

# HOSPITAL PHYSICIAN®

## PULMONARY DISEASE BOARD REVIEW MANUAL

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The *Hospital Physician Pulmonary Disease Board Review Manual* is a peer-reviewed study guide for fellows and practicing physicians preparing for board examinations in pulmonary disease. Each manual reviews a topic essential to current practice in the subspecialty of pulmonary disease.

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## Approach to the Pulmonary Nodule

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## Approach to the Pulmonary Nodule

Catherine A. Riley, MD, and Gregory C. Kane, MD, FACP, FCCP

### INTRODUCTION

Lung cancer remains the leading cause of cancer mortality in the United States<sup>1</sup> as well as worldwide.<sup>2,3</sup> In 2007, it was estimated that lung cancer was responsible for more deaths in the United States than colorectal, breast, and prostate cancer combined.<sup>4</sup> A persistent major limitation in the treatment of lung cancer is the difficulty of detecting it at a curative stage. However, continued technological advancements have allowed physicians to detect progressively smaller nodules on radiographic imaging, potentially before metastasis occurs. Studies suggest that smaller tumors represent earlier stages of disease.<sup>5</sup> Given the dramatically decreased survival over progressive stages of lung cancer, it is reasonable to believe that detecting lung malignancies at an earlier stage will improve cancer survival.

In light of these developments, the evaluation of the pulmonary nodule or pulmonary nodules is an important skill for the pulmonary physician, as these nodules are usually asymptomatic and may be detected incidentally on chest radiographs or computed tomography (CT) performed for other reasons or for screening purposes. Although the American Cancer Society has not endorsed screening CT scans, such scans are still performed frequently in smokers or patients with asbestosis exposure. In evaluating these lesions, inactive infections are a concern, but overwhelmingly the evaluation revolves around determining the presence or absence of malignancy. Malignancy is the principle diagnosis that must be identified or excluded through analysis of the initial images, serial imaging, positron emission tomography (PET), biopsy, or resection. It is important to remember that there are unique risks associated with lung biopsy (pneumothorax, hemoptysis, and respiratory failure) that are not a concern in sites such as breast tissue or skin. Thus, the physician must weigh decisions in these patients carefully. This review discusses the importance of identifying lung cancer and provides a framework for the evaluation of nodules with varying characteristics.

### ASSESSMENT OF PROBABILITY OF MALIGNANCY

When a pulmonary nodule is detected, subsequent management is guided by an estimate of the likelihood that the nodule is malignant. This estimate is determined by radiographic features of the nodule and the patient's underlying risk factors for lung cancer.

#### NODULE CHARACTERISTICS

##### Lesion Size

**Larger than 3 cm.** A pulmonary lesion 3 cm or larger is considered to have a high likelihood of being malignant. In an early study from 1963, 80% of nodules larger than 3 cm were found to be cancerous as compared with 20% of nodules smaller than 2 cm. Later studies focusing on CT-guided imaging found a 90% incidence of lung cancer in nodules larger than 3 cm.<sup>6</sup> To ensure that large lesions are managed aggressively, it seems prudent to apply a cutoff of 3 cm as a threshold for considering lesions as high risk based upon size. Given the high probability of malignancy, nodules of this size should be considered cancer until proven otherwise, and they warrant definitive biopsy or immediate surgical resection, depending on the clinical stage.

**Less than 8 mm.** Nodules in this size range are increasingly being detected incidentally on CT scans, leading to major management dilemmas concerning their follow-up. It has been noted that up to 51% of smokers aged 50 years or older have pulmonary nodules on CT scan.<sup>7</sup> Henschke et al<sup>8</sup> found no cancers in patients whose largest noncalcified nodule was less than 5 mm in size on the baseline scan. In addition, 20% of patients who have a nodule detected on CT can expect to have at least 1 new nodule found during the recommended 2-year follow-up period. These new nodules will subsequently require another series of follow-up scans, with a similar likelihood of new nodules being detected with the continued follow-up. Therefore, patients potentially could undergo repeated CT scans indefinitely if host risk factors are not taken into account and strict guidelines not followed (**Table**).