FLEXIBLE BRONCHOSCOPY INSPECTION, BAL, BX AND TBLB

Bronchoscopy Education Project

Assessment Tools

Scoring Recommendations for Bronchoscopy Assessment Tools

(BSTAT, BSTAT-TBLB/TBNA, BSAT)

The goal of these assessment tools is to be able to monitor a learner's progress along the learning curve from *novice* (Score < 60) to *advanced beginner* (Score 60-79), *intermediate* (score 80-99), and *competent* (score 100). The instructor should be able to ascertain, by observing the learner's performance (For BSTAT tools, this could be done on a once or twice a year basis) that each of the ten elements in each tool are covered satisfactorily. Repeated testing will demonstrate increases in knowledge and technical skill acquisition as the student climbs the learning curve from novice to advanced beginner, intermediate and competent bronchoscopist for the procedure being assessed.

To maximize objective scoring, each task has been defined explicitly in this user manual for each checklist and assessment tool. Participation in specially-designed Train-the-Trainers courses is encouraged to assist with standardization and to help instructors use this program to its fullest potential.

Scores can be plotted on a graph, and each institution or training program can choose its own cut-offs for a PASS grade, although we recommend that a final PASS grade be achieved with a score of 100. In the absence of a large pilot study demonstrating standard normograms as is done for high-stakes testing, consensus of world renowned experts was obtained to delineate cut-off scores for the following four categories.

Category	**Score**
Novice	< 60
Advanced Beginner	60-79
Intermediate	80-99
Competent	100

Specific instructions marked by an asterisk (*) are provided for each of the tools.

Instructions: To administer the BSTAT, learners are asked to perform a complete diagnostic flexible bronchoscopy, while at all times stating what they are doing and where they are navigating in the airway. Thus, items 1, 2, 5, 6, and 7 are scored. They are then asked to go from the neutral position at the main carina to segments RB-4, 5, 6 and LB-8, 9, 10, and items 3 and 4 are scored. Items 8 and 9 are scored using the associated quiz images. Finally, item 10 is scored while the learner performs a BAL, brushing and mucosal biopsy. The BSTAT-TBLB/TBNA is also administered with a full diagnostic bronchoscopy, followed by a conventional TBNA and TBLB procedure (not necessarily all in the same patient, if assessment is being done in a patient). Items 5 and 10 are quiz-based images.

Bronchoscopy Skills and Tasks Assessment Tool (BSTAT)

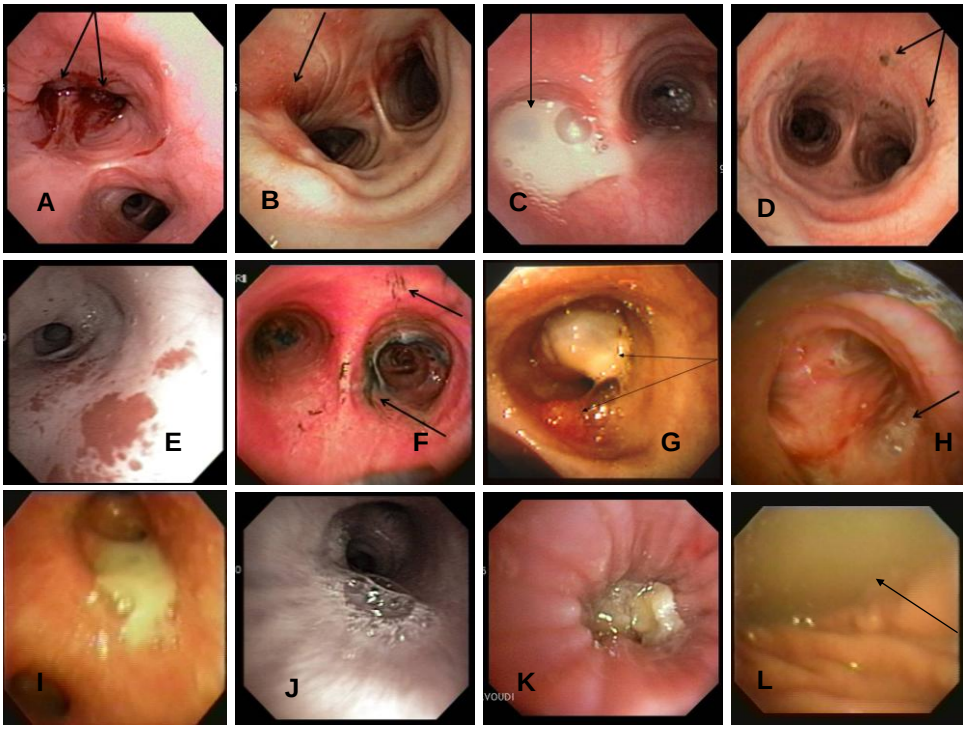
Learner: _____ Training Year _____

Faculty _____ Date _____

Educational Item* Items 1-10 each scored separately	**Satisfactory Yes/No**
1. Identification of Right sided anatomy (2 points each, target 20 points) □ RB1 apical □ RB2 posterior □ RB3 anterior □ RB4 lateral □ RB5 medial □ RB6 superior □ RB7 mediobasal □ RB8 anterobasal □ RB9 laterobasal □ RB10 posterobasal	Yes / No Score ____/20
2. Identification of Left sided anatomy (2 points each, target 16 points) □ LB1+2 apical/posterior □ LB3 anterior □ LB4 superior □ LB5 inferior □ LB6 superior □ LB8 anterobasal □ LB9 laterobasal □ LB10 posterobasal	Yes / No Score ____/16
3. Identify and enter RB 4+5+6 on demand (All three segments must be entered to earn 5 points, no partial points given, target 5 points) □ RB 4+5+6	Yes / No Score ____/5
4. Identify and enter LB 8+9+10 on demand (All three segments must be entered to earn 5 points, no partial points given, target 5 points) □ LB 8+9+10	Yes / No Score ____/5
5. Posture/Hand positions/Equipment safety (3 points each, target 9 points) □ Body posture □ Hand positions □ Equipment handling	Yes / No Score ____/9
6. Scope centered and kept in midline (5 points, no partial points given) □ Scope centered in airway lumen	Yes / No Score ____/5
7. Airway wall trauma avoided (5 points, no partial points given) □ Airway wall trauma avoided	Yes / No Score ____/5
8. Nomenclature: secretions descriptions (1 point each, target 10 points) □ Image 1 □ Image 2 □ Image 3 □ Image 4 □ Image 5 □ Image 6 □ Image 7 □ Image 8 □ Image 9 □ Image 10	Yes / No Score ____/10
9. Nomenclature: Mucosal descriptions (1 point each, target 10 points) □ Image 1 □ Image 2 □ Image 3 □ Image 4 □ Image 5 □ Image 6 □ Image 7 □ Image 8 □ Image 9 □Image 10	Yes / No Score ____/10
10. Tasks: (5 points each, target 15 points) □ BAL □ Mucosal biopsy □ Brush	Yes / No Score ____/15

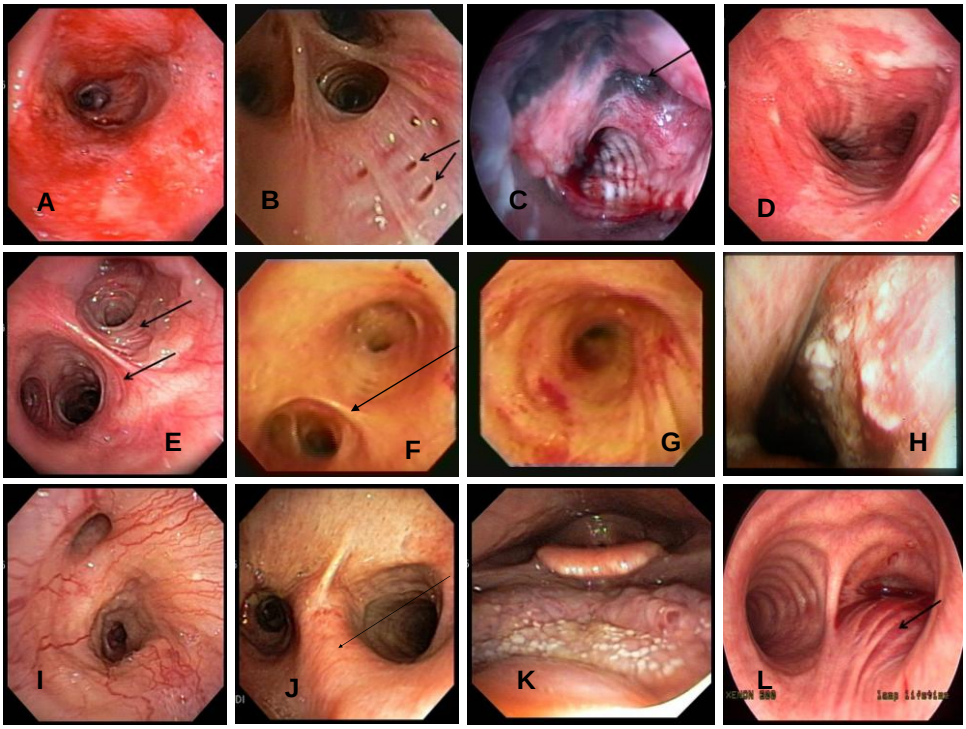
* The combined use of the 10 items pertains to technical skills needed to climb learning curve from novice to advanced beginner to intermediate to competent bronchoscopist able to perform flexible bronchoscopy with lavage, brushing and endobronchial biopsy independently.

FINAL GRADE PASS FAIL **SCORE** _____/100



Item 8: Match the photo (A-L) to the corresponding 10 secretion descriptions (Only one response per description)

_____ Sooty-burns	_____ Bloody	_____ Necrotic debris	_____ Yellow purulent
_____ White creamy	_____ Normal clear	_____ Tar-stained smoker's phlegm	_____ Frothy covering TE fistula
_____ Pink frothy edema	_____ Scope trauma	NO RESPONSE	



Item 9: Match the photo (A-L) to the corresponding 10 mucosal descriptions (Only one response per description)

_____ Exophytic cancer	_____ Necrotic tracheitis	_____ Bronchial pits	_____ Chronic bronchitis
_____ Hypervascularity	_____ Tumor infiltrated carina	_____ Extrinsic compression	_____ Anthracosis
_____ Oral candidiasis	_____ Acute bronchitis	NO RESPONSE	

User Instructions

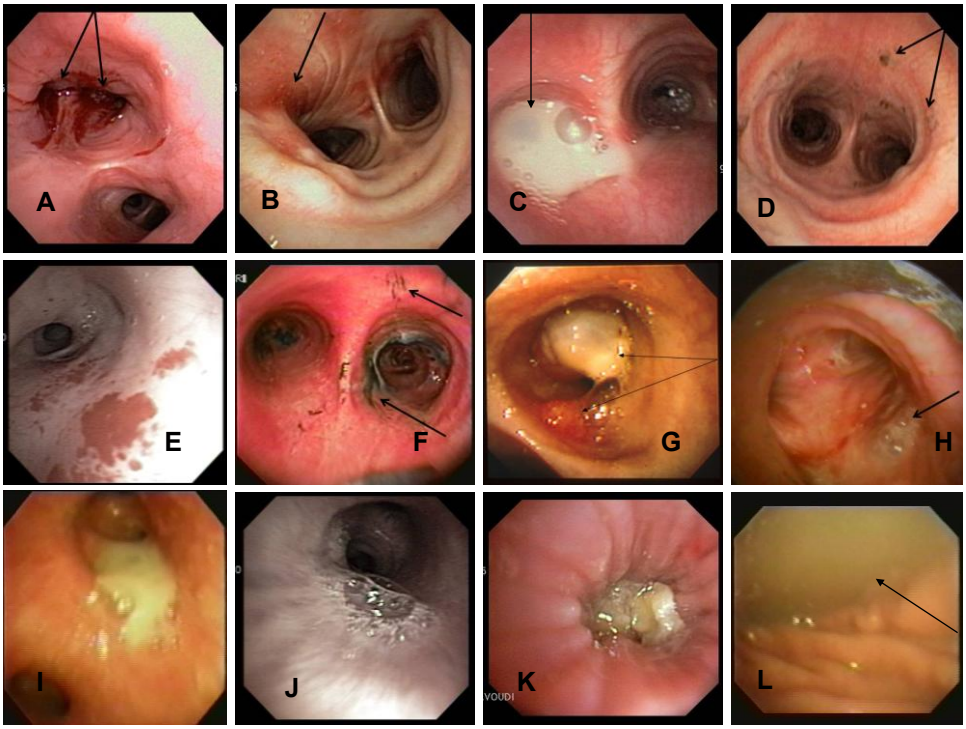
Bronchoscopy Skills and Tasks Assessment Tool (BSTAT)

Educational Item* Items 1-10 each scored separately	**Satisfactory Yes/No**
1. Identification of Right sided anatomy (2 points each, target 20 points) □ RB1 apical □ RB2 posterior □ RB3 anterior □ RB4 lateral □ RB5medial □ RB6 superior □ RB7 mediobasal □ RB8 anterobasal □ RB9 laterobasal □ RB10 posterobasal *Each segment correctly identified AND entered scores TWO points.	Yes / No Score ____/20
2. Identification of Left sided anatomy (2 points each, target 16 points) □ LB1+2 apical/posterior □ LB3 anterior □ LB4 superior □ LB5 inferior □ LB6 superior □ LB8 anterobasal □ LB9 laterobasal □ LB10 posterobasal *Each segment correctly identified AND entered scores TWO points	Yes / No Score ____/16
3. Identify and enter RB 4+5+6 on demand (All three segments must be entered to earn 5 points, no partial points given, target 5 points) □ RB 4+5+6 * All THREE of these segments must be identified and entered correctly using appropriate flexion/extension of the bronchoscope in order to obtain FIVE points. No partial points are given. This is an "All or None" exercise.	Yes / No Score ____/5
4. Identify and enter LB 8+9+10 on demand (All three segments must be entered to earn 5 points, no partial points given, target 5 points) □ LB 8+9+10 All THREE of these segments must be identified and entered correctly using appropriate manipulation of the bronchoscope in order to obtain FIVE points. No partial points are given. This is an "All or None" exercise.	Yes / No Score ____/5
5. Posture/Hand positions/Equipment safety (3 points each, target 9 points) □ Body posture □ Hand positions □ Equipment handling *Procedures are taught different ways. In general however, students should be able to refrain from moving around the patient, they should avoid placing their hands into a patients eyes or exerting too much pressure onto a patient's head. The scope should be kept relatively straight, and should not be twisted at the insertion site. The hand holding the scope should be relaxed, and assistant should be able to easily access the hand being used to hold and manipulate accessory instruments. The bronchoscopist should be able to protect the scope from trauma (biting, slamming against a cart, dropping onto the floor). For each of the items, THREE points (or none) are given.	Yes / No Score ____/9
6. Scope centered and kept in midline (5 points, no partial points given) □ Scope centered in airway lumen In general, the scope should be kept centered so that it does not rub up against the airway wall. This is especially important when inserting the scope to the larynx, passing the vocal cords, and examining segmental bronchi. A scope that is not well-centered decreases overall visualization and may cause airway wall trauma or cough. If the scope is centered in the airway throughout most of the	Yes / No Score ____/5

procedure, a score of FIVE points is achieved. No partial points are given. This is an "All or None" exercise.	
7. Airway wall trauma avoided (5 points, no partial points given) □ Airway wall trauma avoided * In general, airway wall trauma causes erythema, swelling or cough. During the procedure, the scope should be kept "off the wall" using careful manipulation of the lateral as well as flexion/extension function of the scope and appropriate identification and entry into segmental bronchi. If airway wall trauma is avoided during most of the procedure, a score of FIVE points is achieved. No partial points are given. This is an "All or None" exercise.	Yes / No Score ____/5
8. Nomenclature: secretions descriptions (1 point each, target 10 points) □ Sooty-burn □ Bloody □ Necrotic debris □ Yellow purulent □ White creamy □ Normal clear □ Tar-stained smoker's phlegm □ Frothy covering TE fistula □ Pink frothy edema □ Scope trauma * This is a written test for which 1 point is given for each correct answer; to be used with associated slide-show.	Yes / No Score ____/10
9. Nomenclature: Mucosal descriptions (1 point each, target 10 points) □ Exophytic cancer □ Necrotic tracheitis □ Bronchial pits □ Chronic bronchitis □ Hypervascularity □ Tumor infiltrated carina □ Extrinsic compression □ Anthracosis □ Oral candidiasis □Acute bronchitis *This is a written test for which 1 point is given for each correct answer; to be used with associated slide-show.	Yes / No Score ____/10
10. Tasks: (5 points each, target 15 points) □ BAL □ Mucosal biopsy □ Brush * This is an "All or None" exercise for which FIVE points are given to each of the 3 items if performed correctly. No partial points are given within each item.	Yes / No Score ____/15

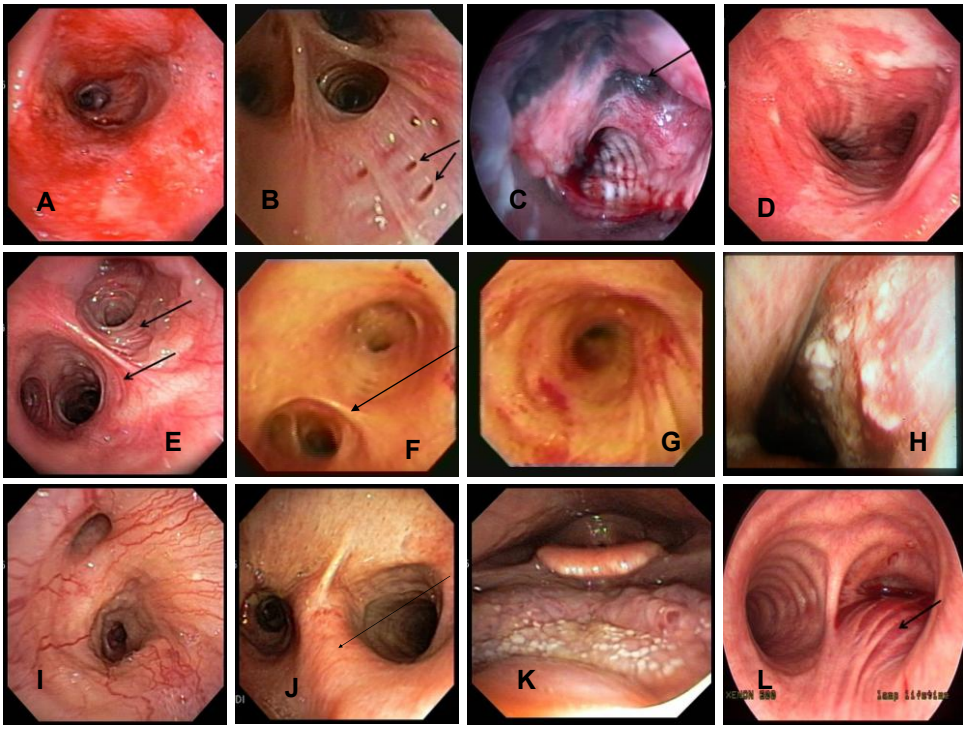
* The combined use of these 10 items pertains to technical skills needed to climb learning curve from novice to advanced beginner to intermediate to competent bronchoscopist able to perform flexible bronchoscopy with BAL, brushing and mucosal biopsy.

FINAL GRADE PASS FAIL **SCORE** _____/100



Item 8: Match the photo (A-L) to the corresponding 10 secretion descriptions (Only one response per description)

__F__ Sooty-burns	__A__ Bloody	__K__ Necrotic debris	__I__ Yellow purulent
__C__ White creamy	__J__ Normal clear	__D__ Tar-stained smoker's phlegm	__H__ Frothy covering TE fistula
__B__ Pink frothy edema	__E__ Scope trauma	NO RESPONSE	



Item 9: Match the photo (A-L) to the corresponding 10 mucosal descriptions (Only one response per description)

__H__ Exophytic cancer	__D__ Necrotic tracheitis	__B__ Bronchial pits	__E__ Chronic bronchitis
__I__ Hypervascularity	__J__ Tumor infiltrated carina	__L__ Extrinsic compression	__C__ Anthracosis
__K__ Oral candidiasis	__A__ Acute bronchitis	NO RESPONSE	

Bronchoscopy Skills and Tasks Assessment Tool for Transbronchial Lung Biopsy and Transbronchial Needle Aspiration (BSTAT-TBLB/TBNA)

Learner: _____ Training Year _____

Faculty _____ Date _____

Educational Item* Items 1-10 each scored separately	**Satisfactory Yes/No**
1. TBLB: Airway inspection without trauma (no partial points) □ Complete inspection done properly	Yes / No Score ____/5
2. TBLB technique (no partial points) □ Wedge scope into target segment □ Visualize target with fluoroscopy □ Advance forceps under fluoroscopy guidance to target □ Open forceps at target □ Advance and close forceps at target □ Remove forceps from scope	Yes / No Score ____/10
3. TBLB Complications: Pneumothorax (no partial points) □ Perform panoramic view of hemithorax using fluoroscopy □ Recognize signs and symptoms □ Demonstrate easy access to small or large bore chest tube	Yes / No Score ____/10
4. TBLB: Complications: Bleeding (no partial points) □ Scope wedged into target segment □ Move patient into lateral decubitus safety position □ Access upper airway with oral suction □ Demonstrate access and use of bite block and endotracheal tube	Yes / No Score ____/10
5. TBLB: Decision making (5 points each , target score 15 points) □ Image 1 □ Image 2 □ Image 3	Yes / No Score ____/15
6. TBNA: Airway inspection and imaging interpretation (5 points each) □ Complete inspection done properly □ Imaging studies correctly interpreted	Yes / No Score ____/10
7. TBNA Technique - Jab (no partial points) □ Advance catheter towards target area □ Advance needle to target area without airway trauma □ Jab needle through airway wall at target region while scope is fixed at nose or mouth □ Move needle back and forth inside node while suctioning □ Release suction prior to needle withdrawal from target region □ Retract needle into the catheter □ Observe that needle is completely retracted inside catheter □ Withdraw catheter from scope	Yes / No Score ____/10
8. TBNA Technique-Hub against wall (no partial points) □ Advance catheter towards target area □ Touch catheter to target area without airway trauma □ Penetrate airway wall with needle while holding scope firmly □ Move needle back and forth inside node while suctioning □ Release suction prior to needle withdrawal from target region □ Retract needle into the catheter □ Observe that needle is completely retracted inside catheter □ Withdraw catheter from scope	Yes / No Score ____/10
9. TBNA Technique -Piggyback: (no partial points) □ Secure catheter and scope simultaneously with one hand □ Advance scope and catheter as a single unit to target region □ Penetrate airway wall at target region □ Move needle back and forth inside node while suctioning □ Release suction prior to needle withdrawal from target region □ Retract needle into the catheter □ Observe that needle is completely retracted inside catheter □ Withdraw catheter from scope	Yes / No Score ____/10
10. TBNA: Decision making: (5 points each, target 10 points) □ Image 4 □ Image 5	Yes / No Score ____/10

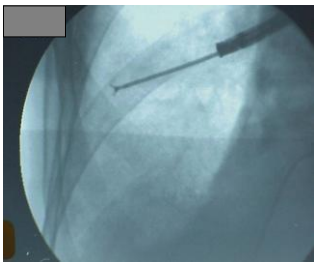
* The combined use of the 10 items pertains to technical skills needed to climb learning curve from novice to advanced beginner to intermediate to competent bronchoscopist able to perform flexible bronchoscopy with transbronchial lung biopsy and transbronchial needle aspiration independently.

FINAL GRADE PASS FAIL **SCORE** _____/100

NAME_____

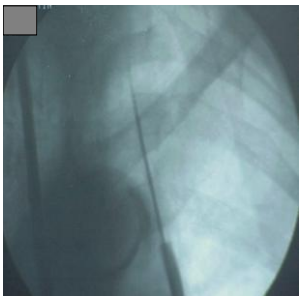
ITEM 5: Choose **One** best answer for each question

1. The target region is most likely (A) RB1, (B) RB6, (C) RB9, (D) RB10,



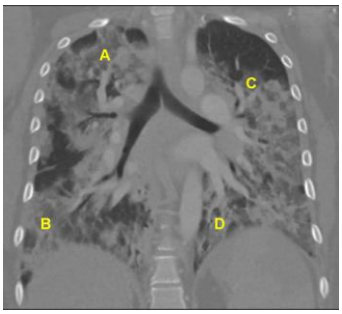
Answer _____

2. The target region is the (A) apical-posterior segment left upper lobe, (B) Lingula, (C) Right upper lobe



Answer _____

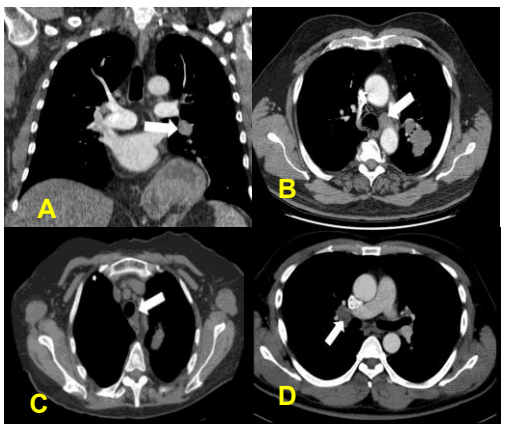
3. Which region should be biopsied in this immuno-suppressed patient with suspected fungal disease ?



Answer _____

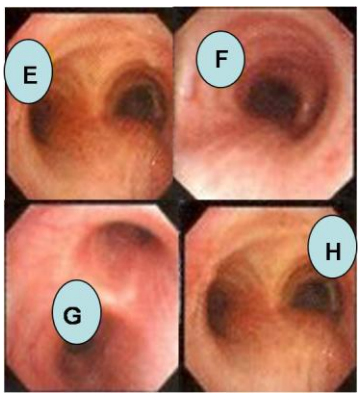
ITEM 10: Choose **One** best answer for each question

4. During conventional TBNA, which of the following lymph nodes will likely offer the highest diagnostic yield for nonsmall cell lung cancer ?



Answer _____

5. Where is the node located (needle insertion site E, F,G, or H)?



Answer _____

User Instructions

Bronchoscopy Skills and Tasks Assessment Tool, for Transbronchial Lung Biopsy and Transbronchial Needle Aspiration (BSTAT-TBLB/TBNA)

Educational Item* Items 1-10 each scored separately	**Satisfactory Yes/No**
1. TBLB: Airway inspection without trauma (no partial points) □ Complete inspection done properly *It goes without saying that the student should be able to perform inspection bronchoscopy and be able to identify and enter all bronchial segments.	Yes / No Score ____/5
2. TBLB technique (no partial points) □ Wedge scope into target segment □ Visualize target with fluoroscopy □ Advance forceps under fluoroscopy guidance to target □ Open forceps at target □ Advance and close forceps at target □ Remove forceps from scope *Many techniques exist for TBLB, but the instructor should focus on certain universal principles. The student should be able to wedge and unwedge the scope, and go through the various motions for TBLB including use of expiration and inspiration. Proper use of fluoroscopy requires a passing grade on the fluoroscopy test. Communication is key with instructions such as open and close forceps. If all six steps are completed satisfactorily, the student receives 10 points.	Yes / No Score ____/10
3. TBLB Complications: Pneumothorax (no partial points) □ Perform panoramic view of hemithorax using fluoroscopy □ Recognize signs and symptoms □ Demonstrate easy access to small or large bore chest tube *The student should be able to demonstrate the ability to respond quickly to this adverse event. Team communication is key, and the instructor should ascertain that the student is able to give appropriate instructions to nursing staff.	Yes / No Score ____/10
4. TBLB: Complications: Bleeding (no partial points) □ Scope wedged into target segment □ Move patient into lateral decubitus safety position □ Access upper airway with oral suction □ Demonstrate access and use of bite block and endotracheal tube *The student should be able to demonstrate the ability to respond quickly to this adverse event. Team communication is key, and the instructor should ascertain that the student is able to give appropriate instructions to nursing staff.	Yes / No Score ____/10
5. TBLB: Decision making (5 points each , target score 15 points) □ Image 1 □ Image 2 □ Image 3 *The written test also serves as the answer sheet; to be used with associated slide-show. Tests should be collected. Students can be given their scores, but should not be provided with the correct answers so that they can take the test at a later date	Yes / No Score ____/15
6. TBNA: Airway inspection and imaging interpretation (5 points each) □ Complete inspection done properly □ Imaging studies correctly interpreted Imaging studies should be reviewed prior to bronchoscopy. Instructor should be certain that the student can justify the procedure and has formulated a plan.	Yes / No Score ____/10
7. TBNA Technique - Jab (no partial points)	Yes / No

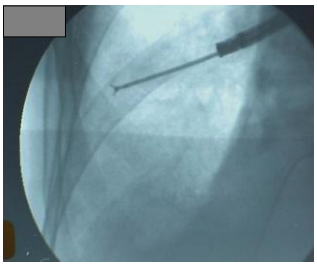
□ Advance catheter towards target area □ Advance needle to target area without airway trauma □ Jab needle through airway wall at target region while scope is fixed at nose or mouth □ Move needle back and forth inside node while suctioning □ Release suction prior to needle withdrawal from target region □ Retract needle into the catheter □ Observe that needle is completely retracted inside catheter □ Withdraw catheter from scope *While there are many ways to perform TBNA these universal principles and instructions are well described by experts. The student should understand these principles and be able to perform each of the three techniques because each one may be necessary in a different setting. The student should be using appropriate safety measures in regards to needle in, needle out instructions, handling the needle catheter, and while withdrawing the catheter from the scope. No partial points are given for any of the techniques.	Score ____/10
8. TBNA Technique-Hub against wall (no partial points) □ Advance catheter towards target area □ Touch catheter to target area without airway trauma □ Penetrate airway wall with needle while holding scope firmly □ Move needle back and forth inside node while suctioning □ Release suction prior to needle withdrawal from target region □ Retract needle into the catheter □ Observe that needle is completely retracted inside catheter □ Withdraw catheter from scope	Yes / No Score ____/10
9. TBNA Technique -Piggyback: (no partial points) □ Secure catheter and scope simultaneously with one hand □ Advance scope and catheter as a single unit to target region □ Penetrate airway wall at target region □ Move needle back and forth inside node while suctioning □ Release suction prior to needle withdrawal from target region □ Retract needle into the catheter □ Observe that needle is completely retracted inside catheter □ Withdraw catheter from scope	Yes / No Score ____/10
10. TBNA: Decision making: (5 points each, target 10 points) □ Image 4 □ Image 5 *The written test serves as the answer sheet; to be used with associated slide-show. Tests should be collected. Learners are given their scores, but should not be provided with the correct answers so that they can take the test at a later date	Yes / No Score ____/10

* The combined use of these 10 items pertains to technical skills needed to climb learning curve from novice to advanced beginner to intermediate to competent bronchoscopist able to perform flexible bronchoscopy with transbronchial lung biopsy and transbronchial needle aspiration independently.

FINAL GRADE PASS FAIL **SCORE** _____/100

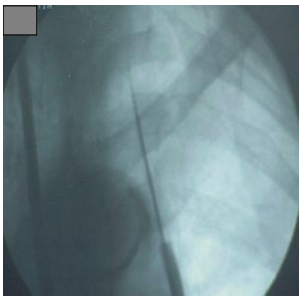
ITEM 5: Choose **One** best answer for each question

1. The target region is most likely (A) RB1, (B) RB6, (C) RB9, (D) RB10,



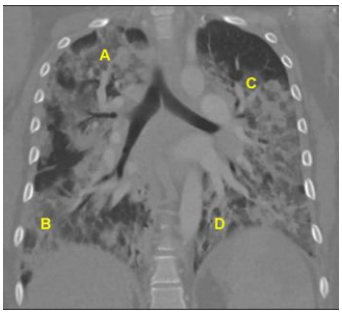
Answer __C__

2. The target region is the (A) apical-posterior segment left upper lobe, (B) Lingula, (C) Right upper lobe



Answer __A_

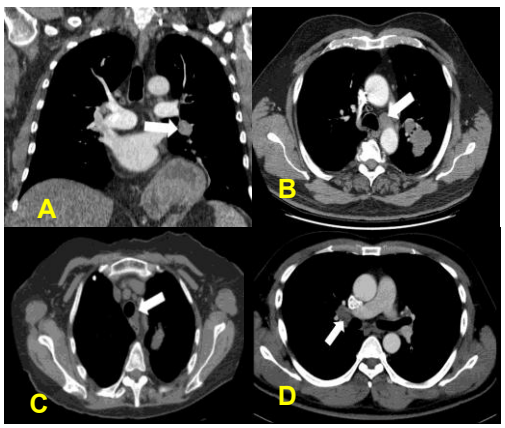
3. Which region should be biopsied in this immuno-suppressed patient with suspected fungal disease ?



Answer ____B___

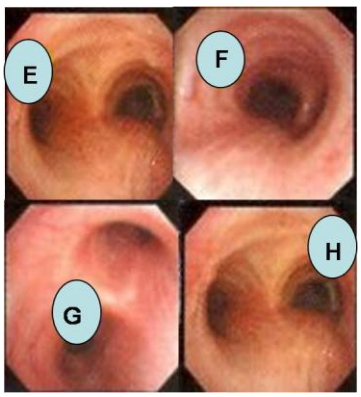
ITEM 10: Choose **One** best answer for each question

4. During conventional TBNA, which of the following lymph nodes will likely offer the highest diagnostic yield for nonsmall cell lung cancer ?



Answer __B__

5. Where is the node located (needle insertion site E, F,G, or H)?



Answer ___E___

Bronchoscopy Self Assessment Tool (BSAT)

The purpose of this assessment tool is to provide bidirectional feedback between learner and instructor. There are no wrong answers. Well performed, this interaction will allow opportunities to ascertain strengths and weaknesses of a training program and educational methodologies. In addition, an open discussion will allow both learner and instructor to identify the learner's zones of proximal development and reflective capacity [1]. Educators may wish to ask learners to complete the BSAT prior to the encounter, and to then review each element of the questionnaire with the learner in order to identify which areas might warrant additional concentration.

1	2	3	4	5
Not comfortable		Comfortable		Very comfortable

1.	I am able to identify airway anatomy	___
2.	I am able to identify airway mucosal abnormalities	___
3.	I am able to describe secretions and other airway abnormalities	___
4.	I am able to maneuver the flexible bronchoscope	___
5.	I am able to do a BAL through the flexible scope	___
6.	I am able to use a brush through the flexible bronchoscope	___
7.	I am able to use biopsy forceps through the scope	___
8.	I am able to perform transbronchial lung biopsy	___
9.	I am able to perform conventional transbronchial needle aspiration	___
10.	I now feel comfortable performing this case in a patient	___

Anatomy Abnormalities Technique Equipment Interpretation of findings

I would like to learn more about (circle all that apply above)

1	2	3	4	5
Poor	Below average	Average	Good	Excellent

Using the above scale please rate your training as (please circle one of the above)

I have the following comments

[1] The constructivist psychologist Lev Vygotsky (1896-1934) believed that learning and development depend on social interaction. Focusing primarily on how children learn, he described a zone of proximal development (ZPD) as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (L.S. Vygotsky: *Mind in Society: Development of Higher Psychological Processes*, p. 86, John-Steiner, Cole, Scribner, and Souberman Editors, Harvard University Press ,1980). Tinsley and Lebak expanded on this theory, describing a zone of reflective capacity in which adults increased their ability for critical reflection through feedback, analyses, and evaluation of one another's work in a collaborative working environment (Lebak, K. & Tinsley, R. Can inquiry and reflection be contagious? Science teachers, students, and action research. Journal of Science Teacher Education;2010:21;953-970).

Bronchoscopy International, Foundation for the Advancement of Medicine, is a transnational charitable organization whose members are devoted to bronchoscopy education. Our vision is that patients need not suffer the burden of medical procedure-related training. Our mission is to help physicians become skilled practitioners, and to make bronchoscopy more readily available to patients so that we might defeat the effects of lung disease around the world.

Bronchoscopy International partners with national, regional, and international medical societies to train physicians and their health care teams, donate equipment, and implement learning programs that support the democratization of knowledge. The organization has developed a six part curriculum to enhance cognitive, affective and experiential knowledge and technical skill. With implementation of the Bronchoscopy Education Project, we also offer a uniform curriculum to training centers and educators around the world. The project is officially endorsed by numerous professional medical associations. Learning resources include books and training manuals, instructional videos, patient-centered problem-based exercises, simulation scenarios, and interactive on-site and on-line seminars. Faculty Development Programs are conducted to nurture a cadre of expert educators. To learn more about Bronchoscopy International and our global activities, please go to www.Bronchoscopy.org.