



## Making a Timely Diagnosis of Lung Cancer

by Ralph L. Haynes, MD



Lung cancer is a major health problem that kills more men and women than colon, breast and prostate cancers combined. In 2002, it is estimated that there will be 89,200 lung cancer deaths among men and 65,700 lung cancer deaths among women in the United States.<sup>1</sup> The survival rate for lung cancer is poor compared with other types of cancer. Despite intensive investigation, the overall five-year survival rate for lung cancer has remained at 14 percent for the last 25 years.<sup>2</sup>

### Pathology

There are two major types of lung cancer: non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). Each one affects different types of cells in the lung and grows and spreads in different ways. Non-small cell tumors comprise 80 percent of lung cancers. Non-small cell tumors include squamous cell carcinoma, adenocarcinoma, large cell carcinoma and bronchoalveolar carcinoma. Small cell tumors make up the remaining 20 percent of lung cancers. Small cell tumors tend to metastasize early and are usually widespread at the time of diagnosis. Treatment for small cell cancer is primarily through chemotherapy.

### Risk Factors

By far, the most powerful risk factor for lung cancer is smoking. Smoking causes 85 percent of lung cancer cases. The risk of lung cancer increases with years of smoking and number of cigarettes smoked per day. Passive or "second-hand" smoke is another established risk for lung cancer. It is responsible for approximately 3,000 lung cancer deaths annually. Of the 180,000 new cases of lung cancer yearly in the United States, most occur in patients who are more than 50 years of age, while four percent occur in patients less than 40 years of age.<sup>3</sup>

Certain occupations such as those involving exposure to asbestos, uranium, arsenic, chromium, nickel, acrylonitrile, beryllium, cadmium, chloromethyl ether, silica, radon and diesel exhaust are known occupational risks for lung cancer.<sup>4</sup> Family history is also a well-documented risk factor. The association between chronic lung disease and lung cancer was recognized more than 40 years ago. Advanced emphysema, chronic bronchitis and chronic tuberculosis often antedate the diagnosis of lung cancer. There is also a strong association between the presence of airflow obstruction and lung cancer. The increased risk is approximately four- to six-fold.<sup>5</sup>

### Screening

The most common screening tests for lung cancer are the chest x-ray and sputum cytology. In the mid-1970s, the National Cancer Institute (NCI) funded studies using these two screening modalities at three sites: the Johns Hopkins Medical School,<sup>6</sup> the Memorial Sloan-Kettering Cancer Center<sup>7</sup> and the Mayo Clinic.<sup>8</sup> At the end of these studies, it was concluded that screening for lung cancer does not reduce mortality. Based primarily on these findings, there has been a 20-year dogma that screening for lung cancer is not beneficial even for the large population of high-risk smokers. However, controversy exists regarding study design and interpretation of results from these three studies. To end this uncertainty, the NCI is conducting the Prostate, Lung, Colorectal and Ovarian<sup>9</sup> (PLCO) Cancer Screening Trial, a long-term randomized controlled study of 74,000 men and women.

There are also intensive efforts to improve lung cancer screening with newer technologies such as low-dose helical computed tomography (LDCT, also called spiral CT) and molecular techniques.<sup>10</sup> Results of the Early Lung Cancer Action Project<sup>11</sup> (ELCAP) and a mass screening study for lung cancer in Japan have shown LDCT to be much more sensitive than chest x-ray in detecting small

- continued on page 2



lung lesions. LDCT may prove to be a more effective screening tool. To help determine this, the NCI is currently conducting the Lung Screening Study made up of 3,000 individuals aged 55 to 74 who are randomized to either chest x-ray or LDCT. In a previous NCI trial, the Lung Cancer Study Group demonstrated that lung cancer patients with resected pathologic stage one disease develop new lung cancers at a rate of one to three percent per year, and this rate increases with increasing recurrence-free survival.<sup>12</sup> Consequently, screening to detect second primary lung neoplasms as early as possible and to intervene with lung-conserving measures are particularly important for these patients.

While lung cancer screening is not a routine practice for the general public, a high index of suspicion maintained by the physician continues to be the best method of early detection. Physicians may decide that the evidence is sufficient to warrant the use of screening tests on an individual basis.

### Symptom Presentation

Symptoms of lung cancer often do not appear until the disease is in an advanced stage. Only about 15 percent of lung cancer cases are found in the early stages before spreading to nearby lymph nodes or elsewhere. Symptoms of lung cancer can be classified as local, regional (extension to chest wall and adjacent structures), or systemic (nonspecific constitutional effects). Local lesions may cause cough, hemoptysis, wheezing, atelectasis, dyspnea, and pneumonitis. Cough is by far the most common symptom, occurring in approximately 75 percent of patients with lung cancer. Because many smokers have chronic bronchitis, a new or increased chronic cough may go unrecognized. A change in the character of cough in a patient who has a history of smoking may mean the development of lung cancer. Hemoptysis occurs in about 35-50 percent of patients and may be the only clue to the diagnosis of lung cancer in the patient whose chest x-ray is normal. A local wheeze may be present when no abnormality is visible on a plain chest x-ray exposed at full inspiration. In this circumstance, radiography at maximal expiration may provide useful information by demonstrating local air trapping (the patient should be instructed to expire forcefully).

Regional lesions may present with cough or dyspnea secondary to pleural effusion, pain, hoarseness, dysphagia and symptoms compatible with superior vena caval or pericardial involvement. Hoarseness may indicate involvement of the laryngeal nerve. Dysphagia may reflect involvement of the esophagus. Patients may present with

severe shoulder pain due to sympathetic nerve involvement (Horner's syndrome). Systemic symptoms include fatigue, weight loss, anorexia, and fever.

Distant metastases from lung cancer have been found in every organ. The four most common sites for metastases are bone, liver, brain and adrenal. At presentation, up to 25 percent of patients may be symptomatic for bone pain, 20 percent with hepatic involvement, 20 percent with lymphadenopathy, and five to 10 percent with neurological manifestation. Ten percent of lung cancer patients develop a paraneoplastic syndrome which may manifest as hypercalcemia, ectopic adrenocorticotropic hormone (ACTH), syndrome of inappropriate antidiuretic hormone (SIADH), neuropathy of Eaton-Lambert syndrome, migratory thrombophlebitis (Trousseau's syndrome), clubbing of the fingers or hypertrophic pulmonary osteoarthritis.

### Most Common Symptoms of Lung Cancer<sup>2</sup>

- Cough that does not go away
- Chest pain aggravated by deep breathing
- Hoarseness
- Weight loss and loss of appetite
- Hemoptysis
- Dyspnea
- Recurring bronchitis or pneumonia
- New onset of wheezing

### Diagnosis

Individual cases of lung cancer are diagnosed on the basis of clinical suspicion and diagnostic work-up. Clinical suspicion is derived from risk factors and symptoms. Diagnostic work-up begins with a thorough history and physical examination. The chest x-ray (PA and Lateral) is usually the first test obtained along with laboratory studies and pulmonary function tests. Most often, a chest CT is then performed. Although not diagnostic, these studies are important in directing further testing. Diagnosis requires histologic confirmation. Fiberoptic bronchoscopy is the primary diagnostic technique for obtaining tissue from the bronchi. Transthoracic needle biopsy performed under CT or fluoroscopic guidance provides a method particularly suitable for peripheral lesions. Sputum cytology may be the only reasonable diagnostic tool in patients too ill for invasive procedures. If a biopsy sample fails to yield adequate tissue to establish a specific diagnosis, the failure to find malignant tissue does not prove the lesion is benign. If no definitive answer is obtained after one or two repeat biopsies, exploratory thoracotomy may be considered. Tissue sampling is also

crucial in accurately staging a patient, as therapeutic decisions require accurate staging.

All patients with signs/symptoms suggestive of lung cancer should be assessed by:

- History and physical examination
- Chest x-ray
- Hematological and biochemical laboratory studies
  - including serum calcium, alkaline phosphatase and liver function tests
- Histological/cytological diagnostic procedures
  - bronchoscopy and/or sputum cytology
- Consider referral to pulmonologist

The most common causes for malpractice suits alleging delays in lung cancer diagnosis are:

- When a recognized sign or symptom receives inadequate evaluation

- When x-ray findings are missed or not followed through to resolution

A high index of suspicion maintained by the physician continues to be the best method of early detection. With any patient presenting with symptoms that might indicate lung cancer, it is important to document:

- All patient symptoms and complaints
- The period of time the patient states symptoms have been present
- Instructions to the patient regarding follow-up, further testing or referral to a specialty consultant (a tracking system should be in place to assure tests and x-rays ordered are received and reviewed by the physician)
- Any advice or instructions given over the telephone

## Closed Claim Abstract - Failure to Diagnosis Lung Cancer

By Karol DeVito, R.N., Risk Management Consultant

### CASE ONE:

This case involves an alleged 22-month delay in the diagnosis of lung cancer in a 59-year-old female resulting in metastasis and a poor prognosis. The patient presented to her physician complaining of chest tightness and coughing. Following his evaluation, the patient was admitted to the hospital for further work-up which included a thallium stress test and chest x-ray. The chest x-ray was interpreted by the radiologist as revealing a right upper-lobe mass which could represent carcinoma. In his dictation, the radiologist recommended follow-up plain films and CT. The chest x-ray report was not added to the chart before the patient's discharge. The discharge summary noted only that the results of a thallium scan were pending. The patient was seen in the office two weeks later noting that a myocardial infarction had been ruled out. She was started on Tagamet and an upper GI study was ordered. There was no

mention of the chest x-ray. Over the next two years, the patient was seen five more times, including consultation for smoking cessation (four pack/day smoker), for coughing which was diagnosed as COPD and for right shoulder pain. Twenty-two months after the initial chest x-ray, the patient was admitted to the emergency room for breathing difficulties and the diagnosis of lung cancer was made. A lawsuit ensued and during deposition testimony, it was revealed that a copy of the initial chest x-ray report had been faxed to her physician's office on the day of its dictation and reviewed by one of the physicians. This physician forwarded the report to another of the group's physicians who was incorrectly listed as the primary physician. The second physician made an attempt to contact the patient upon initially receiving the results of the abnormal chest x-ray, but was unsuccessful as the telephone number was no longer in service. He requested that the chart

be pulled for follow-up, however, no follow-up was pursued.

### CASE TWO:

A patient was admitted to the hospital by her gynecologist for a hysterectomy. A pre-operative chest x-ray, interpreted by the radiologist, revealed a one and one-half centimeter nodular density in the right upper lobe. This finding was documented on the written x-ray report and was forwarded to the patient's hospital chart as well as to the attending gynecologist's private office. However, the radiologist did not directly contact the gynecologist. The patient was never advised of this finding. One year later, the patient developed a cough and chest pain. The patient was diagnosed as having a nine centimeter malignant mass in the right upper lobe. The radiologist was found to be culpable for the failure to directly communicate this suspicious finding which resulted in a one-year delay in the diagnosis of lung cancer.

### CASE THREE:

A woman presented with complaints of recent onset of cough and voice loss. On her initial visit, a chest x-ray was obtained that revealed a four centimeter lesion in the left lower lobe. The radiologist recommended follow-up x-rays in seven to 10 days to exclude carcinoma. No follow-up testing was performed and the

patient was never notified of this recommendation. The patient returned to the same medical center two months later with a complaint of right shoulder and neck pain. At this time, x-rays were obtained but no action was taken regarding the previous chest x-ray findings. One year later, the patient was experiencing fatigue and had to quit her job. She

again returned to the same medical center and was diagnosed with hypertension. Another chest x-ray was obtained that revealed the same lesion which was now five and one-half centimeters. She underwent a lobectomy and radiation therapy for adenocarcinoma. She suffered multiple complications including radiation myelitis which left her paraplegic.

### Risk Management Recommendations

- Educate patients on the risks of smoking and encourage smoking cessation
- Take a complete history and physical
- Order a chest x-ray on any patient symptomatic for lung cancer
- Maintain a high index of suspicion in any patient at high-risk for lung cancer and presenting with symptoms
- Do not automatically rule out lung cancer in non-smokers
- Do not automatically dismiss nonspecific symptoms as due to more common, minor ailments. Follow all symptoms through to a diagnostic resolution
- Abnormalities detected on chest x-rays done for other reasons must receive diagnostic evaluation
- A normal chest x-ray does not exclude lung cancer. Patients with suggestive symptoms require further testing. Consider referral to a pulmonologist
- All x-ray reports should be initialed by the physician before filing in the chart
- Compare current radiology films to all prior studies performed, not just the most recent
- Urgent or significant findings should be communicated directly by the radiologist to the referring physician
- If a biopsy fails to yield adequate tissue to establish a specific diagnosis, the failure to find malignant tissue does not prove the lesion is benign

- If a diagnostic test is not performed, document reasons i.e., patient unsuitable or declined test
- Develop a tracking system for all diagnostic tests, results and consultations ■

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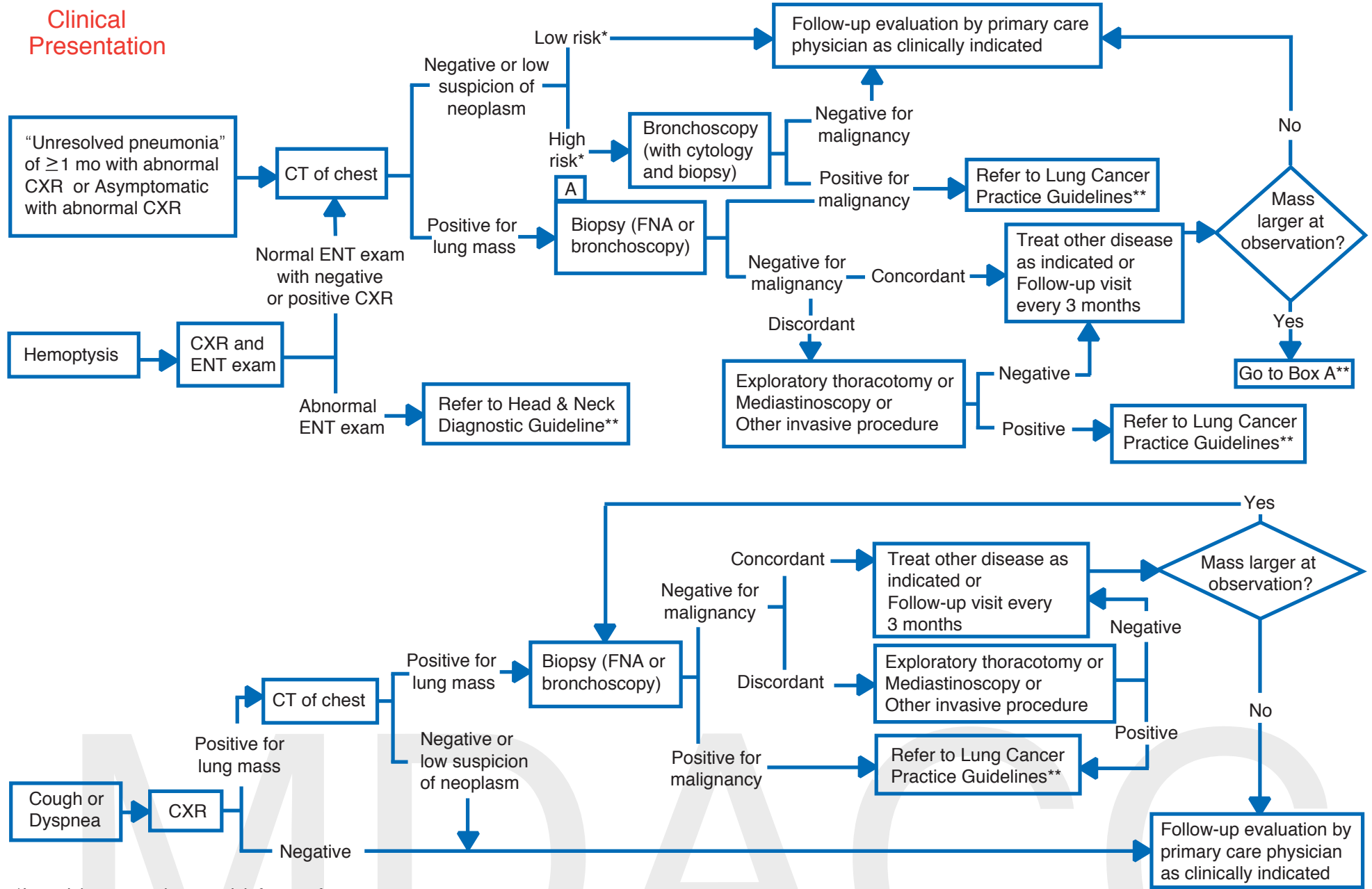
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# Suspicion of Lung Cancer

## Clinical Presentation



\*Low risk: nonsmoker; no risk factors for cancer.  
 High risk: smoking history of  $\geq 10$  pack-years; any previous malignancy; asbestos exposure; or exposure to other known carcinogen.