonly spread through previous blood donations.[16]

c. A number of malignancies may be prevented by taking aspirin. Several studies have demonstrated that regular aspirin use reduces the risk of developing liver cancer, but additional research is also required.[17]

d. We should get screened for cancer regularly. Our colon, breast, prostate, cervix and skin should be tested regularly. 'We should ask our doctor for intervals and age at which to start. Finding cancer early can greatly increase our chance for a cure and reduce our risk of dying from the disease.'[18]

e. We should protect our skin from the sun. We should use sunscreen every time as we go outdoors. The SPF of 30 or higher can protect us against both UVA and UVB rays. We should keep covered ourselves with a broad hat and sunglasses.

f. We should be physically fit by maintaining active lifestyle. We should do simple exercise. We must remain activeby walking, cycling, swimming, biking, dancing or any other exercise that raises our heart beat/rate, blood pressure and get sweated.[19]

g. We must keep our weight in the normal range as per our height.[20] That means keeping to a body mass index (BMI) of 25 or less. we can easily calculate our BMI with online calculators. We must try to stay within 4kgof our limit.

h. Medications, after consulting a doctor, always reducerisk for cancer. There are several medications that have been tested and found effective for reducing risk for cancer.

i. We must avoid exposures to cancer-causing substanceslike arsenic, radon, asbestos, cosmic ray, UV ray, etc.[21] Radiation exposures and some chemicals are cause cancer.

j. If we need to take hormones, limit our use to less than five years.

k. We should eat a cancer risk reducing diet. The role of diet in cancer is far from established, but research suggests that a plant-based diet is associated with reduced risks for several cancers, like colon cancer.[22]We must keep our intake of red meat to no more than 150 gmper day on average.

l. We should maintain discipline and religious life. All religion guide us a discipline and healthy life. Almighty Allah says in Quran, 'O you who believe! Persevere in patience and constancy; vie in such perseverance; strengthen each other; and fear Allah; that you may prosper.' (Al Quran, 3:200). '...never give up hope of Allah's Soothing Mercy: truly, no one despairs of Allah's Soothing Mercy, except those who have no faith.' (Al Quran, 12:87).

## IV. FOOD HABIT AND DIET TO FIGHT

17. Certain cancers have been related to eating certain foods. Studies and research have indicated that people who regularly consume red or processed meat are more likely to acquire breast, prostate, and pancreatic cancers. High-temperature cooking releases carcinogens into food, which could cause cancer.[23] The use of large amounts of fat, alcohol, red and processed meats, being overweight, and not getting enough exercise are all risk factors for developing colorectal cancer. Cancer of the stomach can develop from eating too much salt. Oral cancer has been linked to betel nut consumption.[24]Differences in cancer incidence between nations may be partially explained by the association between food and the development of specific tumors. Below are some dietary recommendations that can help lessen the likelihood of developing cancer.

a. We should limit ourselves to no more than 30 grams of fat every day. Almonds (14 grams per ounce) and peanut butter (8 grams per tablespoon) are examples of healthy fats.

b. Foods that have been cured, smoked, or preserved with nitrites, such as sausages, deli meats, and hot dogs, should be avoided. Consistently eating meals heavy in salt has been linked to an increased risk of stomach cancer.[25]

c. Foods high in fiber help us feel satiated for longer, so we don't go looking for a snack just 10 minutes after lunch is over. According to research, eating meals high in fiber causes the body to produce the appetite-suppressing chemical acetate, indicating to the brain that one is no longer hungry.[26] Diets high in fiber have been linked to a reduced incidence of colon cancer.

d. Cancers of the breast, colon, and prostate are more common in people with low vitamin D levels. There aren't many food sources of vitamin D, but we might notice that some goods, such as soy, almond, and oak milk, are fortified with vitamin D. Vitamin D can be obtained by dietary supplements and safe sun exposure (using sunscreen).[27]

e. Foods high in vitamin C and antioxidants such as fruits and vegetables should be prioritized. Fruits and vegetables obtain their color from a pigment that also contains chemicals that may lower cancer risk.[28] We should aim to consume at least three various colors of fruits and vegetables per day (red, green, yellow, pink, blue, and so on).

f. We need to be cautious about our sugar intake. Natural sugars found in foods like fruits and grains aren't the issue. Obesity and cardiovascular disease are risks associated with additional sugars. That's why those things can be carcinogenic.[29]

g. We should avoid taking tetra packed drinks, cold drinks, canned juices, alcoholic beverages, pastries, patties, chowmein, and other fast and junk food items.

h. There are few foods that contain carcinogenic substances. For example: 'refined and highly processed flour, processed and packaged meat, refined sugar, microwave popcorn, carbonated beverages and soda, drinks containing high corn syrup and harmful color dyes and artificial colors like caramel color, hydrogenated oils, red meat, farmed fish, GMOs (genetically modified organisms), French fries, and canned foods, etc.[30] We should try to avoid those foods.

i. There are few foods that effectively resist and eliminate cancer cells. These include cherries, turmeric, olive oil, sea vegetables, hemp oil and hemp seeds, red grapes, garlic, mushrooms, green tea, cauliflower, cabbage, broccoli, and tomatoes. [31]We should eat/take those foods.

j. Chlorella carotenoids can successfully prevent cancer. 'Cancer simply cannot grow in fully oxygenated cells.' Cruciferous plants like cauliflower, cabbage, broccoli, and Brussels sprouts contain anti-cancer chemicals called glucosinolates.[32]

## V. CANCER TREATMENT

18. According to the National Cancer Institute of USA, there are over 100 types of cancer.[33]Oncologists typically base treatment recommendations for cancer on the patient's cancer type, cancer stage at diagnosis, and general health. There are few examples ofgeneral approaches to cancer treatment has been given below. However, in order to maximize efficacy, doctors may frequently combine treatment modalities.[34]

a. Chemotherapy uses drugs that specifically target fast-dividing cells to eradicate malignant cells.[35] Tumors may also shrink with the aid of medications. However, the adverse consequences can be severe.
b. Hormone therapy entails the consumption of medications that alter the action of hormones or block their natural production in the body.[36] Cancers of the breast and prostate are two examples where hormones play a crucial role. This may be a common approach.
c. Immunotherapy is a well-accepted cancer treatment system which helps our immune system fight cancer.[37]The goal of immunotherapy is to stimulate the body's immune system so that it will attack cancer cells on its own. Checkpoint inhibitors and adoptive cell transfer are two examples of these therapies.
d. Precision medicine, sometimes known as personalized medicine, is a relatively new and evolving field of medicine. It entails conducting genetic testing to figure out what drugs will work best against a patient's specific form of cancer.
e. Radiation therapy involves exposing cancer cells to extremely high levels of radiation.[38] Radiation therapy may be recommended before surgery in order to reduce the size of a tumor.
f. Cancers of the blood, such as leukemia and lymphoma, respond well to stem cell transplant.[39] Cells that have been damaged by chemotherapy or radiation are removed, such as red or white blood cells. The cells have to be strengthened in the lab and then reintroduced to the body.
g. Surgical removal of a malignant tumor is a common element of treatment.[40] In order to stop or slow the spread of cancer, a surgeon may also remove lymph nodes from the patient.
h. Targeted therapies carry out actions inside malignant cells to stop their growth. They have immune-enhancing properties as well. Small-molecule medicines and monoclonal antibodies are two types of these treatments[41].

19. Cancer specialists in the twenty-first century are embracing Artificial Intelligence (AI), DNA sequencing, precision oncology, and other technologies to better therapy and detection of the disease. 'More effective cancer treatments are ongoing goals in terms of medicine." Laboratories and clinical trials continue to develop innovative techniques for treating cancer earlier and improving outcomes.'[42]There are few examples[43] of latest and ultra-modern approaches to cancer treatment have been given below.
a. Precision oncology is the most effective new cancer-fighting weapon.[44]This entails investigating the genetic makeup and molecular characteristics of individual cancer tumors.[45] Precision oncology looks for alterations in cells that may be causing cancer to grow and spread. Then, personalized treatments can be designed. 'Precision oncology treatments, as opposed to general treatments such as chemotherapy, are targeted.'[46] It may mean less injury to good cells as well as fewer adverse effects.
b. Cancer treatment in India is being revolutionized by World Economic Forum (WEF) partners utilizing cutting-edge technology like artificial intelligence (AI) and machine learning. Screening for common malignancies like breast cancer using AI-based risk profile can aid in early diagnosis.[47] In areas where access to imaging specialists is limited, artificial intelligence can be utilized to examine X-rays in search of cancer. Both of these are examples of cancer therapies that the Fourth Industrial Revolution (4IR) Centre at the WEF in India is trying to promote as well. [48]
c. DNA sequencing is the technique of describing the nucleic acid arrangement and the order of nucleotides in DNA. 'The advent of rapid DNA sequencing methods has greatly accelerated biological and medical research and discovery.'[49]The DNA of cancer tumors from 12,000 people is reportedly providing fresh insights into the etiology of the disease, according to researchers at Cambridge University Hospitals in England. Oncologists are studying genomic data to determine the specific mutations that cause cancer in each patient.[50] Causes of cancer include, but are not limited to, cigarette smoking, sun exposure, and cellular defects. They function similarly to fingerprints at a crime scene and it has been said by the scientists **'**We found 58 new mutational signatures and increased our understanding of cancer.'[51]
d. The majority of cancer diagnoses are made through biopsy procedures. However, it is an invasive method that necessitates the removal of a tissue sample, often by surgical means. In order to conduct tests on it in a lab to check for cancer markers, 'liquid biopsies' are a less intrusive and more convenient option.[52] Another technological advancement that can coax cancer cells into visibility in the disease's earliest stages is the use of synthetic biopsies.

e. Recently, patients with leukemia have had success with a treatment that recruits the body's immune system to seek down and kill cancer cells. CAR-T-cell therapy is a treatment for cancer that includes removing and genetically modifying T cells, which are part of the immune system. Chimeric antigen receptors (CARs) are proteins made by modified cells.[53] These can target cancer cells and kill them. Twelve years after receiving CAR-T-cell therapy, two patients were reported to be in remission by researchers at the University of Pennsylvania and published in the journal Nature.

f. Pancreatic cancer is a particularly lethal form of the disease. Less than 5% of patients are still alive after five years because early detection is so uncommon. Researchers at the University Of California San Diego School Of Medicine[54] have created a test that successfully detected 95% of pancreatic tumors in their early stages in a clinical trial. Biomarkers in extracellular vesicles, particles that regulate cell-to-cell communication, were used to diagnose early-stage pancreatic, ovarian, and bladder cancers, according to a study published in Nature Communications Medicine.[55]

g. The survival percentage of cancer patients is greatly improved by early detection. In the case of fatal solid tumors, diagnosis typically happens after the disease has spread to the point where surgical excision is no longer curative. [56] Using biomarkers found in circulating extracellular vesicles (EVs) is a promising method for detecting treatable malignancies at an early stage.

h. Doctors have found that patients who have developed an immunity to immunotherapy can still benefit from an innovative approach for their cancer. When conventional treatments, such as surgery, radiation therapy, or chemotherapy, have failed, immunotherapy's ability to specifically target and kill cancer cells has saved lives. However, not all patients will benefit from treatment and some cancers may develop resistance over time. British oncologists have recently discovered that a combination of immunotherapy and the unique experimental medication guadecitabine can overcome cancer's resistance to immunotherapy.[57] A substantially higher rate of survival was observed in patients for whom no further therapy alternatives existed. More than a third of patients in the phase 1 trial saw their cancer progress slowed by the combination of the immunotherapy medicine pembrolizumab and the next-generation DNA hypomethylating agent guadecitabine. The dual combination has been suggested as a potential new weapon against multiple types of cancer by scientists at the Institute of Cancer Research and the Royal Marsden NHS foundation trust.[58]

## VI. CONCLUSION

20. Cancer has existed in the world long before the advent of human-made carcinogens. Carcinogens are substances known to cause cancer. However, cancer is a natural part of the human experience and can affect multicellular organisms regardless of their environment. While certain human-made chemicals can contribute to cancer, they are not the sole cause. Taking strict measures to protect against artificially produced carcinogens does not guarantee immunity from cancer. Cancer has multiple causes, some of which are preventable. In 2014, the mortality rate from cancer in the United States exceeded 480,000 individuals. Apart from smoking, risk factors associated with cancer include heavy alcohol consumption, obesity, sedentary lifestyle, and poor nutrition. However, there are also causes of cancer that cannot be avoided. Advancing age is currently the primary non-modifiable risk factor, with 87% of cancer cases in the United States being diagnosed in individuals aged 50 or older, according to the American Cancer Society. Genetic factors can also play a role in cancer development. An individual's genetic code influences the timing of cell division and senescence. Genetic alterations can lead to faulty instructions, potentially contributing to cancer development. Some individuals may inherit a genetic predisposition to a specific type of cancer, referred to as "hereditary cancer syndrome" by medical professionals.

21. Incorporating certain foods into our diet can be beneficial in fighting and destroying cancer cells. It is recommended to consume colorful fruits and vegetables, as they contain valuable nutrients and antioxidants. On the other hand, it is important to avoid foods that may contain carcinogenic ingredients. Being mindful of sugar consumption is also crucial, as it can increase the risk of cancer. It is advisable to control alcohol intake and avoid smoking to minimize the chances of developing cancer. Sugared drinks, juices, desserts, candies, refined breads, and bagels should be limited. Processed meats like sausages and bologna should be avoided, while non-starchy vegetables and a variety of fruits should be included in our daily diet. To reduce the risk of cancer, it is important to avoid exposure to cancer-causing substances and undergo regular cancer screenings. Maintaining a disciplined and healthy lifestyle can contribute to overall well-being. In the field of cancer research, modern scientists are utilizing advanced technologies such as Artificial Intelligence (AI), DNA sequencing, and precision oncology to enhance treatment and diagnosis in the 21st century.

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