

Pulmonary Nodule Background

Lung cancer is the second-most common cancer among men and women in the United States and the leading cause of cancer-related death.¹ The five-year survival rate for patients with lung cancer is only 19% but is over 50% for those with early diagnosis.² With the goal of detecting cancer earlier, leading pulmonologists continue to advance nodule management programs to screen and evaluate patients. However, with 95% of nodules found incidentally through chest imaging for other health conditions and 64% of patients not receiving clinical follow-up, many challenges remain.³

Symptoms and Causes

There are two main types of pulmonary nodules: malignant (cancerous) and benign (noncancerous). Most of the time, there are no symptoms associated with pulmonary nodules and a patient is unaware that he or she has a lung nodule until a chest X-ray or computed tomography (CT) scan of the lungs discovers the abnormality on the resulting image. However, if the nodule is from a lung cancer, the patient can sometimes present symptoms such as persistent cough or coughing up blood.

Benign pulmonary nodules can have a wide variety of causes and are often the result of inflammation in the lung due to infection or disease. The most common cause of malignant lung nodules are cancers which may come from the lungs, or from other regions of the body that have spread to the lungs, via a process known as metastasis.

Lung Nodule Diagnosis

Although some nodules can be clearly identified as malignant (e.g. large and spiculated) or benign (e.g. calcified), most nodules fall into an indeterminate category and require further testing or invasive procedures to determine the next steps.

Nodules are assessed differently depending on how they are discovered, but doctors generally apply a common workflow. Once a nodule is discovered, it is assigned a class: solid, nonsolid, or part-solid. Then, the doctor determines the risk of cancer through a variety of non-standardized techniques and guidelines. While many physicians use similar risk characteristics such as nodule size and patient history in this evaluation, these factors alone do not always lead to a clear diagnosis.

To identify malignancies quickly, incidental pulmonary nodules are often managed aggressively. Tissue pathology from a surgical or non-surgical biopsy often leads to a conclusive diagnosis. However, a recent study of management of pulmonary nodules in the community showed that 62% of biopsies and 35% of surgeries are on benign nodules.⁴

Many benign nodules are ultimately diagnosed through tissue pathology but monitoring nodules for long-term stability with CT surveillance is another common diagnostic method. The challenge is that an estimated 75% of patients are characterized as low to moderate risk of malignancy with no standard approach to

¹ Siegel R, Miller K, Jemal A. Cancer Statistics 2018. *CA Cancer J Clin* 2018;68:7-30.

² American Lung Association. "Lung Cancer Fact Sheet," 14 Dec 2018. <https://www.lung.org/lung-health-and-diseases/lung-disease-lookup/lung-cancer/resource-library/lung-cancer-fact-sheet.html>. [Accessed 12 Aug 2019].

³ Pyenson et al. "No Apparent Workup for most new Indeterminate Pulmonary Nodules in US Commercially-Insured Patients." *Journal of HEOR*, 2019. 6(3): 118-129.

⁴ Tanner et al. "Management of Pulmonary Nodules by Community Pulmonologists. A Multicenter Observational Study," *Chest*, vol. 148, no. 6, pp. 1405-1414, 2015.

determine the next step in their care. As a result, patients wait an average of eight months for an incidental nodule to be diagnosed and often undergo invasive procedures for a final diagnosis.^{3,5}

Diagnostic Tools

To address this challenge, recent technological advances have led to the development of a simple, blood-based test to help identify likely benign lung nodules. The test provides quick, accurate results that helps expedite clinical decision-making. In addition, the results may help reduce unnecessary procedures and support a more clear and consistent management pathway.

Treatment

The treatment of lung nodules varies widely depending on whether they are related to infections, inflammation, cancer, or other conditions. Following a lung cancer diagnosis, staging and subtyping inform the treatment pathway. Suspected benign nodules should be followed with routine scans to look for changes in size and shape, but if stable over time can often be left alone.

⁵ Silvestri G et al. Assessment of plasma proteomics biomarkers ability to distinguish benign from malignant lung nodules. CHEST. 2018 Sept. 154(3):491-500.