

Epidemiology of Lung Cancer



Yousheng Mao, MD^a, Ding Yang, MD^a, Jie He, MD^{a,*}, Mark J. Krasna, MD^{b,*}

KEYWORDS

• Lung cancer • Epidemiology • Etiology

KEY POINTS

- Lung cancer is the most frequent malignant tumor with the highest mortality around the world.
- Recent epidemic studies found that tobacco use, radon exposure, indoor and outdoor air pollution, relative harmful occupational exposure, hereditary susceptibility, radiation exposure, and unbalanced diet are responsible for the increase in lung cancer incidence.
- These findings can assist us in preventing lung cancer from the etiologic level. Effective and practical public health policy such as tobacco use restriction law, air pollution control, and antismoking education of teenagers should be established to decrease the lung cancer incidence.

EPIDEMIOLOGIC CHARACTERISTICS

Incidence and Mortality

Globally, lung cancer is the most common cancer and the leading cause of cancer death in men and is the third most common cancer (after breast and colorectal cancers) and the second leading cause of cancer death (after breast cancer) in women. About 1.8 million new cases of lung cancer were diagnosed in 2012, which accounted for 12.9% of the world's total cancer incidence. The worldwide lung cancer mortality rate amounted to 1.59 million deaths in 2012,¹ accounting for 19.4% of the total cancer deaths.

Smoking is a known major risk factor for lung cancer, so lung cancer epidemiologic trends, and its variations, reflect the past trends of cigarette smoking to a great extent. In the United States, most states drew up legislation for smoking restrictions in public areas about 20 years ago and have continually promoted the awareness of smoking hazards to their residents.² Many states have passed the peak of the tobacco-related epidemic; therefore, both the incidence and mortality rates of lung cancer in these areas are decreasing.³

The authors have nothing to disclose.

^a Department of Thoracic Surgery, Cancer Institute and Hospital, Chinese Academy of Medical Sciences, Beijing 100021, China; ^b Meridian Cancer Care, Jersey Shore University Medical Center, Ackerman South-Room 553, 1945 Route 33, Neptune City, NJ 07753, USA

* Corresponding authors.

E-mail addresses: prof.hejie@263.net; MKrasna@meridianhealth.com

Surg Oncol Clin N Am 25 (2016) 439–445

<http://dx.doi.org/10.1016/j.soc.2016.02.001>

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Over the last several decades, the incidence of adenocarcinoma of the lung has increased more rapidly than that of squamous cell carcinoma in men and especially in women.⁴ Adenocarcinoma has become the most common histologic cancer type diagnosed around the world since 2004, according to statistics from the World Health Organization.⁵ This trend probably is associated with the change of historic pattern of tobacco use or the smoke of modern filtered cigarettes.⁴ Sex differences in lung cancer mortality patterns also reflect historical differences between men and women in the increase and reduction of cigarette smoking over the last 50 years.

In developing countries such as China, not only the incidence but also the mortality rate of lung cancer has been increasing rapidly; incidence was ranked first in men and second in women; however, the death rate ranked first in both men and women from the annual report of the China national cancer registration.⁶ The adenocarcinoma subtype has become the major pathologic type not only in the nonsmoking population but also in the smoking population. The smoking pattern, therefore, may be changing but may only be a partial cause of the pathologic evolution of lung cancer. Lung cancer incidence may be related to air pollution caused by rapid and immature industrialization and continual increased use of automobiles in cities.

The global geographic distribution of lung cancer shows marked regional variation. In men, the highest incidence rates are observed in Central and Eastern Europe (53.5 per 100,000) and Eastern Asia (50.4 per 100,000). Notably low incidence rates are observed in Middle and Western Africa (2.0 and 1.7 per 100,000, respectively). In women, the incidence rates are generally lower, and the geographic pattern is a little different, mainly reflecting different historical exposure to tobacco smoking. Thus, the highest estimated rates are in Northern America (33.8) and Northern Europe (23.7) with a relatively high rate in Eastern Asia (19.2) and the lowest rates again in Western and Middle Africa (1.1 and 0.8, respectively). For lung cancer mortality, because of its high fatality (the overall ratio of mortality to incidence is 0.87) and the relative lack of variability in survival in different world regions, the geographic patterns in mortality closely follow those in incidence.

Incidence and mortality rates of lung cancer also differ by ethnicity. In 2012, black Americans had the highest incidence rates of 62 per 100,000 and the highest mortality rates of 48.4 per 100,000, whereas Hispanics had the lowest rate of 28 per 100,000 in incidence and the lowest rate of 19.4 per 100,000 in mortality.⁷

Survival

The incidence and mortality rates of lung cancer tend to mirror one another because most patients with lung cancer eventually die of it.⁸ Despite the new diagnostic and genetic technologies that are now available and the many advances in surgical technique and biologic treatment, such as targeted treatment and immunotherapy, the overall 5-year survival rate (2005–2011) of lung cancer in the United States is still dismal (17.4%).⁷ The global situation is also worse than before.⁸ Most lung cancer is discovered at an advanced stage, and the fact that only 15% of lung cancers are discovered in early stages may be responsible for the dismal prognosis.⁹ Therefore, early diagnosis by screening high-risk populations using low-dose computed tomography scan and effective biomarkers may improve the survival of lung cancer patients.^{10–12}

RISK FACTORS

Tobacco

The prevalence of lung cancer has been confirmed as a consequence of the widespread addiction to cigarettes throughout the world.¹ Many developed countries

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