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## Inside this issue: Bronchoscopy

How Many Passes Are Needed for Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration for Sarcoidosis? A Prospective Multicenter Study.	2
Endoscopic Ultrasound with Bronchoscope-Guided Fine Needle Aspiration for the Diagnosis of Paraesophageally Located Lung Lesions.	3
Impact of Rapid On-Site Cytological Evaluation (ROSE) on the Diagnostic Yield of Transbronchial Needle Aspiration During Mediastinal Lymph Node Sampling: Systematic Review and Meta-Analysis.	4
The Evolutional History of Electromagnetic Navigation Bronchoscopy: State of the Art.	4
Poor Concordance between Sequential Transbronchial Lung Cryobiopsy and Surgical Lung Biopsy in the Diagnosis of Diffuse Interstitial Lung Diseases.	5
Long-Term Quality-Adjusted Survival following Therapeutic Bronchoscopy for Malignant Central Airway Obstruction.	6
Effectiveness of Bronchial Thermoplasty in Patients with Severe Refractory Asthma: Clinical and Histopathologic Correlations.	7
A Multicenter Randomized Controlled Trial of Zephyr Endobronchial Valve Treatment in Heterogeneous Emphysema (LIBERATE).	8
Predictors of Response to Endobronchial Coil Therapy in Patients With Advanced Emphysema.	8
A Novel Laser Fiberscope for Simultaneous Imaging and Phototherapy of Peripheral Lung Cancer.	9

Articles selected and commented on by: **Takeo Inoue** and **Masamichi Mineshita**, Internal Medicine, Division of Respiratory Medicine, St. Marianna University School of Medicine, Japan



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## How Many Passes Are Needed for Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration for Sarcoidosis? A Prospective Multicenter Study.

Oki M, et al.

Respiration. 2018;95(4):251-257

<https://doi.org/10.1159/000485661>

**Comments:** Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is useful for the diagnosis of diseases with mediastinal lymphadenopathy including sarcoidosis. There have been many reports on the usefulness of EBUS-TBNA for diagnosing sarcoidosis. This aim of this study was to determine the number of passes needed for the diagnosis of stage I/II sarcoidosis using EBUS-TBNA. At three institutions, 109 patients underwent EBUS-TBNA for 184 lesions. EBUS-TBNA identified specimens containing granulomas in 81 of 92 patients (88%) with a final diagnosis of sarcoidosis. The cumulative yields through the first, second, third, fourth, fifth, and sixth passes for the main target lesion were 63, 75, 82, 85, 86 and 88%, respectively. In the 55 patients that underwent EBUS-TBNA for multiple lesions, the cumulative yields of 2 passes per lesion for 2 lesions (total of 4 passes) and of 4 passes for single lesions were 86 and 84%, respectively ( $p = 1.00$ ).

The authors recommend at least 4 passes per patient for either single or multiple lesions with EBUS-TBNA for the pathological diagnosis of stage I/II sarcoidosis, when rapid on-site cytological evaluation (ROSE) is not used or available.

## APSR Publications



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### Endoscopic Ultrasound with Bronchoscope-Guided Fine Needle Aspiration for the Diagnosis of Paraesophageally Located Lung Lesions.

Skovgaard Christiansen I, et al

Respiration. 2019;97(4):277-283.

<https://doi.org/10.1159/000492578>

**Comments:** Recently, when a tumor is located near or adjacent to the large airways, endobronchial ultrasound transbronchial needle aspiration (EBUS-TBNA) was a useful and safe procedure to obtain tissue for diagnosis. While the tumor is located near or adjacent to the esophagus can be aspirated and detected by endoscopic ultrasound guided fine needle aspiration (EUS-FNA) using gastrointestinal endoscopes. However, this technique is not commonly available in most pulmonary practices. Current lung cancer staging guidelines recommend endoscopic ultrasound bronchoscopy (EUS-B) (using the EBUS scope in the esophagus) for mediastinal staging, because this is complementary to EBUS for mediastinal nodal staging. In this study, the authors performed endoscopic ultrasound with bronchoscope-guided fine needle aspiration (EUS-B-FNA) in paraesophageally located lung tumors and its added value to bronchoscopy and endobronchial ultrasound (EBUS). EBUS and EUS-B are also suggested in these guidelines for the analysis of lung tumors that are located near or adjacent to the large airways (EBUS-TBNA) or esophagus (EUS-B/EUS). The authors conducted this study to assess the feasibility and diagnostic yield of EUS-B in paraesophageally located lung tumors and its added value to bronchoscopy and EBUS. The yield and sensitivity of EUS-B-FNA for detecting lung cancer was 90%. In 26 patients (45%), the intrapulmonary tumor was exclusively detected by EUS-B. Adding EUS-B to conventional bronchoscopy and EBUS increased the diagnostic yield for diagnosing lung cancer in paraesophageally located lung tumors from 51 to 91%. EUS-B-FNA is a feasible and safe technique for diagnosing centrally located intrapulmonary tumors that are located near or adjacent to the esophagus.

EUS-B should be considered in the same endoscopy session following nondiagnostic bronchoscopy and EBUS.

### **Impact of Rapid On-Site Cytological Evaluation (ROSE) on the Diagnostic Yield of Transbronchial Needle Aspiration During Mediastinal Lymph Node Sampling: Systematic Review and Meta-Analysis.**

Sehgal IS, et al

Chest. 2018 Apr;153(4):929-938

<https://doi.org/10.1016/j.chest.2017.11.004>

**Comments:** Whether the use of rapid on-site cytologic evaluation (ROSE) increases the diagnostic yield of transbronchial needle aspiration (TBNA) remains unclear. This article was a systematic review of studies describing the utility of ROSE in subjects undergoing TBNA. The authors conducted a systematic review of the PubMed, Embase, and Scopus databases for randomized controlled trials investigating the diagnostic yield of conventional transbronchial needle aspiration (c-TBNA) or endobronchial ultrasound (EBUS)-TBNA, with or without ROSE, in subjects with mediastinal lymphadenopathy. Five studies (618 subjects; two EBUS-TBNA, two c-TBNA, and one with both) were identified. The use of ROSE during EBUS-TBNA (but not c-TBNA) resulted in significantly fewer needle passes. There was no difference in the procedure time during EBUS-TBNA. The complication rate was significantly lower when ROSE was used during c-TBNA due to fewer additional procedures required to make a diagnosis.

The use of ROSE neither improved the diagnostic yield nor reduced the procedure time during TBNA. However, the use of ROSE was associated with a fewer number of needle passes during EBUS-TBNA and an overall lower requirement for additional bronchoscopy procedures during TBNA to make a final diagnosis.

### **The Evolutional History of Electromagnetic Navigation Bronchoscopy: State of the Art.**

Mehta AC, et al.

Chest. 2018 Oct;154(4):935-947.

<https://doi.org/10.1016/j.chest.2018.04.029>

**Comments:** Electromagnetic navigation bronchoscopy (ENB) has come a long way from the early roots of electromagnetic theory. Current ENB devices have the potential to change the way lung cancer is detected and treated. This paper provides an overview of the history, current

state, and future of ENB. The first electromagnetic navigation in the lung was developed by a Johns Hopkins radiology resident, Stephen Solomon, and colleagues. Solomon adapted the technology for use in pulmonology and published the first conceptual study in swine in 1998, noting that real-time bronchoscopic positioning by ENB could complement CT-guided trans-bronchial needle aspiration. The first commercial ENB system was developed in Herzliya, Israel, by Pinchas Gilboa. The first preclinical study of the superDimension ENB (ENB-SD) system was conducted at the Sheba Medical Center Hospital. Ten artificial lesions were created in four animals. The procedure was a technical success with all targets successfully reached, and no animal complications. The first use in man of an electromagnetic bronchoscope was performed with the Solomon group in June 2003. The first large-scale prospective clinical study using the ENB-SD system was published from the Cleveland Clinic in 2006. The diagnostic yield was 74% for lung lesions and 100% for lymph nodes. A third system, developed by Veran Medical Technologies, originated with the SPiN Interventional Radiology device in May 2006. A pilot study of the ENB-VM system for transthoracic needle aspiration (TTNA) guidance was published in 2016. The diagnostic yield was 33% for navigational bronchoscopy alone, 83% for ENB-guided TTNA alone, and 87% when the two technologies were combined. The newest version of the ENB-SD system adds software algorithms to enhance the visibility of the target region with three-dimensional fluoroscopy and to compensate for CT-to-body divergence. ENB has been recommended in the guidelines of the American College of Chest Physicians as follows, with a 1C recommendation grade. ENB was also recently added to the interventional pulmonology fellowship accreditation standards.

The authors expect that improved ENB will allow for more accurate, efficient, and streamlined procedures with a shorter procedure time in the future. ENB will be an invaluable adjunct to transparenchymal lung biopsy, robotic bronchoscopy, and use of cone-beam CT scans going forward.

### **Poor Concordance between Sequential Transbronchial Lung Cryobiopsy and Surgical Lung Biopsy in the Diagnosis of Diffuse Interstitial Lung Diseases.**

Romagnoli M, et al.

Am J Respir Crit Care Med. 2019 May 15;199(10):1249-1256.

<https://doi.org/10.1164/rccm.201810-1947OC>

**Comments:** Lung histology can provide crucial information for the diagnostic process of diffuse interstitial lung diseases (ILDs). Although surgical lung biopsy (SLB) is considered the current gold standard for obtaining adequate lung biopsy specimens, SLB is a relatively complex and expensive procedure, and has a risk of mortality.

Transbronchial lung cryobiopsy (TBLC) provides larger (7–10 mm in diameter) and better preserved lung samples than transbronchial lung biopsy using forceps.

Although TBLC has been reported as a valid and less invasive tool for histologic ILD diagnosis, there were no evidence on intrapopulation comparisons between SLB and TBLC.

The authors conducted this study to compare the concordance between sequential TBLC and SLB for the histologic diagnosis and multidisciplinary assessment (MDA) diagnosis in 21 ILD patients without a definite usual interstitial pneumonia pattern on chest HRCT scan.

They found that pathological results from TBLC and SLB were poorly concordant in the assessment of ILD., and that SLBs were more frequently concordant with the final diagnosis for MDA.

Although this kind of study is difficult to conduct because of poor feasibility and ethics concerns, larger studies are desirable to confirm the findings of this study.

### **Long-Term Quality-Adjusted Survival following Therapeutic Bronchoscopy for Malignant Central Airway Obstruction.**

Ong P, et al.

Thorax. 2019 Feb;74(2):141-156.

<http://dx.doi.org/10.1136/thoraxjnl-2018-211521>

**Comments:** Patients suffering from malignant central airway obstruction (MCAO) can receive significant relief from life-threatening symptoms through therapeutic bronchoscopy. However, there are no long-term studies of quality-adjusted survival beyond 30 days in patients treated with therapeutic bronchoscopy for MCAO.

The authors conducted a prospective observational study of 102 consecutive patients undergoing therapeutic bronchoscopy for MCAO. Partial or complete technical success was achieved in

90% of patients. At 7 days post bronchoscopy, dyspnea and health-related quality of life (HRQOL) improved significantly, and these improvements were maintained for the long-term.

Compared with pre-bronchoscopy findings, HRQOL improved post-bronchoscopy, and median quality-adjusted survival was 109 quality-adjusted life-days. Factors associated with improved quality-adjusted survival included better performance status, less dyspnea, treatment-naïve tumors, endobronchial disease, shorter time from cancer diagnosis to intervention and receiving follow-up chemotherapy.

Although this was a single-center study, this study showed the positive impact on long-term quality-adjusted survival and provided valuable information on proper patient selection for MCAO.

### **Effectiveness of Bronchial Thermoplasty in Patients with Severe Refractory Asthma: Clinical and Histopathologic Correlations.**

Pretolani M, et al.

J Allergy Clin Immunol. 2017 Apr;139(4):1176-1185.

<https://doi.org/10.1016/j.jaci.2016.08.009>

**Comments:** Bronchial thermoplasty (BT) is an endoscopic procedure that targets primarily airway remodeling by delivering temperature controlled radio frequency energy to the airway wall. The effectiveness of BT has been reported in patients with severe asthma, but the effects on different bronchial structures has not be elucidated.

The authors collected 300 bronchial biopsy specimens from 15 patients with severe uncontrolled asthma prior to BT and at 3-month follow up assessing immunostained sections for airway smooth muscle (ASM) areas, subepithelial basement membrane thickness, nerve fibers, and epithelial neuroendocrine cells.

They found that BT significantly improved asthma control, and this clinical benefit of BT was accompanied by not only a reduction in the ASM area, but also for subepithelial basement membrane thickening, submucosal nerves, ASM-associated nerves, and epithelial neuroendocrine cells.

This study provided interesting insights on the mechanisms and underlying clinical improvement induced by BT.

### **A Multicenter Randomized Controlled Trial of Zephyr Endobronchial Valve Treatment in Heterogeneous Emphysema (LIBERATE).**

Criner GJ, et al.

Am J Respir Crit Care Med. 2018 Nov 1;198(9):1151-1164.

<https://doi.org/10.1164/rccm.201803-0590OC>

**Comments:** Recently, several non-surgical and minimally invasive bronchoscopic lung volume reduction (BLVR) techniques have been developed to treat patients with severe chronic obstructive pulmonary disease (COPD).

This is a multicenter randomized controlled trial to evaluate the effectiveness and safety of BLVR using one-way valves (Zephyr Endobronchial Valve: EBV) in COPD patients with little to no collateral ventilation in the treated lobe.

A total of 190 COPD patients with severe emphysema and hyperinflation were randomized: 128 EBV and 62 standard care (SoC). At 12 months, 47.7% EBV and 16.8% SoC subjects had a  $\Delta$ FEV1 greater than or equal to 15% ( $P < 0.001$ ).  $\Delta$ EBV–SoC at 12 months was statistically and clinically significant for FEV1, 6-minute-walk distance, and St. George's Respiratory Questionnaire. Pneumothorax was the most common serious adverse event during the treatment period (procedure to 45 days), in 26.6% of EBV subjects.

Although this procedure should be planned to carefully selected patients, EBV provides clinically meaningful benefits in lung function, exercise tolerance, dyspnea, and quality of life for at least 12 months. After completion of this research, the U.S. Food and Drug Administration approved EBV to treat breathing difficulties associated with severe emphysema.

### **Predictors of Response to Endobronchial Coil Therapy in Patients With Advanced Emphysema.**

Slebos DJ, et al.

Chest. 2019 May;155(5):928-937.

<https://doi.org/10.1016/j.chest.2019.02.012>

**Comments:** Endobronchial coils, 10- to 15-cm nitinol wires that regain their preformed shape

following deployment, are designed to compress emphysematous tissue, thus restoring elastic properties in adjacent lung tissue and improving ventilatory mechanical function. Endobronchial coils have been tested in patients with both heterogeneous and homogeneous lung destruction with or without incomplete interlobar fissures.

The RENEW trial was conducted to assess the 1-year effectiveness and safety of endobronchial coils on exercise tolerance, quality of life, and lung function in patients with severe lung hyperinflation and advanced homogeneous or heterogeneous emphysema. Although the primary outcome was the difference in absolute change for the 6-minute-walk distance from baseline to 12 months, modest improvements were seen for the median exercise tolerance, though these improvements are of uncertain clinical importance, with a higher likelihood of major complications.

The authors performed post hoc analysis of the RENEW trial and identified three baseline criteria with proposed inclusion thresholds (residual volume  $\geq$  200% predicted, emphysema score %LAA  $\geq$  20, and absence of airway disease on visual CT imaging) that defined a patient subgroup to achieve clinically significant pulmonary function and volume reduction outcomes at 12-month post-coil treatment.

Prospective confirmation of these findings to establish eligible patients with severe emphysema is required.

### **A Novel Laser Fiberscope for Simultaneous Imaging and Phototherapy of Peripheral Lung Cancer.**

Kinoshita T, et al.

Chest. 2019 Apr 26. doi: 10.1016/j.chest.2019.04.010

<https://doi.org/10.1016/j.chest.2019.04.010>

**Comments:** The increasing use of CT screening has allowed for the earlier detection of incidental small peripheral lung tumors. Although surgical resection is the standard treatment option for these cases, there are risks of complications particularly in patients with preexisting comorbidities.

Although nonsurgical options, such as stereotactic body radiotherapy and radiofrequency abla-

tion, have been developed as an alternative treatment for these patients, these approaches sometimes result in incomplete locoregional control after treatment. An ideal alternative therapeutic platform should incorporate reliable tumor localization for delivery of minimally invasive, targeted, and effective treatment.

The authors have been investigating transbronchial photothermal therapy (PTT) for peripheral lung nodules and developed a unique photosensitizer, porphyrin.

In this paper, authors presented a novel porphyrin-specific fiberscope capable of detecting porphyrin fluorescence for image-guided transbronchial phototherapy of endo/peribronchial tumors, and they highlighted the possibility for clinical application of their PTT strategy for peripheral lung lesions.

Hitherto interventional bronchoscopy has been applied for mainly central airway diseases. In the near future, the development of new options for minimally invasive transbronchial therapy for peripheral malignant lung nodules will be the next frontier of interventional bronchoscopy.

### More on this topic in Respiriology:

**Safety and diagnostic performance of pulmonologists performing electromagnetic guided percutaneous lung biopsy (SPiNperc).** Mallow, C, Lee, H, Oberg, C, et al. *Respirology*. 2019; 24: 453– 458. <https://doi.org/10.1111/resp.13471>

**Quantitative assessment of airway remodelling and response to allergen in asthma.** Adams, DC, Miller, AJ, Applegate, MB, et al. *Respirology*. 2019; 1– 8. <https://doi.org/10.1111/resp.13521>

**Endobronchial ultrasound-guided transbronchial needle aspiration in sarcoidosis: Beyond the diagnostic yield.** Trisolini, R, Baughman, RP, Spagnolo, P, Culver, DA. *Respirology*. 2019; 24: 531– 542. <https://doi.org/10.1111/resp.13537>

**Transbronchial evaluation of peripheral pulmonary lesions using ultrasonic spectrum analysis in lung cancer patients.** Ishiwata, T, Terada, J, Nakajima, T, Tsushima, K, Tatsumi, K. *Respirology*. 2019; 1– 6. <https://doi.org/10.1111/resp.13534>

**Improved diagnostic yield for lung nodules with digital tomosynthesis-corrected navigational bronchoscopy: Initial experience with a novel adjunct.** Aboudara, M, Roller, L, Rickman, O, et al. *Respirology*. 2019; 1– 8. <https://doi.org/10.1111/resp.13609>

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*Articles selected and commented on by Takeo Inoue and Masamichi Mineshita, Internal Medicine, Division of Respiratory Medicine, St. Marianna University School of Medicine, Japan*

*Editor in chief: Prof. Arata Azuma, Department of Pulmonary Medicine and Oncology, Nippon Medical School, Tokyo, Japan; Head of APSR Education committee.*

*Compiled by Dr Christel Norman, Respirology Editorial Office, Perth, Australia*

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