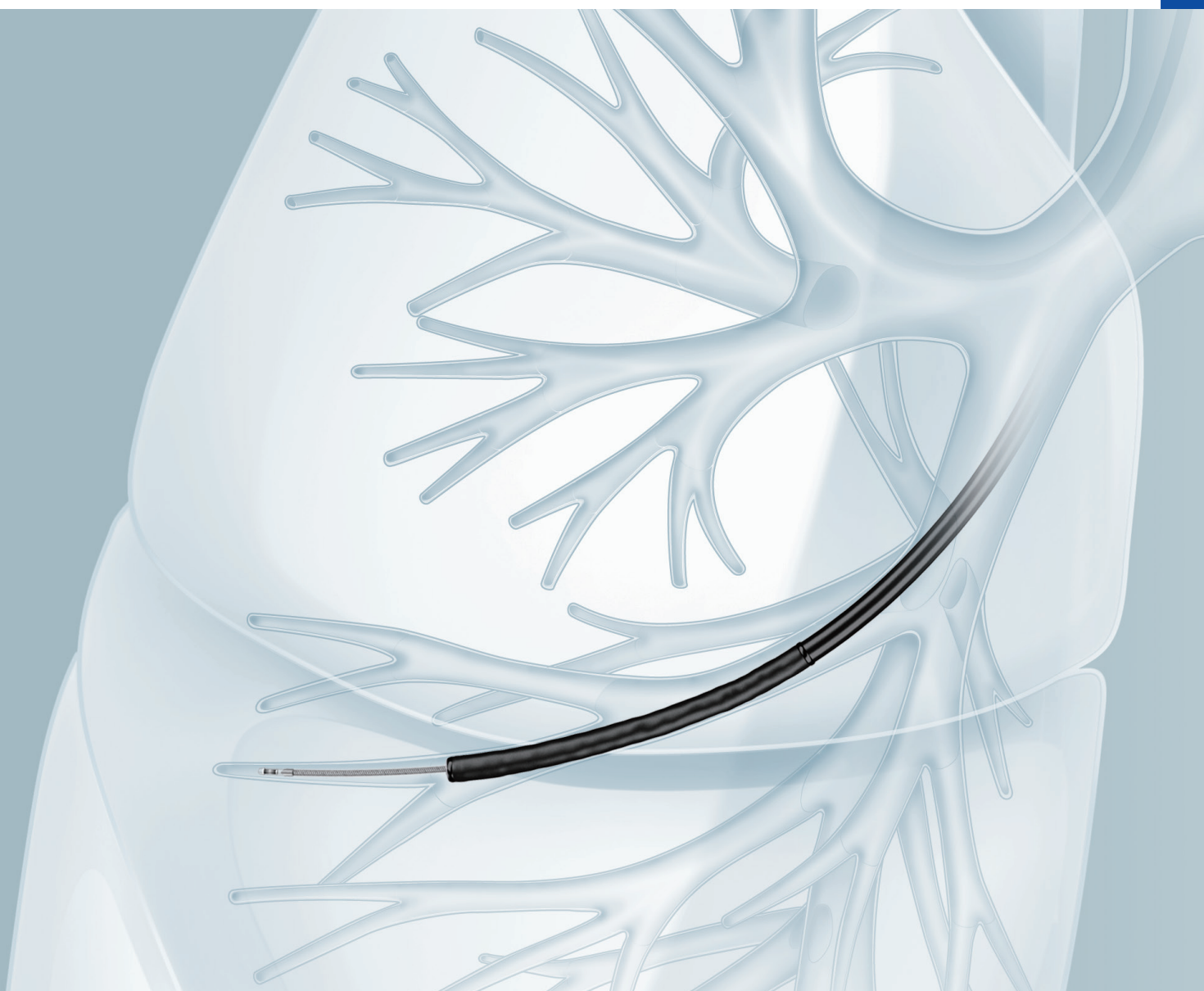


OLYMPUS[®]

Your Vision, Our Future

Radial EBUS / Ultrathin Bronchoscopy

Diagnosis and staging in peripheral pulmonary lesions



INTRODUCTION

Recent advances in radiology such as CT scanning have made it easier to find peripheral pulmonary lesions. Bronchoscopy is an extremely safe methodology widely used for diagnosis of peripheral pulmonary lesions. Its accuracy can be significantly improved by combining it with relatively new bronchoscopic technologies such as the radial ultrasonic probe (R-EBUS) and navigation. The key to the success of a bronchoscopy hinges on how precisely the sampling devices can be advanced through the bronchus after repeated branching. The ultrathin bronchoscope is ideal for moving through branching bronchi and facilitating access to a peripheral pulmonary lesion. Moreover, because the ultrathin bronchoscope can be positioned very close to the target lesion, it greatly improve sampling accuracy.

Supervising HCP

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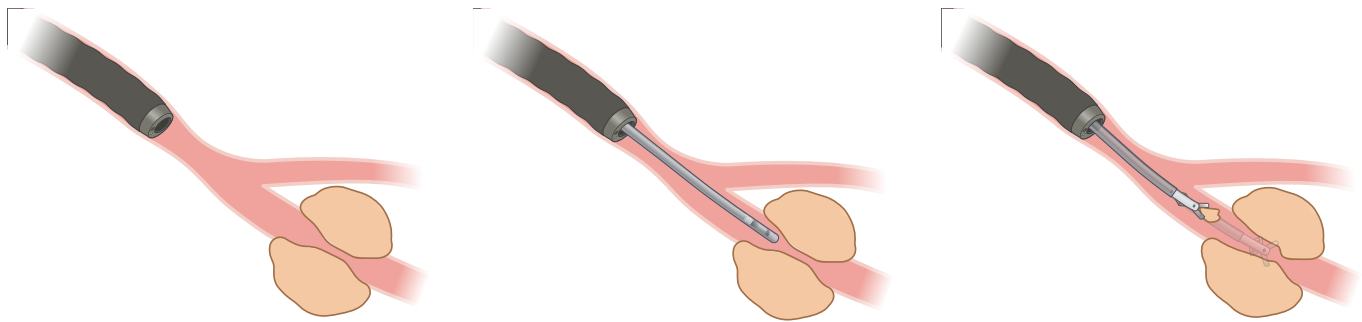
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1.OVERVIEW of EBUS-UT

Outline of EBUS-UT (Endobronchial Ultrasound - Ultrathin bronchoscopy)

The BF-MP190F is an ultrathin hybrid bronchoscope whose distal end has an outer diameter of 3.0 mm and whose instrument channel has an inner diameter of 1.7 mm. The scope is compatible with the thin radial type EBUS probe (UM-S20-17S), which means that EBUS-UT (method) is possible by bringing the BF-MP190F as close as possible to the peripheral pulmonary lesion, checking the lesion position and performing sampling with the radial ultrasonic probe.

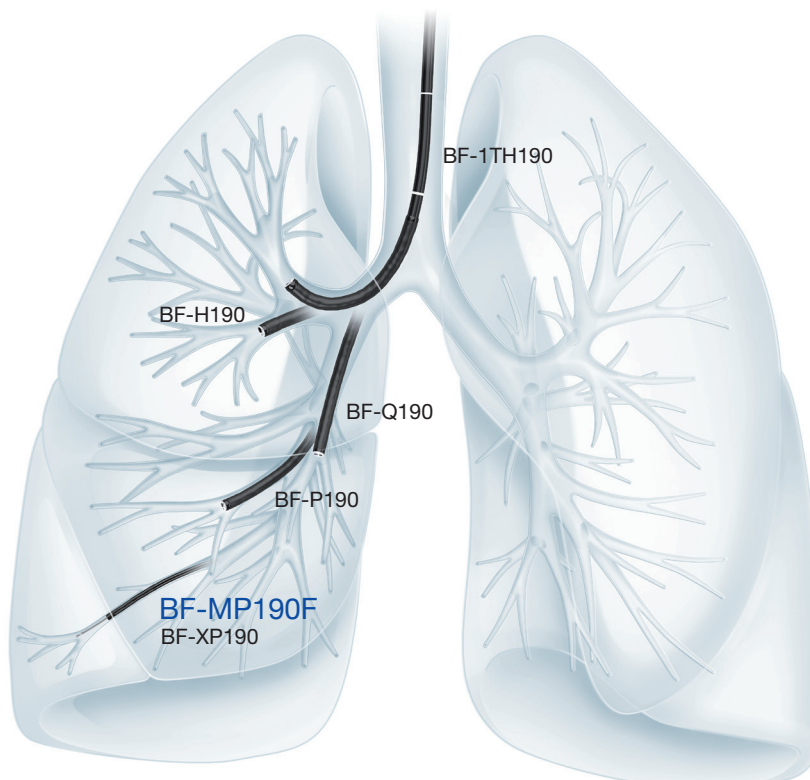


1. Insert the scope close to the lesion

2. Observe the lesions after inserting R-EBUS probe through the instrument channel

3. Obtain the specimen with biopsy forceps and cytology brush

The narrower scope diameter of 3.0 mm makes it possible to access the peripheral bronchi by advancing 1 or 2 branches beyond the BF-P190 accessible range.



Peripheral bronchi accessible with the bronchoscopes

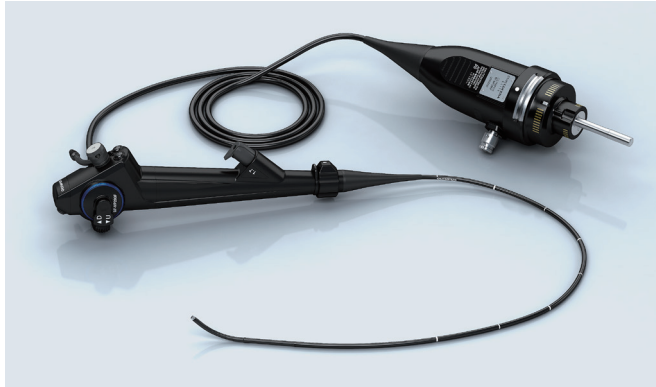
2. PREPARATION

2-1 Equipment and setup

2-1-1 Equipment

Specifications

EVIS EXERA III BRONCHOFIBERVIDEOSCOPE **BF-MP190F**



Optical System	Field of view	90°
	Distal end outer diameter	3.0 mm
Insertion Section	Distal end enlarged	
	Insertion tube outer diameter	3.7 mm
	Working length	600 mm
	Insertion tube rotation function	Yes
	Rotation range	Right: 120°, Left: 120°
Instrument Channel	Channel inner diameter	1.7 mm
Bending Section	Angulation range	Up 210° Down 130°

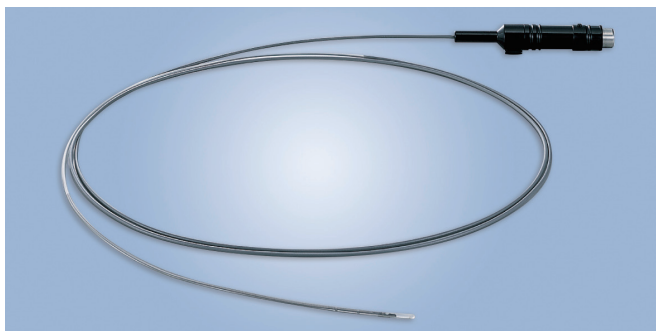
EVIS EUS UNIVERSAL ENDOSCOPIC ULTRASOUND CENTER **EU-ME2**



PROBE DRIVING UNIT **MAJ-1720**



ULTRASONIC PROBE **UM-S20-17S**



Ultrasonic Frequency	20MHz
Working Length	2.150 mm
Insertion Tube Outer diameter	1.4 mm (distal end 1085 mm)
	1.7 mm (on connector side)

SINGLE USE BIOPSY FORCEPS **FB-433D**

Shape of the Distal End	
Maximum Insertion Portion Diameter	Ø 1.5 mm
Working Length	1150 mm

SINGLE USE CYTOLOGY BRUSH **BC-205D-2010**

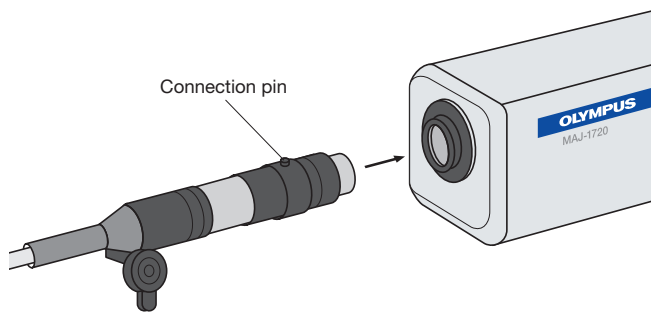
Shape of the Distal End		
Maximum Insertion Portion Diameter	Ø 1.4 mm	
Working Length	1150 mm	
Brush	Diameter	Ø 2.0 mm
	Length	10 mm

2. PREPARATION

2-1-2 Preparing the system

Connecting the ultrasonic probe

To connect the ultrasonic probe to the probe driving unit, hold the probe with the connecting pin facing up and insert the probe straight into the probe driving unit. You might not be able to disconnect the ultrasonic probe from the probe driving unit if the probe is connected with the connecting pin facing in a different direction.
Be sure to turn off the Endoscopic Ultrasound Center when connecting or disconnecting the ultrasonic probe.

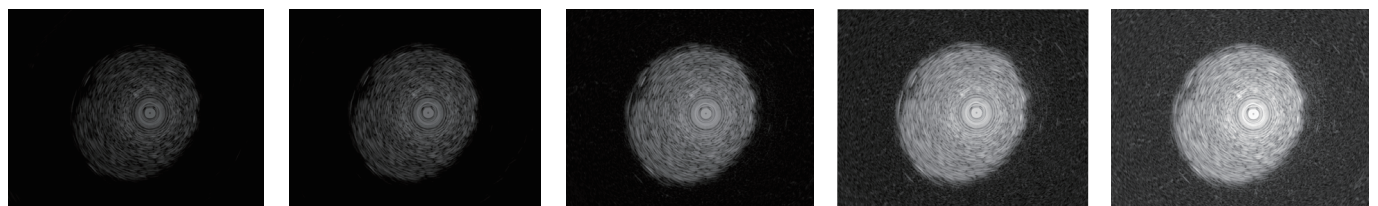
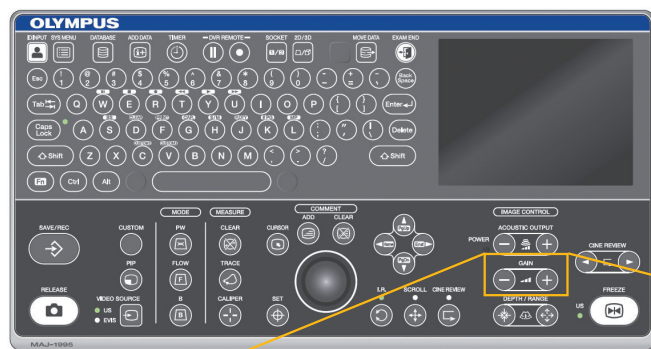


Setting the Endoscopic Ultrasound Center

Scan direction : INVERSE
Gain value : 15
Contrast value : 5

■ GAIN

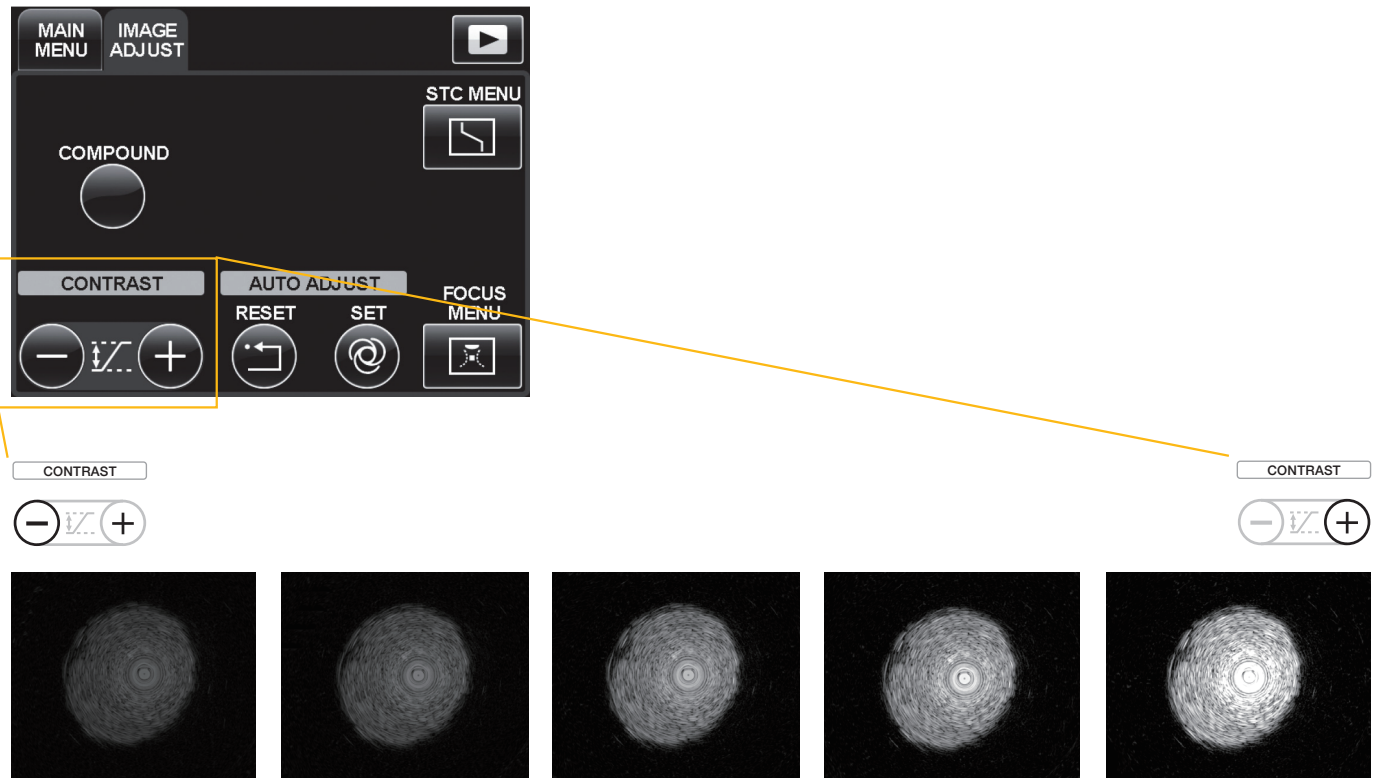
The gain (brightness) of the ultrasound image can be adjusted in 20 steps (0-19).



2. PREPARATION

■ CONTRAST

The CONTRAST buttons adjust the contrast of the B mode ultrasound image. The contrast can be adjusted in eight steps (1 – 8).



■ DIRECTION

The DIR button switches whether the ultrasound image is displayed as the view from the distal end of the ultrasound scope/probe (NORMAL) or as the view from the insertion direction (INVERSE). Press the DIR button to switch the viewing direction of the ultrasound image.

2. PREPARATION

2-2 Patient pretreatment & premedication

Preliminary medication	No food and drink 4 hours before the examination. If the patient takes antiplatelet and/or anticoagulation drug(s) orally, these should be stopped beforehand to avoid affecting the bronchoscopic examination.
Local anesthesia	Anesthetize the pharynx using 4% lidocaine (2 to 5 mL) with a nebulizer. Spray the lidocaine in sync with the patient's exhalation. If lidocaine pools in the oral cavity, have the patient expectorate into a gargle basin as required.
Sedation	Dilute 50 µg of fentanyl (5 mL of the solution obtained by diluting 50 µg of fentanyl (prepared by diluting fentanyl 1 Ap [100 µg, 2 mL] in 8 mL saline) and 2 mg of midazolam (prepared by diluting midazolam 1 Ap [10 mg, 2 mL] in 8 mL saline) in saline. Once the patient is in the supine position on the examination table, inject the solution intravenously. The amount should be adjusted according to the build, age, general status and visceral condition of the patient.
During bronchoscopy	For intratracheal anesthesia during the procedure, perform a bolus injection of 2% lidocaine (1 mL per administration) from the instrument channel of the bronchoscope. Depending on the degree of coughing and pain, you can also administer 20 µg fentanyl and 1 mg midazolam solution by intravenous injection. Oxygen should also be administered as required to maintain an SpO ₂ value of at least 90% on the percutaneous arterial blood oxygen saturation monitor.

3. PROCEDURE

3-1 Inserting the bronchoscope

Note



Make sure that the UP indication on the insertion tube rotation ring is aligned with the UP indication on the control section.

After injecting 2% lidocaine jelly in the nasal cavity, intubate nasally a 4.5 or 5 mm cuff-less tracheal tube under the endoscopic view. The advantages of using the tracheal tube include ease of insertion/withdrawal, a reduction in the stimulus to the nasal and pharyngeal mucosa and vocal cords caused by movement of the bronchoscope, stabilization of the “floppy” thin bronchoscope, reduction of deflection, and easier transmission of the torque required to advance the bronchoscope to its distal end. Apply local anesthesia to the bronchi using 2% lidocaine and conduct observation as far as the subsegmental bronchus level.



Raise the left hand high and keep the insertion tube straight when inserting the bronchoscope.

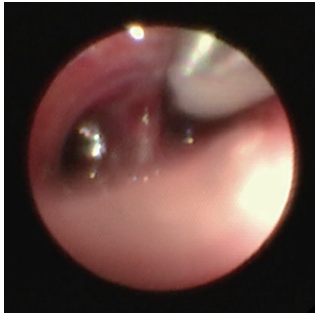
3-2 Approaching the lesion

It is important to perform the CT scan and plan the bronchial route for accessing the target region beforehand. While observing the branching of the bronchi directly, advance the ultrathin bronchoscope through the bronchi, following the pre-planned route. When it is required to rotate the bronchoscope by large rotation, it is effective to use the insertion tube rotation function. If the peripheral bronchi collapse and obstruct the view, which can occur as a result of suction, the view can be usually be reacquired by ceasing to perform suction. If fluoroscopy can be used, confirm that the scope is advancing toward the target lesion.

3. PROCEDURE

3-3 Observation with the ultrasonic probe

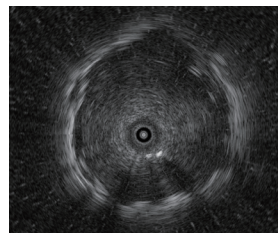
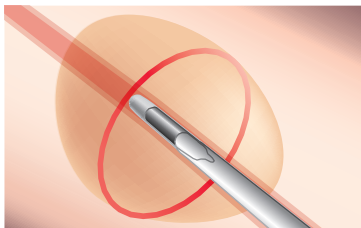
After approaching the ultrathin bronchoscope as close to the lesion as possible, insert the probe through the instrument channel and advance it toward the lesion.



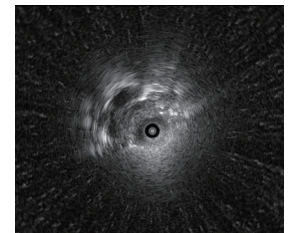
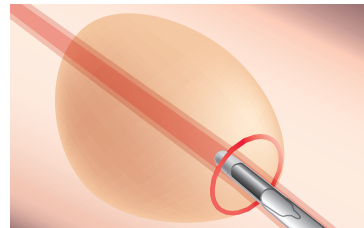
- Since the instrument channel is located beside the lens, even when a bronchus appears to be directly in front of the endoscope at a branching point, advancing the probe straight may cause it to enter the bronchus to the side of the bronchus visible in front. Always check the endoscopic image to confirm which bronchus the probe is entering.

- When the ultrathin bronchoscope is at the closest point to the lesion, push and pull the probe to check whether the EBUS image is reproducible.
- The tip of the probe should be carefully adjusted to observe the the maximum diameter of the lesion under the ultrasound image.

Center of lesion



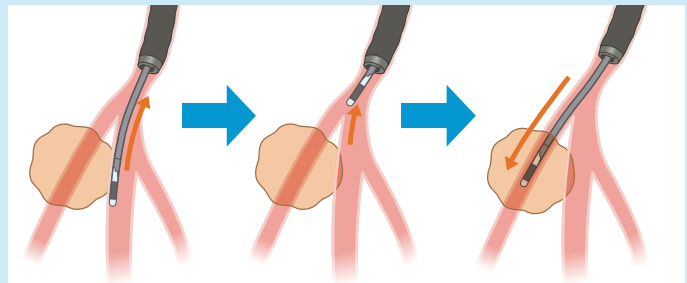
Edge of lesion



Tips

Methods for selecting the bronchus so that the probe goes “within” the lesion:

1. While observing the fluoroscopic image, correct the orientation of the ultrathin bronchoscope and probe.
2. While observing the ultrasound image, correct the orientation of the probe. Angle the bronchoscope to re-select the bronchus through which the probe will approach the lesion.
3. Select the bronchus directly under endoscopic observation.



Note

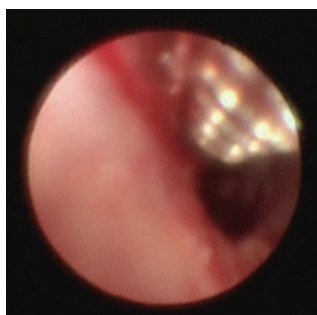
The probe could be damaged if it is subjected to an excessive force or if strong angulation is applied while the probe is being advanced into a bronchial branch.

3. PROCEDURE

3-4 Sampling

The instrument channel of the BF-MP190F has a diameter of 1.7 mm, which is smaller than that of a standard 2.0mm instrument channel. Therefore, biopsy forceps with a diameter of 1.5 mm and a cytology brush with a diameter of 1.4 mm can be used.

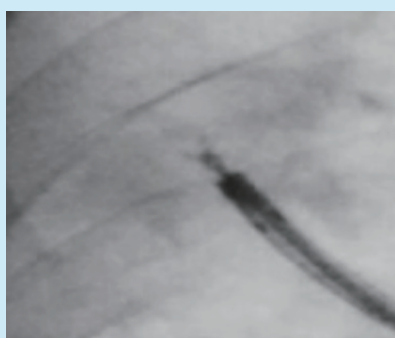
3-4-1. Biopsy



The lesion in a peripheral bronchus might be sometimes visible within the endoscopic field of view. However, since the peripheral bronchi are thin, collapse easily and have poor visibility, there is no need to perform a biopsy under direct view if it is not allowed. After confirming the probe is positioned “within” the lesion in the EBUS image, wedge the bronchoscope in the bronchus and continue biopsies.

Since specimens collected with ultrathin forceps are smaller than specimens collected with ordinary forceps, several samples will be required. We usually collect 10 specimens and put each specimen in its own individual formalin-filled bottle to prevent loss. After collecting half the target number of biopsy samples (i.e., 5 specimens), reconfirm the lesion position with the probe. When withdrawing the thin forceps from the bronchoscope, pull slowly so as not to alter the orientation of the distal end of the scope.

Tips



If the thin forceps do not open properly, try opening the forceps by moving them back and forth.

After opening the thin forceps, apply the cup to the lesion and perform the biopsy.

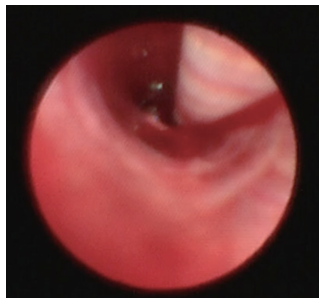
Note

If the lesion is located immediately below the pleura, take extra care to avoid pneumothorax.

The thin forceps has a small cup but still presents a risk of bleeding. If the endoscopic image reddens and the view deteriorates while the target lesion is visible in a larger size in fluoroscopy, there may be bleeding. In this case, wait for about 3 minutes while keeping the bronchoscope in the wedged condition until the bleeding stops, and then withdraw the scope slowly.

3. PROCEDURE

3-4-2. Brush cytology



- Insertion into the bronchoscope
Pull the ring to retract the brush into the tube, and advance the brush until the distal end of the insertion portion appears within the endoscopic field of view.
- Collect tissue
Push the ring slowly to extend the brush from the tube and contact the target area.
Brush the target area to collect a tissue specimen.
Pull the ring to retract the brush into the tube before taking the brush away from the target area.

3-4-3. Bronchial washing

If the ultrathin bronchoscope has reached inside the lesion, withdraw the bronchoscope from the lesion to reduce the risk of intratumoral infection due to washing and then wash the lesion with a small amount (about 5 ml) of saline.



2 hours after completion, check that there is no pneumothorax with fluoroscopy.

Tips

In the peripheral bronchus, the washing solution could not be obtained sufficiently because of the collapse of the bronchi due to the deflation. While suctioning, slowly withdraw the bronchoscope from bronchi and try to collect the washing fluid. Then the bronchoscope can be removed through the tracheal tube and the washing fluid remaining in the operation channel can be collected in the collection container by suctioning the sterilized physiological saline.

3. PROCEDURE

3-5 Processing samples

3-5-1. Histological examination

Put each specimen in a numbered formalin-filled bottle to prevent loss and send it to the pathology department.

3-5-2. Cytological examination

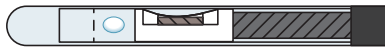
- Strike each brushed specimen on a slide glass to remove the cell component, rub slide glasses to stretch the specimen, immerse it in an alcohol-filled bottle and send it to the pathology department.
- If the presence of acid fast bacterium is suspected, send dried specimens for smear examination.
- Wash the residual components attached to the brush in saline in a centrifuge tube and submit them for cultivation and cytodiagnosis.
- Submit the bronchoalveolar lavage fluid for culture and cytodiagnosis (or cell block examination).



4. HANDLING the ULTRASONIC PROBE

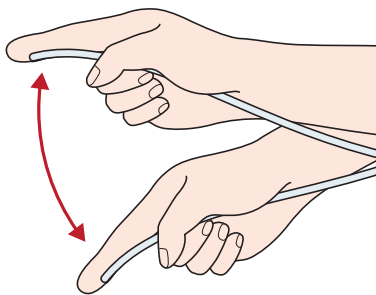
It sometimes happens that EBUS images are not obtained. This can be caused by air bubbles left in the probe. The method for removing air bubbles is shown below:

4-1. Removing air bubbles from the probe

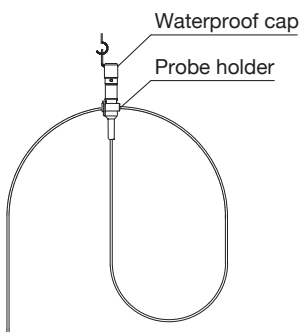


Hold the probe 5 cm away from the probe tip and with the probe tip facing down, shake the probe hard until all the air bubbles disappear from the transparent section of the probe.

Connect the ultrasonic probe again and check to see that the EBUS image has been restored to its normal round shape.



4-2. Storing the probe



Store the probe with the probe tip facing down. This will help prevent air bubbles from entering the periphery of the transducer.

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