According to the Centers for Disease Control and Prevention, 45.1 million adults in the United States were smokers in 2005. Cigarette smoking is a major risk factor for lung cancer; in fact, 90% of lung cancer deaths in men and almost 80% in women are caused by smoking. In this article, we’ll help you understand the how’s and why’s of lung cancer, and we’ll show you what you can do to care for and support your patient from diagnosis to treatment and beyond.

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The author has disclosed that she has no significant relationships with or financial interest in any commercial companies that pertain to this educational activity.

LUNG CANCER—the most common cause of cancer death—is a frightening diagnosis for our patients, and with good reason. In 2006, more than 174,000 people in the United States were diagnosed with lung cancer and more than 162,000 people died of the disease. Seventy percent of lung cancer deaths occur between ages 55 and 74. The overall 5-year survival for all patients with lung cancer is only 15% because most patients initially present with the disease at an advanced stage. Lung cancer is most prevalent among African-Americans, and the mortality rate is on the rise for women.

Against these odds, what can you do for your patient who’s been diagnosed with lung cancer? In this article, I’ll give you some insights, explaining the disease process, discussing risk factors, and describing diagnostic testing and treatment options with an eye on prevention, early detection, and patient teaching.

Cells gone wild
The majority of primary lung cancers are caused by two cell types: small cell cancers (malignant transformation of neuroendocrine cells) and nonsmall cell cancers (malignant transformation of epithelial cells). Small cell carcinoma (oat cell cancer), mixed small cell/large cell carcinoma, and combined small cell carcinoma are the three types of small lung cell cancers. Squamous cell carcinoma, adenocarcinoma, and large cell undifferentiated carcinoma are the three types of nonsmall cell lung cancers. The most common genetic abnormality associated with lung cancer is loss of the tumor suppressor gene p53. Mutations of this gene have been found in 75% to 100% of small
lung cancer
cell cancer patients and 45% to 55% of non-small cell cancer patients.

At least 12 different types of tumors fall under the heading of lung cancer. Let’s take a look at the four major histologic tumor types, which are based on composition and function of the affected tissue (see A closer look at bronchogenic carcinomas).

**Small cell carcinoma** accounts for about 20% to 25% of all bronchogenic carcinomas (cancer originating in the mucosa of the large bronchi, where more than 90% of all lung tumors start). It has the strongest correlation to cigarette smoking. These tumors are typically located centrally. Small cell carcinoma is a rapidly growing tumor that’s usually metastatic at the time of diagnosis. It’s often associated with ectopic hormone production, which is the production of inappropriate hormones in the endocrine glands. For this reason, a patient may initially present with signs and symptoms related to hormone production, such as syndrome of inappropriate antidiuretic hormone secretion. Small cell lung cancer patients usually relapse within 2 years despite treatment. Patients who are diagnosed with small cell lung cancer usually have a prognosis of 6 months or less, with only 3% to 8% surviving beyond 5 years.

**Squamous (scaly or platelike) cell carcinoma** accounts for about 30% of all bronchogenic carcinomas, but it has declined in the past two decades. These tumors are typically located near the hilum and project into the bronchi. Because of the tumor’s location in the central bronchus, the patient may present with obstructive symptoms, such as nonproductive cough, hemoptysis (coughing up blood from the respiratory tract), pneumonia, and atelectasis.

**Adenocarcinoma** accounts for 35% to 40% of all bronchogenic carcinomas, and it’s increasing in women. These tumors arise in the glandular tissue and form a structure. They have a tendency to be small in size and are commonly located in the peripheral regions of the pulmonary parenchyma. The patient may be asymptomatic, and the lesions may be discovered on a routine chest X-ray; however, a patient may seek medical treatment for pleuritic chest pain and shortness of breath. The 5-year survival rate for patients with adenocarcinoma is less than 15%.

**Large cell carcinoma** is a very rapid growing cancer that quickly metastasizes to other areas of the body. It most often presents as chest wall pain, cough, increased sputum production, and hemoptysis. The patient will have a pleural effusion on a chest X-ray, and he may also develop pneumonia due to airway obstruction.

So what are the risk factors associated with lung cancer? Let’s take a look.

**Not blowing smoke**

Cigarette smoking is the primary risk factor for the development of lung cancer. The risk of lung cancer increases with the number of cigarettes smoked and with the number of years that the person has been a smoker. Additional factors include the age at which the person started smoking, the degree of inhalation, the tar and nicotine content of the cigarettes, and the use of unfiltered cigarettes.

Exposure to secondhand smoke also increases a person’s risk of developing lung cancer. The risk for a nonsmoker who’s exposed to secondhand smoke is 1.3 times that of someone who isn’t exposed, with a risk of 24% if a person lives with a smoker.

Cigars and pipe smoking also increase the risk of lung cancer, but the risk is weaker than with cigarette smoking. That’s because cigars and pipe tobacco aren’t as deeply inhaled.

Also, reports have demonstrated that smoking marijuana or cocaine (freebasing) causes histologic and molecular changes in the bronchial epithelium that are similar to metaplastic (spindle-shaped tumor cells) premalignant changes seen in tobacco smokers.

Smoking cessation clearly decreases the risk of lung cancer for former smokers. A recent study showed that smokers who...
decrease the number of cigarettes they smoked in a day didn’t decrease the incidence of lung cancer. The only way to decrease lung cancer risk is to stop smoking altogether. The reduction in risk becomes evident within 5 years of abstinence from smoking.

Would the other risk factors please stand up?
Researchers have estimated that up to 15% of all lung cancer cases are associated with environmental or occupational exposures. The environmental and occupational factors that are best known for causing lung cancer are asbestos and radon. These substances may combine with tobacco smoke to produce lung cancer, but they can also be risk factors in nonsmokers. For a more extensive list of environmental and occupational risk factors, see *Hazards of the Job*.

Data also point to low serum levels of certain antioxidant vitamins, especially derivatives of vitamins A and E, as a risk factor for developing lung cancer. Many studies now suggest that an increased consumption of fruit, green and yellow vegetables, and, possibly, some micronutrients like total carotenoids, B-carotene, and vitamin C can substantially lower the risk of lung cancer among cigarette smokers and nonsmokers alike.

The role of hereditary factors isn’t as well understood; however, a number of studies show that first-degree relatives have an increased risk of developing lung cancer. Unfortunately, there’s no single genetic factor that’s sufficiently predictive at this time.

We do know that patients who have been diagnosed with benign lung diseases, such as diffuse pulmonary fibrosis and interstitial fibrosis (asbestosis), are at increased risk for developing lung cancer even when age, gender, and smoking history are taken into consideration.

Show me a sign
The signs and symptoms of lung cancer may present in different ways depending
on the stage, tumor type, and location. In the early stages of lung cancer, the patient is more likely to present with cough, hemoptysis, and dyspnea. In more advanced stages, the patient may present with chest pain, pleural effusion, and superior vena cava syndrome (blood flow through the superior vena cava is interrupted, resulting in increased vascular pressure, lymphadenopathy, hoarseness, dysphagia, and pericardial effusion).

Additional signs and symptoms include pneumonia, airway obstruction, neurologic deficits, and metastasis to the brain and bone.

Now, what happens if it’s suspected that your patient has lung cancer? That’s up next.

**Let’s take a peak**

When lung cancer is found early, it’s usually because a chest X-ray was taken for some other reason. Routine screening for lung cancer isn’t done in the United States, primarily because several past randomized trials failed to show a survival advantage for high-risk patients who were screened through either standard chest X-ray or evaluation of sputum cytology. Several studies have shown that computed tomography (CT) imaging is superior to standard chest X-ray in detecting early lung cancer, but again, it isn’t done routinely.

After a lung nodule has been detected, the diagnosis must be confirmed histopathologically. Then the tumor must be clinically staged. Diagnosis and staging usually occur concurrently, and many of the same modalities are used for both.

The diagnostic procedure that the health care provider chooses depends on the location of the nodule and its size. Let’s take a look at common ways to confirm the diagnosis.

**Flexible bronchoscopy** is the most common procedure used to diagnose tracheobronchial cancer because it’s an effective way to visualize the entire tracheobronchial tree. Visible endobronchial lesions should be brushed for cytology and biopsied. For a more in-depth look at flexible bronchoscopy, see this issue’s Deciphering Diagnostics article, *Take a look inside the lungs with bronchoscopy.*

**Transbronchial needle aspiration** is performed with flexible bronchoscopy to obtain tissue from the lesion that’s visualized with the bronchoscope.

**Transthoracic needle aspiration** is used

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**Hazards of the job**

Exposure to environmental and occupational carcinogens can increase a person’s risk of developing lung cancer. Here’s a list of established and suspected lung carcinogens.

**Established lung carcinogens**

- Arsenic
- Asbestos
- Bischloromethyl ether
- Chloromethyl methyl ether
- Chromium compounds
- Gamma radiation
- Ionizing radiation (X-rays)
- Mineral oils
- Mustard gas
- Nickel compounds
- Polycyclic aromatic hydrocarbons
- Radon decay products
- Soots
- Tars
- Vinyl chloride
- Wood dust

**Suspected lung carcinogens**

- Acrylonitrile
- Beryllium
- Cadmium
- Ceramic fibers
- Diesel engine exhaust
- Ferric oxide dust
- Insecticides
- Lead

when the lesion is suspected to be too peripheral and can’t be visualized with bronchoscopy (usually when the tumor is located on the outer part of the lung, closer to the chest wall). An interventional radiologist uses either fluoroscopy or CT guidance to perform a needle aspiration for cytology. Incidence of pneumothorax after this procedure is high, so remember to assess your patient for possible pneumothorax, and tell him to notify the health care provider if he experiences shortness of breath or chest pain.

Sputum cytology is the examination of expectorated cells in sputum. It’s rarely performed because its success depends on several factors, such as the tumor’s location, size, and histology and the experience of the cytopathologist. Also, it’s often difficult to obtain a specimen.

All the world’s a stage
The purpose of staging is to determine the burden of the tumor, which will guide the patient’s therapy. Small cell lung cancer is staged as either limited (all of the disease can be included in a single radiation field) or extensive (some of the cancer extends beyond a single radiation field, which contraindicates radiation therapy). Non-small cell lung cancer is staged using the TNM classification system, in which T denotes the extent of the primary tumor, N indicates lymph node involvement, and M describes the extent of metastasis (see Staging nonsmall cell lung cancer).

To stage the tumor, a sample of the lymph nodes is taken. This can be done several different ways, depending on the extent of lymph node involvement. Let’s take a closer look at some common sampling techniques.

Cervical mediastinoscopy is frequently used in patients with nonsmall cell lung cancer. Through a small, transverse incision in the suprasternal notch, the mediastinoscope is introduced into the mediastinum (central compartment of the thoracic cavity) and the lymph nodes are easily removed.

### Staging nonsmall cell lung cancer

**Extent of primary tumor (T)**
The primary tumor is graded T0 through T4 based on the following characteristics:
- **T0**—No evidence of primary tumor
- **Tis**—Carcinoma in situ
- **T1**—Tumor that’s 3 cm or less at its greatest dimension, doesn’t invade the visceral pleura, and is without bronchoscopic evidence of invasion that’s more proximal than a lobar bronchus
- **T2**—Tumor with any of the following features:
  - Size more than 3 cm at its greatest dimension
  - Involvement of a mainstem bronchus, with a proximal extent at least 2 cm away from the carina
  - Invasion of the visceral pleura
  - Association with atelectasis or obstructive pneumonia that extends to the hilar region but doesn’t involve the entire lung
- **T3**—Tumor of any size with any of the following features:
  - Invasion of the chest wall, diaphragm, mediastinal pleura, or parietal pericardium
  - Involvement of a mainstem bronchus within 2 cm of the carina but without invasion of the carina
  - Association with atelectasis or obstructive pneumonia of the entire lung
- **T4**—Tumor of any size with any of the following features:
  - Invasion of the mediastinum, heart, great vessels, trachea, esophagus, vertebral body, or carina
  - Association with a malignant pleural or pericardial effusion
  - Presence of satellite tumor nodule(s) within the lobe of the lung containing the primary tumor

**Extent of regional lymph node involvement (N)**
Regional lymph node involvement is graded N0 through N3 as follows:
- **N0**—No regional lymph node involvement
- **N1**—Involvement of ipsilateral peribronchial, intrapulmonary, or ipsilateral hilar lymph nodes, either by metastasis or direct extension
- **N2**—Involvement of ipsilateral, mediastinal, or subcarinal lymph nodes
- **N3**—Metastasis to contralateral mediastinal or contralateral hilar nodes or either ipsilateral or contralateral involvement of scalene or supraclavicular lymph nodes

**Presence of distant metastasis (M)**
Distant metastatic involvement is graded as either M0 (absent) or M1 (present).

Extended cervical mediastinoscopy is performed following cervical mediastinoscopy if the mediastinal lymph nodes aren’t accessible by using the standard procedure.

Anterior mediastinotomy, also known as the Chamberlain procedure, provides more extensive access to lymph nodes through the second, third, or fourth left intercostal space.

Thoracoscopy provides one of the most thorough examinations of the entire hemithorax, including the visceral and parietal pleurae. It allows for assessment of the primary tumor. In video-assisted thoracic surgery, an endoscope (a tiny telescope attached to a video monitor) is advanced through a small incision between the ribs, allowing the surgeon to view the patient’s internal organs on the monitor. This newer, minimally invasive technique allows for a shorter hospital stay and a quicker recovery time.

In addition, the American Thoracic Society recommends that all patients with a diagnosis of lung cancer undergo complete blood work, including liver function tests, to rule out metastatic disease. A chest CT scan is also recommended for all patients to detect possible mediastinal lymph node metastases and invasion of the chest wall or mediastinum. The latest treatment guidelines for nonsmall cell lung cancer published by the American Society of Clinical Oncology recommend preoperative positron emission tomography imaging for locoregional staging as well. Magnetic resonance imaging is recommended for stage II nonsquamous cell, stage III nonsmall cell, and all small cell lung cancers.

Once your patient has been diagnosed with lung cancer, what are his options? Let’s find out.

Surgery’s a start
The choice of treatment for lung cancer depends on an accurate description of the type of cancer cell and the stage of the tumor. Generally, surgical removal of the entire tumor is the only certain cure. That’s why surgery remains the primary treatment for all thoracic malignancy, particularly for stage I and stage II nonsmall cell lung cancer. The surgeon’s goal is to obtain complete resection, which is defined as the removal of all disease—the proximal margins of the resected specimen are microscopically free of tumor, distant lymph nodes are microscopically free of tumor, and the resected lymph node capsule is intact.

Let’s take a look at the surgical procedures that can be performed.

Lobectomy is the most common surgery for lung cancer. It’s performed when a lesion is confined to a single lobe. During this procedure, the surgeon removes one of the five lung lobes (see Picturing lobectomy and pneumonectomy). Postoperatively, most patients have sufficient lung volume.

A nonanatomic procedure, wedge resection is performed when a patient has cardiac or respiratory compromise. During this procedure, the surgeon excises a wedge-shaped lung portion that includes the lesion. Wedge resection has a higher local recurrence rate because too much or too little tissue is often resected.

Segmentectomy may also be performed if a patient has cardiac or respiratory compromise. This procedure can only be used when there are small, peripheral tumors confined to an anatomic segment. Separation of the diseased segments from the adjacent segments must be done precisely or there’s a greater risk of complication, such as empyema (collection of pus in the pleural space) and bronchopleural fistula.

Pneumonectomy is the removal of the entire lung (see Picturing lobectomy and pneumonectomy). It can result in the loss of more than 50% of the patient’s lung function. This procedure has a higher perioperative mortality rate and a higher postoperative morbidity rate.

But what happens after surgery or if your patient isn’t a candidate for surgery? There are still options for treatment.
Beyond surgery
Radiation therapy is used primarily for patients with stage I and stage II nonsmall cell lung cancer who aren’t considered surgical candidates. Postoperatively, it’s also recommended, along with chemotherapy, for patients with positive lymph nodes or positive surgical margins. Generally, patients selected for radiation therapy include those who refuse surgical intervention and those who have significant comorbidities like poor cardiopulmonary reserve. Radiation therapy can also be used prophylactically, and it may be administered for palliative care if the disease metastasizes to the brain and bone.

Besides radiation therapy, chemotherapy may be used. Keep in mind, though, that chemotherapy is noncurative in advanced or recurrent disease; it’s used to control the disease and its symptoms. The regimens of chemotherapy that are used for lung cancer include platinum-based drugs like cisplatin and carboplatin. These drugs have potential adverse effects, such as kidney damage, neuropathy, hearing loss, acute and delayed nausea and emesis, and myelosuppression (suppression of bone marrow activity, which can result in the reduction of platelets, white blood cells [WBCs], and red blood cells). Other regimens that can be used include the taxanes paclitaxel (Taxol) and docetaxel (Taxotere), which may cause adverse effects like peripheral neuropathy, neutropenia (decreased WBC [neutrophil] count), and fatigue.

The regimen of chemotherapy that’s administered depends on the patient’s performance status and comorbidities and whether the tumor has gotten worse through prior treatment.

Neoadjuvant chemotherapy (chemotherapy before surgery) may be used to improve drug delivery through intact vasculature, increase the efficacy of chemotherapy in earlier-stage disease, facilitate surgery or potentiate the use of less radical surgery, reduce the incidence of positive surgical margins, and, possibly, eradicate distant micrometastases.

A combination of radiation therapy and chemotherapy is the primary treatment for stage IIIIB nonsmall cell lung cancer. The Radiation Therapy Oncology Group conducted a phase 3 clinical trial geared toward patients with locally advanced unresectable
nonsmall cell lung cancer. This study specifically compared concurrent treatment with radiation and chemotherapy versus sequential treatment. Based on the results, concurrent chemoradiation was shown to have a significantly higher survival rate than sequential therapy. For this reason, concurrent chemoradiation should be considered the standard of care for stage III unresectable nonsmall cell lung cancer.

Other nonsurgical therapy includes erlotinib (Tarceva), an epidermal growth factor receptor and tyrosine kinase inhibitor that exhibits antitumor activity. Common adverse effects include acneiform rash and diarrhea.

So what can you do to help your patient through all of this? Plenty, as you’ll find out.

You can make a difference
The diagnosis of lung cancer can be overwhelming for patients and their families. As a nurse, you play an important role from the initial diagnosis and staging through treatment and, possibly, end-of-life decisions. When caring for a patient with lung cancer, you’ll take on many roles: educator, advocate, support person, and caregiver.

If your patient is scheduled to undergo surgery, describe the type of procedure and answer any questions he has about what to expect during and after the surgery. Stress the importance of optimal ventilation, which includes smoking cessation and practicing coughing, deep breathing, and incentive spirometer use. You’ll want to instruct your patient on the use of patient-controlled analgesia, and let him know that chest tubes will be left in place postoperatively until drainage decreases and there’s no air leak. Educate your patient about the importance of early ambulation to decrease the risk of deep vein thrombosis (DVT) and pneumonia and postthoracotomy exercises to decrease the risk of frozen shoulder (a postoperative complication characterized by pain and loss of motion or stiffness in the shoulder).

Patients who undergo lung surgery will be in the hospital for 5 to 7 days, with 1 to 2 days spent in the intensive care unit, depending on the procedure performed. Postoperatively, you’ll monitor your patient’s vital signs, pain management, and chest tubes. Monitor the color and output of drainage and watch for possible air leaks.

Be alert for postoperative complications, including:
- atelectasis
- pneumonia
- respiratory failure
- cardiac arrhythmias
- infection
- DVT
- pulmonary edema
- bronchial pleural fistula
- postthoracotomy pain syndrome (neuropathic pain due to intercostal nerve injury).

For a more in-depth look at what you need to do for your postop patient, see How to prevent complications after thoracic surgery.

If radiation is in your patient’s future, educate and support him through the course of therapy. Your patient will be receiving radiation to the thoracic area, so he may experience esophagitis (inflammation of the esophagus), radiation pneumonitis, fatigue, and decreased appetite. Radiation pneumonitis may occur 1 to 3 months after radiation therapy. Symptoms usually resolve in 2 to 3 months and include fever, cough, and dyspnea. Steroids are the treatment of choice for radiation pneumonitis.

Educate your patient about dietary sup-
How to prevent complications after thoracic surgery
Here’s what you’ll need to do after your patient undergoes thoracic surgery.

Patient management
• Auscultate lung sounds and assess for respiration rate, rhythm, and depth.
• Monitor oxygenation with pulse oximetry.
• Monitor the electrocardiogram for heart rate and rhythm changes.
• Assess capillary refill, skin color, and the surgical dressing.
• Encourage and assist your patient to turn, ambulate, cough, and take deep breaths.

Chest drainage management
• Verify that all connection tubes are patent and secure.
• Monitor drainage characteristics, including color, amount, and consistency.
• Assess for significant increases (greater than 100 mL in 8 hours) or decreases in drainage output.
• Keep the system below your patient’s chest level.
• Keep suction at the level ordered.
• Keep the air vent open when suction is off.
For a wet suction system:
• Note fluctuations in the water seal chamber.
• Assess the suction control chamber.
• Maintain the appropriate fluid in the water seal and suction control chamber.
• Make sure the water seal is intact.
For a dry suction system:
• Note fluctuations in the air leak indicator.
• Assess the regulator dial.

Stress to your patient the importance of taking prescribed antiemetics at scheduled times to prevent nausea and vomiting. This will help him consume the required nutrients and maintain his weight.

Patients are most susceptible to infection 7 to 14 days after the completion of chemotherapy. So teach your patient to limit time spent in crowds of people and to stay away from people who have recently been ill, especially if his blood cell counts are low. Your patients may be taught how to administer a growth factor, which will help stimulate WBCs.

If your patient’s prognosis is poor, he may need to consider end-of-life preferences. You can help him understand the use of an advance directive, proxy directive, living will, or durable power of attorney for health care. You can also discuss the possibility of hospice care.

Your patient and his family may have

Supplements and high-calorie nutrients to help him maintain adequate nutrition during radiation therapy. A referral to a dietician may be needed. Remember to assess your patient’s pain to ensure that he maintains the best possible quality of life.

When chemotherapy is ordered, teach your patient how to recognize the following adverse effects and report them immediately:

- myelosuppression, which causes fatigue, increased infections, and bleeding
- leukopenia (decreased WBC [leukocyte] count), which causes fatigue and increased infections
- anemia, which causes fatigue
- thrombocytopenia (reduced platelet count), which causes bleeding
- nausea and vomiting
- peripheral neuropathy, which causes numbness, tingling, burning, weakness, and pain
- alopecia (hair loss).
many questions and will no doubt be trying to cope with the diagnosis of a life-threatening illness. Remember to be sensitive and listen empathetically. Make sure your patient and his family know where to go for support and who they can talk to about questions or concerns.

Kicking the habit

In patients with clinical stage I disease who have undergone resection with curative intent, the estimated 5-year cancer-free survival rate is as high as 50%. This is why we must work on early detection and prevention strategies. As nurses, we need to participate in education programs that emphasize the importance of smoking cessation and the harmful effects of secondhand smoke. With your compassionate care, patients and their families will be better able to deal with a diagnosis of lung cancer.

Learn more about it


1. Which statement about lung cancer is correct?  
   a. Its overall 5-year survival rate is 25%.  
   b. It’s most prevalent among Caucasian males.  
   c. It’s the most common cause of cancer death.

2. The strongest correlation exists between cigarette smoking  
   and the development of  
   a. large cell carcinoma.  
   b. small cell carcinoma.  
   c. squamous cell carcinoma.

3. The prognosis for a patient diagnosed with small cell lung  
   cancer is  
   a. 6 months or less.  
   b. 12 months or less.  
   c. 5 years or less.

4. Which statement about squamous cell lung carcinoma is  
   correct?  
   a. Its incidence is increasing.  
   b. Tumors are typically located near the hilum.  
   c. The most common symptom is chest wall pain.

5. Adenocarcinoma tumors of the lung tend to  
   a. be small in size.  
   b. project into the bronchi.  
   c. present with pleural effusions.

6. Which type of lung tumor grows rapidly?  
   a. adenocarcinoma  
   b. large cell carcinoma  
   c. squamous cell carcinoma

7. A nonsmoker who lives with a smoker has a  
   a. 24% chance of developing lung cancer.  
   b. 36% chance of developing lung cancer.  
   c. 48% chance of developing lung cancer.

8. A person who quits smoking will decrease his risk of  
   developing lung cancer within  
   a. 1 year.  
   b. 2½ years.  
   c. 5 years.

9. Approximately what percentage of lung cancer cases is  
   associated with environmental or occupational exposure?  
   a. 15%  
   b. 25%  
   c. 35%

10. Studies suggest that a substantial reduction in lung cancer  
    risk can be achieved by  
    a. decreasing the number of cigarettes smoked daily.  
    b. increasing the intake of green and yellow vegetables.  
    c. inhaling cigarette smoke less deeply.

11. A patient in the early stages of lung cancer is likely to  
    present with  
    a. hemoptysis.  
    b. hoarseness.  
    c. dysphagia.

12. The most common procedure used to diagnose tracheo-  
    bronchial cancer is  
    a. a chest X-ray.  
    b. sputum cytology.  
    c. flexible bronchoscopy.

13. Which statement about wedge resection is correct?  
    a. It’s the most common operation for lung cancer.  
    b. It’s performed when a patient has cardiac or respiratory com-  
       promise.  
    c. It can result in the loss of more than 50% of the patient’s lung  
       function.

14. Which statement about lung cancer treatment is correct?  
    a. Chemotherapy is noncurative in advanced or recurrent disease.  
    b. Radiation therapy is used only for patients with stage I and II  
       small cell lung cancer.  
    c. Radiation shouldn’t be used for palliation.

15. Patients who are receiving chemotherapy are most sus-  
    ceptible to infection  
    a. 12 to 24 hours following treatment.  
    b. 3 to 5 days following treatment.  
    c. 7 to 14 days following treatment.

16. Which statement about radiation pneumonitis is correct?  
    a. A cardinal sign is the development of difficulty swallowing.  
    b. Symptoms usually resolve in 2 to 3 months.  
    c. Nonsteroidal anti-inflammatory drugs are the treatment of  
       choice.

17. Which of these is an established lung carcinogen?  
    a. ceramic fibers  
    b. ionizing radiation  
    c. diesel engine exhaust

18. Which of these is a feature of a primary lung tumor staged  
    as T3?  
    a. association with a malignant pleural or pericardial effusion  
    b. presence of a satellite tumor that’s 3 cm or less at its greatest  
       dimension  
    c. invasion of the chest wall, diaphragm, mediastinal pleura, or  
       parietal pericardium

19. When caring for a patient who has had thoracic surgery,  
    it’s important to  
    a. encourage the patient to refrain from coughing.  
    b. maintain the patient’s position on the nonoperative side.  
    c. keep the chest drainage system below the patient’s chest level.
TKO knee pain with total knee replacement (page 30)

B. Test Answers: Darken one circle for your answer to each question.

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TKO knee pain with total knee replacement (page 30)

C. Course Evaluation*

1. Did this CE activity’s learning objectives relate to its general purpose?  ❑ Yes ❑ No
2. Was the journal home study format an effective way to present the material?  ❑ Yes ❑ No
3. Was the content relevant to your nursing practice?  ❑ Yes ❑ No
4. How long did it take you to complete this CE activity? ___ hours ___ minutes
5. Suggestion for future topics

Smoke out lung cancer (page 42)

B. Test Answers: Darken one circle for your answer to each question.

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Smoke out lung cancer (page 42)

C. Course Evaluation*

1. Did this CE activity’s learning objectives relate to its general purpose?  ❑ Yes ❑ No
2. Was the journal home study format an effective way to present the material?  ❑ Yes ❑ No
3. Was the content relevant to your nursing practice?  ❑ Yes ❑ No
4. How long did it take you to complete this CE activity? ___ hours ___ minutes
5. Suggestion for future topics

Do you know how to recognize child abuse? (page 54)

B. Test Answers: Darken one circle for your answer to each question.

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Do you know how to recognize child abuse? (page 54)

C. Course Evaluation*

1. Did this CE activity’s learning objectives relate to its general purpose?  ❑ Yes ❑ No
2. Was the journal home study format an effective way to present the material?  ❑ Yes ❑ No
3. Was the content relevant to your nursing practice?  ❑ Yes ❑ No
4. How long did it take you to complete this CE activity? ___ hours ___ minutes
5. Suggestion for future topics

D. Two Easy Ways to Pay:

❑ Check or money order enclosed (Payable to Lippincott Williams & Wilkins)
❑ Charge my  ❑ Mastercard  ❑ Visa  ❑ American Express

Mail completed test with registration fee to: Lippincott Williams & Wilkins, CE Group, 2710 Yorktowne Blvd., Brick, NJ 08723.

Photocopies of this page will be accepted.

*In accordance with the Iowa Board of Nursing administrative rules governing grievances, a copy of your evaluation of the CE offering may be submitted directly to the Iowa Board of Nursing.