

An Overview of Lung Cancer Symptoms, Pathophysiology, And Treatment

Linda H. Yoder

Patients with lung cancer can provide treatment challenges for even the most skilled clinician. More than 90% of adults with lung cancer are symptomatic when

Linda H. Yoder, PhD, MBA, RN, AOCN®, FAAN, is Program Director, Evidence-Based Practice, Outcomes & Research, Adventist HealthCare, Rockville, MD.

Note: This column and the complimentary Continuing Nursing Education credit are made possible through an educational grant from C-Change, a Washington, DC, based organization comprising the nation's key cancer leaders from government, business, and nonprofit sectors. These cancer leaders share the vision of a future where cancer is prevented, detected early, and cured or is managed successfully as a chronic illness. The mission of C-Change is to leverage the combined expertise and resources of its members to eliminate cancer as a (major) public health problem at the earliest possible time. C-Change is both a forum and a catalyst for identifying issues and major challenges facing the cancer community and for initiating collaborative actions to complement the efforts of individual C-Change members. Medical-Surgical nurses are invited to learn more about this important organization by visiting www.c-changetogether.org

they are diagnosed. According to Van Cleave and Cooley (2004), a minority of patients present with local symptoms related to their primary tumor, but most present with either nonspecific systemic or metastatic symptoms (see Table 1). A new cough or a change in a chronic cough is often the presenting and most distressing symptom in people with lung cancer. Cough is present in 65%-75% of patients with lung cancer, and more than 25% have a productive cough. Many lung cancers occur in central airways and may lead to post-obstructive pneumonia; lymph node enlargement also may occur (Beckles, Spiro, Colice, & Rudd, 2003). Hemoptysis is the presenting symptom in 6%-35% of patients. Approximately 20%-30% of all patients will develop hemoptysis, with 3% experiencing fatal hemoptysis (Beckles et al., 2003; Knop, 2005; Van Cleave & Cooley, 2004).

Dyspnea develops early in about 60% of patients, with approximately 65% of patients experiencing this distressing symptom during their illness. The causes of dyspnea in patients with lung cancer include tumor occlusion of a main airway or lung parenchyma, pleural effusion, pneumonia, and complica-

tions of chemotherapy or radiation therapy, such as pneumonitis (Beckles et al., 2003; Knop, 2005).

The reported prevalence of pain in patients with lung cancer is 28%-51% (Gift, Jablonski, Stommel, & Given, 2004). Chest discomfort and/or chest wall pain is common and occurs in about 50% of patients at diagnosis. The discomfort is often ill-defined, aching, and intermittent. Pleuritic pain may be present due to direct spread of the tumor to the pleural surface (Beckles et al., 2003). Because the majority of patients with lung cancer present with advanced disease, lung cancer

Table 1.
Symptoms of Lung Cancer

- ❖ Cough
- ❖ Dyspnea
- ❖ Hoarseness
- ❖ Chest pain
- ❖ Wheezing
- ❖ Hemoptysis
- ❖ Nausea/Vomiting
- ❖ Swelling of face and arms
- ❖ Anorexia
- ❖ Weight Loss
- ❖ Fatigue
- ❖ Bone pain
- ❖ Clubbing
- ❖ Headache
- ❖ Seizures



Table 2.
American Joint Committee on Cancer (AJCC) TNM System for Defining Lung Cancer

Primary Tumor (T)	
TX	Primary tumor can not be assessed, or tumor is determined by the presence of malignant cells in sputum or bronchial washings, but not visualized by imaging or bronchoscopy.
T0	No evidence of primary tumor
Tis	Carcinoma <i>in situ</i>
T1	Tumor 3 cm or less in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobular bronchus
T2	Tumor with any of the following features of size or extent: <ul style="list-style-type: none"> • More than 3 cm in greatest dimension • Involving main bronchus, 2 cm or more distal to the carina • Invading the visceral pleura • Associated with atelectasis or obstructive pneumonitis that extends to the hilar region, but does not involve the entire lung
T3	Tumor any size that directly invades any of the following: <ul style="list-style-type: none"> • Chest wall, diaphragm, mediastinal pleura, or parietal pericardium • Tumor in the main bronchus less than 2 cm distal to the carina, but without involvement of the carina or associated atelectasis or obstructive pneumonitis of the entire lung
T4	Tumor of any size that invades any of the following: <ul style="list-style-type: none"> • Mediastinum • Trachea • Carina • Heart • Esophagus • Separate tumor nodules in the same lobe • Great vessels • Vertebral body • Tumor with a malignant pleural effusion
Regional Lymph Nodes (N)	
NX	Regional lymph nodes can not be assessed.
N0	No regional lymph node metastasis
N1	Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes, and intrapulmonary nodes including involvement by direct extension of the primary tumor
N2	Metastasis in ipsilateral mediastinal and/or subcarinal lymph nodes
N3	Metastasis to contralateral, mediastinal, contralateral hilar, ipsilateral or contralateral scalene or supraclavicular lymph nodes
Distant Metastasis (M)	
MX	Presence of distant metastasis cannot be assessed.
M0	No distant metastasis
M1	Distant metastasis present.

Source: AJCC, 2002

has become known as a disease for which palliative treatment of symptoms is common (Knop, 2005).

Paraneoplastic syndromes are common in lung cancer and may include Cushing's syndrome, hypercalcemia, syndrome of inappropriate antidiuretic hormone, digital clubbing, pulmonary hyper-

trophic osteoarthropathy, and neurologic syndromes (Van Cleave & Cooley, 2004). Beckles et al. (2003) provide a good overview of each of these paraneoplastic syndromes.

Types of Lung Cancer

Lung cancer is divided into two main categories: non-small

cell lung cancer (NSCLC) and small cell lung cancer (SCLC). NSCLC is further classified into squamous cell carcinoma, adenocarcinoma, and large cell carcinoma. Because treatment varies greatly depending on the type and stage of lung cancer, the diagnostic workup is critical in terms of identifying the specific type of

lung cancer, the stage of the disease, and the ability of the patient to tolerate treatment (Knop, 2005; Van Cleave & Cooley, 2004).

NSCLC represents 80% of all lung cancers, with adenocarcinoma accounting for 40% of all cases of lung cancer. Squamous cell carcinoma occurs most frequently in the central zone of the lung whereas adenocarcinoma tumors are peripheral in origin, arising from the alveolar surface epithelium or bronchial mucosal glands. Large cell carcinoma composes only 15% of all lung cancers and appears to be decreasing in incidence because of improved diagnostic techniques (Van Cleave & Cooley, 2004).

The second major type of lung cancer is SCLC, in which there are also several histologic groupings: pure small cell, mixed small cell, and large cell carcinoma, as well as combined small cell. SCLC is usually more aggressive than NSCLC and presents as a central lesion with hilar and mediastinal invasion along with regional adenopathy. Distant metastasis at presentation is common in patients with SCLC (Van Cleave & Cooley, 2004). The most common sites of metastasis of lung cancer are the bones, liver, adrenal glands, pericardium, brain, and spinal cord.

Staging for NSCLC is done using the internationally accepted TNM (tumor, node, metastasis) staging system (see Table 2). Prognosis and treatment of SCLC are determined using a staging system developed by the Veterans Administration Lung Cancer Study Group, although some hospitals and cancer centers are beginning to apply the TNM system to SCLC (Knop, 2005). SCLC is divided into two stages: limited-stage and extensive-stage disease. In patients with limited-stage disease, the cancer is restricted to the ipsilateral hemi-

thorax, which can be treated with a single radiation port. However, patients with extensive-stage disease have obvious metastasis (Knop, 2005; Van Cleave & Cooley, 2004).

The overall 5-year survival rate for all patients with lung cancer is approximately 15%; depending on the histology and stage of disease, the 5-year survival rate ranges from 1%-60%.

Treatment

Guidelines for the diagnostic workup of people with known or suspected lung cancer include obtaining a thorough history, physical examination, and appropriate laboratory tests to screen for metastatic disease. Confirmation of the type of lung cancer by cytology is of utmost importance before treatment can be determined.

Non-small cell lung cancer. Surgery is the treatment of choice for individuals with early-stage NSCLC who are able to tolerate this intervention. The type of surgical procedure depends on tumor location, the patient's co-

morbidities, and the potential effects on long-term pulmonary function. A lobar resection or greater is recommended, but a sublobar resection may be performed in people who can not tolerate more extensive surgery because of co-morbidities. Patients with positive surgical margins are evaluated for additional treatment, which typically includes radiation/chemotherapy and more surgery. It is recommended that patients with centrally located clinical T3 NSCLC undergo surgical evaluation of the mediastinal lymph nodes before resection because a finding of N2 lymph node disease precludes surgical resection as the initial therapy. Radiation therapy is the primary treatment for people who have co-morbidities, such as cardiac disease or severe pulmonary disease, or who are poor surgical candidates (Knop, 2005; Van Cleave & Cooley, 2004).

People with preoperatively identified stage IIIA lung cancer have a poor prognosis with surgical treatment alone. Patients with incomplete resections and those

Table 3.
AJCC Stage Grouping for Lung Cancer

Stage	TNM Subset
0	Tis N0 M0
1A	T1 N0 M0
1B	T2 N0 M0
IIA	T1 N1 M0
IIB	T2 N1 M0 T3 N0 M0
IIIA	T1 N2 M0 T2 N2 M0 T3 N1 M0 T3 N2 M0
IIIB	Any T N3 M0 T4 Any N M0
IV	Any T any N M1

Source: AJCC, 2002



with residual nodal disease found at surgery may be considered for postoperative radiation therapy. Otherwise healthy IIIB patients with clinical T4N0 from satellite tumors in the same lobe or carinal involvement should be referred to a thoracic surgeon for possible resection. People with stage IV NSCLC have a poor prognosis with a median survival of 8-10 months and a 1-year survival rate of 30%-35% (Knop, 2005; Van Cleave & Cooley, 2004).

Small cell lung cancer. SCLC usually is more aggressive than NSCLC; distant metastasis is common at initial presentation. Primary treatment usually consists of combination chemotherapy, which may be combined with radiation therapy. Limited-stage disease is potentially curable with combined chemotherapy and radiation therapy. Surgical resection might be considered in the rare situation when a patient has limited SCLC. Of those patients who achieve a complete response after induction chemotherapy, 50%-60% will develop brain metastasis in 2 years. In 20%-30% of these patients, the brain is the only site of metastasis. Consequently, people who achieve complete remission are offered prophylactic cranial irradiation to decrease the risk of central nervous system involvement. If patients relapse after an initial response to treatment or if they do not respond to initial treatment, further chemotherapy is usually offered, depending on the patient's previous response to first-line therapy. In patients with extensive disease, radiation therapy may be used for palliation (Knop, 2005; Van Cleave & Cooley, 2004).

Because advanced lung cancer currently is incurable, quality of life (QOL) and patient preferences are key outcomes when

new treatments in clinical trials are assessed. Sarna and colleagues (2002) examined QOL in long-term survivors of NSCLC. They noted that most people were hopeful after their treatment and interestingly, they believed lung cancer made a positive change in their lives. In that study, 22% of survivors had distressed mood, 13% continued to smoke, and 50% had moderate-to-severe pulmonary impairment. The researchers also found that mood state was the most important predictor of QOL. However, in a more recent study examining QOL and the meaning of illness in women with lung cancer, Sarna and colleagues (2005) found that more than 75% reported distress with diagnosis, family distress, and impact on sexual functioning lowering their QOL. Also, 35% experienced depressed mood and 36% reported negative feelings regarding the meaning of their illness. The researchers concluded that younger age, depressed mood, and number of co-morbid diseases are risk factors for decreased QOL.

Clearly, people with lung cancer often experience multiple symptoms that change through the course of their illness. Patients undergoing the various treatment modalities for lung cancer most frequently complain of pain, changes in appetite, fatigue, and respiratory symptoms; often these symptoms cluster together. Along with excellent physical care while patients are hospitalized, nurses can provide interventions with lung cancer patients ranging from patient education regarding surgery, chemotherapy, and radiation therapy as well as symptom management for skin changes related to radiation therapy, fatigue, nausea, weight loss due to appetite changes, and esophagitis. Psychological sup-

port regarding quality of life issues is critical. Because uncontrolled symptoms are associated with increased distress and decreased QOL, nurses are integral to prompt symptom recognition and treatment. ■

References

- American Joint Committee on Cancer (AJCC). (2002). *AJCC staging manual* (6th ed.). New York: Springer-Verlag.
- Beckles, M.A., Spiro, S.G., Colice, G.L., & Rudd, R.M. (2003). Initial evaluation of the patient with lung cancer. *Chest*, 123(Suppl. 1), 97S-104S.
- Gift, A.G., Jablonski, A., Stommel, M., & Given, C.W. (2004). Symptom clusters in elderly patients with lung cancer. *Oncology Nursing Forum*, 31(2), 203-212.
- Knop, C.S. (2005). Lung cancer. In C.H. Yarbro, M.H. Frogge, & M. Goodman (Eds.), *Cancer nursing: Principles and practice* (6th ed.) (pp. 1379-1413). Boston, MA: Jones & Bartlett.
- Van Cleave, J.H., & Cooley, M.E. (2004). Lung cancer. In C.G. Varricchio (Ed.), *A cancer sourcebook for nurses* (8th ed.) (pp. 215-229). Sudbury, MA: Jones & Bartlett.
- Sarna, L., Brown, J.K., Cooley, M.E., Williams, R.D., Chernecky, C., Padilla, G., et al. (2005). Quality of life and meaning of illness of women with lung cancer. *Oncology Nursing Forum*, 32(1), E9-E19.
- Sarna, L., Padilla, G., Holmes, C., Tashkin, D., Brecht, M. L., & Evangelista, L. (2002). Quality of life in long-term survivors of non-small cell lung cancer. *Journal of Clinical Oncology*, 20, 2920-2929.



MSN J608

**Answer/Evaluation Form:
An Overview of Lung Cancer Symptoms, Pathophysiology, and Treatment**

This test may be copied for use by others.

COMPLETE THE FOLLOWING:

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Preferred telephone: (Home) _____ (Work) _____

AMSN Member Expiration Date: _____

Registration fee: AMSN Member: \$10.00
 Nonmember: \$13.00

Answer Form:

1. If you applied what you have learned from this activity into your practice, what would be different?

Evaluation	Strongly disagree	Strongly agree
The offering met the stated objectives.		
2. By completing this activity, I was able to meet the following objectives:		
a. List types of lung cancer.	1 2 3 4 5	
b. Describe treatment options for non-small cell lung cancer.	1 2 3 4 5	
c. Discuss treatment options for small cell lung cancer.	1 2 3 4 5	
3. The content was current and relevant.	1 2 3 4 5	
4. The objectives could be achieved using the content provided.	1 2 3 4 5	
5. This was an effective method to learn this content.	1 2 3 4 5	
6. I am more confident in my abilities since completing this material.	1 2 3 4 5	
7. The material was (check one) ___new ___review for me		
8. Time required to complete the reading assignment: _____minutes		

I verify that I have completed this activity (Signature):

Comments

Objectives

This educational activity is designed for nurses and other health care professionals who care for and educate patients and their families regarding lung cancer symptoms, pathophysiology, and treatment. For those wishing to obtain CNE credit, an evaluation follows. After studying the information presented in this article, the nurse will be able to:

1. List types of lung cancer.
2. Describe treatment options for non-small cell lung cancer.
3. Discuss treatment options for small cell lung cancer.

CE Instructions

1. To receive continuing education credit for individual study after reading the article, complete the answer/evaluation form to the left.
2. Photocopy and send the answer/evaluation form along with a check or money order payable to **AMSN to MEDSURG Nursing, CE Series**, East Holly Avenue Box 56, Pitman, NJ 08071-0056.
3. Test returns must be postmarked by August 31, 2008. Upon completion of the answer/evaluation form, a certificate for **1.1** contact hour(s) will be awarded and sent to you.

This independent study activity is provided by **Anthony J. Jannetti, Inc.**, which is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation (ANCC-COA).

Anthony J. Jannetti, Inc. is a provider approved by the California Board of Registered Nursing, Provider Number, CEP 5387.

This article was reviewed and formatted for contact hour credit by Dottie Roberts, MSN, MACI, RN, CMSRN, OCNS-C, **MEDSURG Nursing** Editor; and Sally S. Russell, MN, RN, CMSRN, AMSN Education Director.