EBUS Radial Mini probe

A practical guide

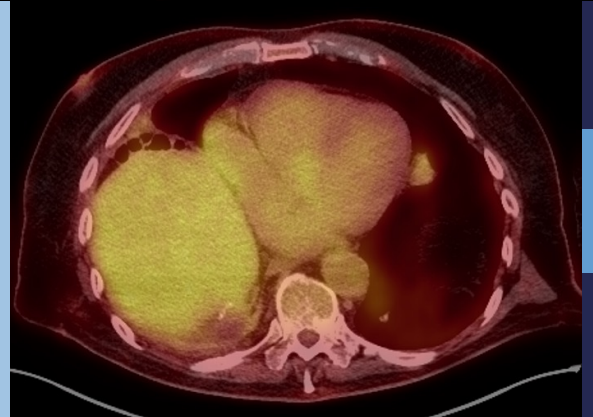
Kamlesh Mohan
Liverpool Heart and Chest Hospital

What would you do ?

72 Male, Ex smoker
Lingula lesion,
FEV1 0.8 litre (38 %)
Previous RL lobectomy
SUV 2.1

<u>Options</u>

- Bronchoscopy
- CT biopsy
- Surgery
- CT surveillance
- Radial EBUS
- ENB
- Robotic bronch



Peripheral Pulmonary Lesions

- Clinical practice (CTPA for ? PE, CT Coronary Angiogram)

- Lung cancer screening (NLST, NELSON, UKLS and meta analysis)

NEJM 2011;365(5):395 – 409

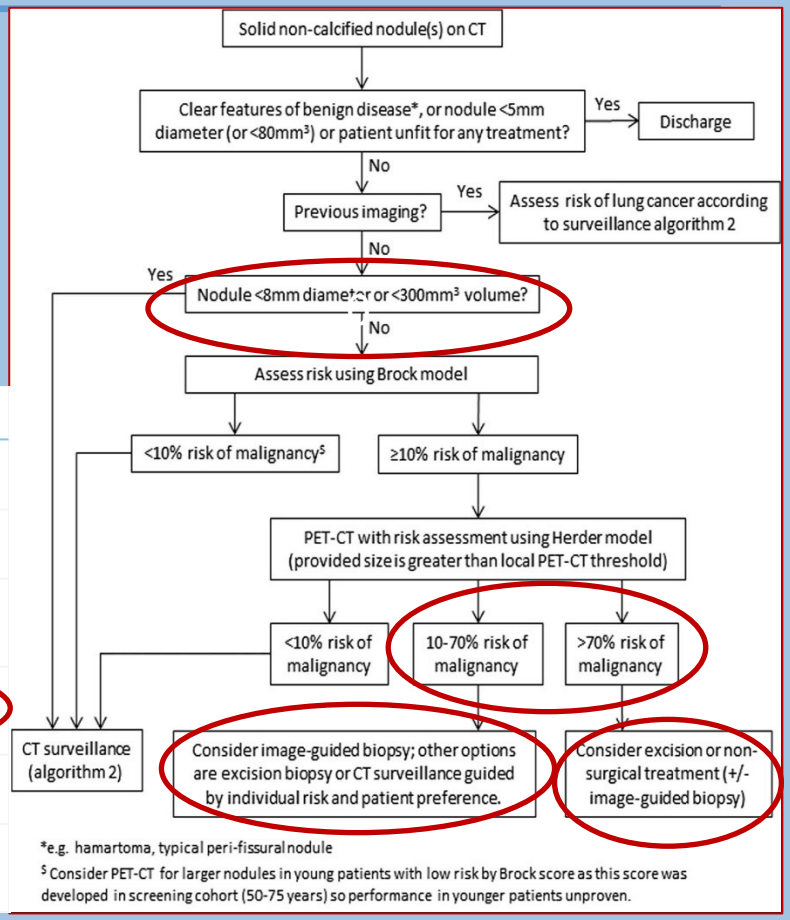
NEJM 2020;382(6):503 – 513

Field et cal. Lancet 2021; 10:100179

Approach to pulmonary nodule/PPL

ACCP 2013
LUNG-Rads 2014
BTS: Brock/Herder 2015
Fleischner 2017

	Fleischner [1,2]	Lung-RADS [3]	BTS [4]	ACCP [5]
Remit	Incidentally detected nodules	Screen-detected nodules	Incidentally and screen-detected nodules	Incidentally and screen-detected nodules
Assessment of size	Average of long & short axis diameter	Average diameter	Semi-automated volumetry	As per Fleischner guidelines
Threshold for discharge	<6mm - optional follow-up below this size if high risk	<6mm (revert to annual screen)	<80mm^3	<5mm - optional follow-up below this size if high risk
Selection of further investigation for larger nodules	>8mm consider PET, PET-CT or biopsy	≥8mm PET-CT, biopsy or assess with Brock/Pancan score	≥8mm Brock/ Pancan score to guide PET-CT/other tests	≥8mm clinical judge-ment or validated model (e.g. Mayo)
Assessment of growth	Increase in size of ≥2mm	Increase in size of >1.5mm	Increase in volume of >25%	Not specified
Pure Ground Glass Nodules	Surveillance only for 5 years duration	Revert to annual screen (unless >20mm)	Risk assess, but surveillance pref-erred (for 4 years)	CT surveillance for 3 years



M Callister et al. Thorax 2015;70:ii1-ii54
M Callister. JTO 2017;12:11S2

Treatment options

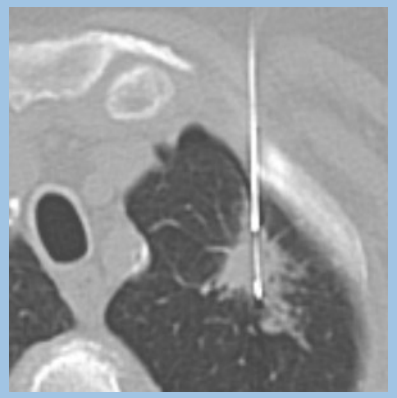
- Surgery – VATS/Robotic, segmentectomy vs lobectomy

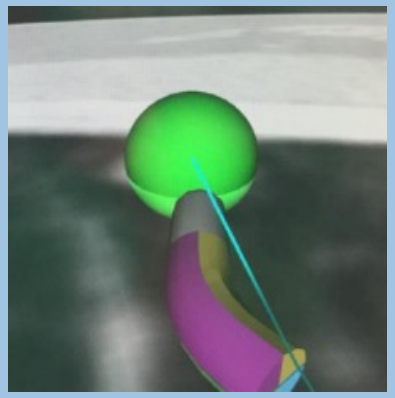
  Saji H, Lancet 2022; 399: 1607-1617
  Altorki, NEJM 2023; 388: 489-498

- SBRT

- Bronchoscopy – MWA, RFA, cryoablation, pulsed electric field therapy

Biopsy options - PPL





Bronchoscopy options

- Correct path (or) Navigation = CT reconstruction (memorise or hand drawn), VBN, ENB, Robotic
- Close = Thin bronchoscope (TB), ultra thin bronchoscope (UTB), Robotic bronchoscopy
- Confirmation = Augmented fluoroscopy (body vision), Radial EBUS, Cone beam CT, iNod

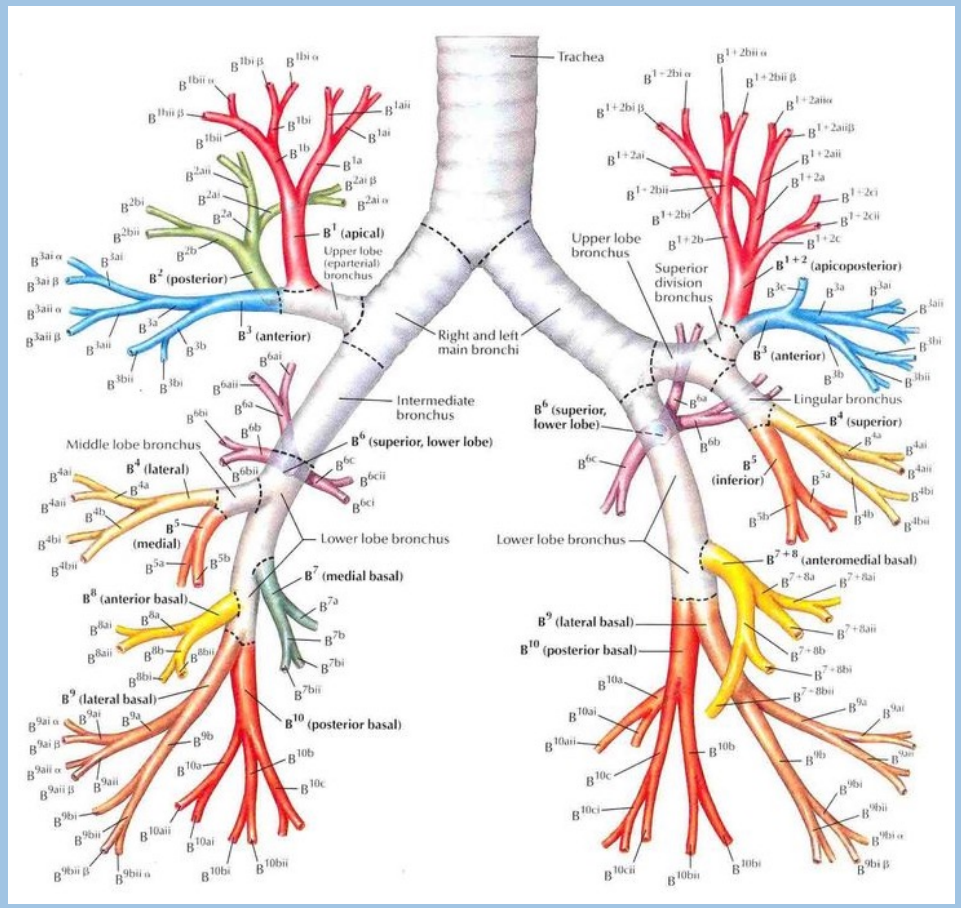
3 Essentials

- Correct path (or) Navigation – CT reconstruction (memorise or hand drawn), VBN, ENB, Robotic
- Close – Thin bronchoscope (TB), ultra thin bronchoscope (UTB), Robotic bronchoscopy
- Confirmation – Augmented fluoroscopy (body vision), Radial EBUS, Cone beam CT, iNod

EBUS radial mini probe

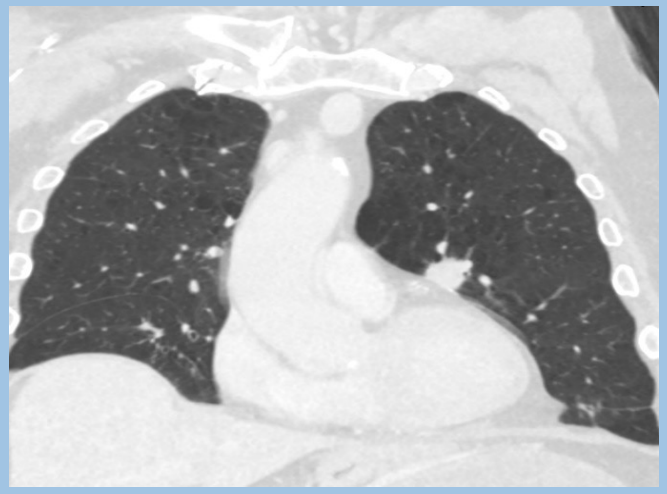
Procedure Planning

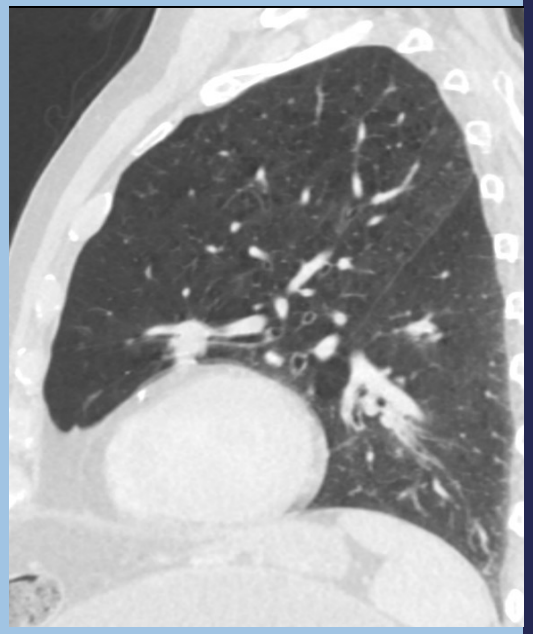
How do you get there

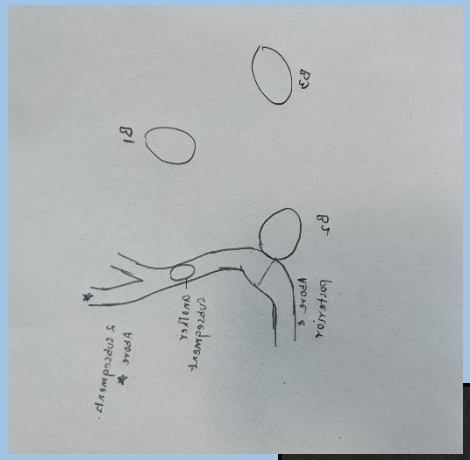


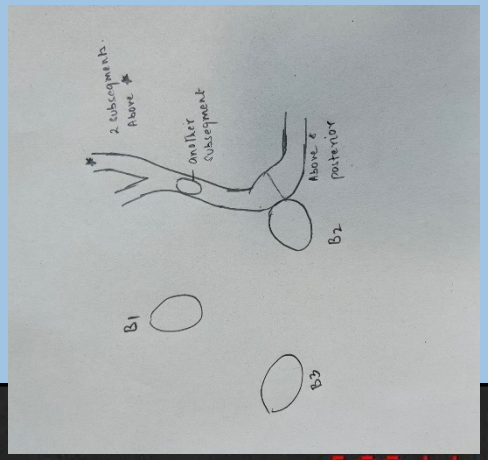
- www.bronchoscopy.nl

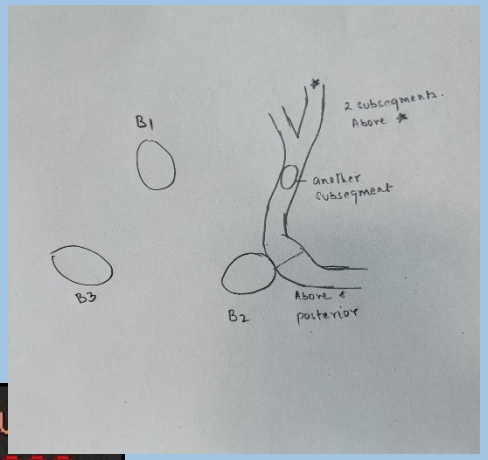
Multi planar reconstruction – Axial/Coronal/Sagittal






B1
B3
B2
another subsegment
Above & posterior


2 subsegments Above
another subsegment
Above & posterior
B1
B2
B3


B1
2 subsegments Above
another subsegment
B3
Above & posterior
B2

[22-Mar-2022...
R
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Current
[22-Mar-2022]
< 2 - 1 >
B
B

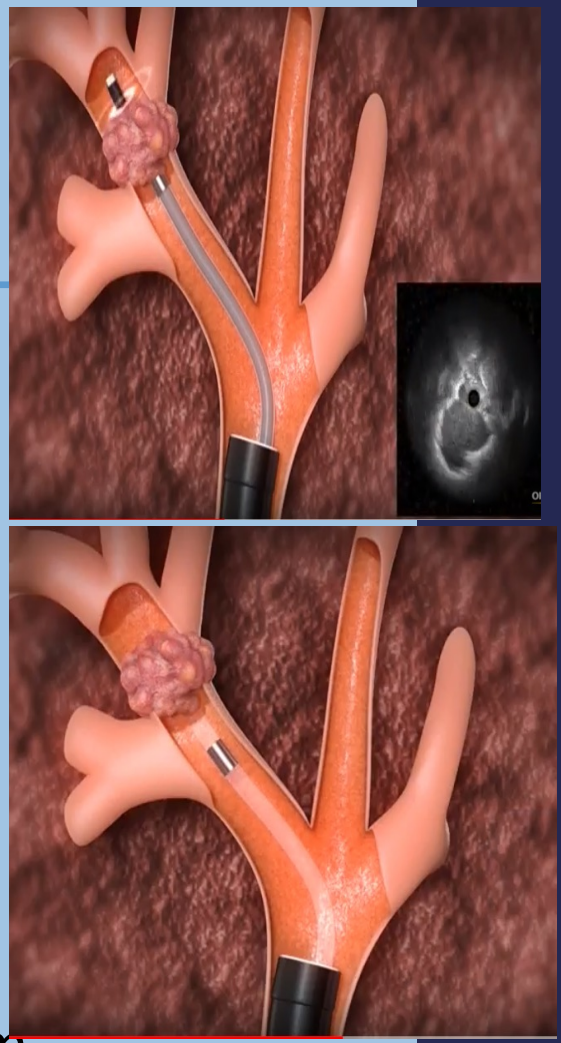
Which bronchoscope

	Standard	TB	UTB
Outer diameter	5.8 mm	4.2 mm	3 mm
WC	2.8 mm	2 mm	1.7 mm
Bronchi	Second Generation	Fourth generation	Fifth generation
R-EBUS (1.4mm) compatibility	Yes	Yes	Yes
Guide Sheath compatibility	Yes	Yes	No

Guide sheath kit (old) with stoppers, forceps and brush

K-401

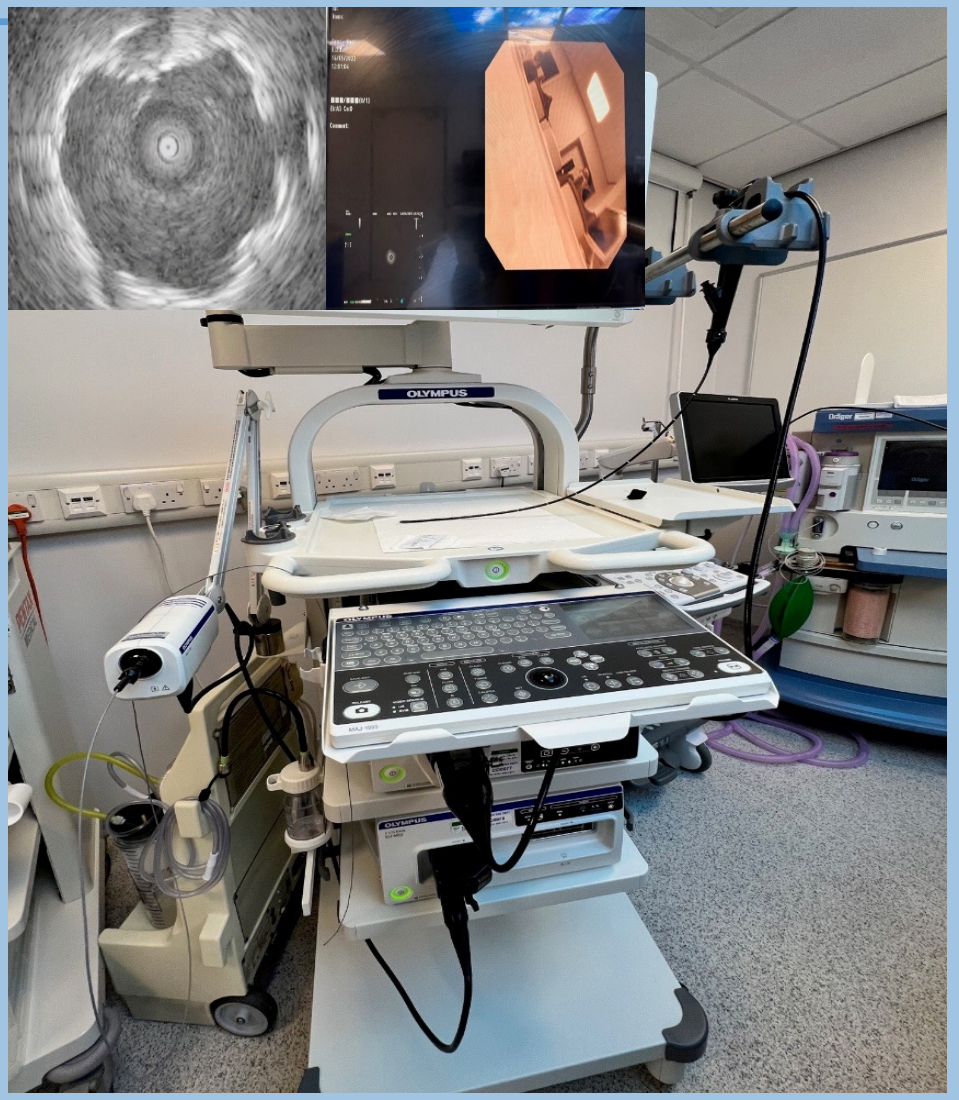
K-403



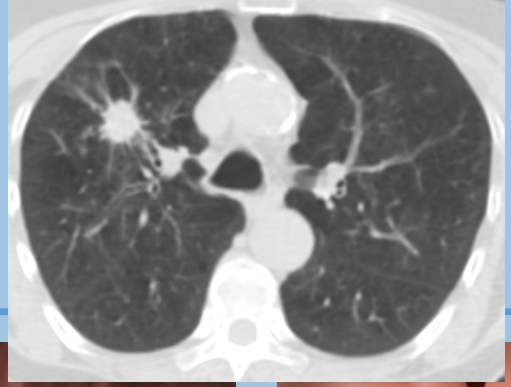
Guide sheath – 1.9 mm
Biopsy forceps – 1.5 mm
Brush – 1.4 mm

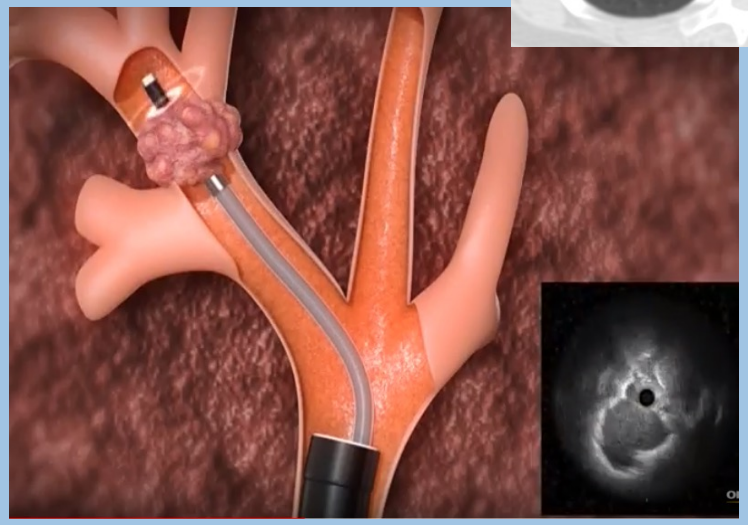
Guide sheath – 2.54 mm
Biopsy forceps – 1.9 mm
Brush – 1.8 mm

Probe, driver unit and USG



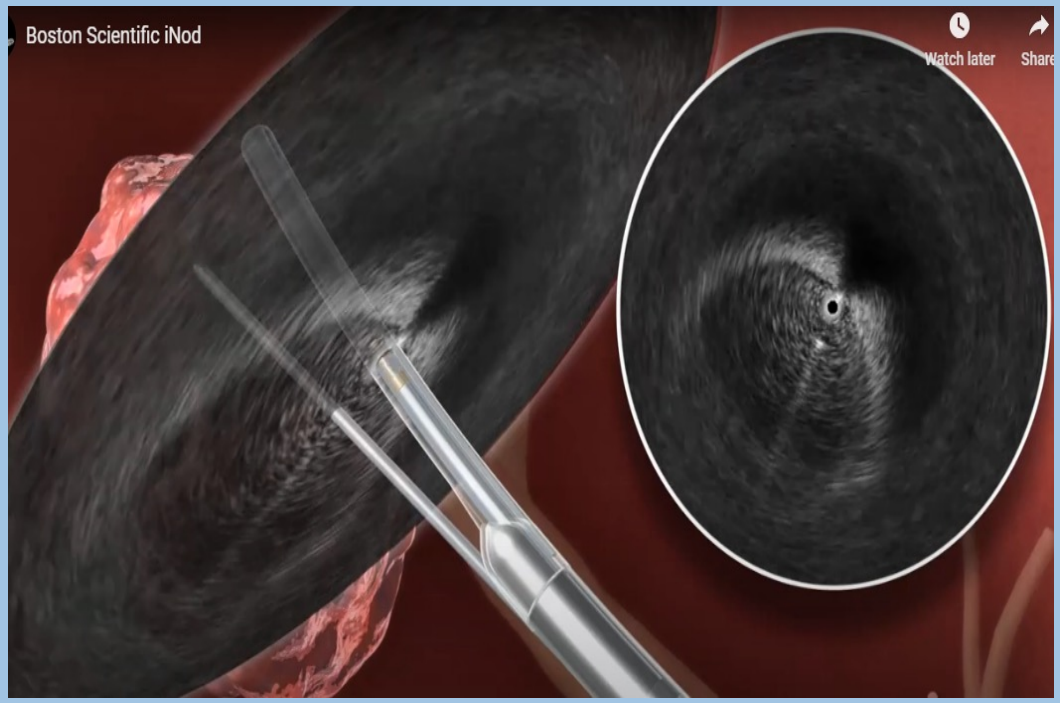
Procedure





iNod

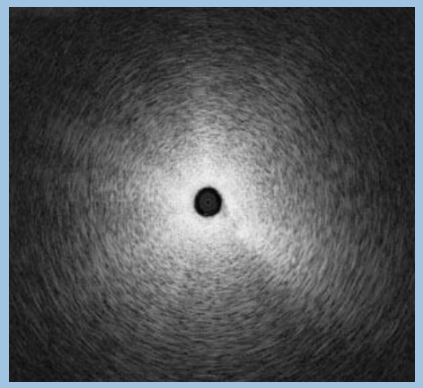
- Real time sampling of peripheral nodules
- Single use sheath, 25 G needle, 30 MHz R-EBUS
- 2 mm working channel, Rotatable shaft



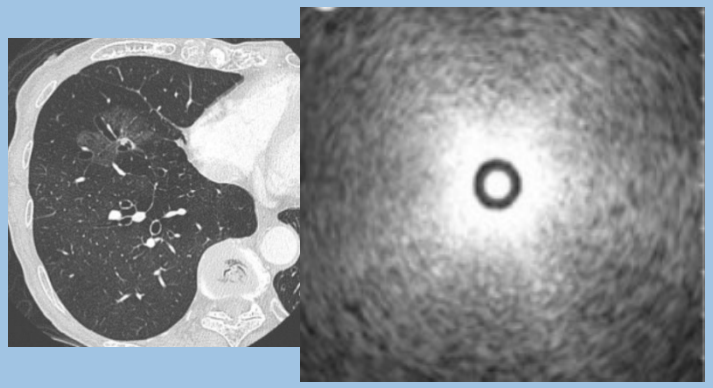
USG Images

Izumo T. ERJ 2015; 45:1661 - 1668

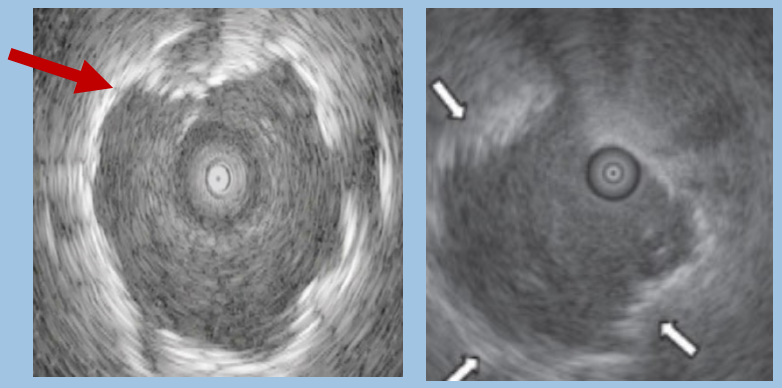
Normal lung (snow storm)



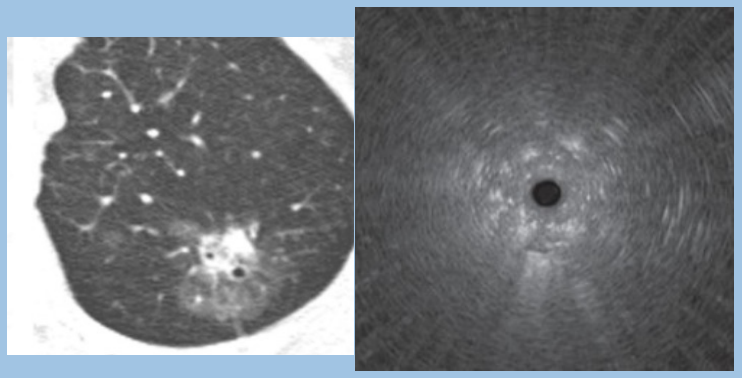
Pure GG lesion (Blizzard)

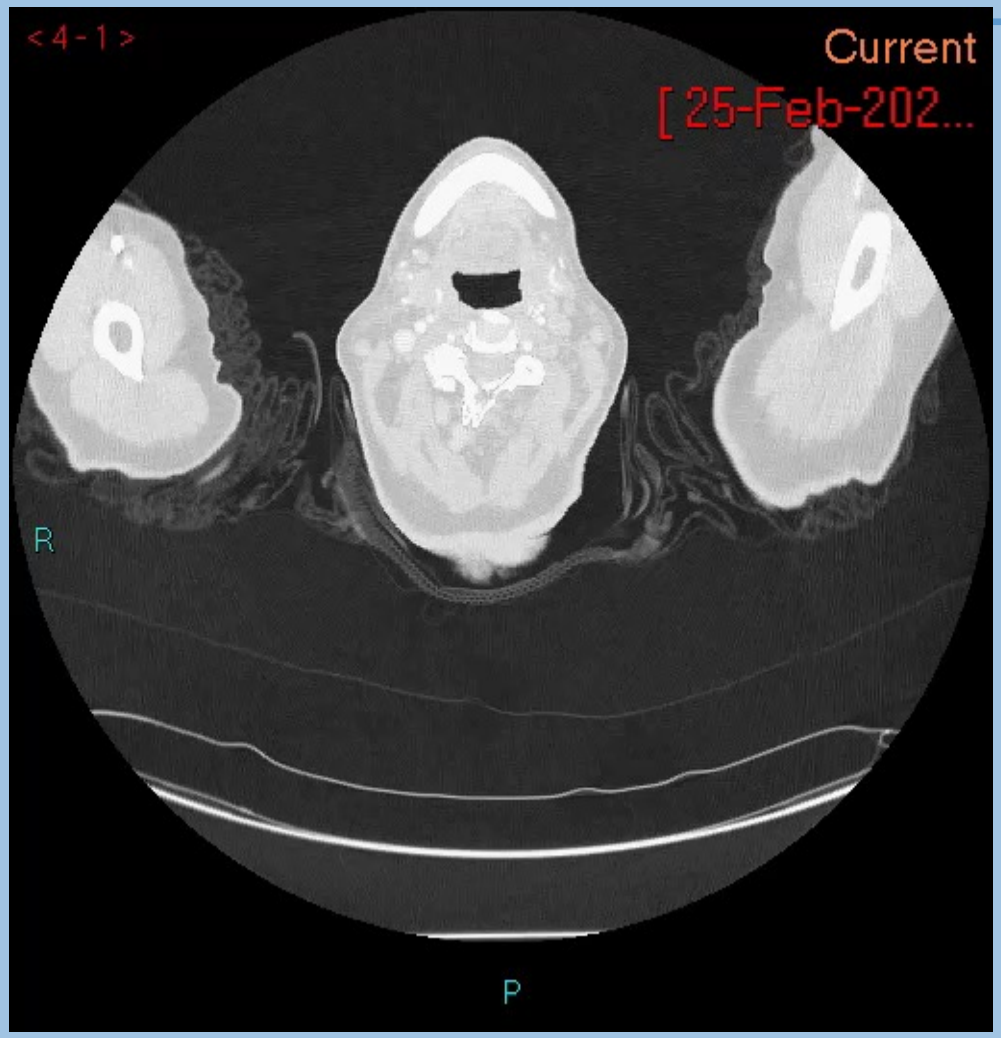


Clear demarcation (Tumour)



Part solid GGO (Mixed Blizzard sign)

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Current
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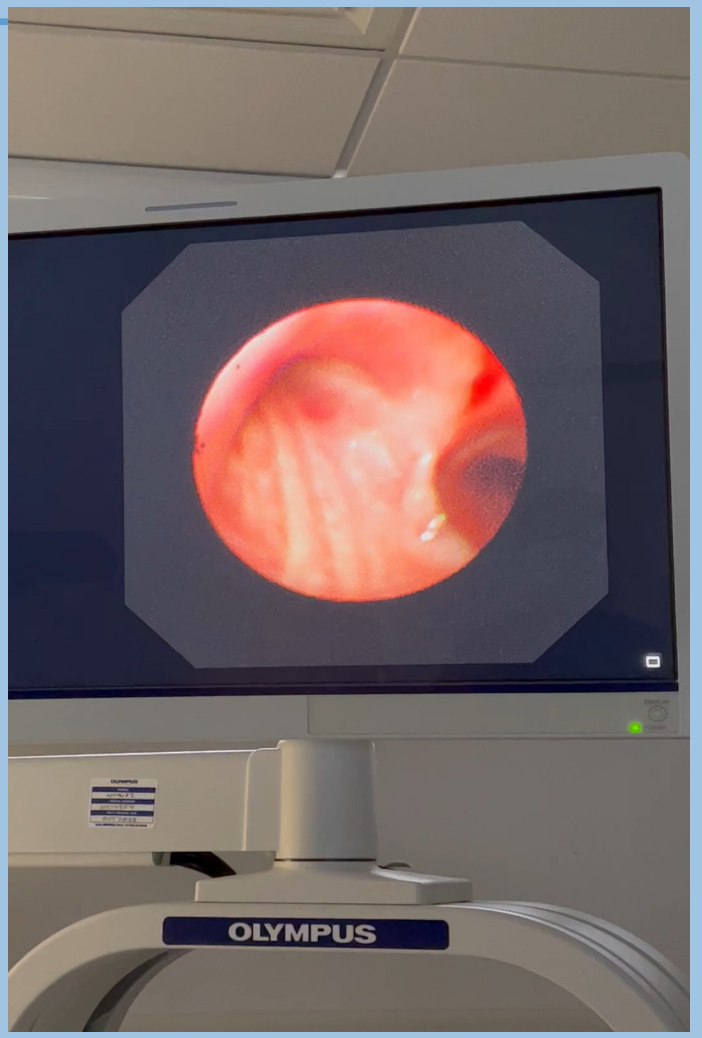

OLYMPUS

EBUS Radial probe

4 Meta – analysis:

Steinfort DP. ERJ 2011; 37(4):902 – 10, Wang MJS. Chest 2012; 142 (2):385 – 93
Ali MS. Respirology 2017; 22 (3):443 – 53, Zuniga. Chest 2020;157:994 - 1011

Localisation > 90 % and Sensitivity – 73 %

Factors

- Necrotic lesion
- Lesion – submucosal/peribronchial
- Lesion or Forceps in the adjacent airway

Solutions

- Inject normal saline
- TBNA, cryo biopsy
- Positioning the radial probe/scope and forceps

Lam S. Respiration 2021;100:764-766

Factors and diagnostic yield

1. Which bronchoscope

	Standard	TB	UTB
Outer	5.8 mm	4.2 mm	3 mm
WC	2.8 mm	2 mm	1.7 mm

- RCT – Higher diagnostic yield with UTB (70.1 %) compared to thin (58.7 %) and standard scope

  Oki M. Chest 2019;156:954 – 964

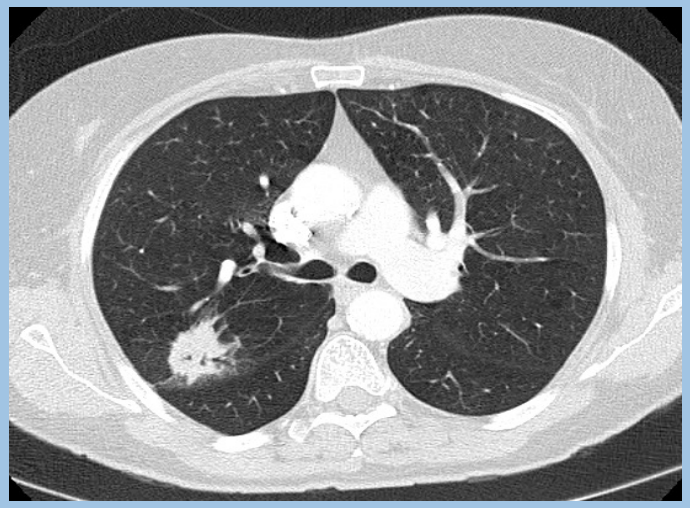
- Diagnostic yield with standard bronch and Guide sheath 72 % vs Thin bronch without GS 70 %

  Chan et al. Ann Am Tho Soc 2014;11:578 - 582

2. Size

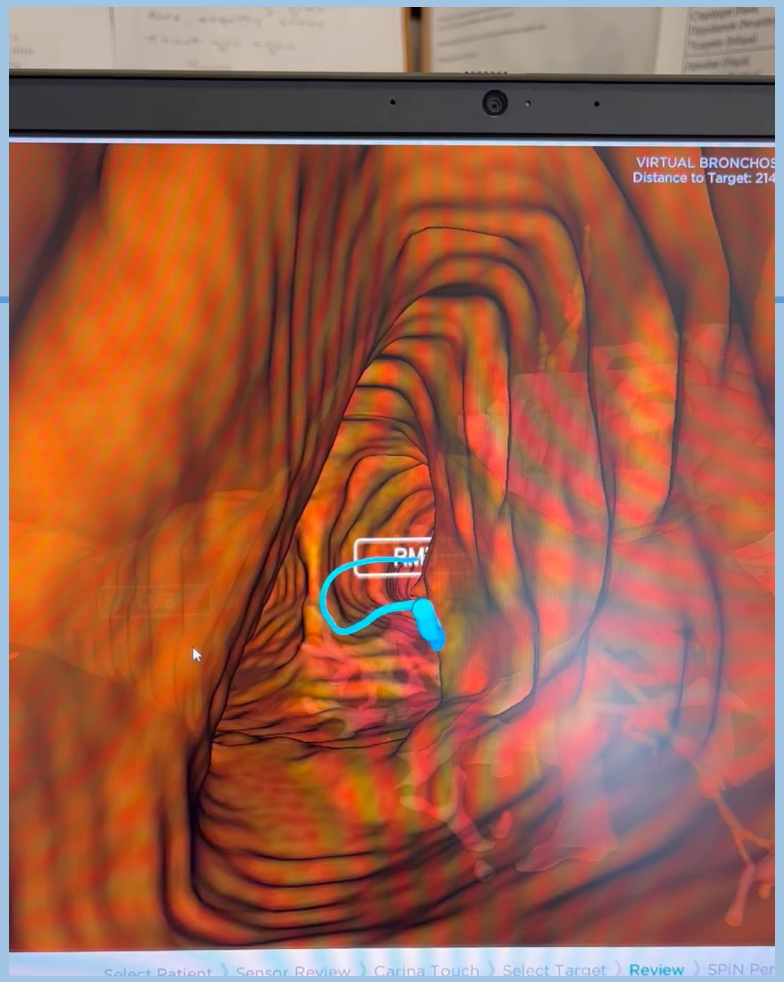
Diagnostic yield

- ≤ 2 cm - Sensitivity 56 %
- > 2 cm – Sensitivity 78%



Steinfort DP. ERJ 2011; 37(4):902 - 10

3. VBN



13.4 % extra yield, short procedure time

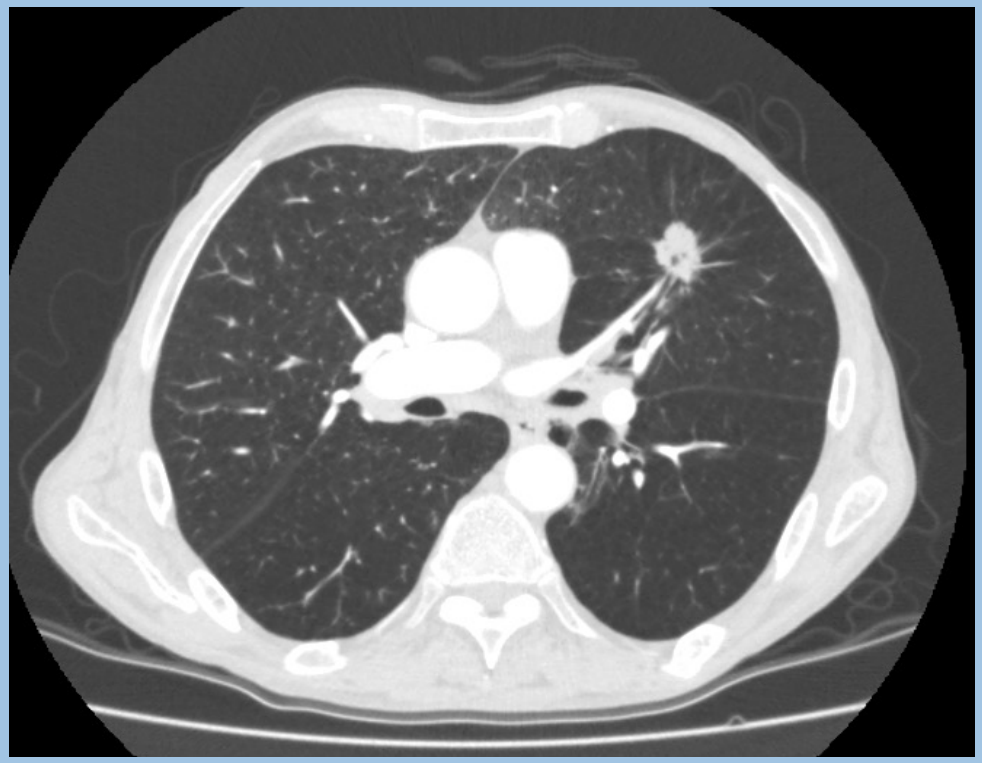
Ishida. Thorax 2011:66;1072

No association between diagnostic sensitivity & VBN

Zuniga S. Chest 2020:157:994-1011

4. Bronchus sign on CT

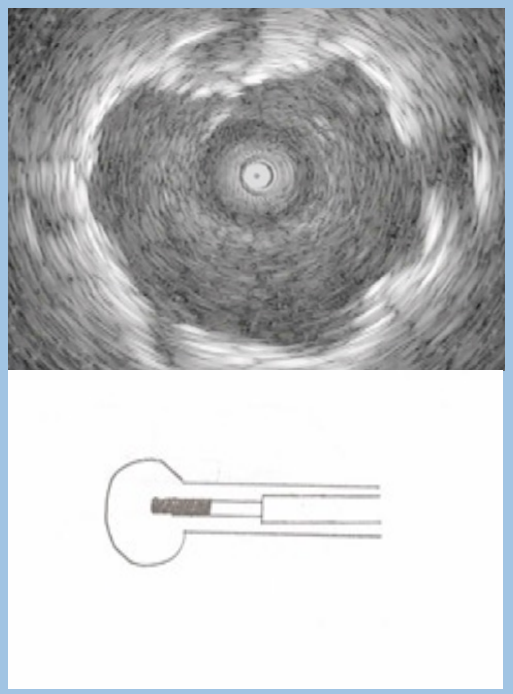
Higher diagnostic yield with Bronchus sign



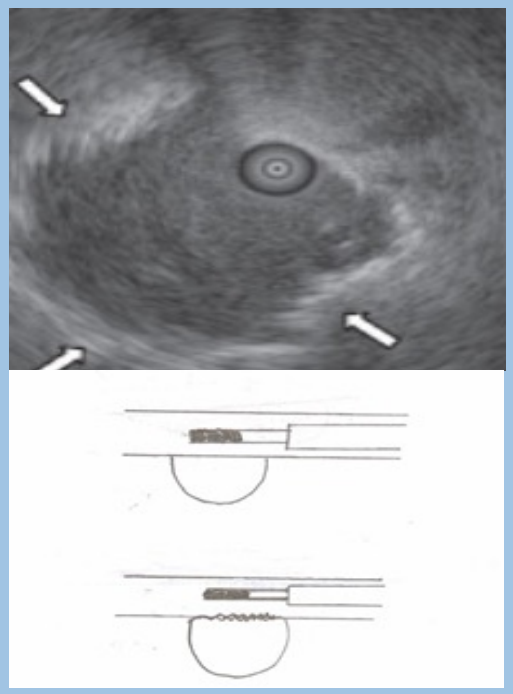
Oki M. Chest 2019:156:954 - 964

5. USG image of the lesion

Concentric lesion
Diagnostic yield 80 %

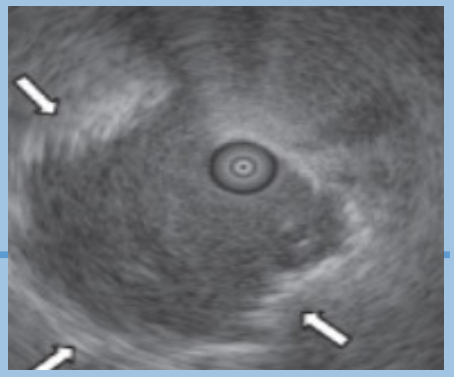


Eccentric lesion
Diagnostic yield 48 %



(Chan et al. Ann Am Tho Soc 2014;11:578 - 582

6. Biopsy tool



SS Kho et al ERJ Open Res 2019; 5: 00135

- Concentric lesion no difference
- Eccentric lesion – cryobiopsy 75 % vs forceps biopsy 46 %

Complications

- PTX – no difference
- Bleeding 47.4 % (cryo) vs 7.9 % (forceps)

Sryma PB. Pulmonology 29 (2023) 50 – 64

- Meta-analysis, 9 studies, N = 300 (1 RCT) (8 used 1.9 mm)
- No difference between cryo and forceps biopsy

Complications

- Pneumothorax – 1 %
- Bleeding
- Infections - 4.47 % Souma et al, Chest 2020;158 (2):797
- Probe breakage
- Unable to find the lesion and management of false negatives

Conclusion

- Anatomy – Bronchoscopy and CT
- Procedure planning +/- VBN
- Start with large lesion with bronchus sign
- GA (stage and diagnose)
- Learning curve & audit results