Lung Cancer: Prevention

Description/Etiology

Lung cancer, a malignant neoplasm that develops in the lung, is the leading cause of cancer-related death worldwide. Lung cancers are broadly divided in two categories: non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). NSCLC, which includes adenomas, squamous cell carcinomas, and bronchoalveolar carcinomas, accounts for most (85%) cases of lung cancer. SCLC, the more aggressive form, accounts for the remaining 15% of cases. (For information on lung cancer, including treatment, see the series of related Quick Lessons).

Preventing lung cancer involves avoiding known causative factors such as direct and secondhand exposure to cigarette smoke and exposure to industrial and environmental pollutants (e.g., asbestos, arsenic, radon, tars, chromium, mustard gas, ionizing radiation, certain hydrocarbons, metals, and chloromethyl ethers). There is some evidence that a diet rich in fruit and cruciferous and green, leafy vegetables may offer some protection against lung cancer and certain other cancers. In addition, some evidence suggests that selenium supplementation, use of nonsteroidal anti-inflammatory drugs (NSAIDs), and consumption of soy products reduces risk for lung cancer (for more information, see Food for Thought, below).

Screening for lung cancer is commonly offered to persons at high risk of developing the disease. According to the American College of Chest Physicians, annual screening with low-dose CT scanning is recommended for smokers and former smokers who are 55–74 years of age and who have smoked 30 pack-years or more and either continue to smoke or have quit within the past 15 years. Heavy smokers who have a persistent cough and/or fatigue may undergo sputum testing and X-rays; biopsy of lung tissue for histologic examination is ordered for persons who have initial test results that could indicate lung cancer. Biopsy is performed during bronchoscopy or mediastinoscopy, using direct needle technique with CT scan, or during thoracotomy (called open lung biopsy).

Facts and Figures

Lung cancer is the leading cause of cancer-related death in the United States and worldwide. In 2014, an estimated 224,210 new cases of lung cancer were diagnosed in the U.S. and 159,260 persons died of the disease. The 5-year survival rate is 16.6%. In the U.S., 85–90% of cases of lung cancer are attributed to exposure to cigarette smoke. Nearly 20% of adults in the U.S. smoke cigarettes. Risk of developing lung cancer is 10-fold higher in current smokers than in persons who have never smoked. Smoking cessation reduces but does not eliminate the increased risk for lung cancer associated with smoking; risk of developing lung cancer is 30–50% lower than in current smokers at 10 years after smoking cessation. Risk of developing lung cancer is increased by 20–30% in individuals who are exposed to secondhand smoke in the home; each year in the U.S., ~ 3,400 nonsmokers die of lung cancer related to secondhand smoke exposure. About 3–4% of cases of lung cancer are caused by asbestos exposure.

Risk Factors

Risk factors for developing lung cancer are not limited to smoking cigarettes, and also include smoking cigars, chewing tobacco, low flavonoid intake, and being exposed to secondhand smoke, pesticides, asbestos, or drycleaning solvents. Having preexisting lung
disease (e.g., tuberculosis, chronic obstructive pulmonary disease [COPD]) increases risk for lung cancer in both smokers and nonsmokers, and the presence of familial/genetic risk factors is believed to increase risk for lung cancer, although the genetics of lung cancer are poorly understood. Generally, the risk for developing lung cancer increases with the number of cigarettes smoked per day, the number of years of smoking, and the depth of inhalation of smoke. Although risk decreases with increasing number of years since smoking cessation, lung cancer can develop years after quitting. Individuals with inherited susceptibility to lung cancer are at elevated risk for lung cancer even with minimal smoking. A diet high in saturated fat is associated with increased risk of developing lung cancer; a diet rich in cruciferous and leafy, green vegetables may be protective in some individuals.

**Signs and Symptoms/Clinical Presentation**

Lung cancer usually manifests with persistent cough, bloody sputum, dyspnea, chest pain, wheezing, fatigue, loss of appetite, and/or weight loss. Other signs and symptoms depend on disease progression and whether or not metastasis is present; these include weakness, joint pain, difficulty swallowing, hoarseness or other changes in voice, eyelid drooping, bone pain, and facial edema.

**Assessment**

› **Patient History**
  • Ask about smoking history, exposure to industrial and environmental respiratory irritants, and family history of cancer and respiratory conditions

› **Physical Findings of Particular Interest**
  • Examination of nails may identify cyanosis

› **Laboratory Tests That May Be Ordered**
  • ABGs may be performed as part of patient assessment of pulmonary function
  • Sputum cytology can detect cancer cells, if present
  • Histologic examination of biopsied lung tissue can identify lung cancer, if present, and provide information to assist with cancer staging

› **Other Diagnostic Tests/Studies**
  • Chest X-ray may indicate an abnormal area in the lung; CT scan, MRI, or PET scan may be indicated as follow-up imaging to more clearly delineate the abnormalities

**Treatment Goals**

› **Assess Physiologic Status and Lung Cancer Risk Factors**
  • Assess the patient’s risk factors for lung cancer
  • Assess pulmonary function, including evaluating for cough, wheezing, chest pain, and dyspnea; assess for cyanosis, weakness, and anorexia; and review laboratory/other diagnostic test results (e.g., ABGs). Immediately report abnormalities and treat, as ordered
    – Promote adequate respiratory function by maintaining supplemental oxygen and elevating the head of the bed, as ordered
    – Administer analgesia, as ordered, and monitor treatment efficacy and for adverse effects
  • Assess fall risk due to dyspnea, pain, and weakness; follow facility protocols to maintain patient safety (e.g., airway, circulation, and prevention of injury)
  • Encourage good hydration and nutrition and assist with ADLs, as appropriate
  • Follow facility pre- and postprocedure protocols if patient undergoes lung cancer screening/diagnostic testing
    – Reinforce pre- and postprocedure education and verify completion of facility informed consent documents

› **Educate About a Healthy Lifestyle and Undergoing Regular Preventive Screening**
  • Assess patient’s anxiety level about the screening process and personal risk for lung cancer; provide emotional support, educate, and encourage discussion about risk factors, prevention strategies, risks and benefits of diagnostic testing modalities, and the importance of maintaining a healthy lifestyle (e.g., participating in regular exercise, maintaining an optimum weight, consuming a nutritious diet high in fruits and vegetables, and reducing stress)
  • Encourage undergoing lung cancer screening tests regularly, including X-rays, spiral CT scans, and sputum tests
  • Request referral to a genetic specialty clinician, if appropriate, for genetic counseling and testing to determine genetic risk for lung cancer
  • Request referral to a social worker, if appropriate, for identification of local smoking cessation programs
Food for Thought
› Risk of developing lung cancer is increased 10-fold in persons who are exposed to both secondhand smoke and radon. Researchers sent kits for measuring in-home radon and secondhand smoke to 50 study participants. Of those who returned the kits, 26% were found to have high radon levels and 38% tested positive for air nicotine. More than half of study participants who had a high radon result contacted a radon mitigation specialist or reported planning to contact one, and 75% of those with positive air nicotine adopted a smoke-free home policy (Hahn et al., 2014).

Red Flags
› Taking beta-carotene supplements may accelerate the development of lung cancer in some persons who are at high risk (e.g., smokers)

What Do I Need to Tell the Patient/Patient’s Family?
› If the patient smokes cigarettes, emphasize the increased risk for lung cancer due to smoking, and encourage discussion with the primary care or other treating clinician about various methods of smoking cessation (e.g., medications, patch, gum, educational programs)
› Emphasize the importance of continued medical surveillance, including screening, chest X-rays, and sputum tests, for patients who smoke to increase the chances of early detection of lung cancer

References