

EBUS

EndoBronchial UltraSound

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EBUS

- ◆ **First reported in the literature around 2002**
- ◆ **Utilizes a transducer to produce and receive sound waves**
- ◆ **Utilizes a processor to integrate the echoes to generate a 2-D ultrasound image**
- ◆ **Radial Probe**
 - ◆ **Uses rotating transducer at end of probe**
 - ◆ **Inserted through guide sheath of regular bronchoscope**
 - ◆ **360 degree image**
- ◆ **Linear Probe**
 - ◆ **Uses fixed ultrasound transducer at end of bronchoscope**
 - ◆ **50 degree image parallel to long axis of bronchoscope**
 - ◆ **Incorporated Doppler capabilities**
 - ◆ **TBNA performed with needle within catheter**
 - ◆ **Needle extends 20 degrees angle from direct view**

Applications

- ◆ **Mediastinal Staging of Lung Cancer**
- ◆ **Evaluation of Suspicious Mediastinal Adenopathy**
- ◆ **Diagnosis of Sarcoid**
- ◆ **Lymphoma Diagnosis ???**

Mediastinal Staging

- ◆ **Mediastinoscopy**
- ◆ **TBNA – Wang Needle**
- ◆ **EUS - NA**
- ◆ **EBUS**
- ◆ **EUS - EBUS**

The trachea
(windpipe) carries air from your nose and throat to your lungs.

The bronchial tubes branch off from the trachea, carrying air to the lungs and to each lobe within the lungs.

Lobes are distinct sections of the lungs. They contain **alveoli** (tiny air sacs). Oxygen enters the bloodstream from the alveoli.

The chest wall is made up of ribs and muscles.

The pleural cavity is the space between the lungs and the chest wall.

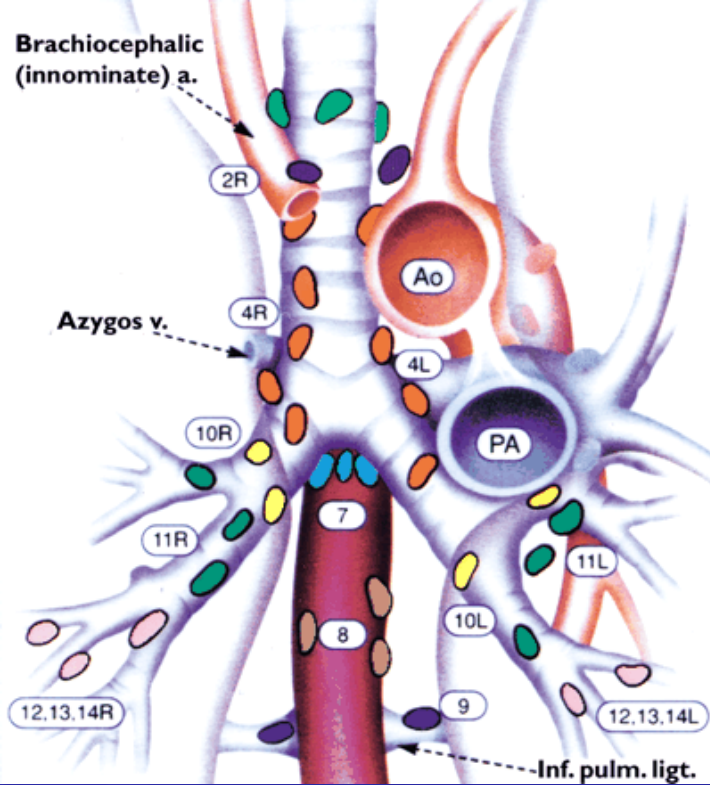
Lymph nodes around your lungs filter fluid from your lungs and help your body defend itself against infection.

Right lung

Left lung

The mediastinum is the area that separates the two lungs.

Mediastinoscopy



Superior Mediastinal Nodes

- 1 Highest Mediastinal
- 2 Upper Paratracheal
- 3 Prevascular and Retrotracheal
- 4 Lower Paratracheal (including azygos nodes)

N_2 = single digit, ipsilateral
 N_3 = single digit, contralateral or supraclavicular

Aortic Nodes

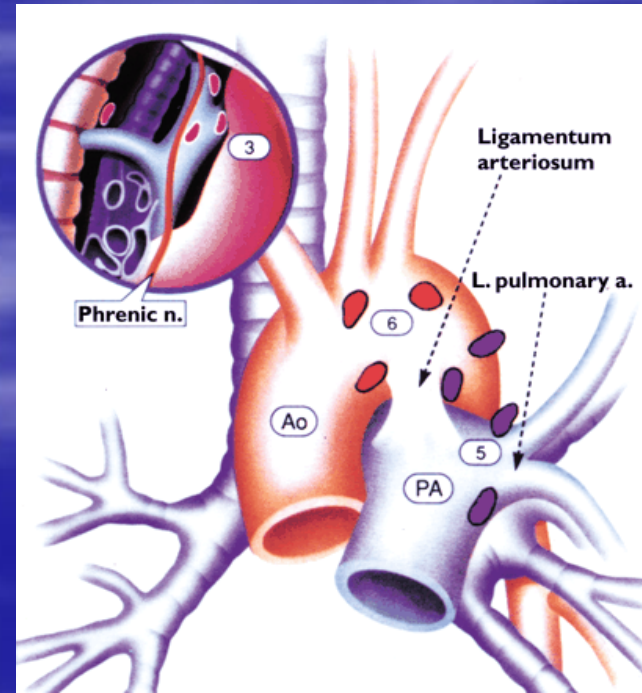
- 5 Subaortic (AP window)
- 6 Para-aortic (Ascending aorta or phrenic)

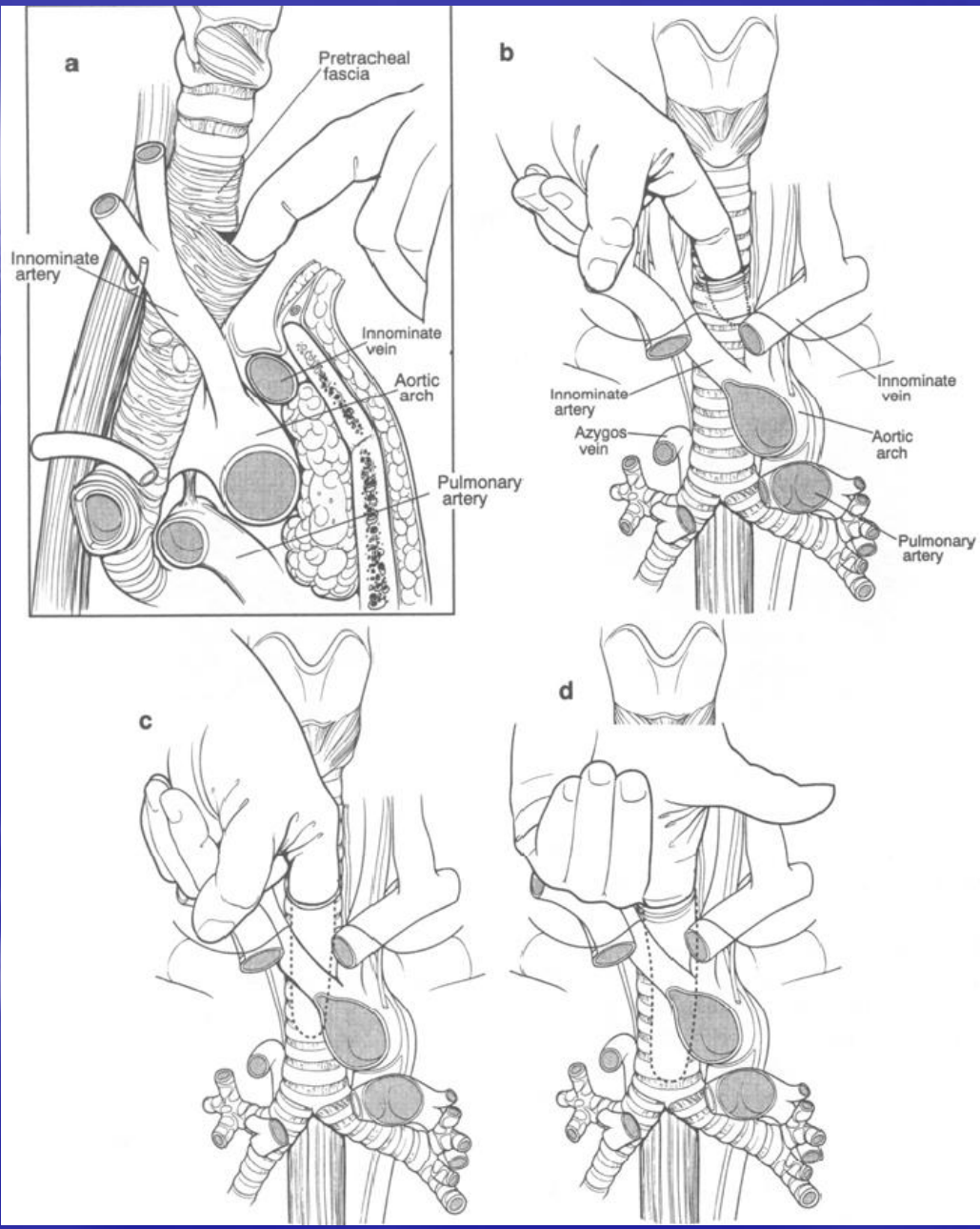
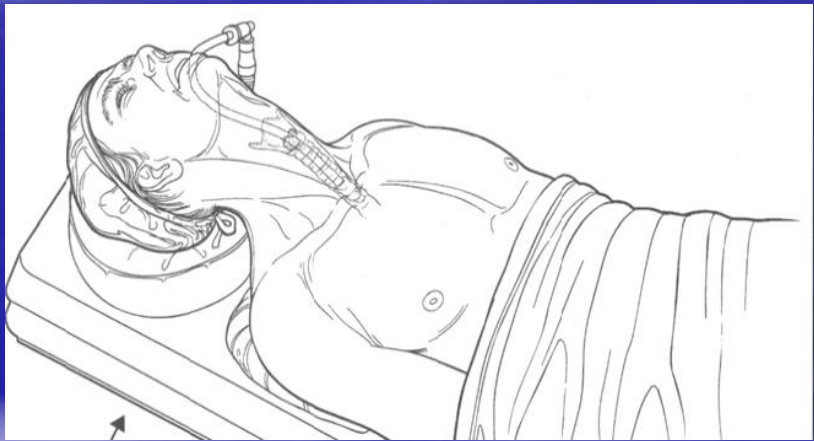
Inferior Mediastinal Nodes

- 7 Inferior Mediastinal Nodes
- 8 Paraesophageal (below carina)
- 9 Pulmonary Ligament

N_1 Nodes

- 10 Hilar
- 11 Interlobar
- 12 Lobar
- 13 Segmental
- 14 Subsegmental

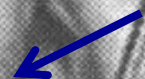




Pulmonary Artery



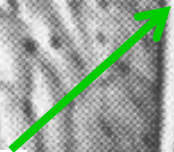
Azygous Vein



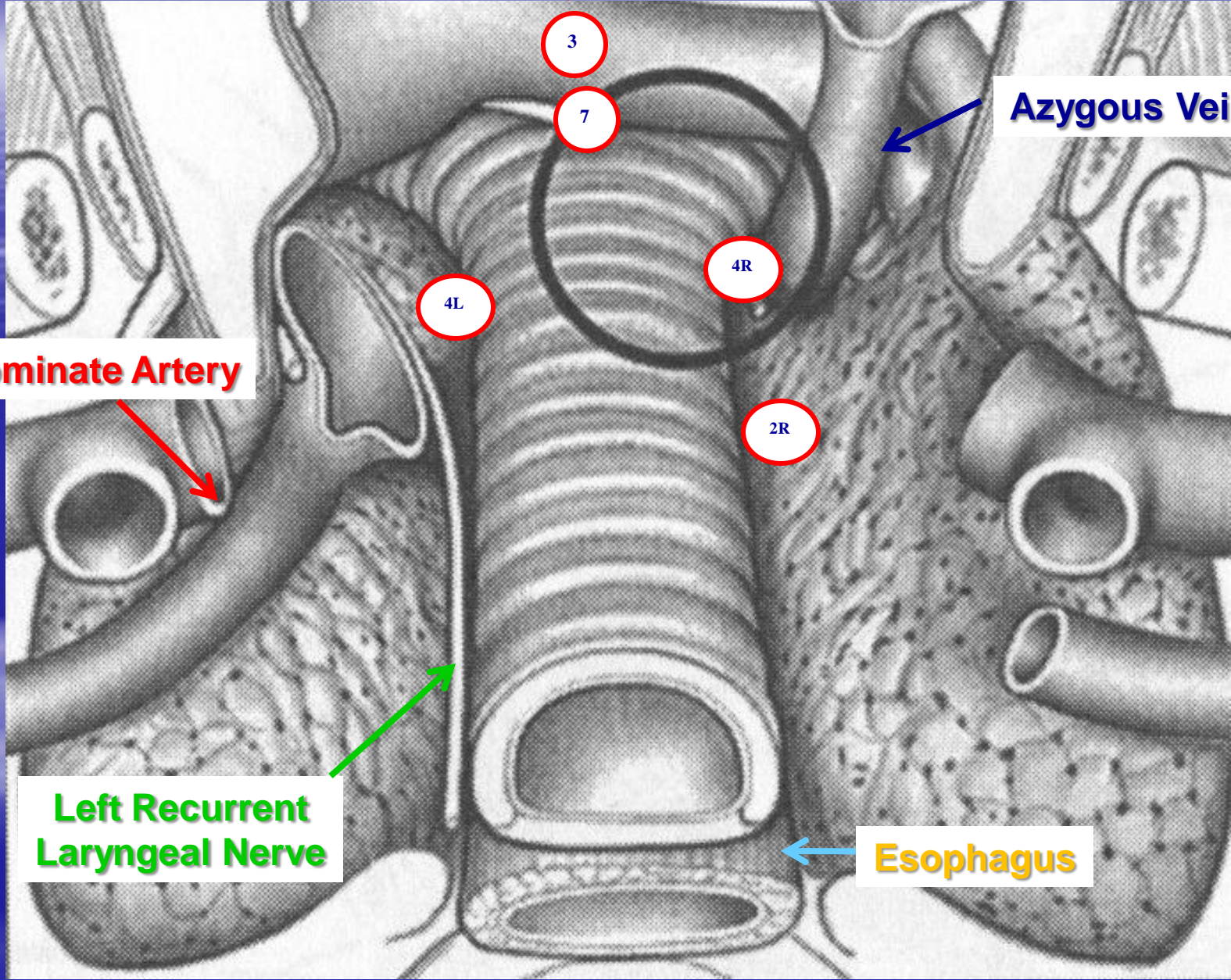
Innominate Artery



Left Recurrent Laryngeal Nerve



Esophagus



Mediastinoscopy

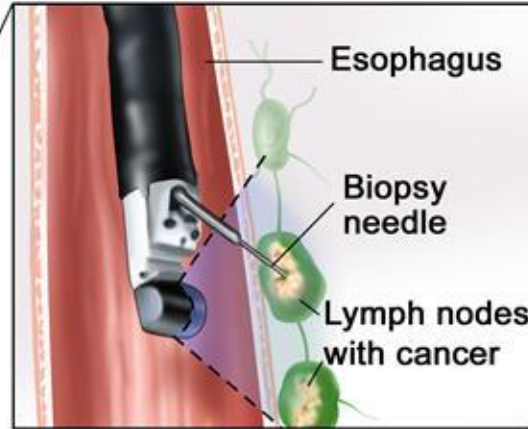
- ◆ 78% sensitive Overall in the Literature
- ◆ 86% sensitive in recent study of 2100 consecutive cases:
Lemaire et al, Ann Thorac Surg 2006
- ◆ Main limitation is accessing Level 5/6
- ◆ <1% complication rate in experienced hands

TBNA – Wang Needle

- ◆ **78% sensitive Overall in the Literature**
- ◆ **Main limitation is that it is limited to the subcarinal node station.**

EUS - NA

Endoscope with
ultrasound probe



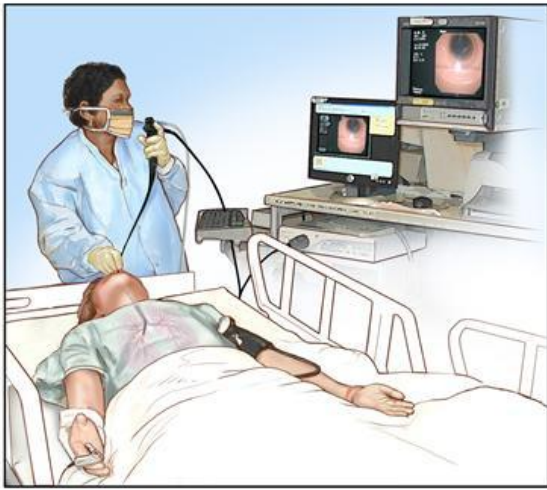
Cancer

EUS - NA

- ◆ **66-87% sensitive Overall in the Literature**
- ◆ **Limitations in accessing Level 5/6 and the paratracheal lymph node stations**
- ◆ **Advantage is ability to access Level 8/9 and subdiaphragmatic sites**

EBUS

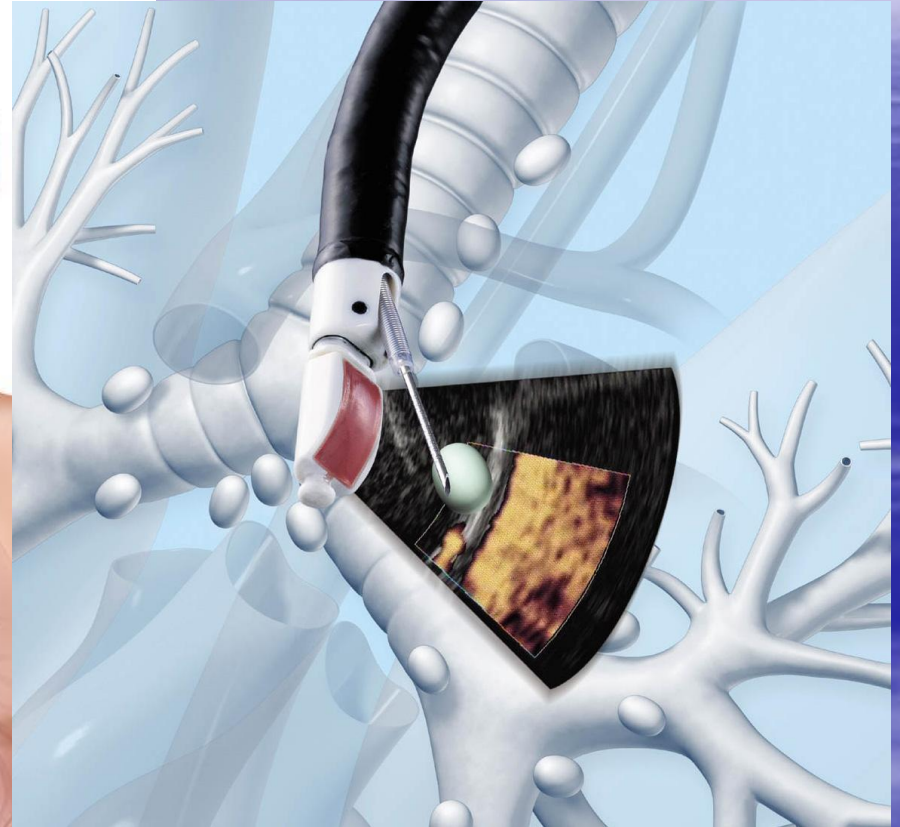
Bronchoscope

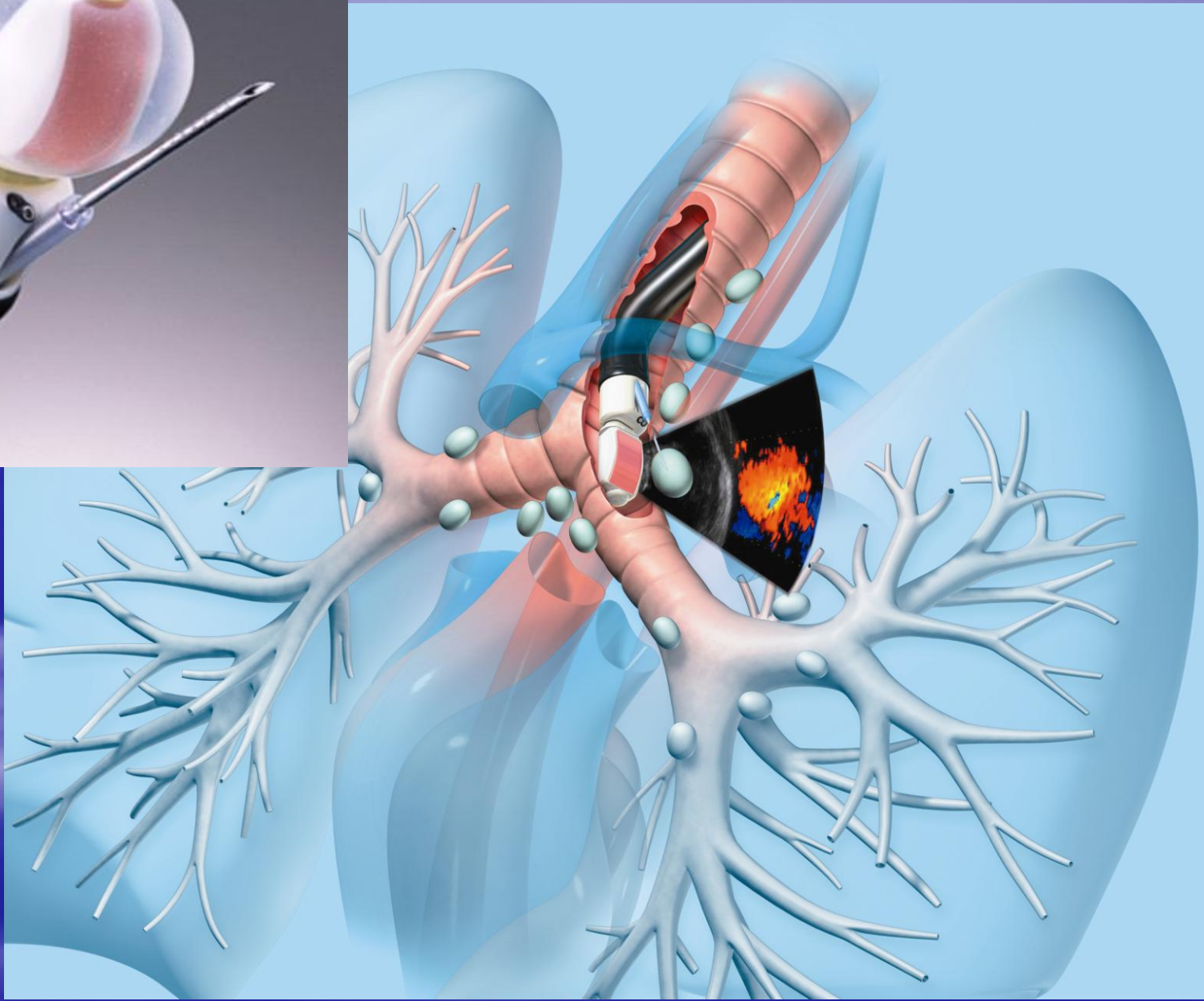


Trachea

Bronchi

Cancer





Lymph Node

Ultrasound Scan Range

Needle

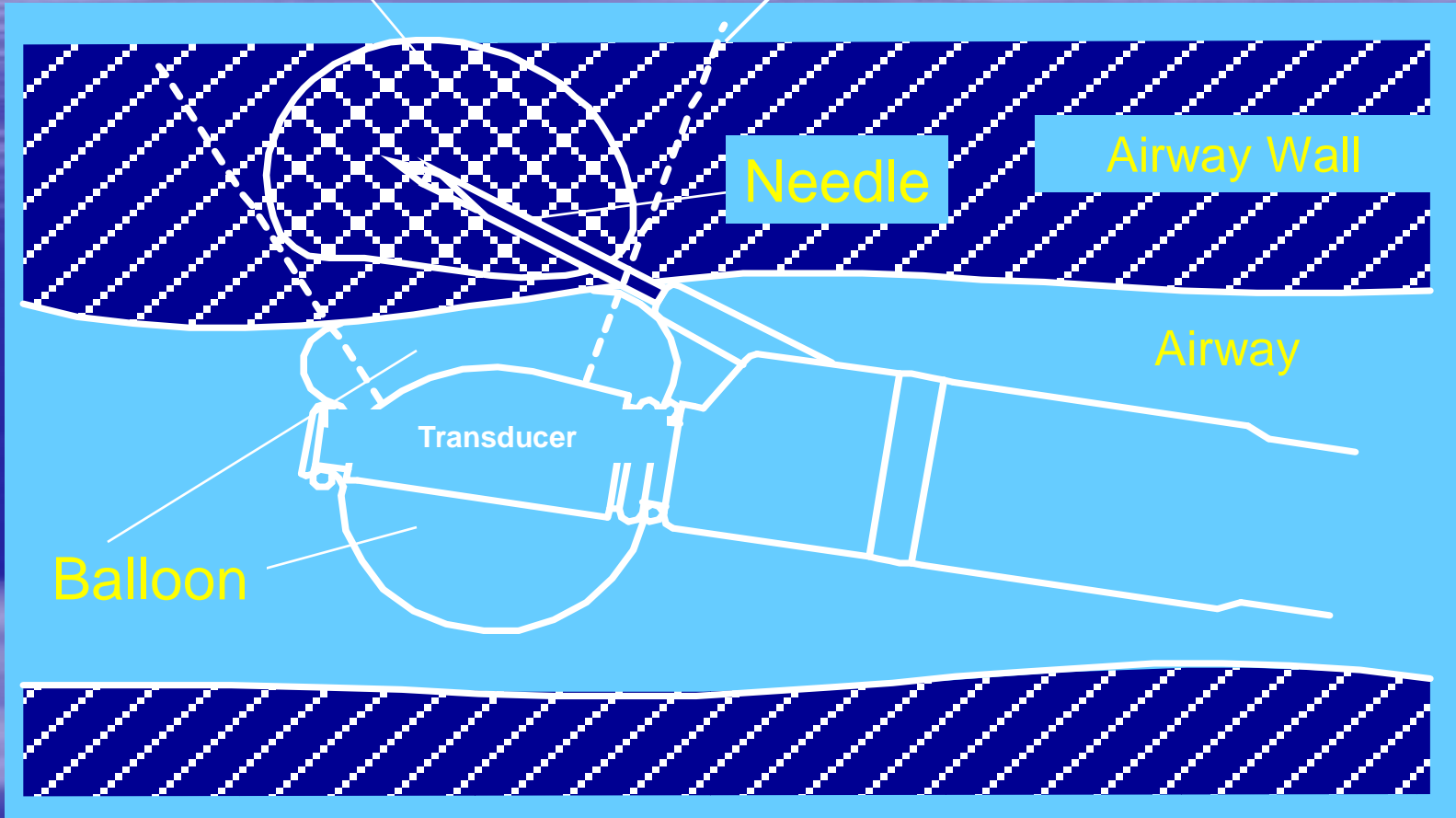
Airway Wall

Airway

Transducer

Balloon

scope



EBUS

- ◆ **90% sensitive Overall in the Literature**
- ◆ **97% sensitive if used in conjunction with EUS**
- ◆ **Allows access to nodal stations 8, 10, 11, and 12 which are NOT accessible by Mediastinoscopy**

Anesthetic Options for EBUS

Options

- ◆ **Conscious sedation**
- ◆ **General Anesthesia**
 - ◆ **Endotracheal Intubation**
 - ◆ ***Laryngeal Mask Airway Ventilation***

Conscious Sedation

- ◆ **Best suited for targeted biopsies**
- ◆ **Limited time-frame for patient cooperation**
 - ◆ **Airway irritation**
 - ◆ **Coughing**
- ◆ **Difficult to perform a complete lymph node staging**

Endotracheal Intubation

- ◆ **Disadvantage**

- ◆ Bronchoscope lies centrally in the trachea so **limits access to lower paratracheal lymph nodes, prevents upper paratracheal lymph node biopsies and need larger than 8.0 tube to accommodate the EBUS bronchoscope.**

- ◆ **Advantage**

- ◆ **Avoid placing EBUS thru the cords**
- ◆ **Most secure airway should bleeding arise.**

LMA

- ◆ **Preferred Approach**
- ◆ **Allows adequate access to ALL lymph node stations**
- ◆ **Allows maximal patient comfort**
- ◆ **Unlimited time to perform biopsies**

Anesthetic Option

- ◆ MD Anderson study; *J Cardiothoracic Vasc Anes, 2007*
- ◆ LMA #4
- ◆ TIVA with Propofol and small dose narcotics
- ◆ Volatile anesthetics less preferred since:
 - ◆ Cause local vasodilation of bronchial vasculature
 - ◆ Suctioning reduced the effectiveness of inhaled agents
- ◆ Muscle relaxant
 - ◆ Prevent reflex coughing and laryngospasm
- ◆ Consider Dexamethasone to minimize airway edema

Questions?

Thank You

