

Review on risk behaviors affecting lung cancer development

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Abstract: Lung cancer has been the leading cause of death for a long time. Cancer is the leading contributor to death mostly. Lung cancer is one of the leading causes of death compared to other cancers. The objective of this study is to examine the overall picture of Thailand's lung cancer data and to propose strategies for reducing cell proliferation to different parts of the body. This research study was conducted by reviewing the academic literature and research papers related to lung cancer with reference of Chulalongkorn University. This includes definitions, causes, types, treatments, prevention and the main causes that contribute to the increase in lung cancer rates and deaths. As a result, there are several issues that cause lung cancer to spread widely and develop into more severe lung cancers.

Keywords: cancer, lung cancer, casuses of cancer.

1. INTRODUCTION

Cancer is currently a major public health problem for people all over the world, including Thailand. According to statistics from the World Health Organization in 2018, it is estimated that around 18 million people worldwide are diagnosed with cancer and about 9.6 million died from cancer or 1 from 6 people are killed by cancer. The overall situation of cancer in Thailand Statistics shows that cancer is the number 1 cause of death, representing for 16% of all deaths which higher than the death rate from accidents and heart disease 2 - 3 times, or an average of 8 deaths from cancer per hour. An estimated 170,495 deaths and approximately 114,199 deaths from cancer, the top 5 most common cancers are lung cancer, liver and bile duct cancer, breast cancer, colon cancer and gall bladder cancer. The top 5 cancers causing deaths are liver and bile duct cancer, lung cancer, gall bladder cancer, breast cancer and colon cancer, respectively. Lung cancer is the leading cause of cancer deaths worldwide by approximately 1.6 million of people every year [2]. Studies have shown that there are many risk factors for lung cancer. On average, men who smoke are 9 to 10 times more likely to develop lung cancer. [3] Familial genes increase the risk of lung cancer [4] Environmental tobacco smoke increases the risk of lung cancer at 1.34 times [5] Exposure to environmental tobacco smoke increases the risk of lung cancer at 1.34 times, the smoke from solid fuels at 1.80 times [6], the air pollution at 1.0-1.6 times [7] Truck industry diesel smoke increases the risk 30% to 50% [8]. In addition, occupational lung carcinogens include: Asbestos, Arsenic, Cadmium, Beryllium, Chromium, Nickel, Silica, and diesel fumes representing for 10% of deaths from lung cancer [9,10] lung tuberculosis, 3.3 times the risk of lung cancer [11,12]. For example, chronic obstructive pulmonary disease occurs in 40 to 70 % of lung cancer cases, but it is an independent factor [13]. The current situation suggests that cancer is closer to us.

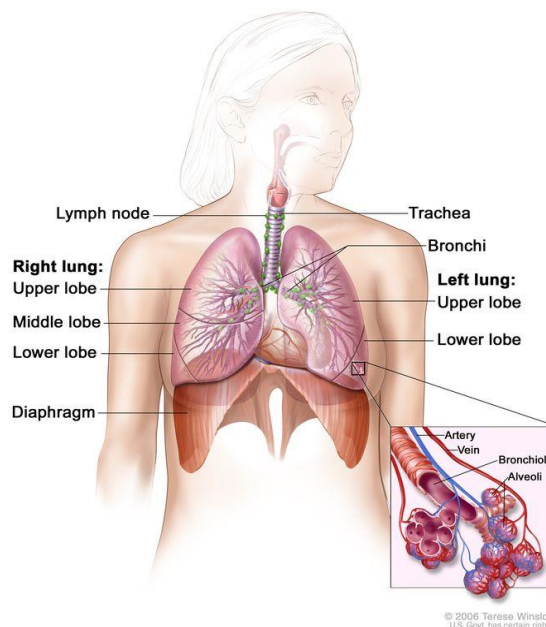
Lung cancer is a common cancer from the cancer registration at the population level in Thailand. The incidence of lung cancer is the second most common among males, after liver cancer. It has an incidence of 22.7 per 100,000 population and the 4th most common among women after breast cancer, cervical cancer and liver cancer. The incidence was 10.1 per 100,000 population [14]. Factors that increase the risk of lung cancer are 1) smoking, both those who smoke themselves and those close to them who are exposed to cigarette smoke also known as "Second hand smoke". Smoking is the main factor at 80-90% because cigarettes are full of carcinogens. When smoke is inhaled, these substances directly damage the tissues in the lungs, causing cell damage and eventually lead to cancer. People who smoke a pack of cigarettes a day for 20 years had an 8 to 20 times increased risk of developing lung cancer. It is used in the construction material manufacturing industry (roof tiles flat tile, ceiling), cement pipe manufacturing industry, rubber vinyl floor tiles, brake linings, insulation

and textile industry. Asbestos is a substance that can cause lung cancer. People who work in factories that use Asbestos are 7 times more likely to develop lung cancer than general people. 3) Radon gas is a radioactive gas produced by the breakdown of radium or Uranium found in buildings or structures that often contain radium-contaminated soil, rock, or sand, other chemicals, such as arsenic, and coal, that patients often get from their industrial occupations or toxic substances from pollution that come from the exhaust pipes of vehicles 4) PM 2.5 dust or tiny dust particles with a molecular size of only 2.5 microns that cannot be seen by the naked eye. PM 2.5 dust increases the risk of lung cancer at 1-1.4 times. When PM 2.5 dust enters the lungs, it causes inflammation and a genetic mutation which can cause lung cancer. Organs and cells in the body will be more and more deteriorated. The people most at risk of lung cancer are around the age of 55 years and over, especially those who smoke and 6) genetics. If there is a family history of lung cancer, it will have an increased risk of lung cancer [15].

Due to the current socio-economic conditions, people have increased risk of lung cancer such as stress increase [16]. Have inappropriate dietary habits which risk of non-communicable diseases (NCDs) [17,18]. including the toxic environment. whether air pollution contamination of natural toxins [19]. This study focuses on collecting, analyzing related academic and research data [20].

Lung Cancer

Lung cancer is a disease in which malignant (cancer) cells form in the tissues of the lung. The lungs are a pair of cone-shaped breathing organs in the chest. The lungs bring oxygen into the body when you breathe in. They release carbon dioxide, a waste product of the body's cells when you breathe out. Each lung has sections called lobes. The left lung has 2 lobes. The right lung is slightly larger with 3 lobes. A thin membrane called the pleura surrounds the lungs. 2 tubes called bronchi lead from the trachea (windpipe) to the right and left lungs. The bronchi are sometimes also involved in lung cancer. Tiny air sacs called alveoli and small tubes called bronchioles make up the inside of the lungs [21].



Symptom of Lung Cancer

Sometimes lung cancer does not cause any signs or symptoms. It may be found during a chest x-ray done for another condition. If you have symptoms, they may include:

Early symptoms of lung cancer

The early stages of lung cancer don't always cause symptoms. When early symptoms occur, they can include signs such as shortness of breath, along with unexpected symptoms, such as back pain. Back pain can occur when tumors cause pressure in your lungs or when they spread to your spinal cord and ribs.

Other early signs of lung cancer may include: A lingering or worsening cough, coughing up phlegm or blood, chest pain that worsens when you breathe deeply, laugh, or cough, hoarseness, wheezing, weakness and fatigue, loss of appetite and weight loss, recurrent respiratory infections such as pneumonia or bronchitis. For late symptoms of lung cancer, additional symptoms of lung cancer depend on where new tumors form. Not everyone with late-stage lung cancer will experience every symptom.

Late-stage symptoms might include: lumps in the neck or collarbone, bone pain especially in the back, ribs, or hips, headaches, dizziness, balance issues, numbness in arms or legs, yellowing of skin and eyes (jaundice), drooping of one eyelid and shrunken pupils, lack of perspiration on one side of the face, shoulder pain, and swelling of the face and upper body.

Additionally, lung cancer tumors can sometimes release a substance similar to hormones, leading to a wide variety of symptoms known as paraneoplastic syndrome. Symptoms include: muscle weakness, nausea and vomiting, high blood pressure, high blood sugar, confusion and seizures [22].

Type of Lung Cancer

Lung cancer is categorized according to the type of cancer:

Small Cell Lung Cancer: Small Cell Lung Cancer: Cancer that tends to spread quickly when cells respond well to chemotherapy. (Chemotherapy) and radiation therapy (Radiotherapy). The main treatment is chemotherapy to destroy cancer cells both at the beginning and prevent them from spreading to other areas. Radiation therapy is used to increase the efficiency of local disease control. This may be treated simultaneously with both chemotherapy and radiation (Chemoradiotherapy) or may consider continual but not concurrent treatment. This depends on the stage of the disease and the patient's physical condition. Doctor's opinion and patient consent cells grow and proliferate rapidly, resulting in rapid death of patients, which is found in 10-15%.

Stage I: Limited Stage Cancer cells are found in one lung and only one lymph node.

Stage II: Extensive Stage Cancer cells have spread outside the chest cavity or spread to other organs.

Non-Small Cell Lung Cancer: In the early stages, the disease has not yet spread or not yet distributed. The main treatment, surgery may consider supplementing with chemotherapy, targeted therapy, immunotherapy and radiotherapy according to indications. In more advanced cases, there is a risk that the disease may recur or spread. The main treatment may be switched to chemotherapy along with radiotherapy. Additional therapies, such as targeted therapy and/or immunotherapy may be considered as indicated, which all depend on the stage of the disease and the patient's physical condition, doctor's opinion and patient consent. It spreads more slowly and can be cured by surgery if detected early. This type of cancer is found at approximately 85-90%.

Stage I when a lump is found in the lung. In this early stage, the patient usually does not show any abnormalities.

Stage II cancer has spread into the lymph nodes at the pole of the lung. Stages I and II are treatable by removing the lump from the body.

Stage III cancer has spread to other lung lobes or spread to the lymph nodes in the middle of the chest cavity or beyond that side of the chest cavity

Stage IV when the cancer has spread to other parts of the body, such as the lymph nodes in the neck, liver, bones, adrenal glands, and the brain [23].

Risk behaviors

There are several risk factors that impact the condition of lung cancer. The most significant risk factor for lung cancer is cigarette smoking. According to estimates, lung cancer diagnosis could be avoided up to 90% of cases. By far, smoking poses the greatest risk for developing lung cancer. Smoking is believed to be the cause of about 80% of lung cancer fatalities, and the %age is likely significantly greater for small cell lung cancer (SCLC). Furthermore, smoking cigars and pipes as well as other tobacco products raises the risk of developing lung cancer. Over 7,000 chemicals make up the deadly mixture that is tobacco smoke. Many are toxic. There are at least 70 types that have been linked to human or animal cancer. The risk of developing lung cancer or passing away from it is 15–30 times higher in smokers than in nonsmokers. Moreover, obesity and being overweight can alter the body in ways that contribute to the development of cancer. Long-lasting

inflammation, elevated levels of insulin, insulin-like growth factor, and sex hormones are a few examples of these changes. The more additional weight and the longer they are overweight, the higher their risk of developing cancer is. To determine if they alter the risk of developing lung cancer, numerous foods and dietary supplements will be examined with many issues to learn constantly. We are aware that beta-carotene supplement users who also smoke have a higher chance of developing lung cancer [24,25,26].

Moreover, Radon gas is the risk factor for lung cancer. The International Agency for Research on Cancer has officially classified Radon gas as a human carcinogen since 1988, 24 years ago. This radioactive gas occurs naturally from the degradation of Uranium, which is found in sandstones around the world until finally becoming radium and radon gas. When entering the respiratory system, Radon gas decays, releasing high-energy alpha radiation that damages the cells lining the airways and eventually becomes cancer. According to epidemiological studies of thousands of miners around the world by using a study period of more than 50 years in different areas, it found that Radon gas is a direct risk factor for lung cancer depending on age, exposure time and the initiation of touch. In our country, there has been a study on the relationship of Radon gas with lung cancer in the Northern provinces. This is because it is the area with the highest incidence of lung cancer in Thailand. It found the level of Radon gas in the residence and the length of time they smoke or have ever smoked, which is a significant risk factor associated with developing lung cancer [27].

Radiation causes cancer at 2% of all cancer cases.

1. Radiation from electrical appliances and household appliances as well as electromagnetic waves from mobile phones. This is the notion that it may contribute to the incidence of Leukemia and brain cancer. However; there is no conclusive evidence recently.

2. Radiation from an atomic reactor source. There is conclusive evidence that unnecessarily high doses of radiation can cause cancer. This can be seen in examples of World War II atomic bombs on Hiroshima and Nagasaki, and the atomic power plant at Chernobyl. The next 5-10 years later, people in the radiation exposure area resulting in various types of cancer subsequently, such as Thyroid cancer, bone and tissue cancer and Leukemia, etc [28].

Heredity and Cancer risk

Although hereditary cancer risk is only 5% when compared to the risk caused by external factors may seem petty. But with the low risk, it is still inevitable because you can only know when symptoms have occurred or have been found by diagnosis. Disease in the case of hereditary cancer caused by the transfer of abnormal genes from parents to offspring which can be passed on to the next generation indefinitely and also can cause cancer at an early ages. In every person, there are 2 groups of genes that are responsible for regulating cell growth, namely the BRCA1 gene and the BRCA2 gene. If there is abnormal growth of these genes, it can lead to breast cancer and ovarian cancer and can also be inherited genetically. If a woman inherits an abnormal gene, she has a higher chance of developing breast and ovarian cancer. In case of a man, it increases the chance of getting breast cancer as well [29].

P.M. 2.5 dust, Risk factor for Lung cancer

The World Health Organization (WHO) sets the average PM 2.5 particulate matter in the air as if it exceeds 25 micrograms per cubic meter, it is considered dangerous to health. While Thailand defines the danger of PM 2.5 dust at 50 micrograms per cubic meter, More or less of the standard, PM 2.5 dust today is considered critical with almost 100 micrograms per cubic meter especially around roadsides or areas with heavy traffic and around construction sites. In addition, environmental scholars provide additional information that the major problem of PM 2.5 dust is caused by Nitrogen Dioxide (NO₂) being released into the air so much that it reacts chemically with ozone and sunlight until it becomes a tiny dust. PM_{2.5} dust can be inhaled deep into the respiratory tract and lungs and cause irritation, burning nose, coughing, sneezing, sputum, asthma, acute heart attack, cerebrovascular disease and the most dangerous may even be lung cancer [30].

Chemicals, Risk factors for Lung Cancer

Chemicals can raise lung cancer risk especially those who work in industrial factories if exposed to chemicals for a long time. The chemicals that are at risk of affecting lung cancer include Arsenic, Chrysotile, Asbestos, Beryllium and Beryllium compounds, BIS (Chromomethyl) BIS (Chloromethyl) ether), Cadmium (Cadmium), Chromium valence C6 (Chromium (VI) Compounds) including chromium trioxide, chromic acid chromate or dichromate, coal (Coal tars), Nickel Compounds, Silica (Silica Dust), Lead (Lead Compounds,inorganic), Acrylonitrile (Acrylonitrile) [31].

Obesity increases the risk of cancer

According to the Cancer Research UK, smoking is still the number one cause of preventable cancer in the UK. While obesity is the second leading cause. However; the number of smokers is decreasing while the number of obese people is increasing. This is a concern for health experts: about 1 from 3 adults in the UK is obese, with 13.4 million adults being obese. Out of the 6.3 million of non-smokers are not obese, and 1.5 million smoke and are overweight. Fat cells contribute to the increase in hormones and stimulates cells in the body to divide more often which increases the likelihood of cancer cells [32]. Obesity is the disease of obesity group and obesity leads to metabolic disorders that affect blood pressure, cholesterol, Triglycerides and Insulin resistance type 2 diabetes is linked to obesity. High insulin in the blood can lead to high blood pressure conditions and abnormal blood lipid disorders. Fats in blood also have an effect on Insulin resistance and abnormalities in the Insulin secretion of beta cells, a process known as Lipotoxicity. Another cause of beta cell destruction is chronic high blood sugar levels, abnormal glucose tolerance conditions and cause a high risk of cardiovascular disease especially belly fat that causes fat accumulation on the abdomen than under the skin. If there is fat accumulation in the middle of the body, it was found that the incidence of chronic non-communicable diseases was higher than the fat accumulated in other parts of the body. Being overweight or obese doesn't mean that a person will definitely get cancer but it's the factor that increases the risk and if a person gains overweight for a long time. They are at sevenfold more risk [33,34].

Stress affects the incidence of cancer

Dr. Narong Suphatthaphan, Former head of the Department of Psychiatry Faculty of Medicine, Ramathibodi Hospital, said that stress contributes to cancer in 2 ways. Firstly, stress leads some people to turn to other substances to reduce stress. These substances can cause cancer, such as those who reduce stress by smoking. Cigarettes contain cancer-causing substances. Secondly, animal experiments have shown that stress affects the immune system. This reduces the ability to remove cancer-causing substances and the substances that cause it will affect the organs, more divisions cause cancer. At present it is believed that our bodies normally contain cancer-causing substances all the time and the body can get rid of these substances, causing cancer. But when stress arises will affect the immune system. The immune system is unable to eliminate cancer-causing substances. However; but it does not mean stress can always lead to cancer. It also depends on the severity of stress. Some people tend to be very emotional and stressful which increase the risk of cancer. In addition, stress leads to inappropriate behavior or problem resolution such as drinking, smoking, or other substance abuse including overeating behaviors that result in higher rates of cancer risk [35].

Lung Carcinogen

Research reports that smoking and tobacco smoke will increase the risk of lung cancer. It was found that smokers were more likely to Lung cancer is up to 20 times higher than in non-smokers. However, there are many types of mortality rates. Therefore, a group of carcinogens has been classified by the Institute of International Agency for Research on Cancer (IARC). The IARC has categorized it according to the risk of carcinogenicity in humans. Here are the examples of evidence-based carcinogens that we may have to encounter these substances in our daily life to be aware and avoid from exposure to such substances.

1. Asbestos is a natural mineral contaminated in rock, consisting of Magnesium, Iron, Silicate and other trace elements characterized as fine fibers that are small and easily dispersed in the atmosphere found in the textile industry and construction material manufacturing industry. It is reported worldwide that patients with a history of exposure to Asbestos have a mortality rate of more than 100,000 cases per B3. Although the concentration of Asbestos is major risk but studies have shown that exposure to large amount of Asbestos for a short time can also cause cancer. In addition, several studies have shown that smoking increases the risk of lung cancer in people exposed to Asbestos by many times.
2. Fly ash from coal combustion, incomplete combustion of coal produces very small dusty fly ash, can spread over a long distance. It also passes into the lungs and can be absorbed into the bloodstream. It also produces Carbon Dioxide and many volatile organic compounds. From research results in many countries in the Asian region, it was found that fly ash from coal combustion both in factories and households can significantly increase the risk of lung cancer.
3. Exhaust from the combustion of diesel engines; International Cancer Research Agency, The World Health Organization (WHO) reports on diesel combustion exhaust emission that diesel fumes or exhausted from diesel engines can cause lung cancer. Studies have shown that people who work with diesel engines have a 7 times higher risk of lung cancer than the general population due to the frequent inhalation of toxic particles in the exhaust gas produced by diesel combustion that may cause lung infections and can lead to lung cancer.

4. Smoking 1 cigarette produces more than 4,000 chemicals which more than a hundred are toxic substances that affect the functioning of organs in the body and more than 60 types are confirmed to be carcinogenic. Smoking is the cause of many diseases such as double risk of heart disease, increase the risk of emphysema at 6 times and increase the risk of lung cancer at 10 times higher. In addition, smoking can cause cancer in many organs, especially organs that are in direct contact with the carcinogen in tobacco smoke, such as laryngeal cancer, oral cancer and pharyngeal cancer or if carcinogen is absorbed into the bloodstream, it can cause cancer of other organs, such as pancreatic cancer, gall bladder cancer, etc. It can be said in general that approximately 30% of all human cancers are caused by smoking.

5. In addition, second hand smoker of environmental tobacco smoke (ETS) exposure causes lung cancer, heart disease and respiratory disease. There are 2 forms of exposure are cigarette smoke from the end of the cigarette butt and smoke from smokers. The study found that cigarette smoke from the end of the cigarette butt has more carcinogen than the smoke that smokers exhaled. U.S. Environmental Protection Agency: EPA, The National Institute of Environmental Health Science's National Toxicology Program has classified environmental exposure to tobacco smoke as a cause of cancer. It is estimated that cigarette smoke from the environment is the cause. Out of the 3,000 deaths of non-smokers are from lung cancer, it also contributes to 300,000 deaths per year of lower respiratory tract infections in children aged 0-18 months in the United States. As mentioned above, there are many substances that are known to be carcinogenic to humans. If you are interested in finding out more information, you can visit the IARC website [36,37]

Cancer Prevention across Lifetime

Cancer Prevention impact to lower opportunity of getting cancer by preventing cancer, the quantity of new cases in a group or population is descended significantly. Cancer Prevention will help decreasing the amount of deaths caused by cancer.

Cancer is caused by an amalgamation of extra factors in daily life. Prevention new cancers in preliminary, scientists analyze the risk factors and possessive factors and anything that increases possibility of developing cancer is called a cancer risk factor; anything that can restrain the cancer is called a cancer protective factor. Therefore, scientists realize that classifying the age separated to each group to show that which class of group should decrease or change the lifestyle.

Certainly many people can't avoid the risk factor of cancer. For example, both smoking and inheriting from genes are risk factors for Non-Small Cell Lung Cancer treated by immunotherapy but smoke from smokers can be avoided. Frequency of exercise and a healthy food consumption should be protective factors for cancer. Avoiding risk factors and substantial protective factors should decrease your risk to get cancer accurately. Investigation suggests that we should begin to protect the health of babies and young children that are the future of the nation. Moreover it will reduce their opportunities to receive cancer in the future [38,39]

Age	Encouraging Behaviors That May Lower Cancer Risk	Reducing Harmful Exposures	Managing chronic diseases such as diabetes.
Childhood	<ul style="list-style-type: none"> ● Getting enough folic acid during pregnancy. ● Breastfeeding. ● Getting enough physical activity during childhood. ● Ensuring safe stable, nurturing relationships and environments for all children and families. 	<ul style="list-style-type: none"> ● Avoiding alcohol and tobacco use during pregnancy. ● Keeping children away from secondhand smoke. ● Reducing exposure to traffic-related air pollution. ● Avoiding exposure to chemicals that can cause cancer. ● Limiting the amount of radiation used during certain medical tests, like CT (computed tomography) scans. ● Learning about your family's history of exposure to diethylstilbestrol (DES). ● Preventing adverse childhood experiences. 	

Teenage	<ul style="list-style-type: none"> • Completing the human papillomavirus (HPV) vaccine series. • Having a diet rich in fruits and vegetables. • Getting enough physical activity. • Ensuring safe stable, nurturing relationships and environments for all children and families. 	<ul style="list-style-type: none"> • Avoiding intentional tanning. • Quit smoking, external icon and other tobacco using. • Preventing underage drinking. • Avoiding exposure to certain chemicals. • Limiting radiation dose during medical imaging procedures. • Preventing adverse childhood experiences. 	
Adult	<ul style="list-style-type: none"> • Eating a diet rich in fruits and vegetables. • Getting regular physical activity. • Keeping a healthy weight. • Using sun protection when going outdoors. • Breastfeeding. 	<ul style="list-style-type: none"> • Avoiding tobacco products and secondhand smoke. • Avoiding intentional tanning. • Limiting consumption of alcohol and sweetened drinks. 	
Middle life	<ul style="list-style-type: none"> • Getting enough physical activity. • Maintaining a healthy weight. • Getting enough sleep. • Seeking appropriate medical care. 	<ul style="list-style-type: none"> • Limiting alcohol use. • Quitting smoking external icon and other tobacco use. • Avoiding exposure to certain chemicals. • Limiting radiation dose during medical imaging procedures. 	<ul style="list-style-type: none"> • Testing for hepatitis C virus (HCV) infection. • Getting help to quit smoking and external icon • Screening for and managing obesity and external icon • Screening for certain types of cancer. • Reducing harmful exposures.

2. CONCLUSION

Causes of lung cancer are cells proliferating abnormally, quickly, and uncontrollably, which leads to lung cancer. Resulting in aberrant cell clusters that when becomes large, can be seen. There are numerous and they are dispersed throughout the body. There are 2 forms of lung cancer: Small Cell Lung Cancer: 10-15% of patients quickly pass away due to the rapid growth and spread of the cancerous cells and Non-Small Cell Lung Cancer: It can be surgically treated to cure it and spreads more slowly if diagnosed early. 85–90% of people have this type of cancer. Preventive Behavior for lung cancer are quit Smoking and significant reduction in lung cancer incidence. Don't start smoking, avoid places with cigarette smoke or wear protective equipment when it is necessary to enter a place where there is pollution or smoke. Check for danger signals that should see a doctor, screening with low radiation chest computed tomography once a year if there is a risk of have a history of a heavy smoker and still smoke or in case of quitting less than 15 years and between 55-80 years of age.

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