Special article

"Dating" Cancers

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Abstract

Cancer is a generic term for a large group of diseases characterized by the growth of abnormal cells beyond their usual boundaries that can invade adjoining parts of the body and/or spread to other organs. There are risk factors that increase a person's chance of developing cancer. Knowledge would be beneficial as a areminders that very likely the person is about to have an "appointment" or "date" with a forth-coming diseases. Thus, effective preventive and curative interventions would ideally be planned in favor of so-called precision medicine.

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According to the World Health Organization's 2016 report, cancers (malignancies or malignant tumors) are human most dreaded malady and the most prevalent such disease in the world. There are many varieties affecting almost every human organs. Their inciting causes are related to human behaviors, certain environments, genetic traits, or a combination of all these factors. Notwithstanding these aspects, the majority of cancers are caused by inappropriate behaviors, somewhat like dating diseases - inviting these potentially fatal disorders into one's life.

The following is a sampling of some of the major types of cancer.

Skin cancers:

Basal-cell carcinoma and *melanocarcinoma* occur in certain persons who expose themselves to sunlight during frequent sun-bathing episodes. However, these forms of cancer develope more commonly in persons of certain races, especially fair-skinned individuals and those with susceptibility genes.

Kaposi sarcoma appears in the skin, especially in certain advanced cases of human immunodeficiency virus (HIV) infection, at which time the patient's immunity has become extremely low; it is commonly seen in cases of full-blown AIDS. It is caused by human herpes virus-8 (HHV-8), which is also known as Kaposi sarcoma herpes virus (KSHV). In 1981 the emerging of Kaposi sarcoma in patient was the main presenting sign of AIDS.

Brain Cancers:

About 5 percent of brain tumors may be linked to hereditary genetic factors or conditions, including Li-Fraumeni syndrome, neurofibromatosis, nevoid basal cell carcinoma syndrome, tuberose sclerosis, Turcot syndrome, and von Hippel-Lindau disease.

Although, there are no known ways currently to prevent a brain tumor through lifestyle changes, some studies of diet and vitamin supplementation seem to indicate that dietary N-nitroso compounds, which are formed in the body from nitrites or nitrates found in some cured meats, cigarette smoke and cosmetics, may raise the risk of brain tumors.

Head and neck cancers:

Head and neck cancers comprise a group of cancers that are anatomically located in the oral cavity, the oropharynx, the nasal cavity, paranasal air sinuses, the nasopharynx, the hypopharynx and the larynx. Most of these cancers are squamous cell carcinoma (HNSCC). They are the result of tobacco and/or alcohol abuse or infection with human papilloma viruses (HPV). Besides, Kaposi sarcoma may affect the oral cavity as well as skin and respiratory tract in cases whose immunity is lowered during chemotherapy for other malignancies.

Lip cancer: Epithelial cell carcinoma of the lips frequently occurs in persons who have the habit of chewing betel nut, and sucking a lump of dried tobacco leaves inserted between the lips and the teeth.

Nasopharyngeal carcinoma (NPC) is commonly associated with Epstein-Barr virus infection, but co-factors, such as exogenous exposures (i.e. consumption of dietary nitrosamines, occupational exposure to wood dusts, and tobacco use including cigarettes, cigars, pipes, chewing tobacco and snuff), play important role in the pathogenesis. Frequent and heavy consumption of alcohol is also a risk factor. The disease is common in people who live in southeast China including Hong Kong. Men are two times more likely than women to develop nasopharyngeal cancer.

Eating salt-cured fish and meats on a regular basis increases a person's risk of developing NPC. Recent research suggests that people who have used marijuana may also be at higher risk. Epstein-Barr virus that is the cause of mononucleosis also plays a role in causing NPC.

A review by Hildesheim and Wang of the literature published between 2000 and 2011 on Genome-wide association studies (GWAS) in NPC

encountered genes within the major histocompatibility complex region on chromosome 6_p21, where the human leucocyte antigen (HLA) genes are located. A further comprehensive study reported in 2015 by the Cancer Genome Atlas Network showed that human-papillomavirus-associated tumors are dominated by helical domain mutations of the oncogene *PIK3CA*, novel alterations involving loss of *TRAF3*, and *11q13/22*.

Esophageal Cancer

Esophageal carcinoma is commonly seen in persons with the habit of eating extremely hot rice soup and drinking hot tea. Formerly, Chinese people, especially strenuous laborers, were victims.

Cigarette smokers are also prone to develop esophageal carcinoma in old age.

Gastric cancer:

Stomach cancer occurs most commonly in people older than 55. Men are twice as likely to develop stomach cancer as women.

Helicobacter pylori, a common bacterium that causes stomach inflammation and ulcers, is considered one of the main causes of stomach cancer. Testing and treating for *H. pylori* is recommended for persons having had a first-degree relative, who had been diagnosed with stomach cancer.

Stomach cancer is more prevalent in Black, Hispanic and Asian people than White. Eating a diet high in salt, including foods preserved by drying, smoking, salting, or picking, has been linked to an increased risk of stomach cancer.

People who have chronic gastritis and pernicious anemia have a higher risk of stomach cancer for as yet unclear reasons. Tobacco use and drinking a lot of alcohol also increase the risk of developing stomach cancer.

It is not yet clear why excess body weight increases a man's risk of developing stomach cancer.

Colorectal Cancer:

The majority of colorectal cancer cases occur in people older than 50. However, the incidence rate has increased by nearly 2 percent per year in adults younger than 50. Inherited colorectal cancers are less common (about 5%) and occur when gene mutations, or changes, are passed within a family from one generation to the next. If a person has a family history of colorectal cancer, his or her risk of developing the disease is nearly double. Only genetic testing can determine a genetic mutation.

Members of families with certain uncommon inherited conditions also have a significantly increased risk of colorectal cancer. These include familial adenomatous polyposis, juvenile polyposis syndrome, and Peutz-Jeghers syndrome, for instances.

People who have had adenomas have a greater risk of colorectal cancer. Polyp removal can prevent colorectal cancer.

People with a personal history of colorectal cancer and women who have had ovarian cancer or uterine cancer are more likely to develop colorectal cancer.

Racial preponderance is evident in Black people. Black women are more likely to die from colorectal cancer than women from any other racial groups.

People who lead an inactive lifestyle, meaning no regular exercise and a lot of sitting, and people who are overweight or obese may be at increased risk of colorectal cancer. Current research consistently links eating more red meat and processed meat to a higher risk of the disease. Diets rich in fruits and vegetables help reduce the risk of colorectal cancer. Aspirin and other non-steroidal anti-inflammatory drugs, calcium and vitamin D supplements may help to reduce the risk of colorectal cancer.

Smokers are also more likely to die from colorectal cancer than nonsmokers.

Inflammatory bowel diseases, such as ulcerative colitis or Crohn's disease, increase the risk of colorectal cancer.

Liver Cancer:

Liver cancers are common in Thailand. *Hepatocellular carcinoma (HCC)* is prevalent in the central provinces in persons infected with hepatitis B and C viruses, whereas cholangiocarcinoma is common in northeastern and northern provinces, where liver fluke *(Opisthorchis viverrini)* infestation is endemic. Liver flukes infest persons who eat partially cooked fresh-water fish. Khon Kaen province has the highest prevalent of CCA in the world.

Other risk factors: (a) liver cirrhosis from chronic alcoholic toxicity, hepatitis B and C infection, and fatty liver; (b) non-alcoholic steatohepatitis (NASH); (c) frequent consumption of foods containing aflatoxin, nitrosamine, vinyl chloride from heated plastic food containers; (d) taking arsenic in traditional medicine concoctions, and in cigarette smoke; and (e) taking oral female hormone contraceptives.

Pancreatic Cancer:

Most people who develop pancreatic cancer are older than 45. The disease is more common in men than in women. Black people are more likely than Asian, Hispanic or White people to develop pancreatic cancer. People of Ashkenazi Jewish heritage are more likely than others to develop pancreatic cancer.

Pancreatic cancer may run in the family and/or link with genetic conditions that increase the risk of other types of cancer.

Smoking, obesity and fattening diets are risk factors for pancreatic cancer.

Person who have had diabetes for many years are at increases risk of developing pancreatic cancer. In addition, suddenly developing diabetes later in adulthood can be an early sign of pancreatic cancer.

Chronic pancreatitis following repeated episodes of acute pancreatitis in persons consuming alcoholic beverages may increase the risk of developing pancreatic cancer.

Exposure to certain chemicals such as pesticides, benzene, certain dyes and petrochemicals, may increase the risk of developing pancreatic cancer.

Cancers of the Chest:

All structures of the chest are subject to neoplastic growth but the incidence of tumor on the bronchus is greater than the incidence at all other sites combined.

Laryngeal cancer:

This form of cancer occur in pipe smokers more often than in cigarette smokers, perhaps due to tobacco smoke lingering in the laryngeal part the throat for a longer duration before passing down to the lower respiratory tracts.

Lung cancers:

At the beginning of the last century, carcinoma of the lung was a relatively rare disease seen occasionally at post-mortem examination. The striking increase in incidence of the disease since that time has been one of the most remarkable phenomena observed in medicine. The increase is real to the fact that lung has become *"the disease of civilization"*. The soaring increase in tobacco consumption is to blame for the increasing incidence of cancer of the lung.

Cigarette-smoking has been accepted as a principle cause of cancer of the lung; in other words, most cases of lung cancers (about 80%) are due to cigarette-smoking. Cigar- and pipe-smoking are notably much less responsible. The habit of smoking may play upon the diseases' incidence; those who smoke their cigarettes down to a miniscule stub are more prone to develop lung cancer than those discard half the cigarette used. A prolonged period of smoking before cessation of smoking is an important factor.

In one report, among non-smoker the incidence of this form of cancer was 3.4 cases per 100,000 living population, whereas in smokers of half a pack of cigarettes per day the incidence was 59.3 per 100,000 and in those who smoked one to two packs per day it was 217.3 per 100,000. The association between excessive smoking and lung cancer holds true for women as well as for men.

The carcinogenicity of smoke condensates, in particular tar and its derivatives, includes the polycyclic aromatic hydrocarbons such as 3, 4-benzpyrene as potent carcinogen. Poloniun-210 in tobacco leaf and cigarette smoke emits alpha particles which injure bronchial epithelium and produce a carcinogenic effect. Arsenic content in cigarette papers may additionally account for the carcinogenic effects of cigarette smoke. Worthy of note is that the harmful toxic substances in tobacco smoke have been much reduced by replacing the use of lighted (burning) tobacco-cigarettes with the modern forms of e-cigarettes, from which carcinogenic tar has been removed while retaining the addictive nicotine.

Exposure to airborne radiation, especially radon gas in uranium mine and indoor radon, has been claimed to be the second leading cause of lung cancers. The principal radiation hazard may be not radon itself but its radioactive daughter, i.e. polonium-210.

Pleural Mesothelioma:

There is a complex relationship between malignant mesothelioma and its etiologic agents. Currently, most pleural mesotheliomas in men in Europe and North America are attributable to amphibole asbestos exposure, especially for workers heavily exposed to commercial forms of amphibole asbestos. Following occupational chrysotile exposure the incidence of pleural mesothelioma ranges from 0% to 0.47%. In certain geographic locations, other types of mineral fibers (erionite, fluoro-edenite and balangeroite) can induce mesothelioma.

Therapeutic radiation for other malignancies is a well-established cause of mesothelioma, with relative risks as high as 30 percent.

Racial variations are also noted, such as higher prevalence in Western White and a lower prevalence in Asians. A small number of mesotheliomas (probably about 1%) are caused by germline mutations/deletions of BRCA1-associated protein-1 (BAP1).

Prostate Cancer:

Prostate cancer is increasing among Asian men living in urbanized environments, particularly among those who have a lifestyle with less physical activity and a less healthy diet. Prostate cancer that runs in a family occurs about 20 percent of men due to a combination of shared genes and shared environmental or lifestyle factors. Hereditary prostate cancer is rare and accounts for about 5 percent of all cases. Genes that may carry an increased risk of developing prostate cancer include HPC1, HPC2, HPCX, CAPB, ATM and FANCA, but none of them has been shown to be specific to the disease. Research to identify genes associated with an increased risk of prostate cancer is ongoing.

Men may have mutations in the BRCA1 and BRCA2 genes, which cause a small percentage of aggressive familial prostate cancer; they should consider screening for prostate cancer at an earlier age.

Testicular Cancer:

Men with cryptorchidism have increased risk of developing testicular cancer. Most guidelines recommend orchidopexy for cryptorchidism between the ages of 6 and 15 months.

Kidney Cancer:

Smoking tobacco doubles the risk of developing kidney cancer, i.e. about 30 percent in men and about 25 percent in women. There is a link between kidney cancer and obesity. Hypertensive men may be more likely to develop kidney cancer. Overuse of certain medications, e.g. painkillers containing phenacetin, aspirin, acetaminophen and ibuprofen, have been linked to kidney cancer.

Finding a specific genetic mutation can help his or her doctor develop an appropriate plan the best treatment options.

Genetic conditions that increase a person's risk of developing kidney cancer include: Von Hippel-Lindau syndrome, Birt-Hogg-Dube syndrome, and Tuberous sclerosis complex.

Bladder Cancer:

The most common risk factor is cigarette smoking, including smoking cigars and pipes. Smokers are 4 - 7 times more likely to develop bladder cancer than non-smokers.

Chemical used in the textile, rubber, leather, dye, paint and print industries, and chemicals called aromatic amine can increase the risk of bladder cancer.

Chronic bladder problems, such as bladder stones and infections may increase the risk of bladder cancer. People who have schistosomiasis, a parasitic disease, are more likely to develop squamous cell bladder cancer.

People who have had chemotherapy with cyclophosphamide, and pioglitazone (diabetic drug) have a higher risk of developing bladder cancer.

People with an inherited condition called Lynch syndrome (hereditary non-polyposis colorectal cancer) may have increased risk of developing bladder cancer.

Arsenic is a naturally occurring substance when found in drinking water, it has been associated with an increased risk of bladder cancer.

Breast and Ovarian Cancers:

DNA mutations to the tumor suppression genes, such as BRCA1 and BRCA2 genes, are associated with hereditary breast and ovarian cancer (HBOC). However, inherited breast cancers are not common.

Women who began menstruating before ages 11 or 12 or went through menopause after age 55 have a somewhat higher risk of breast cancer. Estrogen and progesterone are hormones that control the development of secondary sex characteristics, such as breast development, and pregnancy. Longer exposure to these hormones increases breast cancer risk. Hormone replacement therapy after menopause (post-menopausal hormone therapy) increases a woman's risk of breast cancer.

Postmenopausal women who are overweight or obese have an increased risk of breast cancer. Regular physical activity may protect against breast cancer by helping women maintain a healthy body weight, lowering hormone levels, or causing changes in a woman's metabolism or immune factors. More affluent women have a higher risk of developing breast cancer than less affluent women.

Family history: First degree relatives, who have been diagnosed with breast cancer or ovarian cancer, especially before age 50; if two first-degree relatives develop breast cancer, the risk is five-fold higher than the average risk.

Prevention: For women with BRCA1 or BRCA2 genetic mutations, which substantially increase the risk of breast cancer, preventive removal of the breasts appears to reduce the risk of developing breast cancer by at least 95 percent. Chemoprevention is carried out through the use of hormone-blocking drugs tamoxifen and raloxifene to reduce breast cancer risk. Other drugs used include statins and metformin.

Other ways to lower risk of breast cancer includes getting regular physical activity, staying at a healthy weight, limiting amount of alcoholic drinks consumed, and avoiding the use of post-menopausal hormone therapy to ease menopausal symptoms. Breast-feeding may also reduce a woman's breast cancer risk.

Uterine cancer:

Uterine cancer most often occurs in women over 50 years of age.

Fatty tissue in women who are overweight produces additional estrogen that can increase the risk of uterine cancer. About 70 percent of uterine cancer cases are linked to obesity.

White women are more likely to develop uterine cancer than women of other races/ethnicities.

Uterine cancer may run in families where colon cancer is hereditary. For instance, women in families with Lynch syndrome (hereditary non-polyposis colorectal cancer) have a higher risk for uterine cancer.

Radiation therapy for another cancer in the pelvic area have an increased risk of uterine cancer.

Women who eat foods high in animal fat may have an increased risk of uterine cancer.

Risks of uterine cancer are prevalent in women who take hormone replacement therapy after menopause, especially if they are taking estrogen alone, and women who have never been pregnant.

Taking birth control pills reduces the risk of an overgrowth of the uterine lining, lessening the chance of having uterine cancer.

Cervical cancer:

The riskiest factor for cervical cancer is infection with human papilloma virus 16 and 18. Sexual activity with a person who has HPV is the most common way of getting HPV.

Women with lowered immune systems have a higher risk of developing cervical cancer: for instances, persons receiving corticosteroid medications, undergoing organ transplantation, or treatments for other cancers, or who are infected with HIV.

Women who smoke are about twice as likely to develop cervical cancer as women who do not smoke. This includes women who are passive smokers.

Multiple sex partners and taking oral contraceptive pills are also cancer risks.

Epilogue

The authors of this review article assemble the current knowledge of cancer risk factors in order to seek available models to cancel “dates” with forth-coming malicious ailments. Such models include stopping tobacco smoking in order to prevent lung cancer, and undergoing prenatal genetic testing of cord blood for abnormalities in the double strand DNA for predicting future cancer risks and performing repairs on time.

Although most cancers occur in the elderly, certain types are common among those at younger ages: researchers think obesity is to blame. Six different cancers that are associated with obesity increased among adults ages 25-49 years, include multiple myeloma, colorectal, endometrial, gall bladder, kidney and pancreatic cancers.

While some cancers have a fairly clear cause, like smoking for lung cancer, or HPV for cervical cancer, obesity is among the most impactful of these. Excess body weight has linked to 40 percent of cancer cases in the United States, and it is a risk factor for breast, ovarian and liver cancer, endometrial, gall bladder, kidney, pancreatic and multiple myeloma. Some fattening foods, such as processed meats and snacks, have been independently linked to cancer risk.

There are currently several thousand immunotherapy trials under way around the world. These trials are aimed at proving that immunotherapy is a better way for treatment of certain cancers, not only for effectiveness, but also to spare the life-sapping effects of chemotherapy and the years of follow-up surgeries.

In 1996, James Allison, at the University of Texas MD Anderson Cancer Center in Houston, figured out how immune cells could be trained to identify and attack cancer cells, extract blood cells and pick out cancer-fighting T-cells that could recognized proteins in tumor cells. The patients would then get chemotherapy or undergo surgical extirpation to eliminate as much of the existing cancer as possible, before giving transfusion of those immune-enriched cells, a process which would repopulate throughout the patients’ body and attack cancer cells.

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