CHEST®

# State of Practice: Tissue Sampling and Testing for Non-small Cell Lung Cancer

VOLUME 1, ISSUE 2

*CHEST Clinical Perspectives™*

## Introduction

The treatment of non-small cell lung cancer (NSCLC) has changed dramatically with the development of biological therapies targeting mutation-activated receptors and/or mutated genes. Pulmonologists are pivotal in this new paradigm as they are often responsible for the diagnosis and staging of lung cancer and the subsequent referral of patients to the appropriate specialty service. Additionally, the majority of pulmonologists remain involved in patient care after referral.[1]

Mutation status significantly affects the treatment of and prognosis for patients with NSCLC.[2] Matching a specific targeted drug to the identified driver mutation for an individual patient has resulted in significantly improved therapeutic efficacy, often with decreased toxicity. Screening for driver mutations has become an increasingly standard part of the diagnostic workup for NSCLC, and the resultant information is useful in choosing between standard chemotherapy in the absence of a targetable mutation vs up-front targeted therapies.[3]

Obtaining high-quality tumor tissue samples is critical in order to perform molecular testing. Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a minimally invasive procedure that is safe and less invasive than mediastinoscopy, transthoracic needle aspiration (TTNA), or transbronchial biopsy (TBBX). Using EBUS-TBNA, it is possible to obtain tumor cells or tissue to support a cytohistologic diagnosis, complete the staging, and obtain data to inform subsequent treatment decisions.[2]

While molecular testing has become standard practice in thoracic oncology, we were interested in understanding the degree to which pulmonologists have adopted the practice and the extent to which they are involved in the process in patients with NSCLC.

For this issue of *CHEST Clinical Perspectives*™, CHEST surveyed pulmonologists who diagnose lung cancer to understand the state of practice regarding diagnostic workup and tissue sampling practices. More specifically, the objectives of this research were to:

- Measure adoption rates and barriers to adoption of EBUS-TBNA for tissue sampling.
- Measure factors related to EBUS-TBNA sampling technique.
- Measure practices related to tissue analysis.
- Assess awareness and knowledge of drugs for cell mutation targets.

**Read on to learn more about:**

- EBUS-TBNA adoption and practices
- Attitudes toward tissue sampling and molecular testing in academic and community settings
- Implications of knowledge and practice gaps in academic and community institutions

## METHODOLOGY

CHEST conducted an online survey with a sample of n=105 pulmonologists who diagnose lung cancer. Respondents were sampled from the CHEST member database and were screened to ensure that they diagnose at least one to five new cases of lung cancer per month. Respondents were sent a link to the survey from CHEST, and data were collected from June 1-13, 2017.

CHEST hypothesized at the outset that practice setting may play a role in tissue sampling technique adoption and testing, due in part to the widely varying resources available to clinicians in academic vs community-based settings. To explore this hypothesis, stratified random sampling was employed to ensure an even mix of pulmonologists practicing in academic and non-academic settings. This stratification was established in order to provide a minimum sample for viewing responses by practice setting. To ensure that responses across the entire data set are representative of the pulmonology community as a whole, the data were weighted according to the actual distribution of pulmonologists observed in the CHEST member database. For example, when the data refer to all respondents, the weighted percentage is used. When data are compared between academic and community respondents, the unweighted percentage is given.

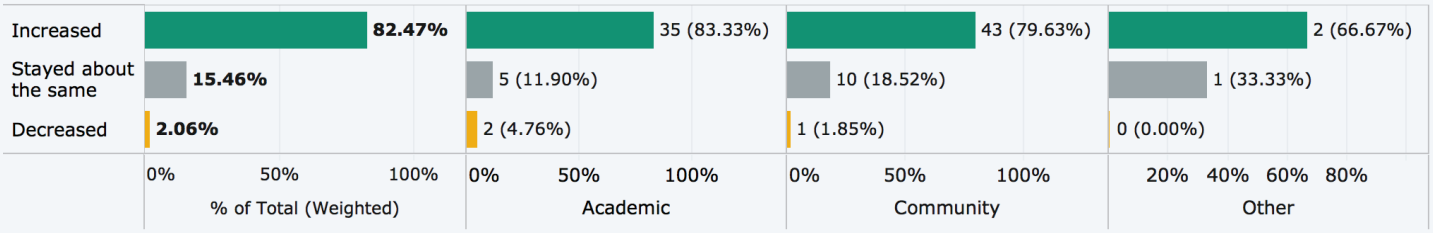
Descriptive statistics were used to assess distributions of the data across important behavioral variables. Inferential statistics were used to assess differences in descriptive and behavioral measures, which were cross-tabulated with patient volume and practice setting data. Depending on data type, a two-tailed independent samples t-test or a chi-square test was used to test for statistical significance ($P < .1$ considered statistically significant).

## TISSUE SAMPLING TECHNIQUES

**EBUS-TBNA is frequently used, but access to technology and facilities is the biggest barrier to EBUS-TBNA adoption.**

The majority of respondents in both academic and community settings agreed that the use of EBUS-TBNA has increased over the past 3 years.

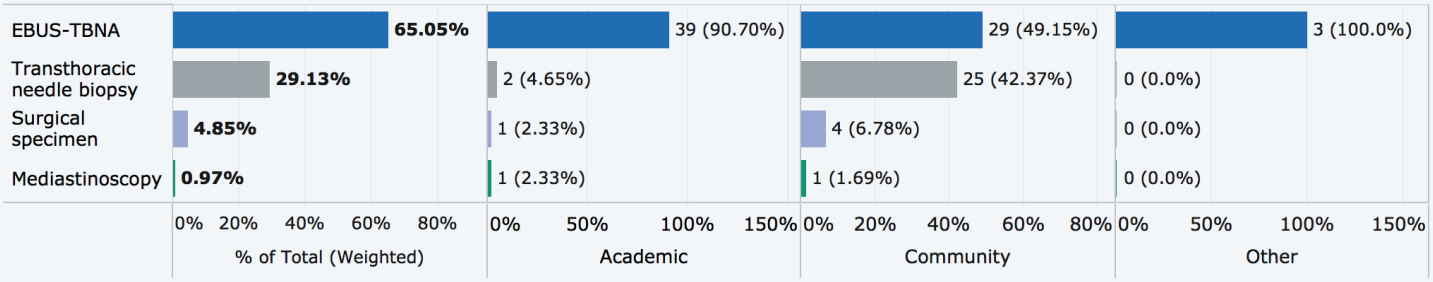
### Trend in EBUS-TBNA Use Over Past 3 Years




**Q:** During the past 3 years, has the volume of EBUS-TBNA procedures that you order/perform...

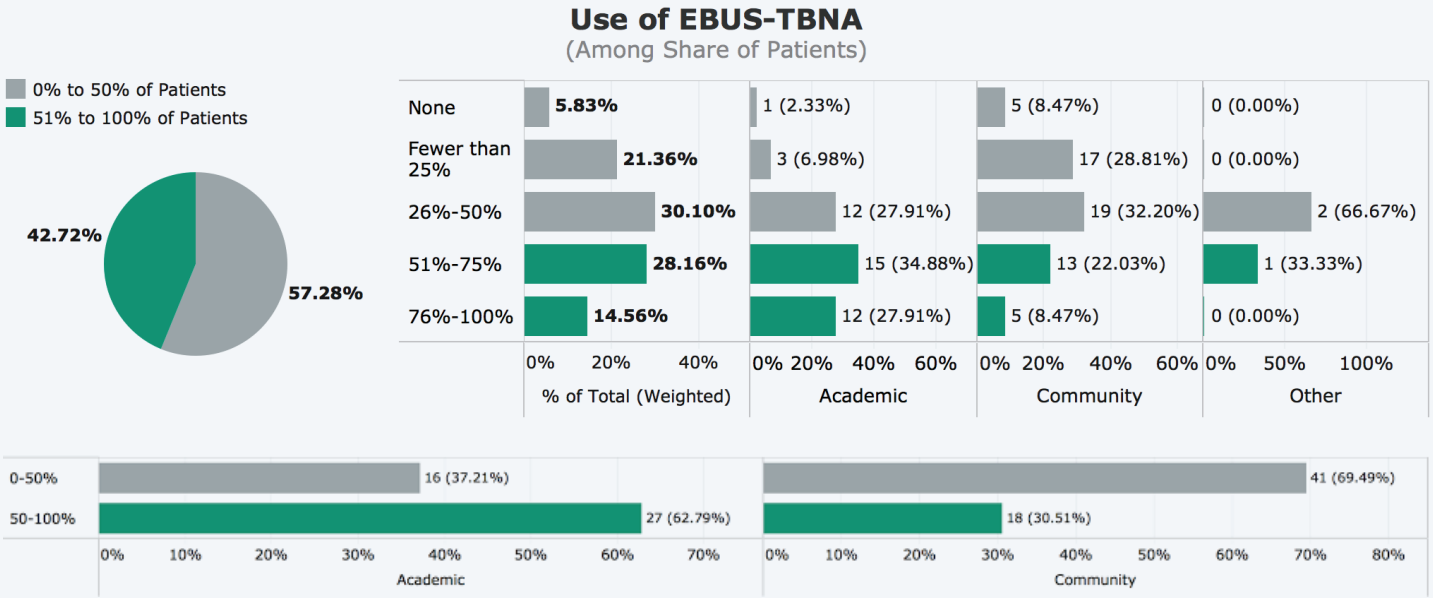
Respondents identified EBUS-TBNA as the tissue sampling technique they used most often (65%) followed by transthoracic needle biopsy (29%). There was a substantial difference in reported use of EBUS-TBNA by practice setting; 91% of academic-based respondents identified EBUS-TBNA as their principal tissue sampling technique compared with only 49% of community-based practitioners, who are almost equally likely to rely on transthoracic needle biopsy (42%).

### Most Frequently Used Tissue Sampling Techniques




**Q:** Which of the following biopsy/tissue sampling techniques do you employ most often with your patients (regardless of whether or not you perform the actual procedure)?

While many respondents indicated use of EBUS-TBNA, the reported share of their patients undergoing that procedure varied greatly—57% reported less than half of their patients undergo EBUS-TBNA, while 43% said more than half of their patients undergo the procedure. Uptake of EBUS in academic medical centers was substantially higher than in community-based facilities, where respondents were twice as likely to say that the majority of their patients being evaluated for lung cancer undergo EBUS-TBNA (63% vs 31%).



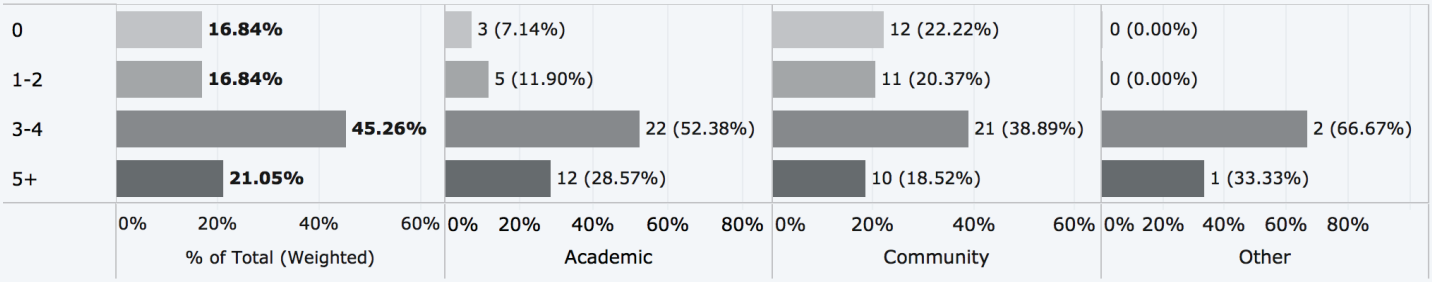

**Q:** On approximately what percentage of your patients do you use EBUS-TBNA for cancer diagnosis and staging?

## TISSUE SAMPLING PRACTICES

**No consistency in number of needle passes reported when collecting tissue samples using EBUS-TBNA.**

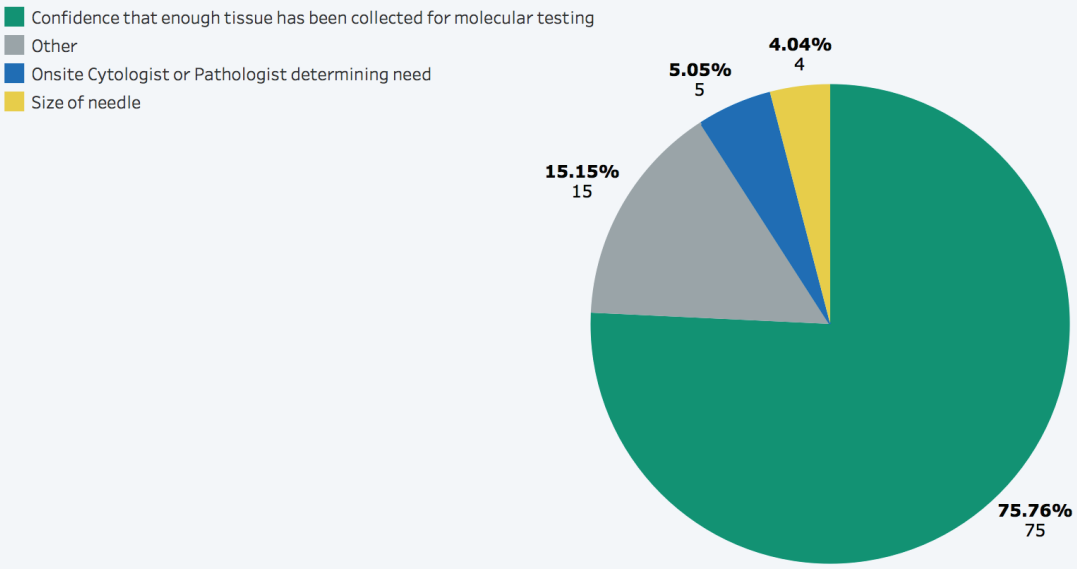
There was significant variation in the number of passes made to collect tissue for molecular testing once a cancer diagnosis has been established. The largest percentage (45%) make three to four passes expressly for the purpose of collecting tissue for molecular testing. Physicians practicing in an academic setting were much more likely to make three or more passes for collection of tissue for molecular testing (52%). Conversely, nearly one-fourth of physicians in community settings (22%) did not make additional passes specifically for the purpose of molecular testing.

### Number of EBUS-TBNA Passes Per Sample Site




**Q:** In patients undergoing EBUS-TBNA, how many separate passes do you make per sample site to collect tissue for molecular analysis after a lung cancer diagnosis has been established?

### Variables Determining Number of Passes

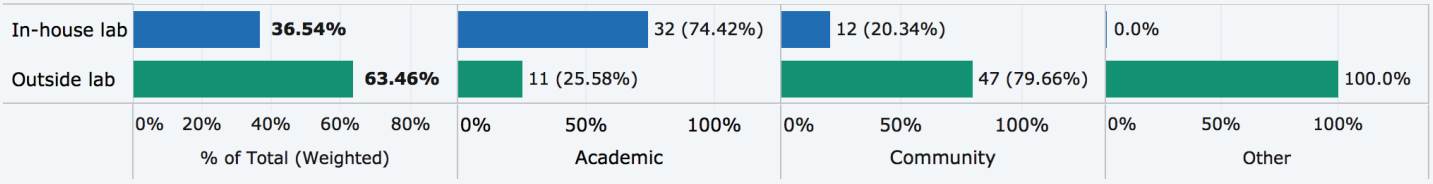



**Q:** What variables determine the number of passes per sample site to collect tissue for molecular analysis after a lung cancer diagnosis has been established?

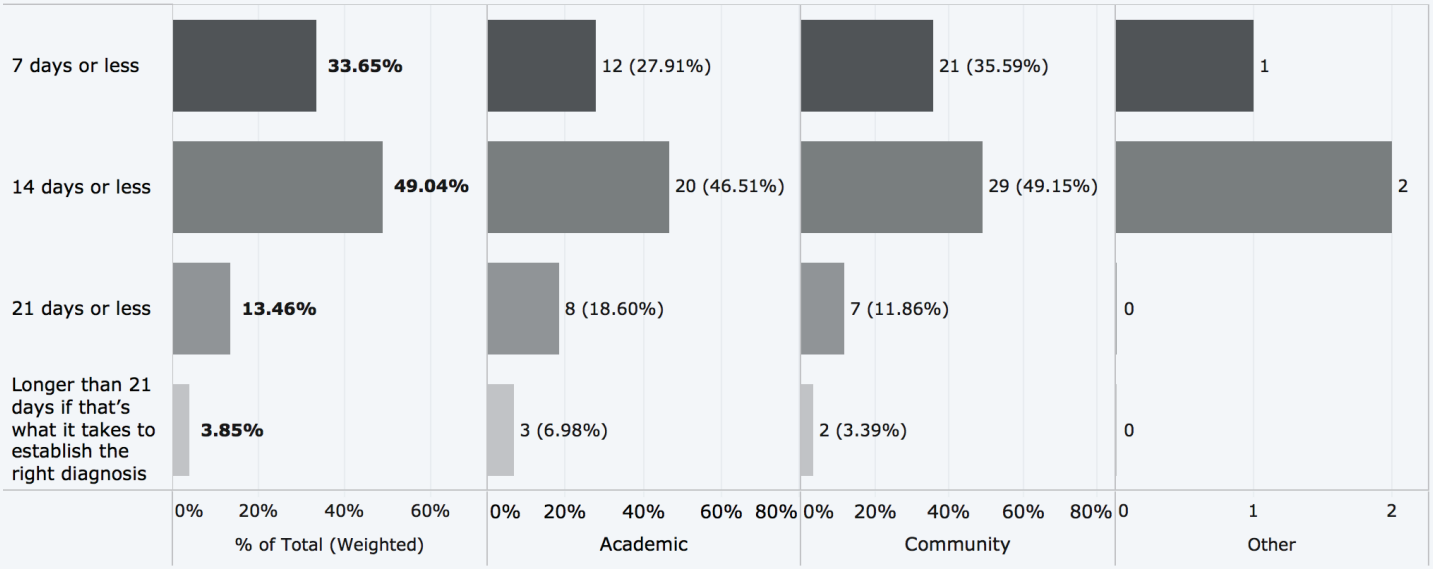
## TISSUE ANALYSIS RESOURCES AND APPROACHES

**Access to resources varies widely and can affect time to treatment.**

Overall, only one-third of respondents (37%) reported having in-house lab services. Access to lab services varied substantially by type of institution, with 74% of academic respondents having in-house lab services compared with only 20% of community-based respondents. Most respondents (83%) indicated the acceptable time from tissue acquisition to first treatment is 14 days or less.




**Q:** Does your hospital lab do molecular testing in house or are samples sent to an outside lab for analysis?



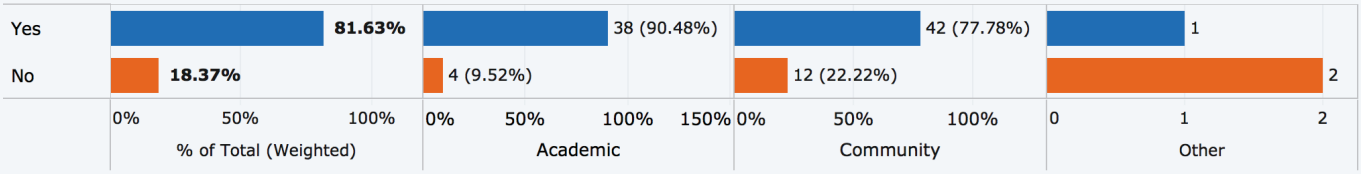

**Q:** Given patient concerns about beginning treatment as quickly as possible, the potential impact of therapies and the need to make an accurate diagnosis and treatment plan, how much time is acceptable from the time of tissue acquisition to first treatment?

**Access to ROSE may not be the critical barrier given that many community-based sites have this capability.**

The majority of respondents (82%) practice in a hospital that has rapid on-site evaluation (ROSE) for testing of tissue samples. While academic medical centers (90%) were more likely to have ROSE, it was also prevalent among community-based respondents (78%). Among respondents who don't have ROSE, virtually all use cellblock cytology to preserve tissue samples for testing.

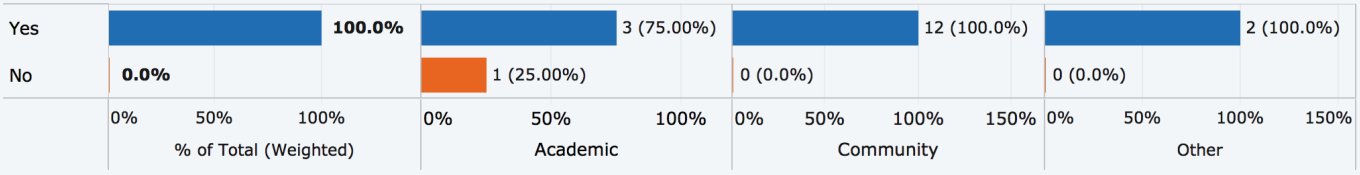
Almost half of respondents (48%) agreed that samples preserved in cell block technology are as good as core needle biopsy in terms of yielding enough tissues for diagnostic and molecular testing. Respondents in academic settings were more likely to agree with this statement.

**ROSE Availability Where Tissue Samples Are Collected**



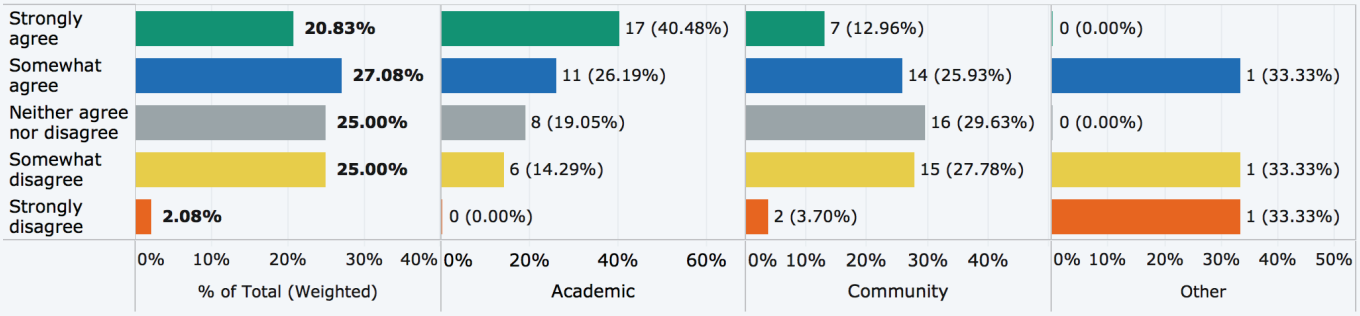

**Q:** Do you have rapid on-site evaluation (ROSE) available at the location where EBUS-TBNA tissue samples are collected from your patient?

**Use Cellblock Cytology When No ROSE Access**



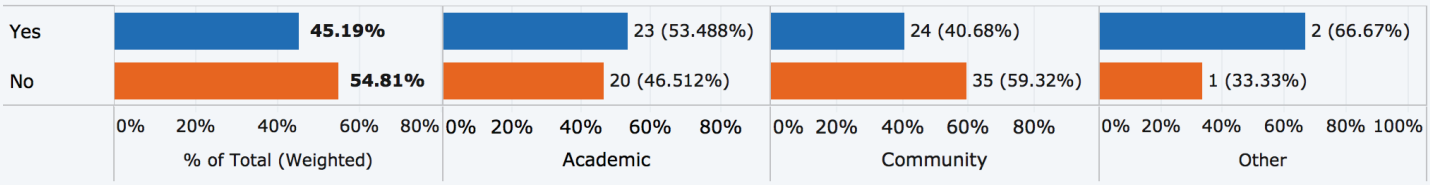

**Q:** If ROSE is not available, do you send samples to pathology preserved using cellblock cytology?

**Samples Preserved in Cellblock Cytology vs Core Biopsy**

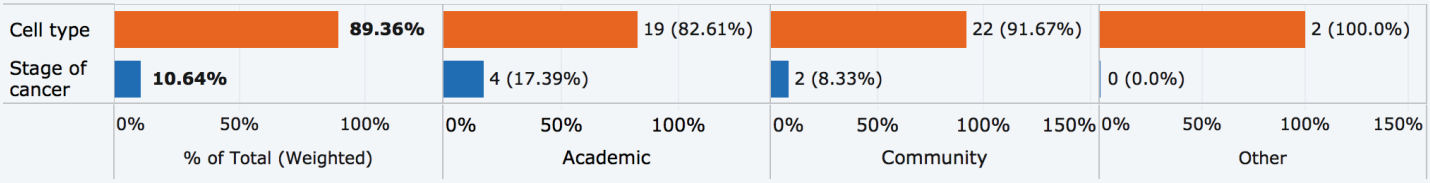



**Q:** Please rate your level of agreement with the following statement: EBUS-TBNA samples preserved in cell block cytology are just as useful as core biopsy in terms of generating enough tissue in one procedure for diagnostic and molecular testing purposes.

Only about half of respondents (45%) routinely order reflex testing on their tissue samples, with this behavior slightly more pronounced among academic medical center respondents (53%). Respondents who routinely order reflex testing overwhelmingly indicated that they do so on the basis of cell type (89%).



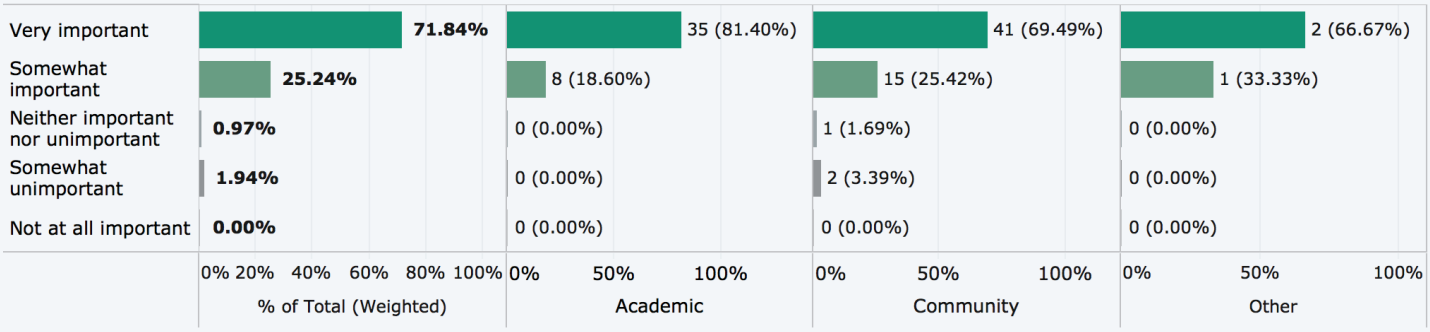

**Q:** Do you order reflex testing on your tissue samples?



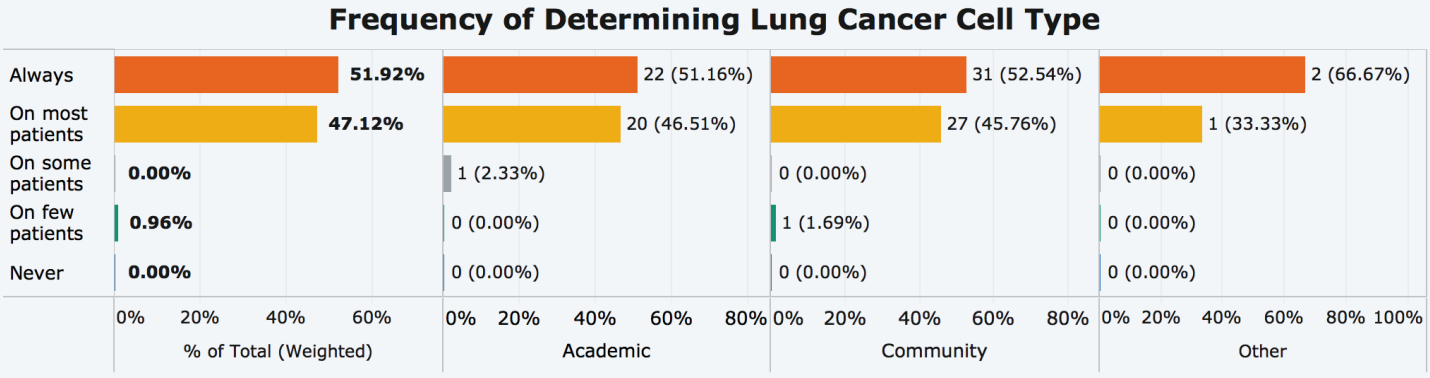

**Q:** Do you order reflex testing based on cell type or stage of cancer?

**Attitudes toward the importance of determining cell type differ based on practice setting.**

Most respondents (72%) agreed that it is very important to determine cell type. There was a significant difference in attitudes between academic and community-based respondents, with academic respondents (81%) far more likely to say it is very important to determine cell type. In comparison, only 69% of community-based respondents reported that it was very important to determine cell type.




**Q:** How important is it to determine the type of cancer cell (adenocarcinoma vs squamous carcinoma) when you are evaluating a patient for lung cancer?




**Q:** How frequently do you determine the type of lung cancer cell when evaluating a patient for lung cancer?

**Academic centers are more likely to perform molecular testing regardless of stage.**

Nearly half of respondents send all samples with advanced stage lung cancer and advanced stage adenocarcinoma for molecular testing. Again, academic medical center-based respondents were more likely than community-based respondents to send all samples for molecular testing. Roughly, one-fourth send samples for molecular testing only after cell type has been determined.

**Approach to Sending Samples for Molecular Testing**

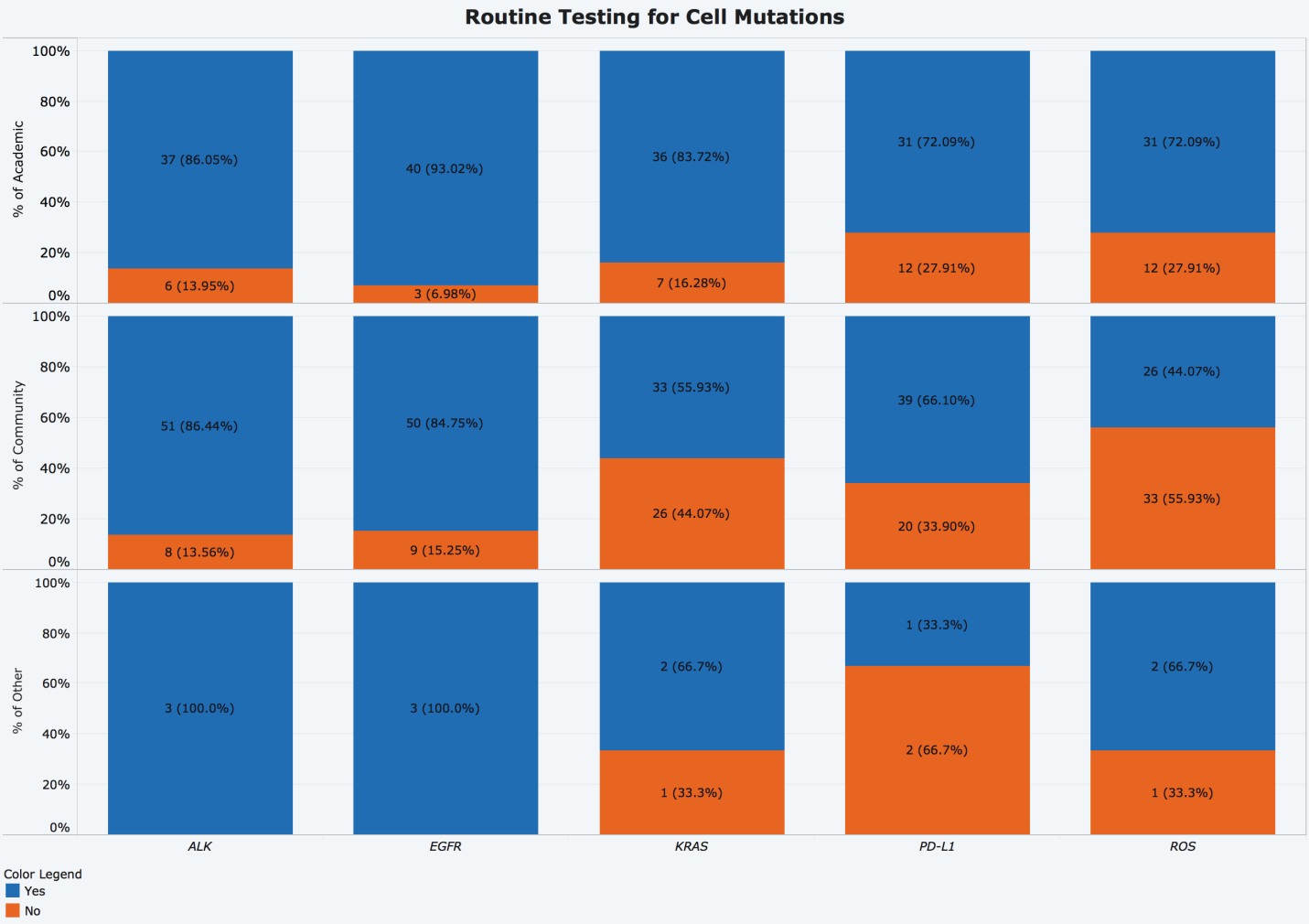
| | Advanced Lung Cancer | | | | Adenocarcinoma | | | |
|---|---|---|---|---|---|---|---|---|
| | % of Total (Weighted) | % of Academic | % of Community | % of Other | % of Total (Weighted) | % of Academic | % of Community | % of Other |
| All samples are routinely sent for molecular testing | 44.66% | 51.16% | 42.37% | 66.67% | 53.47% | 69.05% | 47.37% | 66.67% |
| Samples are only sent for testing once the cell type has been determined | 30.10% | 27.91% | 30.51% | 33.33% | 24.75% | 16.67% | 26.32% | 33.33% |
| Samples are sent for testing based on the work up preference of the oncologist to whom the patient is going to be referred | 20.39% | 18.60% | 22.03% | 0.00% | 21.78% | 14.29% | 26.32% | 0.00% |
| Other approach | 4.85% | 2.33% | 5.08% | 0.00% | | | | |

**Q:** Thinking about your patients who have been diagnosed with advanced stage lung cancer (Stage IIIB or Stage IV), which of the above best describes your approach to sending tissue samples for molecular testing?

Thinking about your patients who have been diagnosed with advanced adenocarcinoma (Stage IIIB or Stage IV), which of the above best describes your approach to sending tissue samples for molecular testing?

**Academic medical centers test for a wider variety of tumor mutations.**

Respondents most frequently test for *EGFR* (87%) and *ALK* (86%) cell mutations, and frequency of testing orders was equally high among both academic and community-based respondents. Respondents at academic medical centers reported considerably higher levels of testing for *PD-L1* and *ROS* compared with their community-based colleagues (PD-L1, 72% vs 66%; ROS, 72% vs 44%).



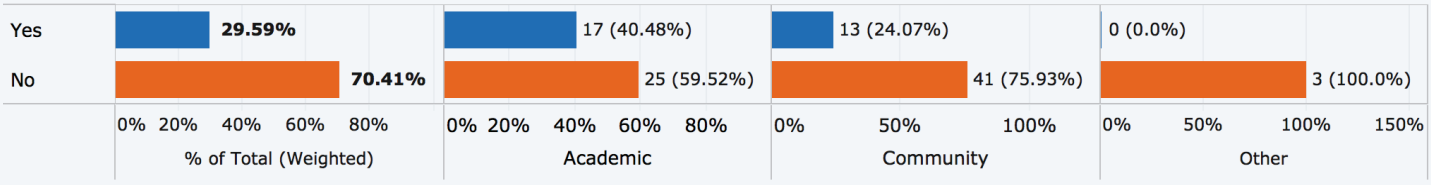

**Q:** Do you routinely test for EGFR / ALK / ROS / PD-L1 / KRAS?

## GUIDELINE AWARENESS

**Awareness of, and adherence to, EBUS-TBNA guidelines is low.**

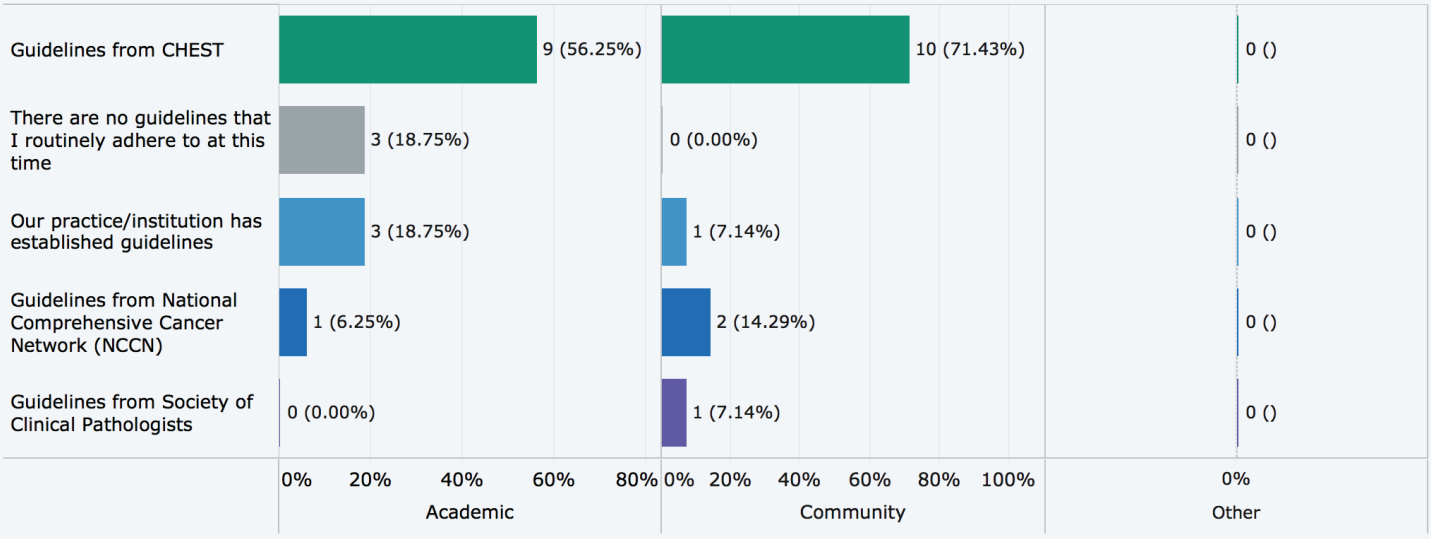
Only a minority of respondents—even among academic medical center-based respondents—was aware of guidelines for EBUS-TBNA and molecular testing. Awareness was especially low in community settings. Respondents who were aware of guidelines most frequently cited CHEST guidelines (61%) as the ones to which they adhere.

### Awareness of EBUS-TBNA Guidelines




**Q:** Are you aware of any specific guidelines or protocols regarding the number of passes a bronchoscopist should make when performing EBUS-TBNA?

### Adherence to EBUS-TBNA Guidelines



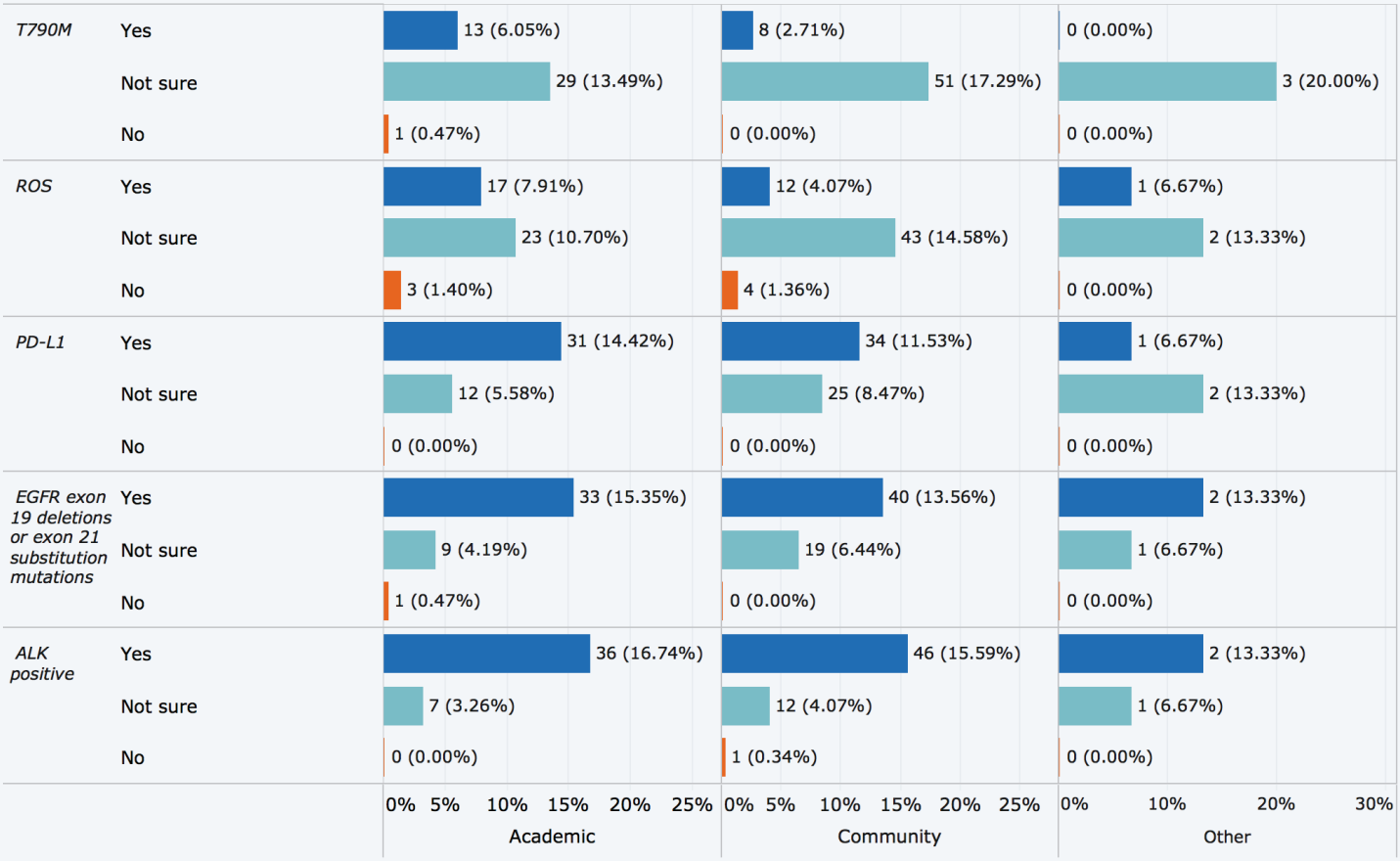

**Q:** Which guidelines or protocols do you currently adhere to when performing EBUS-TBNA?

## TREATMENT AND SIDE EFFECTS

**Most respondents are aware of approved therapies for *EGFR* and *ALK* mutations, regardless of practice setting, though knowledge of side effects may differ.**

Respondents were most familiar with FDA-approved drug therapies for *ALK* (79%) and *EGFR* (72%) cell mutations, followed by *PD-L1* (63%). Academic medical center-based respondents were more aware of therapies targeting *ROS*, *PD-L1,* and *T790M* mutations.

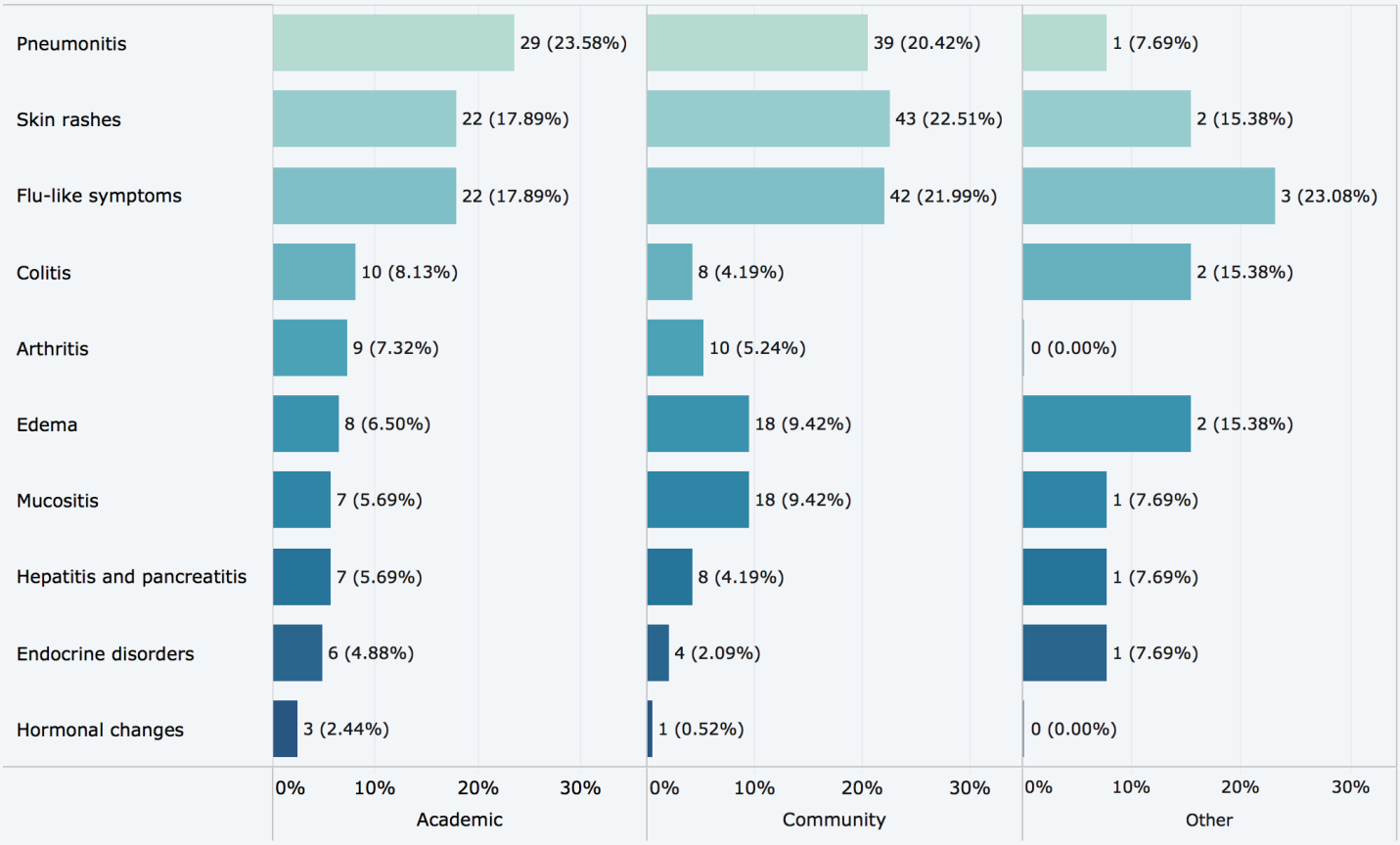
### Awareness of FDA-Approved Drug Therapies




**Q:** To the best of your knowledge, are there FDA-approved drugs for the following cell mutation targets?

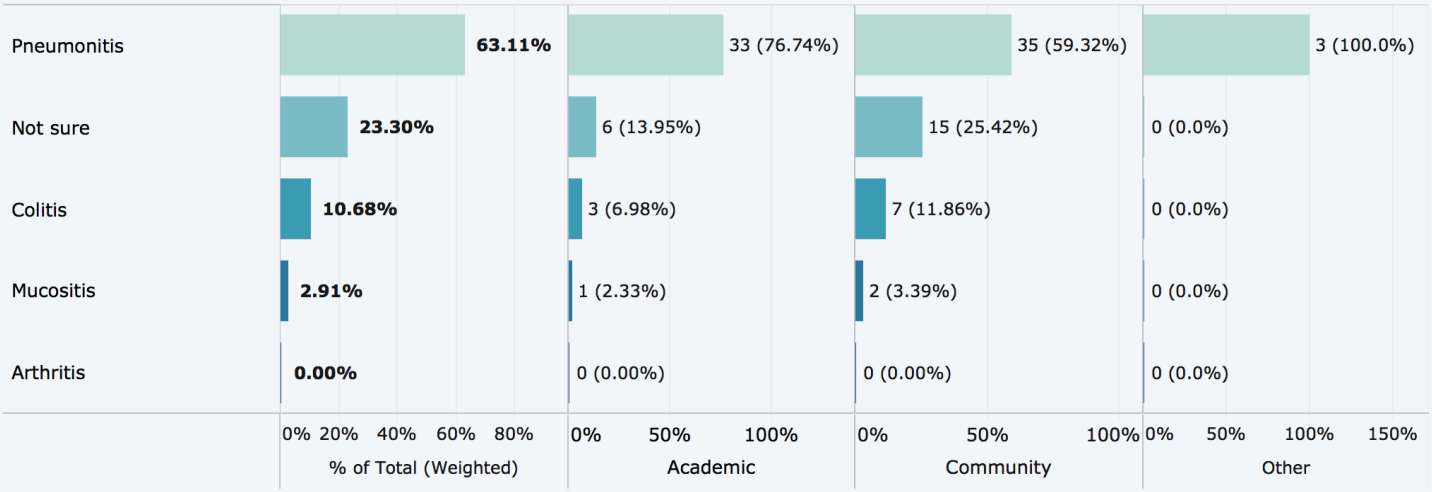
Respondents most frequently identified skin rashes (68%), flu-like symptoms (66%), and pneumonitis (66%) as side effects of immunotherapy, though knowledge varied somewhat by practice setting.

**Commonly Seen Side Effects of Immunotherapy**



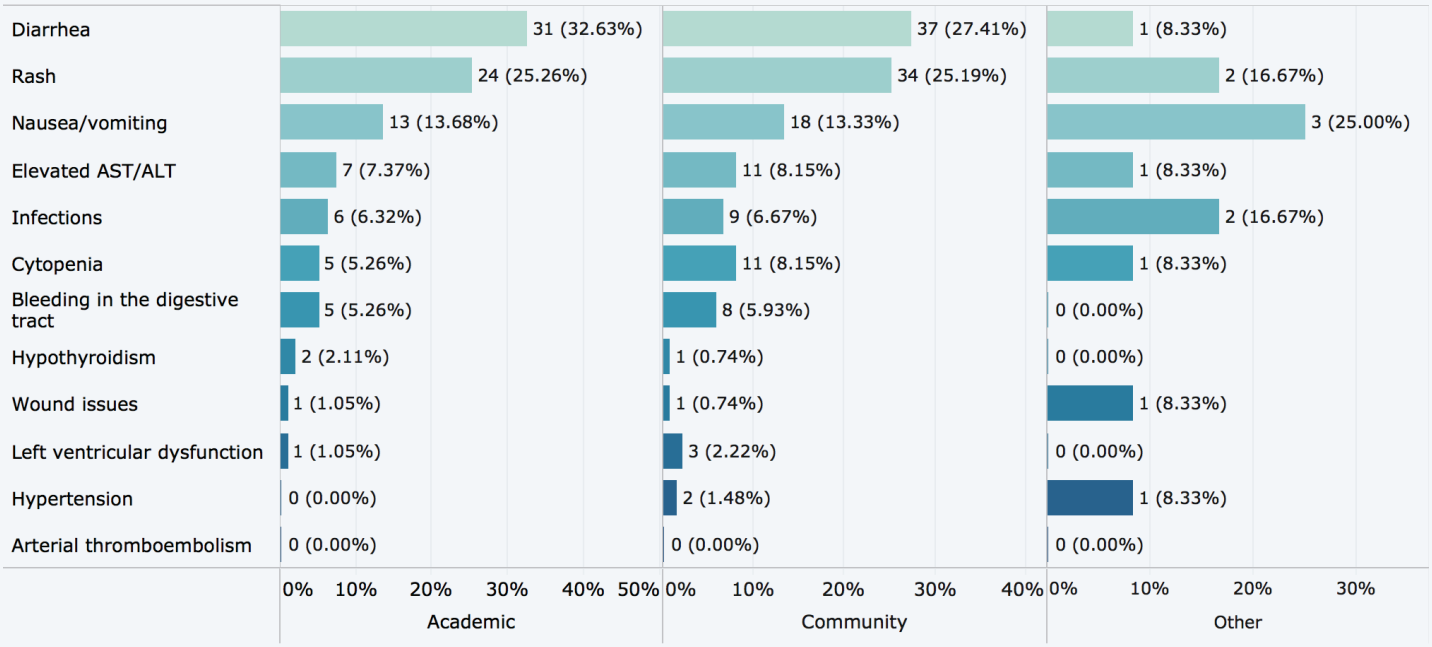

**Q:** What are the side effects you most commonly see in your patients who are receiving immunotherapy?

Two-thirds of respondents identified pneumonitis (63%) as the most life-threatening side effect of immunotherapy, though knowledge varied somewhat between academic medical center-based respondents and their community-based colleagues.




**Q:** Which side effect of immunotherapy is most life-threatening to patients?

Respondents were most likely to identify diarrhea (68%) and rashes (58%) as side effects observed with TKI therapy. Awareness of other side effects was considerably lower among academic and community-based respondents.

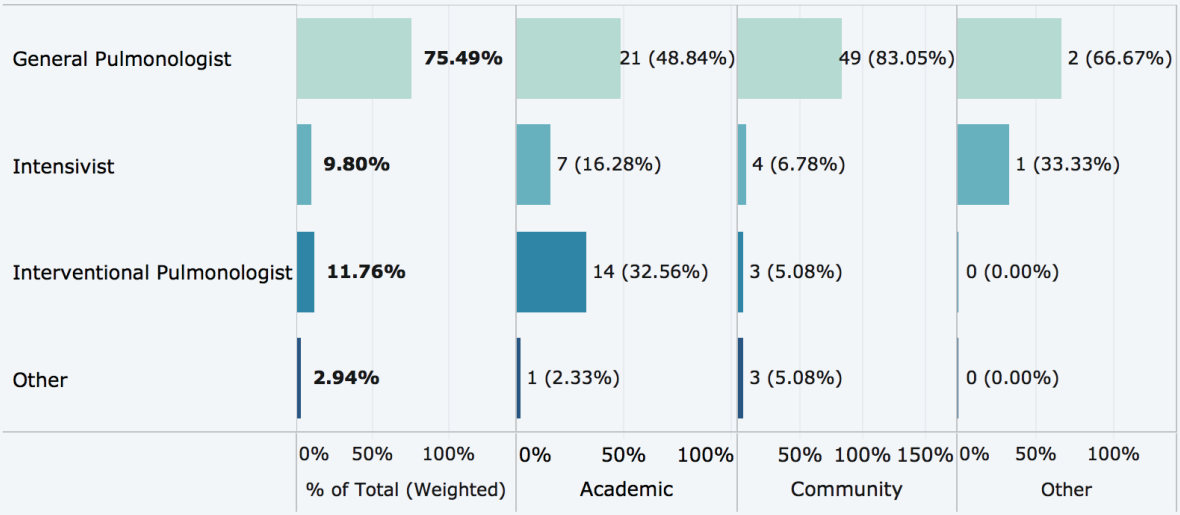



**Q:** Which side effect of immunotherapy is most life-threatening to patients?

## RESPONDENT AND PRACTICE PROFILES

The majority of the respondent base comprised general pulmonologists (75%), followed by interventional pulmonologists (12%) and intensivists (10%). The majority practice in community-based settings, either a tertiary-care hospital (36%) or a general hospital (36%); 28% practice in an academic setting. The complement of interventional pulmonologists is higher among academic medical center-based respondents (33%) in comparison to community-based respondents (5%).

### Individual Type

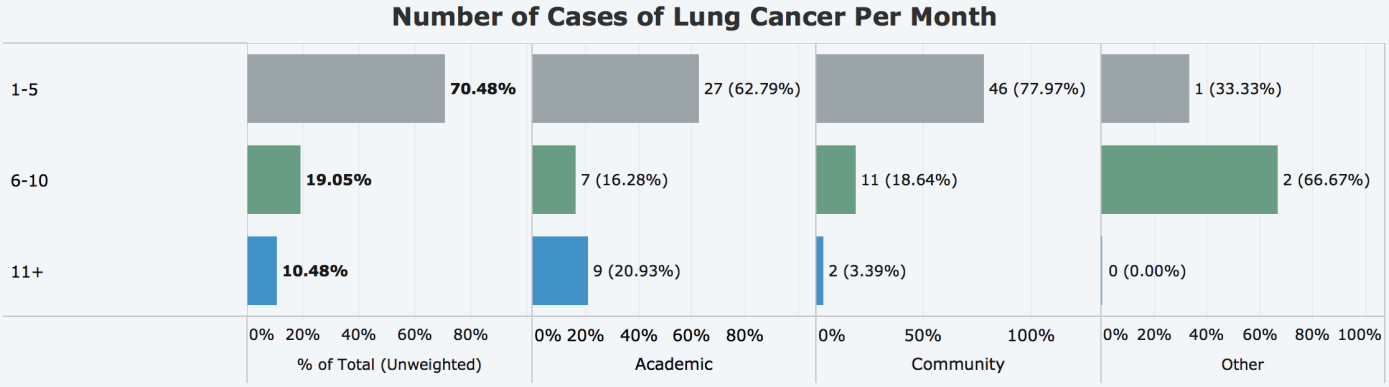



**Q:** Are you a...

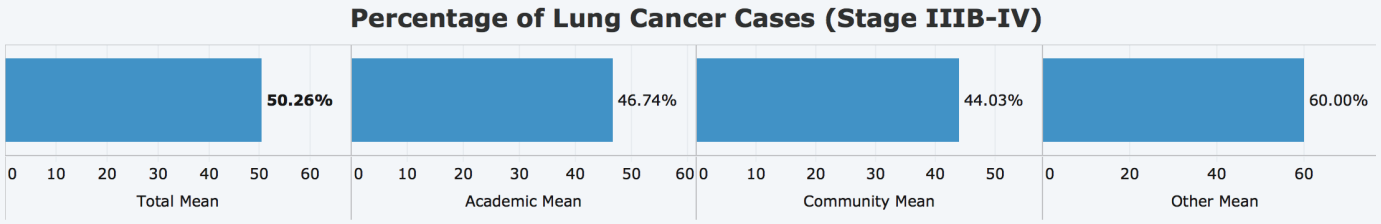
### Primary Hospital Affiliation


**Q:** Which of the following best describes your primary hospital affiliation?

The largest share of respondents (70%) diagnose five or fewer new lung cancer cases each month. Respondents practicing in an academic medical center reported higher volumes of new diagnoses per month in comparison to their community-based colleagues: 37% of academic medical center-based respondents diagnose six or more new cases per month compared with only 22% of community-based respondents.

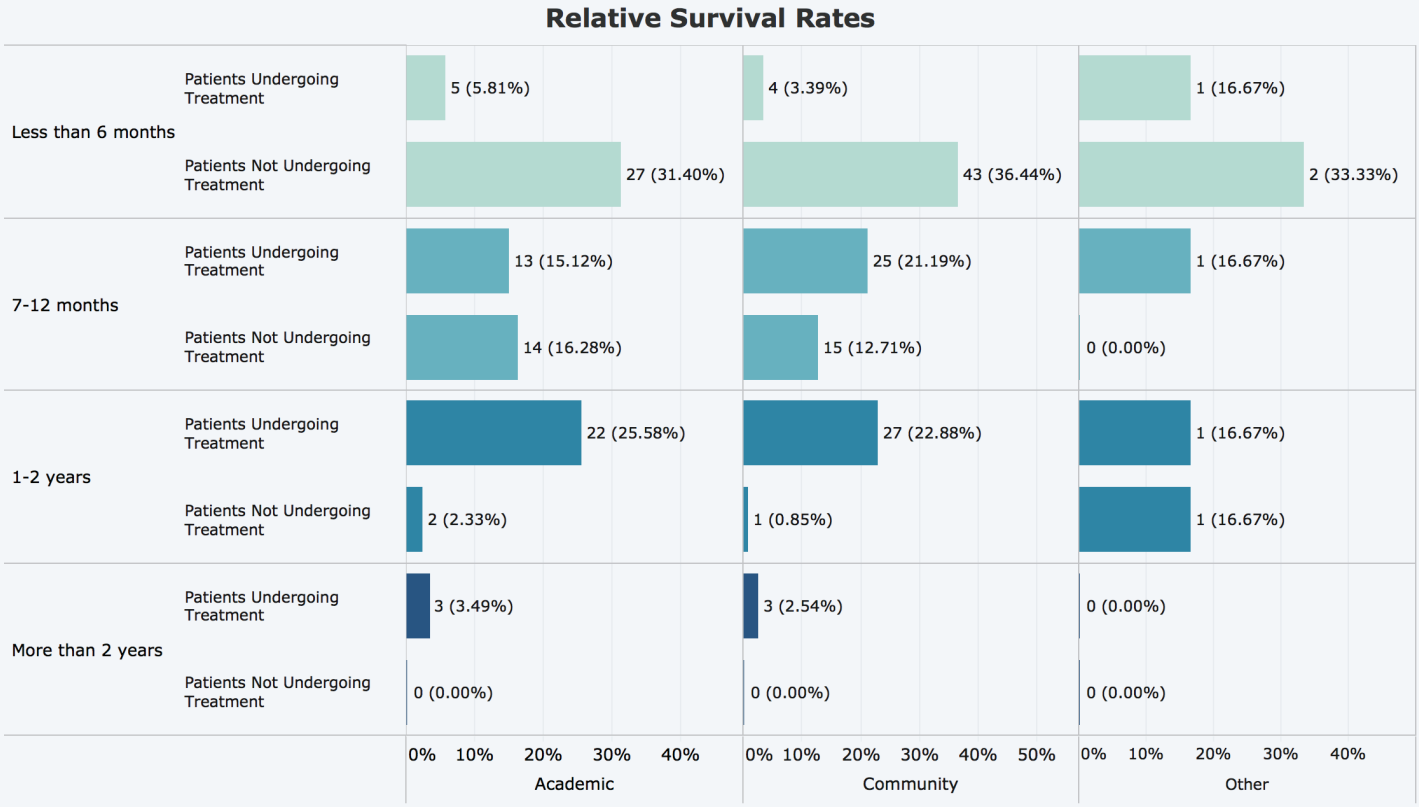



**Q:** How many new cases of lung cancer, on average, do you diagnose in a typical month?




**Q:** What percentage of the patients with lung cancer that you see for diagnosis and/or surveillance are Stage IIIB-IV?

Overall, half of respondents (52%) reported relative survival rates of 1 year or more for patients who undergo treatment; for patients who do not undergo treatment, nearly all respondents (98%) said that survival is less than 1 year. There was only a modest degree of differentiation in survival rates by practice setting: 58% of academic medical center respondents reported relative survival rates of 1 year or longer for their stage IIIB to stage IV patients who undergo treatment, while community-based respondents lagged slightly (51%).




**Q:** What is the relative survival rate of your patients diagnosed with stage IIIB-IV lung cancer WHO UNDERGO TREATMENT?

What is the relative survival rate of your patients diagnosed with stage IIIB-IV lung cancer who DO NOT undergo treatment?

## DISCUSSION

Pulmonologists are often involved in the diagnosis of lung cancer, as well as the acquisition of tissue for testing. The development of molecularly targeted therapies for NSCLC has shifted the standard of care to include testing for molecular mutations in order to optimize therapy accordingly. Key knowledge from this survey suggests that differences in attitudes, knowledge, and practices exist that can influence tissue sampling and molecular testing practices. While the majority of respondents were in agreement about most tissue acquisition and testing practices, the actual performance of these practices varied. These differences have implications for patient care, especially if one considers that what the pulmonologist does with respect to tissue acquisition and testing can help determine what information an oncologist has in hand when first seeing a patient with NSCLC.

While the use of EBUS-TBNA has increased in all settings, uptake by community centers has been slower, and they have not adopted EBUS-TBNA to the same degree as academic centers. Respondents who are not using EBUS-TBNA cite access as a barrier, ie, they are not using it because they don't have it. Among respondents, about one-third perform EBUS-TBNA themselves, while almost half refer tissue collection to an interventional pulmonologist. In this survey, all interventional pulmonologists and one-fourth of general pulmonologists perform EBUS-TBNA. As such, respondents differed in their degree of technical experience and familiarity with acquisition and testing protocols. Analyses based upon performing/not performing the procedure indicated some significant differences that are included under the corresponding key learning heading.

**KEY LEARNING:**

Care for patients undergoing diagnostic evaluation is variable but could improve in some circumstances.

**Key Learning: Care for patients undergoing diagnostic evaluation is variable but could improve in some circumstances.**

In order to initiate targeted therapy right from the start in patients with a diagnosis of NSCLC, oncologists need to have in-hand information about tumor mutations and biomarkers. Without these key pieces of information, they may need to delay treatment or initiate therapy that may not be optimal for that patient. Additionally, patients find the time between being told they may have cancer and their first treatment to be the most stressful in the cancer continuum. Variables that can affect the time to treatment and the selection of initial treatment include the technology that is available for testing (eg, access/no access to ROSE, on-site laboratories); acquisition of sufficient tissue for the spectrum of tests that may be needed (eg, need to perform three or more needle passes with EBUS-TBNA); what the pulmonologist orders

for tissue samples (eg, cell typing, molecular testing); institutional protocols (eg, reflex testing protocol in place); and payer considerations (eg, reimbursement for testing). What is clear from these data and other studies is that an institutional protocol for how tissue is to be managed will streamline the process.

While the general consensus indicates that there should be at least three to four needle passes when using EBUS-TBNA to acquire tissue samples, an important finding was that not all academic centers were complying. In community settings, a significant minority performs less than three needle passes, implying they believe sufficient tissue can be obtained with fewer passes. Current evidence shows that a minimum of three to four needle passes is needed, especially if molecular testing will be performed. There is general agreement in the literature that at least three needle passes per target should be obtained in order to ensure adequate sample for subsequent testing and that the oncologist has all the information needed when making initial treatment decisions.[4-6]

Access to ROSE was not a barrier; in fact, a larger than expected percentage of community centers have ROSE. Among respondents who don't have ROSE, virtually all use cellblock cytology to preserve tissue samples for testing. Respondents who performed tissue sampling themselves were more likely to think that cell block cytology is equally good.

Only about half of respondents routinely order reflex testing, even at academic medical centers. These results are similar to a 2013 American College of Chest Physicians survey that reported that 43% of pulmonologists had implemented routine reflex testing of NSCLC patients in their practice. Currently, the majority of respondents (89%) who routinely order reflex testing do so on the basis of cell type. Two-thirds of pulmonologists who performed the tissue sampling themselves ordered reflex testing. Though cost could be an issue at some institutions, this finding suggests there are opportunities for pulmonologists, pathologists, and oncologists to work as a team to streamline tissue sampling and handling processes and develop algorithms for reflex testing that include cell type and stage.

While there are no hard rules relating to time to treatment, most centers are moving to 14 days, so the finding that a significant minority expected treatment to begin within 7 days was unexpected.

Most respondents in all settings agreed that cell type determination was important; however, only about half did testing in every patient. With respect to sending samples for molecular testing based on cell type, academic respondents were more likely to send all samples of adenocarcinoma and any advanced lung cancer compared with less than half of community-based respondents. Overall, roughly one-fourth say they send samples for molecular testing only after cell type has been determined; however, the practice varied by setting, with more community-based respondents waiting to send adenocarcinoma (26% vs 17% academic setting) and any lung cancer (31% vs 28% academic setting). Community-based respondents were more likely to send samples based upon the oncologists' preference in both adenocarcinoma (26%) and any lung cancer (22%).

The findings that testing rates are relatively low, even for adenocarcinoma, and that not all academic centers send all samples for testing are important. More institutions are sending both adenocarcinoma and squamous cell samples for testing, recognizing that a small percentage of squamous tumors express *EGFR*, and many tumors are composites of adenocarcinoma and squamous cells. It was also interesting to see that respondents in all settings relied more upon cell type than stage, which can be important in defining reflex testing protocols. These findings reiterate the importance of pulmonologists communicating with medical oncologists. As the clinician responsible for ordering tests on the samples they collect, pulmonologists could benefit from oncologists' insight into which molecular tests should be done and the implications for timely and appropriate treatment.

With respect to which mutation tests are done, the survey results are in alignment with current guidelines, including those from CHEST, that recommend *EGFR* and *ALK* molecular testing in NSCLC. The majority of respondents in all settings test for *ALK* and *EGFR* mutations in NSCLC samples. Academic medical center-based respondents test for *PD-L1* and *ROS* mutations at a substantially higher rate than community-based respondents. An interesting finding was that community respondents test more for *KRAS*, which has no targeted therapy, than for *PD-L1*, which does. Respondents who performed tissue sampling were more likely to test for all mutations vs those who referred the procedure.

**KEY LEARNING:**

Gaps in attitudes, knowledge, and behaviors exist between academic center and community-based respondents.

Since academic centers are usually the first to adopt new technology, it makes sense that they would test for *PD-L1* and *ROS* mutations more frequently than their community-based colleagues. Mutations in *EGFR, KRAS*, and *ALK* are mutually exclusive in patients with NSCLC, and the presence of one mutation in lieu of another can influence response to targeted therapy.[7-10] Epidermal growth factor receptor *(EGFR)* is present in about 15% of non-small cell lung cancers in the United States. EGFR-positive NSCLC can be treated with the tyrosine kinase inhibitors erlotinib, gefitinib, or afatinib. Anaplastic lymphoma kinase is only present in about 4% of US non-small cell lung cancers, often in younger, nonsmoking patients. NSCLC with ALK mutations can be treated by crizotinib and ceritinib and also tyrosine kinase inhibitors.[11]

**Key Learning: Gaps in attitudes, knowledge, and behaviors exist between academic center and community-based respondents.**

A key theme that emerged from the survey results was the difference in resource access, practice patterns, knowledge, and attitudes regarding EBUS-TBNA and molecular testing between respondents practicing in academic medical centers and those practicing in the community (tertiary care or general hospitals).

**Compared with academic respondents, community-based respondents were:**

MORE LIKELY TO

- Be general pulmonologists and see fewer new cases of NSCLC per month
- Use transthoracic needle biopsy as EBUS-TBNA
- Wait for cell type information before sending samples for molecular testing
- Send samples based upon the oncologists' preference
- Unsure about potentially life-threatening side effects of targeted therapy

HALF AS LIKELY TO

- Have access to EBUS-TBNA and on-site lab services and slightly less likely to have ROSE
- Use EBUS-TBNA
- Say that the majority of their patients being evaluated for lung cancer undergo EBUS-TBNA

LESS LIKELY TO

- Perform tissue sampling themselves
- Make additional needle passes to collect tissue samples
- Agree that cell block cytology is equivalent to core biopsy in terms of generating enough tissue for diagnostic and molecular testing
- Consider cell type determination "very important"
- Send all adenocarcinoma and any lung cancer for molecular testing
- Test for mutations beyond *ALK* and *EGFR*
- Be aware of EBUS-TBNA guidelines
- Identify pneumonitis as a potentially life-threatening side effect of immunotherapy

Most respondents were aware that *EGFR*, *ALK*, and *PD-L1* targeted treatments are available for NSCLC; however, sample acquisition, preparation, and testing practices varied and were less than optimal in some settings. These findings have important implications for patient care, as they suggest that in some cases, the oncologist will not have sufficient information to select the best initial treatment for patients with NSCLC, which could impede the timely delivery of appropriate care and optimal outcomes.

*These findings identify educational opportunities that exist for improving knowledge and practices in both academic and community settings. First, more efforts should be made to bring community center practices in alignment with current guidelines. Second, pathologists and oncologists are more familiar than pulmonologists with sample needs (quality and quantity) and testing practices relative to mutation status; therefore, improving communication among pulmonologists, pathologists, and oncologists could improve overall practices and ensure that oncologists have all the information necessary to optimize initial treatment.*

**KEY LEARNING:**

Awareness of and adherence to guidelines relating to EBUS-TBNA are low in both academic and community settings.

**Key Learning: Awareness of and adherence to guidelines relating to EBUS-TBNA are low in both academic and community settings.**

- The majority of respondents were not aware that EBUS-TBNA guidelines exist.
- Among the minority that is aware of guidelines, they are most familiar with the CHEST guidelines.
- Adherence rates to any guidelines are low.

Overall awareness of any EBUS-TBNA guidelines is low, even among pulmonologists who perform the procedure. While the majority of pulmonologists who perform EBUS are aware of CHEST guidelines, a significant percentage is not aware of them or do not adhere to them. This may imply that a significant number of pulmonologists determine for themselves how many needle passes are required to obtain sufficient samples for the spectrum of tests that might be needed. It should be noted that the CHEST EBUS-TBNA guidelines are less than 2 years old; therefore, it is possible that awareness is evolving among clinicians, especially outside of academic centers.

In order to appropriately assess for molecular markers, it is essential that adequate tissue samples be obtained and provided to the pathologist. The CHEST 2015 guidelines note, "It is critical to obtain adequate tissue to characterize a lung cancer. Within an institution, effective communication between those obtaining the biopsies, those interpreting them, and those delivering the treatment must be in place so that collectively, the members of various subspecialties involved in the care of the lung cancer patient can decide how best to obtain and optimally use the tissue. If specimens are not adequate for histologic and molecular characterization then obtaining a second biopsy is acceptable given the importance of accurate tumor characterization.[4]"

*The results highlight a need to increase awareness among pulmonologists, especially those who perform EBUS-TBNA, that guidelines exist. This lack of awareness may have important implications with respect to how respondents perform EBUS-TBNA, when they send samples for tests, and optimizing the amount and quality of tissue samples for recommended molecular tests.*

**KEY TAKEAWAYS**

- Variations in practices that affect patient care exist to a greater extent in community settings than in academic centers; however, knowledge and practice gaps exist in both settings.
- In both community and academic settings, a significant percentage do not perform three to four needle passes when acquiring tissue using EBUS-TBNA.
- The percentage of samples sent for cell and molecular testing is higher in academic centers but is overall lower than current guidelines suggest.
- Awareness of and adherence to EBUS-TBNA guidelines are low, even among pulmonologists who perform the procedure.
- Communication among pulmonologists, pathologists, and oncologists needs to be improved in order to define and streamline processes that optimize time to appropriate initial treatment in patients with NSCLC.

**ABOUT *CHEST CLINICAL PERSPECTIVES™***

CHEST is the global leader in advancing best patient outcomes through innovative chest medicine education, clinical research, and team-based care. This includes connecting health-care professionals to cutting-edge original research and a wide array of evidence-based guidelines through the journal *CHEST*, while also serving as a resource for clinicians through year-round meetings, live courses, books, white papers, and mobile apps delivering content in the areas of pulmonary, critical care, and sleep medicine.

We've launched this series of *CHEST Clinical Perspectives* studies to cover compelling issues in chest medicine, on topics ranging from the use of biologics in treatment of patients with severe asthma, to the state of practice in tissue sampling and testing for NSCLC. An expert panel of thought leaders from the Mayo Clinic, Baylor College of Medicine, Medical University of South Carolina, Walter Reed Army Medical Center, and Emory University helps to guide the content of each study and lends rich expertise and perspectives in interpreting the results. Each year, a capstone report is issued, incorporating findings from each of the studies conducted that year.

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