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Review on carcinogens materials in chemical laboratories

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Abstract
The review recalls the types of carcinogenic chemicals that are used in laboratories, as well as the types of cigarettes and nicotine for smokers, which are considered essential substances for cancer. Smokers are more likely to develop lung cancer, although lung cancer can also affect people who have never smoked. The risk of lung cancer increases with the length of time you smoke and the number of cigarettes you smoke. If you quit smoking, even after smoking for many years, you can significantly reduce your chances of developing lung cancer. Inhalation of carcinogenic lab materials or smoking causes lung cancer by damaging the cells lining the lungs. When you inhale cigarette smoke that is full of cancer-causing substances (carcinogens), changes in lung tissue begin almost immediately. At first, your body may be able to repair this damage. But with each repeated exposure, the normal cells that line your lungs are increasingly damaged. Over time, the damage causes cells to function abnormally and cancer may eventually develops. Many laboratories carry specific risks, including the risk of exposure to carcinogens, and preventing accidents in the laboratory requires high care and constant vigilance. Examples of risk factors include high voltages, pressures, high and low temperatures, corrosive and toxic chemicals, chemical fumes, radiation, fire and explosions, as well as biological hazards including infectious organisms and their toxins.

Keywords: review, cancerous materials, cancer, chemical cancerous, compounds, tumor

Introduction
Direct carcinogens, due to their ability to destroy DNA or disrupt cellular metabolism. Many radioactive substances are considered carcinogens, but their radioactivity is due to radiation, ie gamma rays and alpha particles, which they emit. Common examples of carcinogens include asbestos, some dioxins and tobacco smoke. Cancer is a disease in which cells are not able to carry out programmed cell death. Carcinogens may increase the risk of cancer by altering cellular metabolism or directly damaging DNA, interfering with biological processes, and inducing uncontrolled malignant cell division, ultimately leading to tumorigenesis. Usually, in severe and difficult-to-treat cases, DNA damage leads to apoptosis, but if the programmed cell death pathway is destroyed, the cell cannot prevent itself from turning into a cancerous cell. There are many natural carcinogens. Such as aflatoxin B1, which is produced by the fungus Aspergillus that grows on stored grains such as nuts. Peanut butter is a strong example of natural microbial carcinogens. Viruses such as hepatitis B and HPV have also been shown to cause cancer. The first carcinogen in animals is the Sarco-Ross virus, which was discovered by the scientist Peyton Ross in 1910. Gasoline, asbestos, kibone, and waste from mining shale benzene were classified as carcinogenic. Since the 1930s, the smoke and tobacco industry has been identified as sources of many carcinogens, including benzopyrene and nitrosamines in tobacco, such as nitrocycline, radioactive aldehydes such as formaldehyde, which is dangerous when used in embalming and making plastics, and vinyl chloride, which is used in the manufacture of PVC is a carcinogen and therefore poses a danger to the PVC industry.

Carcinogenic Chemicals
Carcinogens are chemicals that do not necessarily cause cancer but enhance the activity of other carcinogens that cause cancer. When carcinogens enter the body, the body tries to eliminate them through what is called biotransformation. The purpose of these interactions is to convert carcinogens into decomposing substances that are easily disposed of by the body. However, these interactions may increase the toxicity of the carcinogen. DNA is nucleophilic and so the decaying carbon electrons are carcinogenic, due to DNA attack on them. For example, some alkenes may be poisoned by human enzymes resulting in electrophilic epoxides. The DNA attacks the epoxide, and attaches to it permanently. It is the same mechanism that makes the benzopyrene found in tobacco smoke, aromatic compounds, aflatoxin, and mustard gas carcinogens. That of all people diagnosed with lung cancer in the United States, about 16.8% live for at least five years after diagnosis. In England and Wales, between 2010 and 2011, the five-year lung cancer survival rate was estimated at 9.5%. But the results are

generally worse in the developing world. Cancer is often at a late stage at diagnosis. About 30-40% of non-small cell lung cancer (NSCLC) cases are stage IV, and 60% of SCLC cases are stage IV. English data indicate that about 70% of patients survive the first year when diagnosed with stage 1 cancer, but this is only 14% for those with late-stage cancer. Symptoms for NSCLC include lung symptoms, large tumor size (>3 cm), and degree of spread (stage) and metastasis to multiple lymph nodes that are larger than the other type. Weight loss of more than 10% also occurs. While for SCLC, symptoms include poor performance, sex, central nervous system problems, and liver problems at the time of diagnosis. Lung cancer was uncommon before the advent of cigarette smoking. It was not even recognized as a distinct disease until 1761. Various aspects of lung cancer were further described in 1810 with malignant lung tumors accounting for only 1% of all cancers seen at autopsy in 1878, but rising to 10-15% by the early 1900s. The number of cases in the medical literature was only about 374 worldwide in 1912 but upon review of autopsies it showed that the incidence of lung cancer had increased from 0.3% in 1852 to 5.66% in 1952. In Germany in 1929, a physician realized Fritz Lickett The relationship between smoking and lung cancer. The British Physicians Study, published in the 1950s, was the first solid epidemiological evidence for the link between lung cancer and smoking. As a result, in 1964, surgeons in the United States recommended that smokers stop smoking.

The dangers of radon were first recognized among mountain miners in Saxony. These mines were rich in uranium with radium. The miners developed lung disease, which was eventually recognized as lung cancer in the 1870s. Despite this discovery, mining continued into the 1950s, due to the USSR's demand for uranium. Radon was confirmed as a cause of lung cancer in the 1960s. The first successful pneumonectomy for lung cancer was performed in 1933. Radiation therapy has been used since the 1940s. Radical radiotherapy, initially used in the 1950s, was an attempt to use higher doses of radiation in patients with relatively early-stage lung cancer who were unfit for surgery. In 1997, continuous accelerated radiotherapy was seen as more effective than conventional radical radiotherapy. With small cell lung cancer, initial attempts in the 1960s at surgical resection and radical radiotherapy were unsuccessful. In the 1970s, successful chemotherapy regimens were developed.

Calcium

Some studies have found an association between calcium intake and a lower risk of breast cancer. The Nurses' Health Study found that calcium intake in a regular diet reduces the risk of breast cancer to 33%, and the Food Association for Cancer Prevention unanimously agreed in its second study that the risk of breast cancer is reduced by 20% when the body receives 1250 mg of calcium. A study of women's health showed an inverse relationship between total calcium and the risk of premenopausal breast cancer. In two other studies, one in France and the other in Finland, they showed that there is an inverse relationship between calcium intake and breast cancer, Calcium element reduces cell proliferation and leads to differentiation of the mammary glands. Increased calcium intake in foods reduces the small epithelium of the chest glands due to fat, and also reduces the manufacture of carcinogens in the body. Breast density is positively associated with breast cancer. Eating calcium in a diet reduces the thickness of the breast. Increasing the proportion of calcium in the food has been found to reduce epithelial membrane diseases, which are a precursor to breast cancer.

Iodine deficiency

The protective effects of iodine on breast cancer have been postulated from epidemiological evidence and described in animal models.

Chemical Compounds that cause Cancer

Bisphenol is a chemical compound used in the production of plastics and has a role in many commercial products such as laptop computers, baby bottles, containers and water tubes, as well as used in the manufacture of laboratory and hospital equipment. Bisphenol was first produced in 1891, but its estrogenic properties were not discovered until the mid-1930s. At the present time, Xenoestrogen and its work as an endocrine disruptor, due to its collision with hormones inside the body, and thus a cause of disruption of the vital functions of the endocrine glands. The Food and Drug Administration (FDA) has deemed low levels of BPA in foods to be safe, but it remains a challenge as more information emerges over time about the effects of the chemicals. Prenatal exposure rates to environmentally relevant doses of BPA show an increase in the number of intraductal hyperplasia (precancerous lesions) of the mammary glands that appears during adolescence, whereas higher doses induce the development of carcinomas in breast tissue. Animals exposed to BPA before birth develop or grow significant tumors, and all studies have shown an increased susceptibility to mammary gland tumors that appear at puberty. in her mammary gland. The research concluded that the exposure of fetuses to low doses of (BPA) leads to the modification of the formation of the mammary gland, and thus the presence of ulcers that precede cancer and compound tumors. In carcinomas of extinct mammals in this study, scientists exposed newborn/prepubertal mice to formula-fed BPA at various concentrations of 0, 25, and 250 mcg/kg of weight per day for tumorigenesis studies, and an egg was exposed to 30 dimethylbenzanthracene. mg/kg body weight on the 50th day of life. DMBA stimulates the presence of cancer in mammals and allows mammalian cancer-forming chemicals to increase the number of infected mammals. The results of the study showed that female mice in control, BPA 25, and BPA 250 groups administered by the carcinogen displayed any dose depending on the increase in BPA in mammary tumors. The groups were 2.84, 3.82, and 5.00 in mice carrying breast tumors, respectively. Treatment with BPA also reduced tumor latency, with median tumor latency between 65 and 53,

and 56.5 days for the 0, BPA 25, and BPA 250 groups respectively. Exposure of mothers to BPA during lactation reduced the first tumor latency time, as well. It led to a higher number of carcinogens caused by mammary tumors in female offspring. If this effect is found in rodents, it applies to humans, even if exposure to BPA is low, because it will contribute to an increased risk of breast cancer. The incidence of spontaneous breast cancer in women is associated with prolonged exposure to high levels of estrogens, such as dimethyl-estrogen. Disruption of normal hormonal actions. This study provides evidence of the estrogenic effect of dimethol. In this study, human breast epithelial cells called MCF-10F were treated with 10-3 M 10-5 M, 10-4 M, 10-6 M BPA and continuously for two weeks, the treated cells died. "10-3 M BPA" on the second day of treatment, concentrations of "10-4 M BPA" were also toxic to the cells of the epithelial tissue, and they died in turn on the fourth day of treatment. This information indicated that concentrations of BPA are toxic to MCF- cells. 10F cells. After a two-week observation, it was observed that the cells formed in high percentage on channel-like structures in collagen. MCF-10F cells were treated with 5-10 M and 10-6 M BPA with a high percentage of solid mass 20% 27%, respectively. These data indicate that The estrogenic dimethol is able to induce neoplastic transformation of human breast epithelial cells. Genetic changes are involved in the early stages of cancer initiation by altering ductulogenesis. BPA was able to induce transformation of human breast MCF-10F epithelial cells. After treatment with EDM, the cells produced fewer collagen tubes and more solid masses. The consumer group recommended that people who want to reduce their exposure to bisphenols should stay away from canned foods and refined plastic containers (which share the seventh identification code with gum and other plastics) unless they want plastic packaging, it is required that the substance be bisphenol A-free The International Board of Toxicology advises avoiding microwave food in plastic containers, putting plastic in the dishwasher, or using harsh detergents on plastic to avoid leakage.

Aromatic amines

Aromatic amines are chemicals that are created in the manufacture of products such as dyes, polyurethane products, and some pesticides. It is also found in cigarette smoke, fuel exhaust, and on burnt meat. The three types of aromatic monocyclic, polycyclic, and heterocyclic amines have been found in recent studies of breast health. Monocyclic amines in their entirety have been classified as carcinogens in mammals. Studies have shown that women who eat excessive amounts of very flat meat are exposed to heterocyclic amines and develop breast cancer that coincides with the postmenopausal stage. human tissue.

Benzene

Benzene is a petrochemical solvent. Most exposure to gasoline stems from air pollution from industrial fires, gas and exhaust fumes, as well as cigarette smoke. The World Cancer Research Agency and the National Toxicology Program have classified benzene as a human carcinogen. Several studies have indicated an association between benzene exposure and breast cancer risk. Laboratory studies on mice have shown that exposure to high levels of benzene leads to breast cancer.

Repeller

Although DDT was banned more than 20 years ago, studies have shown that trace amounts of DDT are still found in some agricultural products, as well as in human and animal milk. While there was a contradiction in the findings of individual studies, the most recent evidence reviewed included that exposure to DDT before puberty increases the risk of developing breast cancer in the future.

Ethylene oxide

Ethylene oxide is a chemical found in some personal care products and primarily used in perfumery. It is also used to sterilize various medical instruments. The National Toxicology Program has classified ethylene oxide as a human and animal carcinogen. In a study conducted by the National Institute for Occupational Safety and Health in the presence of 7,576 women, a positive relationship was found between the incidence of breast cancer and exposure to ethylene oxide during the medical sterilization process. Also, putting human breast cells with small amounts of ethylene oxide in the laboratory can damage DNA in breast tissue.

Aromatic hydrocarbons

Aromatic hydrocarbons are combustible chemical products from burning coal, fuel, cigarette smoke, and various other sources. PAHs are mostly found in the air and in the breath through the body. PAHs easily accumulate and can reproduce estrogen. PAHs can also be toxin genes, meaning they have the ability to damage DNA. Vinyl Chloride Release Vinyl chloride is produced when polyvinyl chloride (PVC) is made. Polyvinyl chloride (PVC) is found in plastic packaging, outerwear, plastic toys and other plastic products. Vinyl chloride can be found in smoking cigarettes, and in the air around garbage. It can also be present in wastewater when PVC is made. The National Toxicology Program and the International Agency for Research on Cancer have classified vinyl chloride as a human carcinogen.

Exposure to Carcinogens while working

Processes to guard against laboratory misfortunes embrace safety education or training, establishment of safety policies in the laboratory, safety checks of experimental designs, use of personal protective equipment, and a

buddy system for specified hazardous operations. Laboratory work in many countries is subject to health and safety laws. In some cases, laboratory activities can create environmental health hazards, for example, the deliberate or accidental discharge of toxic or infectious substances from the laboratory into the environment.

Toxic and carcinogenic substances (toxic trace elements)

Arsenic

Arsenic derived at the highest of the slant of hazardous affluences published in 1999 in the United States of America due to its frequent presence in the situation and its toxic activity, and the possibility of human exposure to this element. Arsenic is followed by lead, mercury, vinyl chloride, benzene, PCBs, cadmium, and benzo(e) pyrene (source: Agency for Toxic Substances and Disease Registry, ATSDR). The amount of non-hazardous arsenic when ingested by mouth is likely to be 0.3 mcg/kg body weight per day.

Mercury

Mercury poisoning comes from food ingestion of organic mercury compounds such as dimethyl mercury (CH3, -Hg - CH3). وAnd methyl mercury salts, and pentyl mercury salts The previous substances are very toxic and soluble in fats, and they are directly absorbed and accumulate in red blood cells and the central nervous system. Some of them use fungicides and for treating seeds (spraying seeds). Methylmercury compounds are made from deposits of inorganic mercury salts found at the bottom of lakes and rivers. Thus, the amount of these compounds is likely to increase in fish and other organisms that live in water. The level of natural mercury in the environment appears to have stabilized over the past 50 years. Records of mercury poisoning in Japan indicate that it was caused by the consumption of fish caught from waters heavily contaminated with industrial waste water containing mercury, and that the cause of poisoning in Iraq was due to the consumption of mercury-rich grain seed flour for use in agriculture. The dose that an adult 70 kg can carry is 0.35 mg Hg per week, including a maximum of 0.2 mg of methylmercury, which is highly toxic. It gives an average intake of food, mostly fish consumption.

Lead

The pollution of the environment with lead increases with the expansion of industrialization and the emissions coming from cars that run on fuels added to lead. Tetraethyl lead is added to fuel to improve beating and to increase the octane number, and it is converted with fuel combustion to $PbCI_2$, Pbo and other inorganic compounds of lead. It was found that the bulk of these compounds in its width bar. The fuel to PbCl, Pb0, and other inorganic compounds of lead. It was found that the bulk of these vehicles are in a strip of approximately 30 m width along the highways, and the lead level decreases sharply after this distance. At a distance of 100 meters from a heavy road, the level of lead in the atmosphere decreases by 10 times, and in the soil and plants by 20 times the level in the road. The decrease in the level of lead in the fuel and the increase in the use of unleaded fuels led to a decrease in the extent of pollution. It is noteworthy that lead contamination of the environment did not lead to a significant increase in the level of lead in foods. Because the lead in the soil is stopped (it does not move), and therefore the increase in the level of lead in the plant is not commensurate with the extent of soil contamination. The broad surface vegetables (spinach, cabbage) may contain higher levels of lead when grown near a lead emitting source. Lead is not transmitted to animals fed contaminated plants because the body does not absorb much lead and most of it is excreted in the faeces. Other sources of lead contamination include lead tin in cooking utensils, welded metal cans, and their lead coating, especially if the food is acidic. Previous sources of pollution are less important. After 1.75 mg of lead per week as the tolerable dose for adults of weight 70. Analysis of hair and bones indicated that human lead contamination in the pre-industrial era was higher than it is today. This is due to the presence of lead pipes used to bring drinking water and tin-coated utensils It contains lead and the frequent use of lead salts to put a thick, shiny layer on pottery used as kitchen utensils.

Cadmium

The cadmium ion is not similar to the lead ion and mercury, because it is directly absorbed by plants and distributed evenly throughout all their tissues. Therefore, decontamination by removing the husk and removing the outer leaves, as is the case with lead, is not possible here. Some wild mushrooms, horse mushrooms, giant mushrooms, etc.), peanuts and flax seeds contain higher amounts of cadmium. When consumed, the cadmium intake increases the finer the flaxseed is ground. The sources of pollution are industrial wastewater and sludge from filtering plants, which are often used as fertilizers. Long-term intake of cadmium leads to its accumulation in human organs, especially in the liver and kidneys, where the level of -0.3 0.2 mg cd / g causes renal cortex. The estimated dose that an adult human can tolerate (70 kg) per week is 0.49 mg cadmium. In general, recent studies show that the concentration of toxic trace elements, lead, mercury, and cadmium tends to decrease. This is partly due to the improvement in the analysis of trace elements and the actual reduction in foods., and Radioactive nuclides.

Acetophenone

The lethal dose of acetophenone is estimated to be about 815 mg/kg (orally in rats), and acetophenone has recently been classified as a group IV carcinogen (not carcinogenic to humans), with confirmation that it does not cause carcinogenic effects in humans although there are no studies to measure the possibility of Cancer in humans is caused by acetophenone, while animal studies have shown that it causes chromosomal abnormalities in hamsters.

Deodorants

Much has been said about the possibility of aluminum-containing deodorants that are used under the armpits for breast cancer, as the most common site for breast cancer is the upper outer quadrant of the breast. Aluminum salts, such as those used in deodorants, have recently been categorized as metallo estrogens—a new class of powerful environmental estrogens. In the research published in the Journal of Applied Toxicology. Dr. Philippa and Dr. Darber noted that aluminum salts increase the levels of estrogen related genes in human breast cancer cells in vitro. Fortunately, this external relationship between aluminum salts and estrogen activity does not mean an increased risk of breast cancer in humans. . The lack of a link between deodorant and breast cancer has become the topic of a number of research articles

Nitrate, nitrite

Plants of group A can store much more nitrate than those of group B, since the amount of nitrate in them depends, among other things, on the amount of nitrogen fertilizer used for their growth. Even light plays a role because some plants store more nitrate when they lose light, in addition to the properties of the soil. One of the sources of nitrates for humans is animal food and drinking water. It was calculated from the National Consumption Study that nitrate intakes were high in children from 64 years of age. It is followed by women and men who prefer fruits and vegetables in their meals rather than meat and fish. It was found that the acceptable daily dose of nitrate is used by 23-40% of the population. It is noteworthy that the amount of nitrate formed every day in the human body is about 1 mg / kg of body weight, which is equivalent to the entire intake of food. The precursor of nitrate in humans is arginine, which is cleaved to give NO and sterolin. NO is oxidized to, N2O3, which reacts with water and gives nitrate. Hemoglobin oxidizes nitrites to nitrates, giving rise to methemoglobin, which cannot transport oxygen. Therefore, nitrates are toxic, especially to children (cyanosis), because their methemoglobin reductase is still weakly active. This enzyme returns methemoglobin to hemoglobin. Nitrate toxicity starts from being reduced to nitrite by bacteria. In humans, about 25% of the nitrate absorbed from food is removed by saliva, and up to 7% of it is due to nitrite in the oral cavity within 24 hours through the activity of bacterial nitrate reductase, and it is transported to the stomach. About 90% of the amount of nitrite that reaches the digestive system comes from the return of nitrate. Reduction of nitrite by bacteria led to the hypothesis that toxic nitrosamines and amines could be endogenously formed from nitrosation of amines, and this risk was exaggerated. Endogenous nitrate has been described as practically insignificant in the Nutrition Report since 1996

Nitrosoamines and nitrozoamides

Nitrosoamines and nitrozoamides are both potent carcinogens. It is obtained from the reaction of secondary amines and amides replaced by N and nitrous acid. Nitroso-Nim* NO or nitrosylhalogenine XNO is the active intermediate. The presence of nitrous and amines in different amounts in many foods has been investigated. The most common of its compounds is dimethylnitrozoamine, which is also the most potent of carcinogens. Some of the efficacy was attributed to nitrosopyridine and nitrosopyrrolidine. In the cured and cured meat products, pickling salt was found to contain 30% of the samples containing Nitrozo dimethyl amine (NDMA). The concentration of nitrozopyrrolidene (1.5 kg/wg) in meat products increases by about 10 times to 15.4% kg/wg) during roasting or frying. In the general sum to mg 1. The inhibition of the nitration reaction is possible, and it is carried out by ascorbic acid, which oxidizes nitrite to its dehydro form, while nitrite returns to NO. Similarly, tocopherols and some food components inhibit substitution reactions. Among the appropriate measures to reduce the danger of internal or external nitrosamines, we mention: ¤ Reducing nitrates and nitrites added to processed meat., Complete abandonment of the use of nitrites is a major health risk, as there are risks of bacterial poisoning, especially botulism.

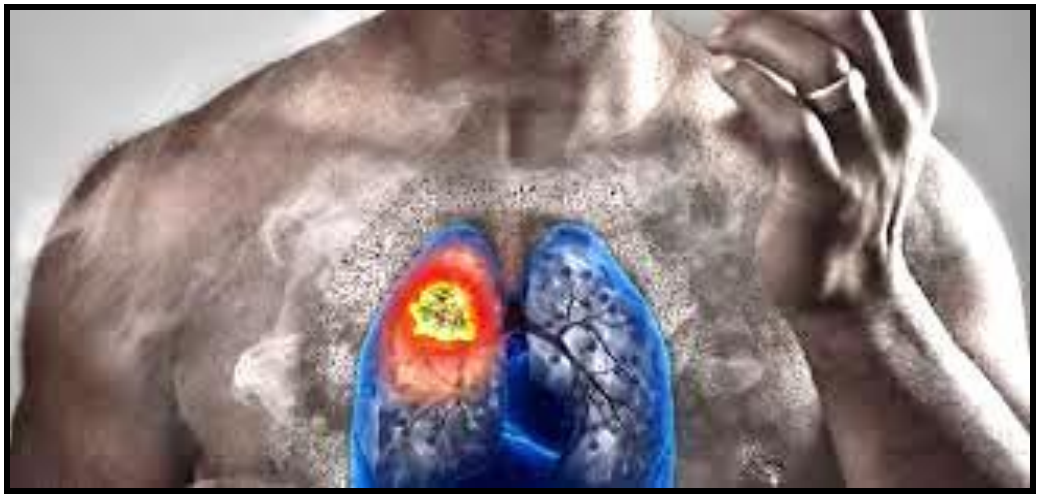

Fig 1: Lung cancer due to nicotine inhalation

Fig 2: Protective equipment from carcinogens in laboratories

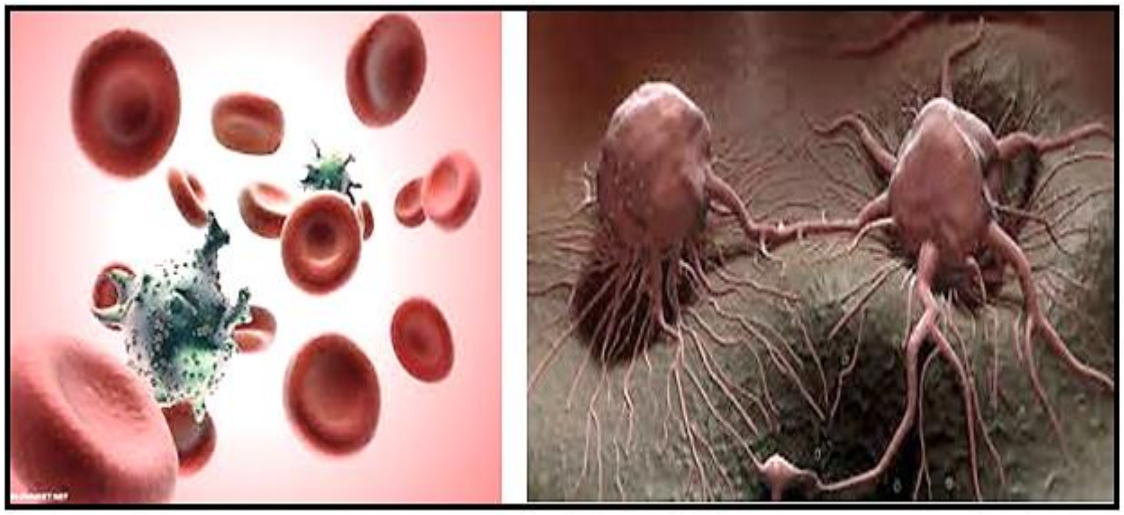

Fig 3: The effect of carcinogens on cell division

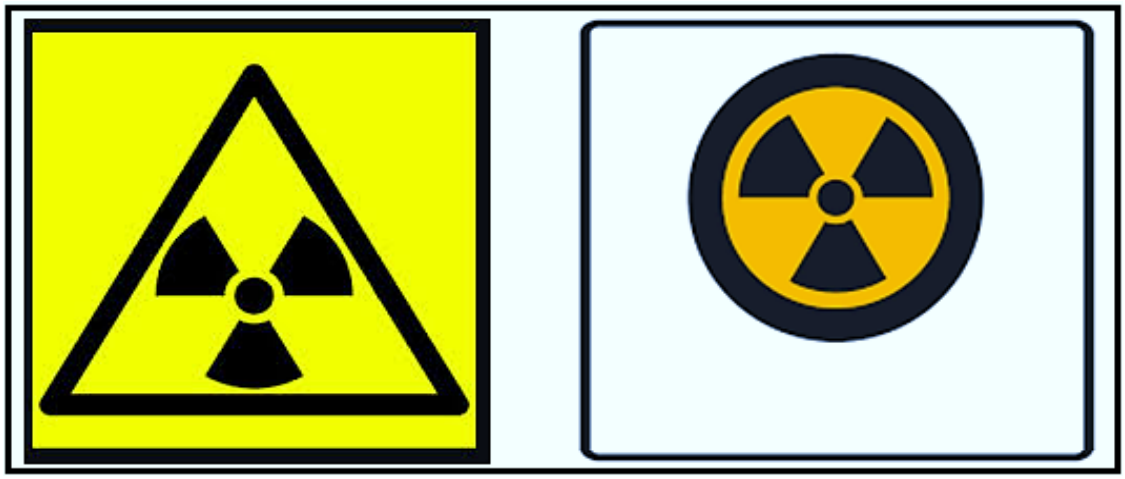

Fig 4: Laboratory markers of carcinogens

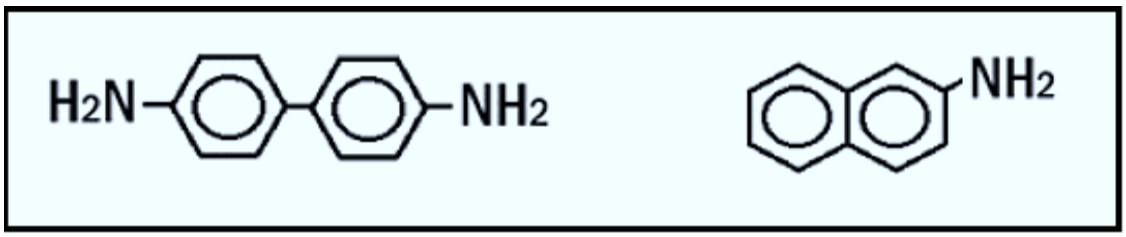

Fig 5: Benzidine and naphthyl amine as carcinogen compounds

Conclusion

From the review, we can conclude that staying away from carcinogens and wearing condoms and masks reduces the incidence of cancer, as well as refraining from smoking. If you've never smoked, don't start smoking. Talk with your children about not smoking so they can understand how to avoid this major risk factor associated with lung cancer. Start conversations about the dangers of smoking with your children early on so they know how to deal with peer pressure. Quitting reduces the risk of lung cancer, even if you've been a smoker for years. You can talk to your doctor about smoking cessation strategies and methods that can help you quit smoking. Options include nicotine replacement products, medications, and support groups.

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