Lung Cancer

Lung cancer is the uncontrolled growth of abnormal cells in one or both of the lungs. While normal cells reproduce and develop into healthy lung tissue, these abnormal cells reproduce faster and never grow into normal lung tissue. Lumps of cancer cells (tumors) then form and grow. Besides interfering with how the lung functions, cancer cells can spread from the tumor into the bloodstream or lymphatic system where they can spread to other organs.

Causes

Cigarette smoking is by far the most important cause of lung cancer, and the risk from smoking increases with the number of cigarettes smoked and the length of time spent smoking.[1] Other recognized causes include radon,[2] secondhand smoke,[3] and some occupational chemicals and air pollutants like benzene,[4] formaldehyde,[5] and diesel air pollution.[6].Asbestos, a product used in insulation and manufacturing for years, is also an important cause of lung cancer.[7] It has been estimated that active smoking is responsible for close to 90 percent of lung cancer cases; radon causes 10 percent, occupational exposures to carcinogens account for approximately 9 to 15 percent and outdoor air pollution 1 to 2 percent. Because of the interactions between exposures, the combined attributable risk for lung cancer exceeds 100 percent.[8]

Symptoms

Symptoms include a persistent cough, shortness of breath, wheezing, coughing up blood, chest pain and recurring pneumonia or bronchitis.[9] However, as earlier stages often seem to be symptomless, most lung cancers are diagnosed in advanced stages. Unfortunately, efforts to detect lung cancer early have not led to a reduction in lung cancer deaths. Many techniques have limited effectiveness in detecting cases.[10] The choice of treatment and prognosis depend upon the specific type of tumor.[11]

Types

There are two major types of lung cancer: non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). Non-small cell lung cancer is much more common and accounts for 85 percent of all lung cancer cases.[12] It usually spreads to different parts of the body more slowly than small cell lung cancer. There are three main types of NSCLC, which are named for the type of cells in which the cancer develops: squamous cell carcinoma, adenocarcinoma, and large cell carcinoma. Only 17.3 percent of the people who develop non-small cell lung cancer survive for 5 years.[13]

Small cell lung cancer, also called “oat cell cancer,” accounts for 14

percent of all lung cancers.[14] This type of lung cancer grows more quickly and is more likely to spread to other organs in the body. It often starts in the bronchi and towards the center of the lungs. Small cell lung cancer is mainly attributable to smoking. Only 6.2 percent of the people who develop small cell lung cancer survive for 5 years.[15] Sometimes lung cancer may have characteristics of both types; this is known as mixed small cell/large cell carcinoma.

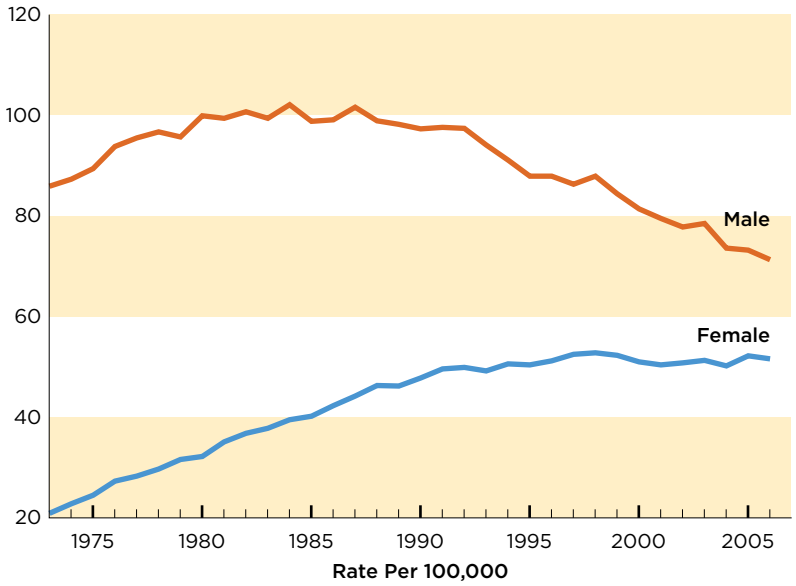
Incidence

In 2006, approximately 365,000 Americans suffered from lung cancer. The national incidence rate for lung cancer was 63.1 per 100,000 population. The incidence rate for men was 77.7 per 100,000 and 52.5 per 100,000 for women. Lung cancer incidence rates among men have decreased by 29 percent since 1980, while among women they have increased by sixty percent (Figure 1).[16]

Deaths

Lung cancer is the number one cancer killer in the nation. It has been the leading cause of cancer death among men since the early 1950s, and in 1987 it surpassed breast cancer to become the leading cause of cancer deaths among women as well. In 2006, lung cancer had an age-adjusted death rate of 51.5 per 100,000 population in the U.S. and accounted for 31 and 26 percent of all male and female cancer deaths, respectively.[17]

Figure 1: Lung Cancer Age-Adjusted Incidence Rates by Sex, 1973-2006



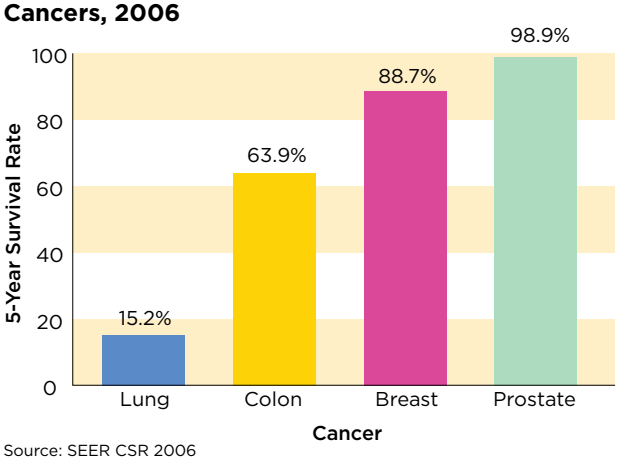
Source: SEER CSR 1975-2006

Smoking-Related

The U.S. Surgeon General estimates that 90 percent of lung cancer deaths in men and 80 percent in women are caused by smoking. Men and women who smoke are 23 and 13 times, respectively, more likely to develop lung cancer.[18] Nonsmokers have a 20 to 30 percent greater chance of developing lung cancer if they are exposed to secondhand smoke at home or work.[19] Exposure to secondhand smoke causes approximately 3,400 lung cancer deaths among nonsmokers each year.[20]

Lung cancer death rates mimic smoking rates, but with a long lag period between the two. The smoking epidemic among men was reflected in steady increase in the male lung cancer death rate through 1990, after which it began to decline. The lung cancer death rate among women, who took up regular cigarette smoking later than men, has begun to plateau after increasing for many decades.[21,22]

Figure 2: Five-Year Survival Rates for Selected Cancers, 2006



Source: SEER CSR 2006

Survival Rates

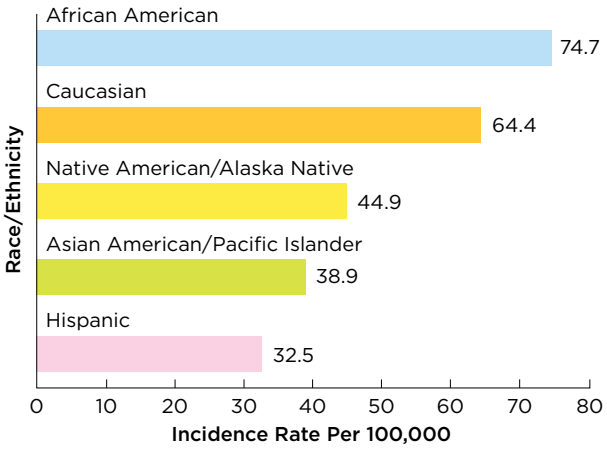
Survival rates for lung cancer tend to be much lower than those of most other common cancers. The 5-year survival rate for all patients in whom lung cancer is diagnosed is 15.2 percent, compared to 63.9 percent for colon cancer, 88.7 percent for breast cancer, and 98.9 percent for prostate cancer (Figure 2).[23] However, lung cancer survival rates tend to increase when the disease is caught in an early stage. Unfortunately, most lung cancers are not identified until later stages. This is one important reason why it is so critical that research on identifying lung cancer early be expanded.

Racial/ Ethnic Differences

African Americans

African Americans have higher lung cancer incidence rates than any other ethnic or racial group, including Caucasians (64.4 per 100,000). In 2006, African Americans had an age-adjusted lung cancer incidence rate of 74.7 per 100,000 (Figure 3). The incidence rate for African Americans males was 104.3 per 100,000, compared with an incidence rate of 54.7 per 100,000 for African American females.[24]

Figure 3: Lung Cancer Incidence Rates by Race and Ethnicity, 2006



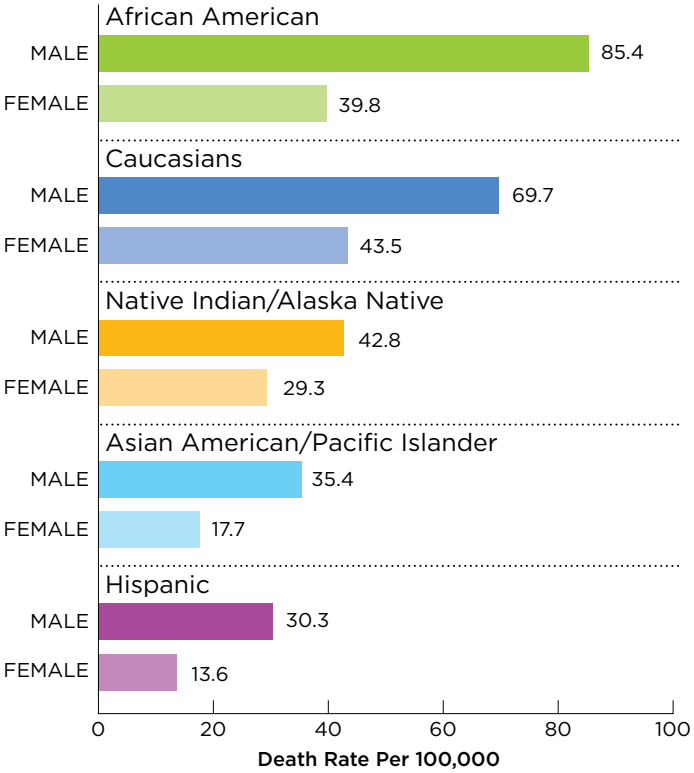
Source: SEER CSR 2006

Recently, a model was developed to predict lung cancer risk specific to African-Americans. Most previous models have been developed based on Caucasian populations. The new model found that certain factors, such as wood and asbestos dust exposure, were important predictors of lung cancer risk in African Americans, but not in Caucasians. Another important risk factor was that African Americans with COPD (Chronic Obstructive Pulmonary Disease) were 6.4 times more likely to develop lung cancer than African Americans without COPD.[25]

In one workplace study, African American coke oven workers' odds of dying from lung cancer have been found to be 1.38 times those of their white colleagues, although no such difference has been found among white-collar workers. This suggests that factors besides exposure contribute to the difference in lung cancer rates, such as healthcare coverage or access or community beliefs concerning the disease.[26]

A recent analysis of pooled data from 13 large cohort studies provided compelling evidence of the differences in lung cancer risk between African Americans and Caucasians who never smoked. African American women aged 40 to 84 years had incidence rates that were 56 percent higher than among Caucasian women. Death rates were about 33 percent higher for both African American men and women, compared to Americans with European backgrounds. The authors concluded that this increased risk might account for some portion of the difference in lung cancer rates between African Americans and persons of European descent who do smoke.[27]

Figure 4: Lung Cancer Age-Adjusted Death Rates by Sex and Race and Ethnicity, 2006



Source: NCHS 2006

African Americans are more likely to die from lung cancer than Caucasians, though African American men bear the brunt of the difference. In 2006, African Americans had an age-adjusted lung cancer death rate of 57.9 per 100,000, about 6 percent greater than the rate of 54.7 per 100,000 among Caucasians. However, the age-adjusted death rate among African American men (85.4 per 100,000) is 22.5 percent higher than the rate among Caucasian men (69.7 per 100,000 ; Figure 4). Age-adjusted lung cancer death rates are actually higher for Caucasian (43.5 per 100,000) compared to African American women (39.8 per 100,000).[28]

Lung cancer survival rates also tend to be lower among African Americans. For 1999-2005, the lung cancer five-year survival rate for African Americans was 12.4 percent, over a fifth lower than the rate of 15.9 percent for Caucasians. The rate for African American men was a mere 10.8 percent, while it was somewhat higher for African American women at 14.5 percent. These rates are both lower than their counterparts among Caucasians.[29]

One study found that African American patients with SCLC tended to have other conditions associated with lower survival rates, such as significant weight loss, less ability to carry on ordinary daily activities, and being a Medicaid recipient. However, African Americans had outcomes similar to those of other patients if they were given equivalent therapy.[30] These results show promise that the lung cancer burden born by African Americans may successfully be diminished if they receive appropriate treatment.

Survival rate differences may also depend on other factors. One study adjusted for smoking, staging, treatment, and socioeconomic status in

its analysis of factors that affected survival. When these things were taken in to account, the difference in survival rates was eliminated. This study implies that the disparity in five-year survival rate is most likely due to African Americans having lower per-capita income, greater likelihood of smoking, greater delay in getting treatment, and being less likely to agree to neoadjuvant therapy (chemotherapy before surgery with the goal of shrinking the tumor) compared to Caucasians.[31]

Researchers looking at African Americans in South Carolina in 2008 found that they were 29.5 percent less likely to undergo surgical resection for localized NSCLC compared to Caucasians. African Americans in this study were more likely than Caucasians to be younger, male, not married, less educated, poor, uninsured or covered by Medicaid, and to reside in a rural community. Even after controlling for sociodemographics, co-occurring diseases, and tumor factors, their odds of undergoing surgery were less than half that of Caucasians. Earlier studies had explored this disparity, but this research showed that the problem persists.[32]

Access to quality healthcare has become integral for patients in their fight against lung cancer. Unfortunately, many studies have found disparities in the quality of care received by African American and Caucasian lung cancer patients. For example, an analysis of Medicare-eligible patients with NSCLC found many discrepancies in treatment. African Americans were less likely to undergo staging, receive surgery once staged, or receive a recommendation for surgery even when there were no clear indications against it. Survival was similar for African American and Caucasians after surgical resection, although African Americans were 70 percent more likely to decline surgery.[33]

Hispanics/Latinos

Hispanics tend to have some of the lowest lung cancer incidence and death rate of any racial or ethnic group, including Caucasians. The age-adjusted incidence rate among Hispanics was 32.5 per 100,000 in 2006 (Figure 3, above). This rate is approximately half that for Caucasians. The low incidence rate of lung cancer among Hispanics has traditionally been linked to the low rate of cigarette smoking among this population. Between the years of 1997 and 2006, lung cancer incidence rates among Hispanics decreased by 2.3 percent and 1.8 percent per year for men and women, respectively.[34]

A study compared lung cancer incidence rates between first generation Hispanics and Caucasians in Florida and Hispanics in their home countries. Among Mexicans, Puerto Ricans, and Cubans, and others of Hispanic origin, rates were highest among Caucasians, then Hispanics in Florida, and lowest for those in each Hispanic groups' home country. It is typical for immigrant populations to take on the disease profile of the country to move to, although the reasons for this vary and are not always understood. In this case, differences in smoking behavior may explain some of the increase for Florida Hispanics, compared to Hispanics in their native countries.[35]

The age-adjusted mortality rate due to lung cancer is almost two-thirds lower among Hispanics than among Caucasians and African Americans. Approximately 20.7 per 100,000 Hispanic deaths can be attributed to lung cancer, compared with 54.7 per 100,000 Caucasians, and 57.9 per 100,000 African Americans. The rate among Hispanic women is 55 percent lower than that among Hispanic men, at 13.6 and 30.3 per 100,000, respectively (Figure 4, above).[36]

Hispanics who are affected by lung cancer may have more trouble obtaining treatment than Caucasians. Inconsistencies have been observed in the treatment of Hispanic and Caucasian lung cancer patients. Hispanics had worse odds (OR = 0.44) of obtaining lung resection at high-volume hospitals compared to Caucasians in a 2007 survey.[37] Hispanics also had higher odds of dying in the hospital, but this finding was not statistically significant after controlling for hospital volume. These findings suggest that Hispanics are more likely to die in the hospital following lung resection surgery because they go to hospitals that have lower procedure volumes than Caucasians. The survey found that the differences in treatment were not due to health insurance, segregation or number of surgical hospitals in the county.[38]

Asian Americans and Native Hawaiians/ Pacific Islanders

Asian Americans/Pacific Islanders had the second lowest incidence rate of lung cancer after Hispanics (32.5 per 100,000).The age-adjusted incidence rate for lung cancer in the Asian American/Pacific Islander population in 2006 was 38.9 per 100,000 (Figure 3, above). The age-adjusted incidence rate for women was lower, at 28.1 per 100,000, while the age-adjusted incidence rate for men was 1.9 times greater at 53.4 per 100,000.[39]

In 2006, the age-adjusted death rate for lung cancer among the Asian American/Pacific Islander population was 25.2 per 100,000. This rate is much lower than those seen among Caucasian and African American populations. The rate among Asian American/Pacific Islander women, 17.7 per 100,000, is almost exactly half that among men, 35.4 per 100,000 (Figure 4, above).[40]

American Indians/ Alaska Natives

Native Americans had the third highest incidence rate of lung cancer after African Americans (74.7 per 100,000) and Caucasians (64.4 per 100,000).[41] The age-adjusted incidence rate of lung cancer in the American Indian/Alaska Native population in 2006 was 44.9 per 100,000 (Figure 3, above). The age-adjusted incidence rate for women is slightly lower, at 39.8 per 100,000, while the age-adjusted incidence rate for men is 51.6 per 100,000.

A review of Indian Health Service (IHS) records found a wide range of incidence rates among IHS regions: 14.9 per 100,000 in the Southwest,

87.1 per 100,000 in the Southern Plains, 93.2 per 100,000 in Alaska, and 104.3 per 100,000 in the Northern Plains. The rate in the region with the highest incidence, the Northern Plains, was 7 times greater than the rate in the region with the lowest incidence, the Southwest. In addition, lung cancer cases among American Indians/Alaska Natives were diagnosed before 65 years of age 39.6 percent more often (41.6%) than among Caucasians (29.8%).[42]

The age-adjusted mortality rate due to lung cancer is slightly more than a third lower among American Indians/Alaska Natives than among Caucasians and African Americans. Approximately 35.2 per 100,000 American Indian/Alaska Native deaths can be attributed to lung cancer, compared with 54.7 per 100,000 Caucasians, and 57.9 per 100,000 African Americans. The rate among men, 42.8 per 100,000, is 46.1 percent higher than the rate of 29.3 per 100,000 among women (Figure 4, above).[43]

More research needs to be done to determine cancer prevalence, risk factors, and effects upon Native American/Alaska Native populations. One way in which researchers could gather more reliable and useful data about Native Americans/Alaska Natives is to link cancer registry data with Indian Health Service records. This should decrease health disparities in this population through better planning, implementation and evaluation of cancer control efforts.[44]

Resources

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