5. National Lung Screening Trial Research Team, , Aberle DR, Adams AM, Berg CD, Black WC, Clapp JD, Fagerstrom RM. Reduced lung-cancer mortality with low-dose computed tomographic screening. *New Engl J Med*. 2011;365:395-409.
6. World Health Organization, International Agency for Research on Cancer, International Association for the Study of Lung Cancer, International Academy of Pathology. In: Travis WD, ed. *Pathology and Genetics of Tumours of the Lung, Pleura, Thymus and Heart*. Lyon Oxford: IARC Press; Oxford University Press; 2004.
7. Goldberg SK, Walkenstein MD, Steinbach A, Aranson R. The role of staging bronchoscopy in the preoperative assessment of a solitary pulmonary nodule. *Chest*. 1993;104:94-7.
8. Torrington KG, Kern JD. The utility of fiberoptic bronchoscopy in the evaluation of the solitary pulmonary nodule. *Chest*. 1993;104:1021-4.
9. Chhajed PN, Bernasconi M, Gambazzi F, Bubendorf L, Rasch H, Kneifel S, et al. Combining bronchoscopy and positron emission tomography for the diagnosis of the small pulmonary nodule < or = 3 cm. *Chest*. 2005;128:3558-64.
10. van't Westeinde SC, Horeweg N, Vernhout RM, Groen HJ, Lammers JW, Weenink C, et al. The role of conventional bronchoscopy in the workup of suspicious CT scan screen-detected pulmonary nodules. *Chest*. 2012;142:377-84.

Key Words: solitary pulmonary nodule, bronchoscopy, preoperative workup

EDITORIAL COMMENTARY

Conventional bronchoscopy for evaluation of the solitary pulmonary nodule: Beneficial for a select few patients, or are we still “looking for a needle in a haystack”?

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See related article on pages 36-40.

Not only can evaluation of the solitary pulmonary nodule (SPN) be vexing, but SPN evaluations are also increasing as a result of the expanding use of computed tomographic (CT) imaging. Clinicians typically take multiple factors into consideration to get a general impression of malignancy risk, including patient age, smoking history, CT characteristics, and positron emission tomographic imaging findings. Calculated risk models have even been established in an attempt to assign chances of SPN malignancy more precisely.¹ Removal through a minimally invasive approach of any nodule larger than 8 mm highly suspected to contain a primary pulmonary malignancy, followed by anatomic pulmonary resection with mediastinal lymph node sampling if non-small cell lung cancer is confirmed

by frozen-section pathologic review, is considered an optimal strategy for most patients with low surgical risk.²

Removal obviously eliminates sampling error inherent in needle biopsy, avoids delay in surgical treatment for patients in whom non-small cell lung cancer is confirmed, and is usually undertaken at low risk levels. For patients with SPNs suspected of malignancy who are reluctant to undergo any surgical intervention before a definitive diagnosis of malignancy, similar patients at higher surgical risk, or patients with SPNs at intermediate risk for malignancy, preoperative biopsy can be useful. Options in these cases include CT-guided needle biopsy or bronchoscopy with brushing, washing, or needle biopsy (unguided or guided) according to SPN location, SPN size, and institutional preference.

In this issue of the *Journal*, Zhang and coworkers³ report on 1026 patients who underwent conventional bronchoscopy for the evaluation of a SPN at their institution. Overall accuracy and negative predictive value in this study were 24.3% and 20.5%, respectively, reinforcing the very well-established need for further investigation of suspect SPN when bronchoscopy results are negative. Higher diagnostic rates were found in male patients and with larger nodules. Conventional bronchoscopy resulted in a 7.8% overall incidence of positive diagnostic findings, including “altering therapy” in 3.7% of their series.

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In this era of cost containment, efforts to streamline patient evaluations and avoid unnecessary procedures are paramount. Zhang and coworkers³ are to be congratulated on putting conventional bronchoscopy “under the microscope” in this regard. Strengths include a very large study with a single expert thoracic surgeon ostensibly using a consistent approach to all bronchoscopic procedures, impressively with no complications. Surgical pathologic examination served as control in all but 2 cases, which is another strength. Perhaps on a controversial note, surgery was deemed not to be indicated for both of these patients on the basis of bronchoscopic findings of small cell lung cancer.

This report represents a good effort to define a potential role for conventional bronchoscopy in the evaluation of SPNs; however, there are some limitations. Although Zhang and coworkers³ speculate (probably correctly) that male sex likely represented a surrogate for central squamous cell cancer location, which improved diagnostic rates, they did not separate SPNs into central versus peripheral locations, which would be an important variable for accurate predictive modeling. Moreover, positron emission tomographic imaging was not used, which would also be expected to affect modeling by improving patient selection. Undoubtedly, guided techniques such as electromagnetic navigation, transbronchial ultrasonography, and virtual bronchoscopic navigation will be used more frequently in the future and significantly improve the diagnostic

accuracy of bronchoscopy for SPNs. Finally, specific details of the diagnostic strategy in these cases are lacking. For example, were transbronchial brushings or washings more commonly diagnostic for larger more central SPNs, which could not be visualized? Specific methodology and the associated diagnostic rates would enhance interpretation of these data.

Although this large retrospective study sets a standard for the capability of conventional bronchoscopy to diagnose SPNs, the title’s question form does seem appropriate given the low diagnostic yield. Development of predictive models, which include other important variables such as location (central vs peripheral) and positron emission tomographic imaging, which minimize conventional bronchoscopic procedures with futile diagnostic potential in the evaluation of SPNs, would be helpful. Future models with guided bronchoscopic techniques would also appear to have very good potential in this regard.

References

1. Herder GJ, van Tinteren H, Golding H, Kostense PJ, Comans EF, Smit EF, et al. Clinical prediction model to characterize pulmonary nodules: validation and added value of 18F-fluorodeoxyglucose positron emission tomography. *Chest*. 2005;128:2490-6.
2. Gould MK, Donington J, Lynch WR, Mazzone PJ, Midhun DE, Naidich DP, et al. Evaluation of individuals with pulmonary nodules: when is it lung cancer? Diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2013;143(5 Suppl):e93S-120S.
3. Zhang Y, Zhang Y, Chen S, Li Y, Yu Y, Sun Y, et al. Is bronchoscopy necessary in the pre-operative work-up of solitary pulmonary nodules? *J Thorac Cardiovasc Surg*. 2015;150:36-40.