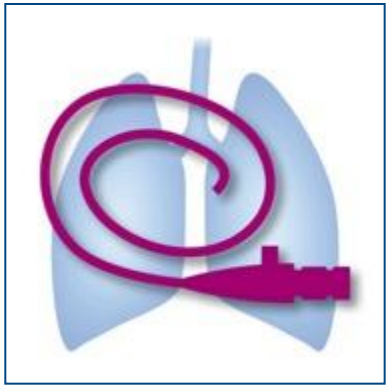
Pneumo Update Europe 2016

24-25 June, Prague

Pulmonary Endoscopy

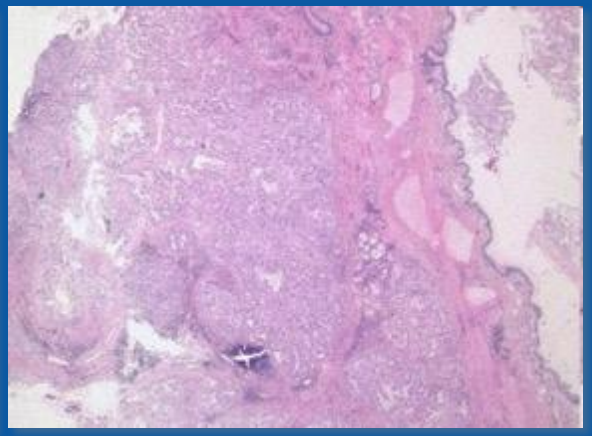


Felix Herth, Germany

Topics

- Cryo Biopsy
- SPN
- Endosonography
- ELVR
- Best of the rest

Cryo Biopsy

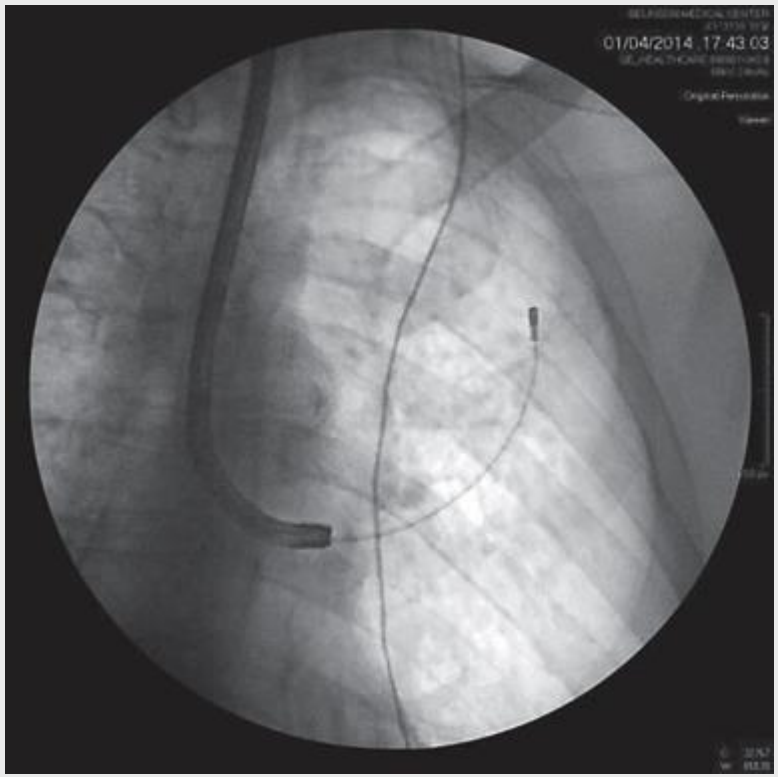


Tomassetti S, et al., Bronchoscopic lung cryobiopsy increases diagnostic confidence in the multidisciplinary diagnosis of idiopathic pulmonary fibrosis..

117 patients with fibrotic ILDs
MDT decision
cross-sectional study

58 Cryo biopsy
59 SLB
2clinicians, 2 radiologists, 2 pathologists sequentially reviewed clinical-radiological findings and biopsy results

process their diagnostic impressions and confidence levels.



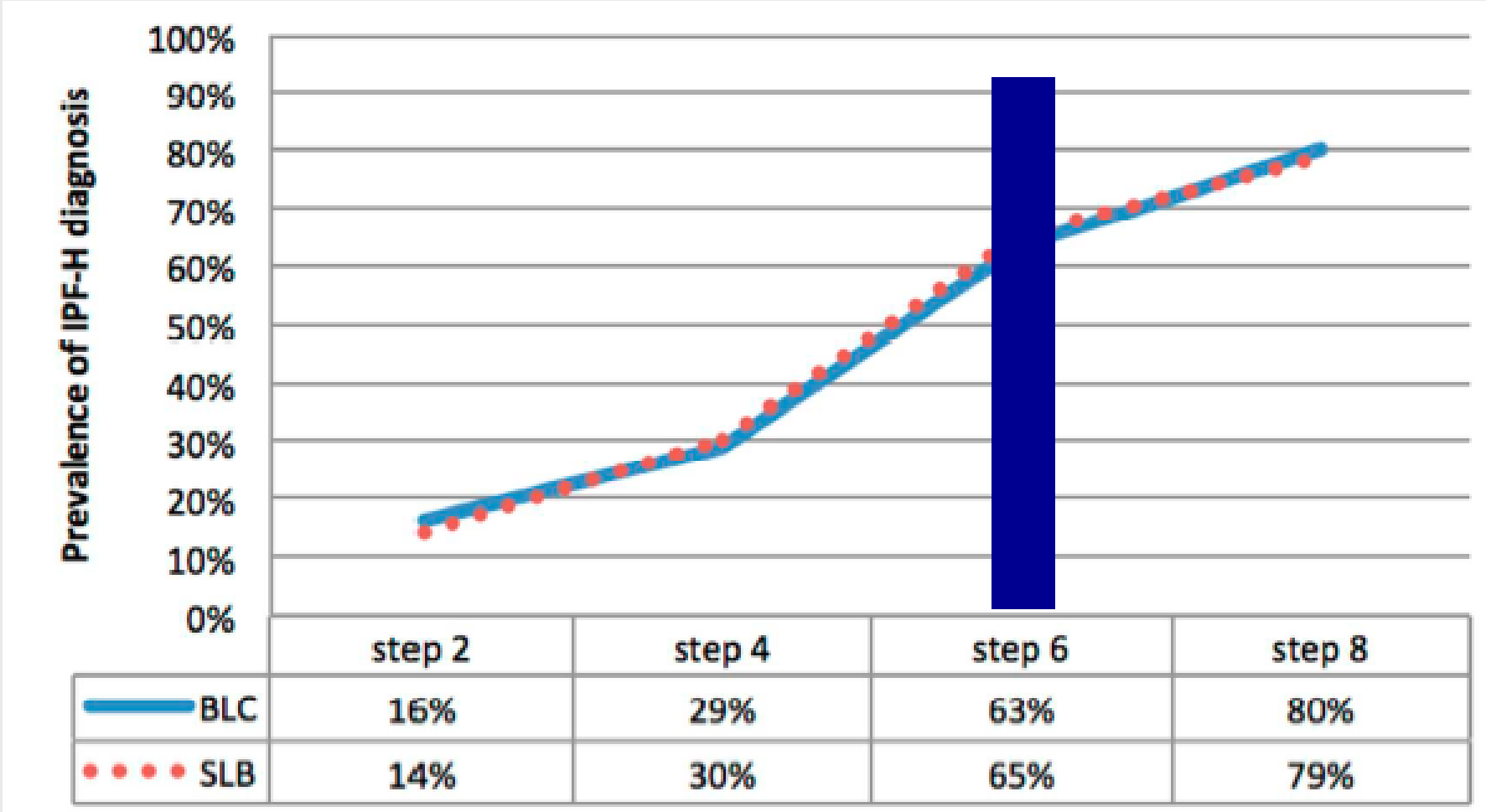
Am J Respir Crit Car Med 2016 Apr 1;193(7):745-52

Tomassetti S, et al., Bronchoscopic lung cryobiopsy increases diagnostic confidence in the multidisciplinary diagnosis of idiopathic pulmonary fibrosis..

STEP	DATA	PARTICIPANTS	DISCUSSION
1	Clinical-Radiological data	C + R	Individual
2			Group
3	BAL	C + R + P	Individual
4			Group
5	BIOPSY	C + R + P	Individual
6			Group
7	FOLLOW-UP data	C + R + P	Individual
8			Group

Am J Respir Crit Car Med 2016 Apr 1;193(7):745-52

Tomassetti S, et al., Bronchoscopic lung cryobiopsy increases diagnostic confidence in the multidisciplinary diagnosis of idiopathic pulmonary fibrosis..

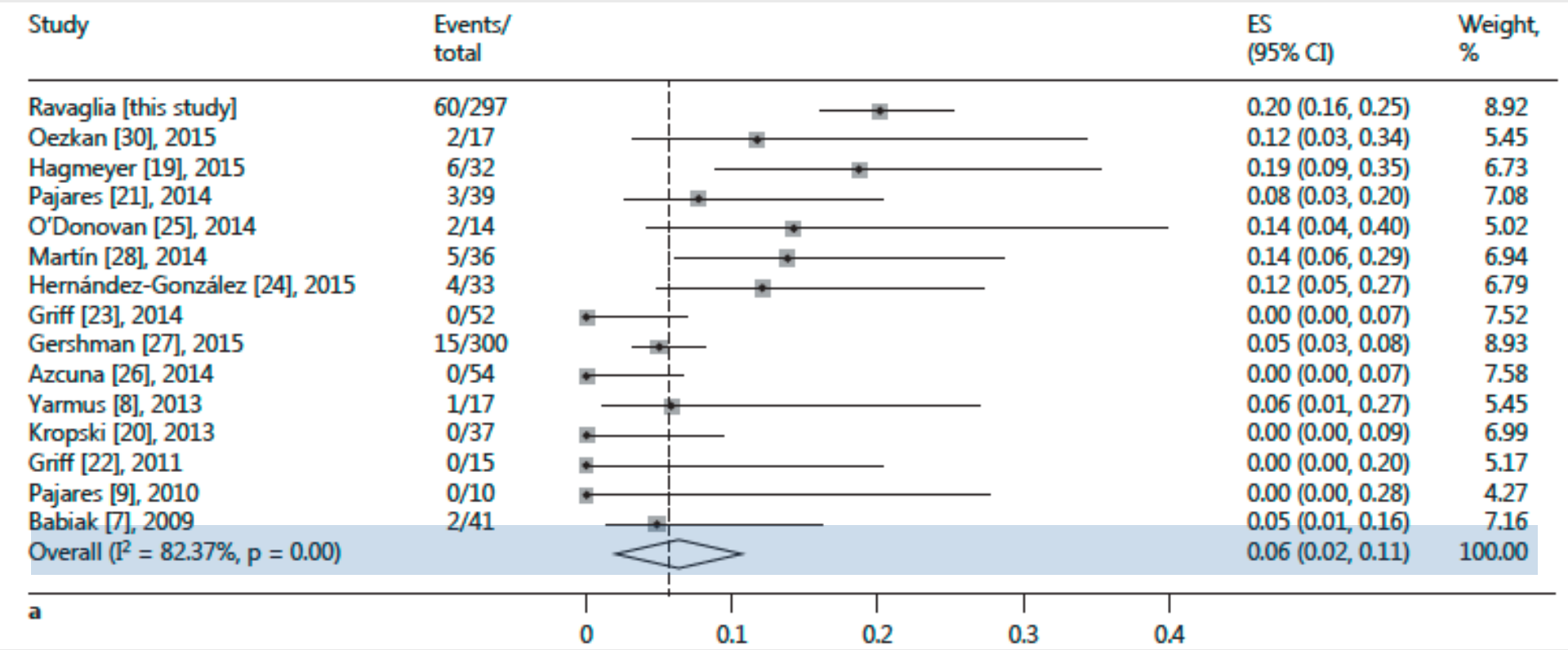


	step 2	step 4	step 6	step 8
BLC	16%	29%	63%	80%
SLB	14%	30%	65%	79%

Am J Respir Crit Car Med 2016 Apr 1;193(7):745-52

Ravaglia C., et al., Safety and Diagnostic Yield of Transbronchial Lung Cryobiopsy in Diffuse Parenchymal Lung Diseases: A Comparative Study versus Video-Assisted Thoracoscopic Lung Biopsy and a Systematic Review of the Literature.

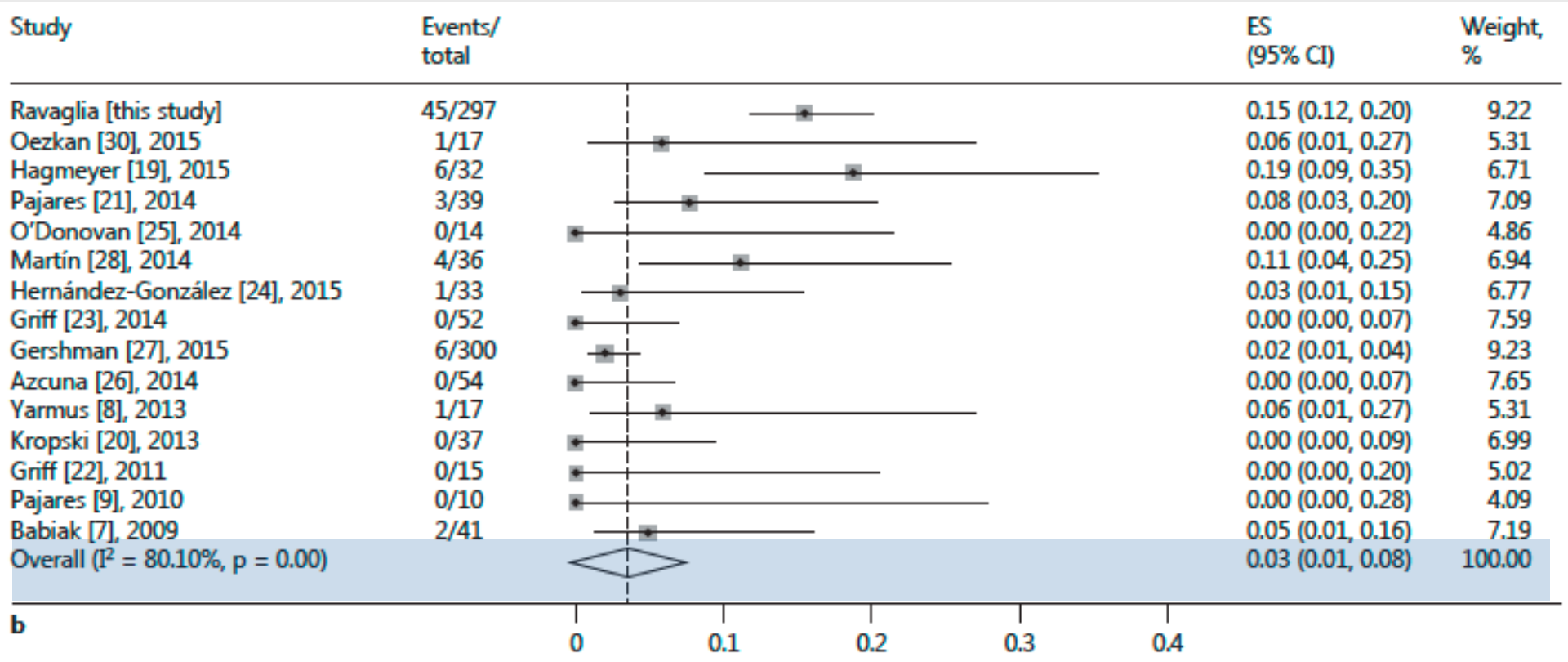
Pneumo



Respiration, 2016;91:215–227

Ravaglia C., et al., Safety and Diagnostic Yield of Transbronchial Lung Cryobiopsy in Diffuse Parenchymal Lung Diseases: A Comparative Study versus Video-Assisted Thoracoscopic Lung Biopsy and a Systematic Review of the Literature.

Bleeding



Respiration, 2016;91:215–227

Take-Home Message

- **Cryo-biopsy in ILD increasing**
- **diagnostic rate 70-80 %**
- **similar information value like SLB**

main complication

- **pneumothorax**

main limitation

- **need for intubation/rigid scope**

- **European multicenter trial presented at ERS**

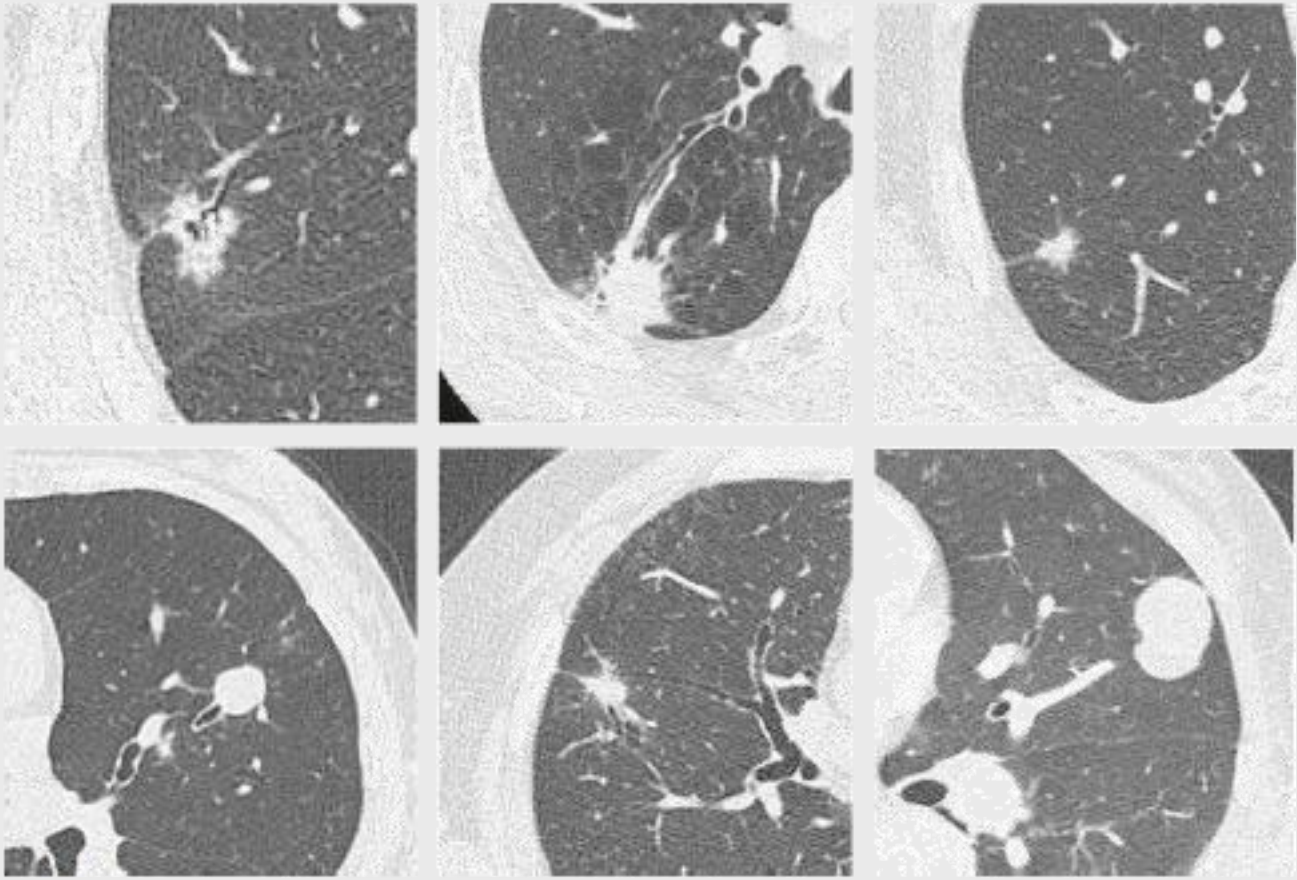
SPN

Minezawa T. et al., Bronchus sign on thin-section computed tomography is a powerful predictive factor for successful transbronchial biopsy using endobronchial ultrasound with a guide sheath for small peripheral lung lesions

149 patients
SPN 2 cm
retrospective

TBB
110 malignant
39 benign

predictors of success



CT bronchus sign A | CT bronchus sign B | CT bronchus sign C

BMC Med Imaging. 2015; 15:21

Minezawa T. et al., Bronchus sign on thin-section computed tomography is a powerful predictive factor for successful transbronchial biopsy using endobronchial ultrasound with a guide sheath for small peripheral lung lesions

Table 6 Diagnostic yield according to the CT bronchus sign, Chest X-ray findings and lesion size

CT bronchus sign	Visibility on Chest X-ray	Lesion size	Diagnostic yield % (total/malignancy)
A	Clearly visible	All size	88.0/98.6
		≥20 mm	91.9/100
		<20 mm	76.9/94.6
	Vague or invisible	All size	77.8/82.8
		≥20 mm	83.3/83.3
		<20 mm	75.0/82.4
B	Clearly visible	All size	68.8/90.9
		≥20 mm	87.5/83.3
		<20 mm	60.0/100
	Vague or invisible	All size	63.6/59.1
		≥20 mm	50.0/50.0
		<20 mm	65.2/64.3

Variables		HR	(95%CI)	*p* value
Visibility on Chest X-ray	Clearly visible	2.03	0.90–4.59	$P=0.087$
	Vague or invisible	Ref.		
CT bronchus sign[a]	A	11.1	2.99–41.2	$P<0.001$*
	B	4.62	1.24–17.2	$P=0.023$*
	C	Ref.		

* significant difference, [a] See Methods. *Ref.* reference

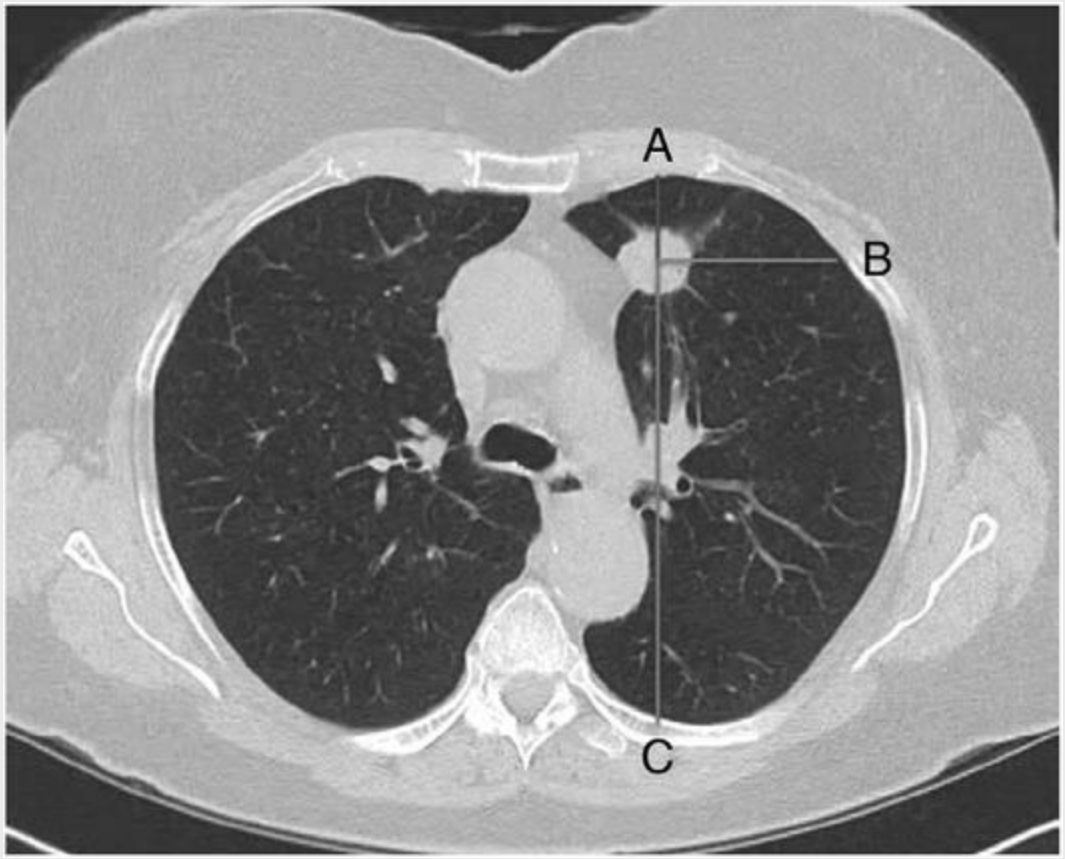
BMC Med Imaging. 2015; 15:21

Chen A. et al., The effect of respiratory motion on pulmonary nodule location during electromagnetic navigation bronchoscopy.

49 patients
85 SPN
mean SPN size17 mm

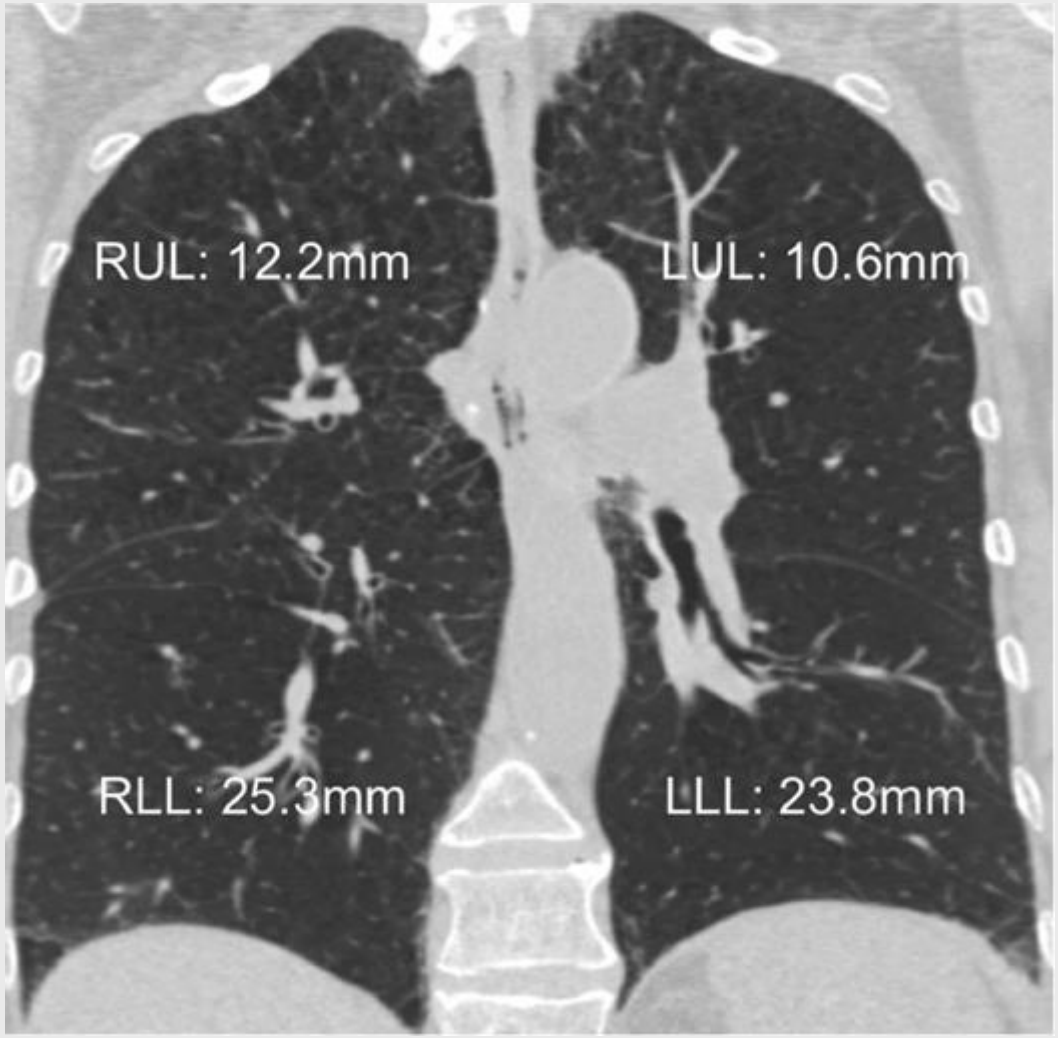
In-/expiratory HR-CT

motion of SPN



Chest, 2015; 147(5):1275-81

Chen A. et al., The effect of respiratory motion on pulmonary nodule location during electromagnetic navigation bronchoscopy.



- **LLL = left lower lobe**
- **LUL = left upper lobe**
- **RLL = right lower lobe**
- **RUL = right upper lobe**

Chest, 2015; 147(5):1275-81

Koizumi T. et al., Bronchoscopy-Guided Cooled Radiofrequency Ablation as a Novel Intervention Therapy for Peripheral Lung Cancer.

20 patients
SPN size 21 mm

28 x RFA endoscopical

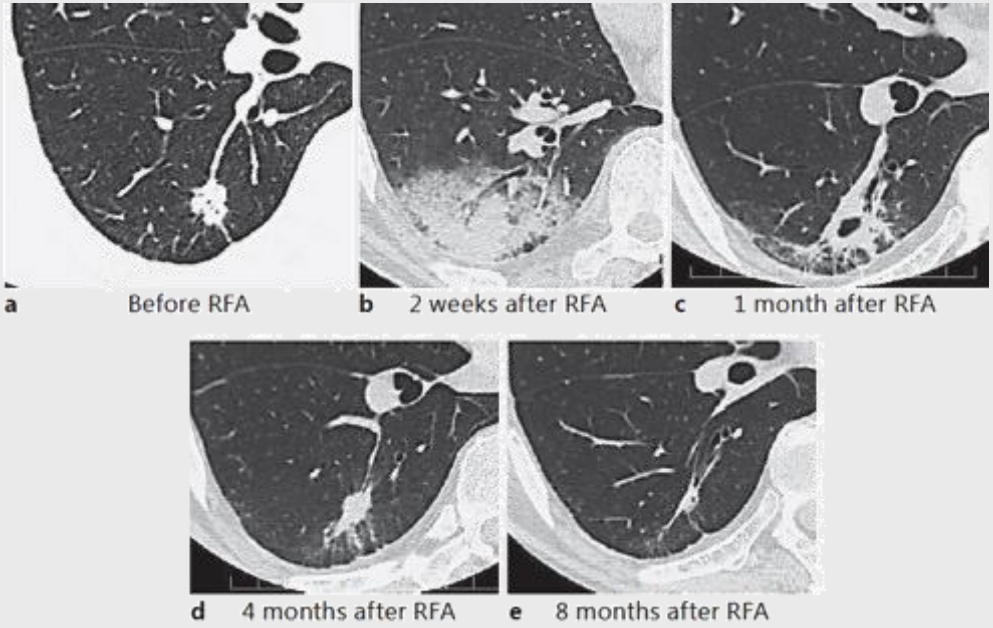
efficacy
safety

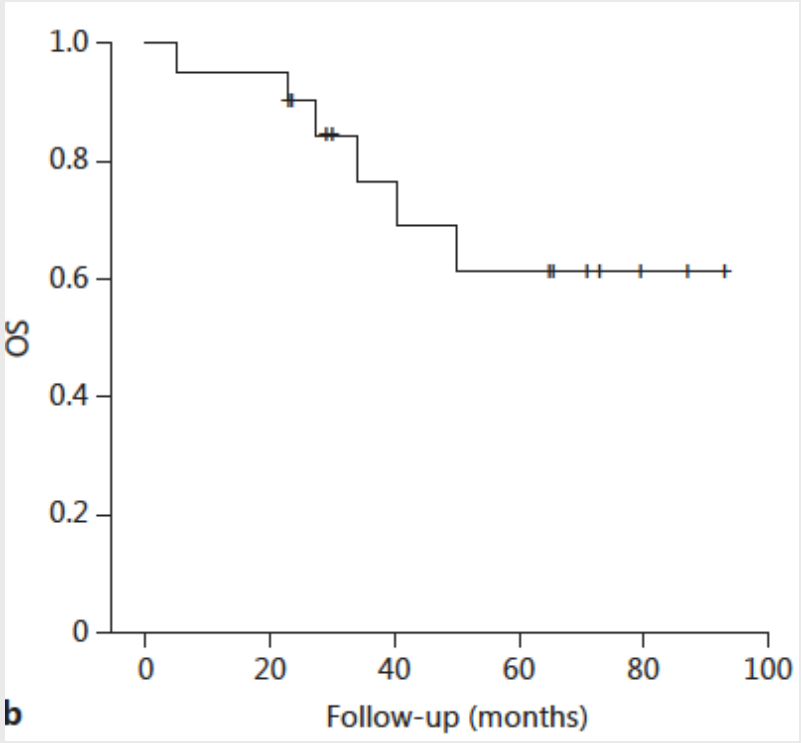
Case	Age, years	Sex	Location	Histology	Synchronous lesions	Tumor size, mm	Comorbid diseases or history
1	80	F	rt B2	AD	+	24	cerebral infarction, after lt lobectomy
2	84	F	rt B2	AD	+	24	*Mycobacterium avium* infection, low pulmonary function
3	77	F	rt B3	AD	+	36	low pulmonary function
4	79	F	lt B8	AD	+	18	prior pleuritis, low pulmonary function
5	66	M	lt B9	SCC	–	27	after rt lobectomy, IHD
6	80	M	lt B1 + 2	SCC	–	21	IHD, COPD (GOLD II)
7	83	F	rt B3	undiff.	–	28	IHD, chronic renal failure
8	64	M	rt B1	AD	–	35	dilated cardiomyopathy, atrial fibrillation
9	78	F	lt B3	AD	+	21	low pulmonary function
10	83	M	lt B1 + 2	SCC	–	25	IHD, ASO
11	70	F	lt B3	AD	+	22	after operation for cervical carcinoma
12	84	M	rt B1	AD	–	32	follicular lymphoma
13	87	M	lt B3	AD	–	31	COPD (GOLD III)
14	80	F	rt B4	AD	+	14	liver cirrhosis, after operation for colon cancer
15	71	M	lt B1 + 2	SCC	+	15	COPD (GOLD III)
16	58	F	rt B2	AD	–	12	primary biliary cirrhosis
17	77	F	rt B9	AD	+	24	IHD
18	76	F	lt B4	AD	–	26	after operation for breast and ovarian cancer
19	78	M	rt B2	SCC	+	19	COPD (GOLD III)
			rt B1			19	
20	62	M	lt B8	SCC	+	45	after operation for gastric cancer
			rt B6			20	
			lt B6			24	

AD = adenocarcinoma; SCC = squamous cell carcinoma; IHD = ischemic heart disease; ASO = arteriosclerosis obliterans; COPD = chronic obstructive pulmonary disease.

Respiration. 2015; 90(1):47-55

Koizumi T. et al., Bronchoscopy-Guided Cooled Radiofrequency Ablation as a Novel Intervention Therapy for Peripheral Lung Cancer.





- cooled electrode catheter with a 10-mm active tip
- duration was approximately within 20 min
- No serious adverse event
- 2 patients weak chest pain

Respiration. 2015; 90(1):47-55

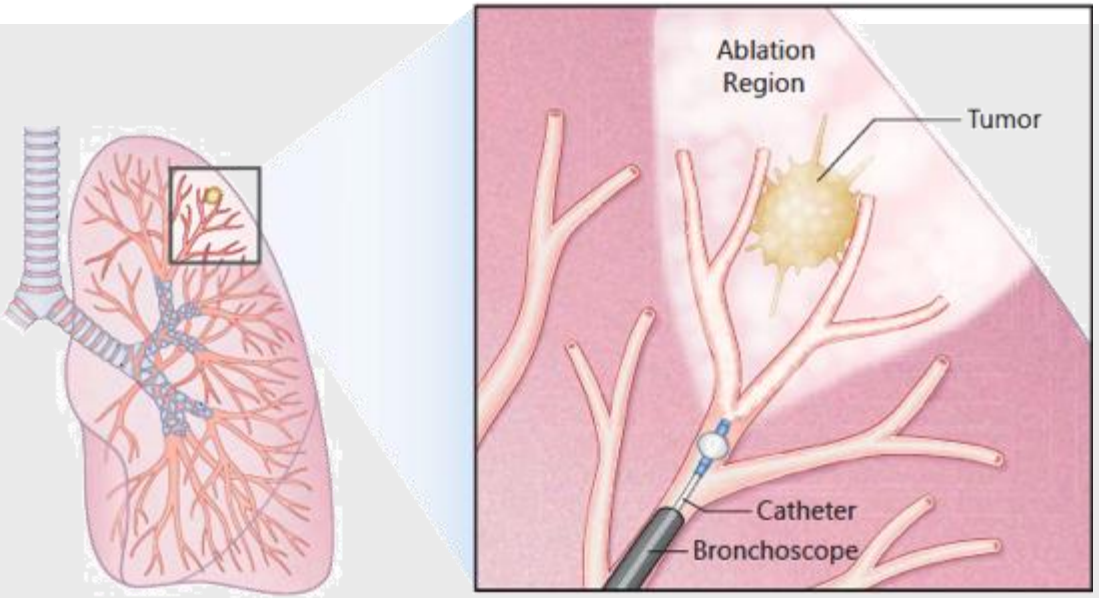
Henne E. et al., Thermal Vapor Ablation for Lung Lesions in a Porcine Model.

11 pigs
66 „SPN“

Vapor ablation

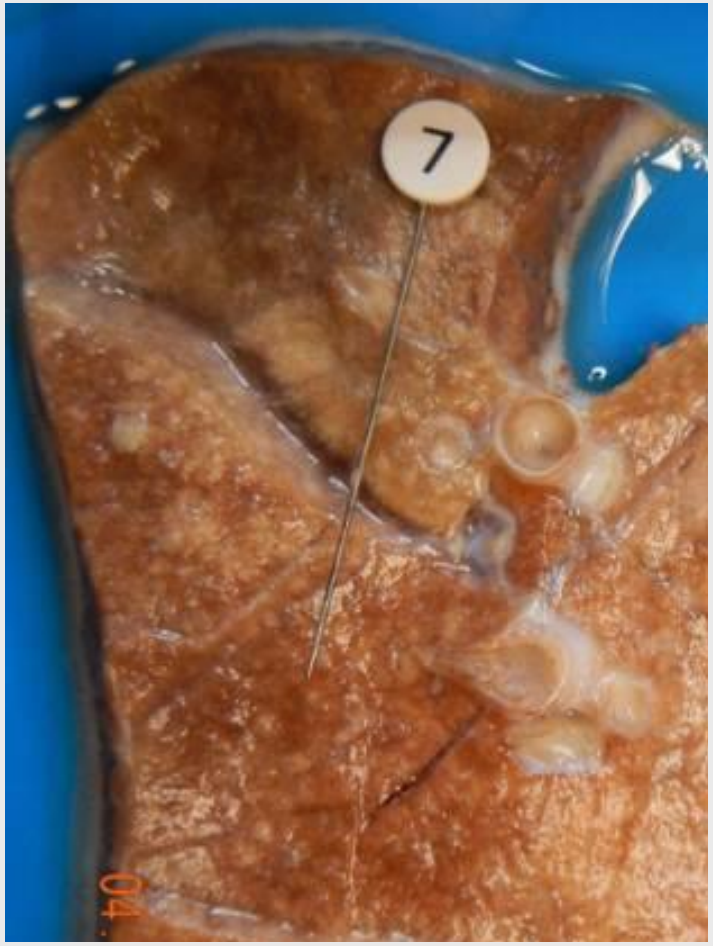
efficacy
safety

Group name	Energy (Calories)	Number of treatments per animal	Group size (n)	Survival (days)*
Low power/Survival	125 ± 20	3	2	21
Med power/Survival	270 ± 20	3	4	10-30
Med-High power/Acute	270 - 390	4-16	5	-



Respiration, 2015; 90(2):146-54

Henne E. et al., Thermal Vapor Ablation for Lung Lesions in a Porcine Model.



Respiration, 2015; 90(2):146-54

additional SPN papers

- **TPNA (Tunneln) is possible in the eno suite**

  Harzheim D et al, Respiration 2016

- **Ultrathin scopes improving the diagnostic yield**

  Oki M et al, Am J Respir Crit Care Med, 2015

- **Greyscale analysis of the radial EBUS image improves the diagnostic yield**

  Nguyen P et al, Respirology, 2015

Take-Home Message

- **bronchus sign helpful**
- **SPN´s are moving**
- **Endoscopic treatment options are upcoming**
  - **Radiofrequency ablation**
  - **Steam**
  - **.....**

Endosonography

Casal RF. et al., Randomized trial of endobronchial ultrasound-guided transbronchial needle aspiration under general anesthesia versus moderate sedation.

149 Patienten mit EBUS

RCT moderate sedation vs. general anaestehesia

Efficiency
complications
Patient acceptance

	GA		MS		*P* Value
	n	%	n	%	
Diagnostic yield					
No	22 (29.3)		23 (31.1)		0.816
Yes	53 (70.7)		51 (68.9)		
Sedation/anesthesia-related complications					
n	4 (5.3)		21 (29.6)		<0.001
Hypotension	4		1		
Hypertension	0		6		
Hypoxemia	0		2		
Excessive cough	0		4		
Arrhythmia	0		3		
Aspiration	0		1		
Inadequate sedation	0		4		
How much do you recall the procedure?					<0.001
None	60	80	31	45.6	
Small amount	14	18.7	20	29.4	
Significantly	1	1.3	17	25	

GA=general anesthesia; MS=moderate sedation

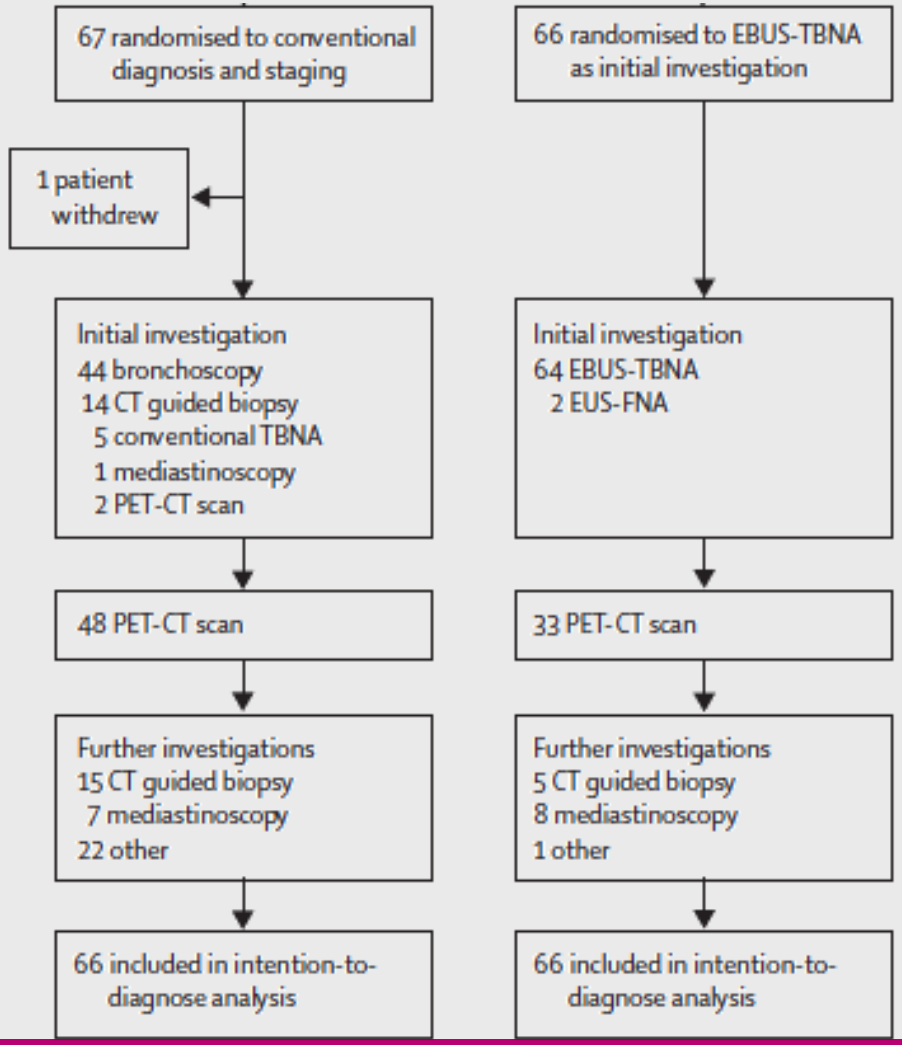
Am J Respir Crit Care Med, 2015. 191(7):796-803

Navani N., et al., Lung cancer diagnosis and staging with endobronchial ultrasound-guided transbronchial needle aspiration compared with conventional approaches: an open-label, pragmatic, randomised controlled trial.

133 Patienten mit Va NSCLC Stad. I to IIIA

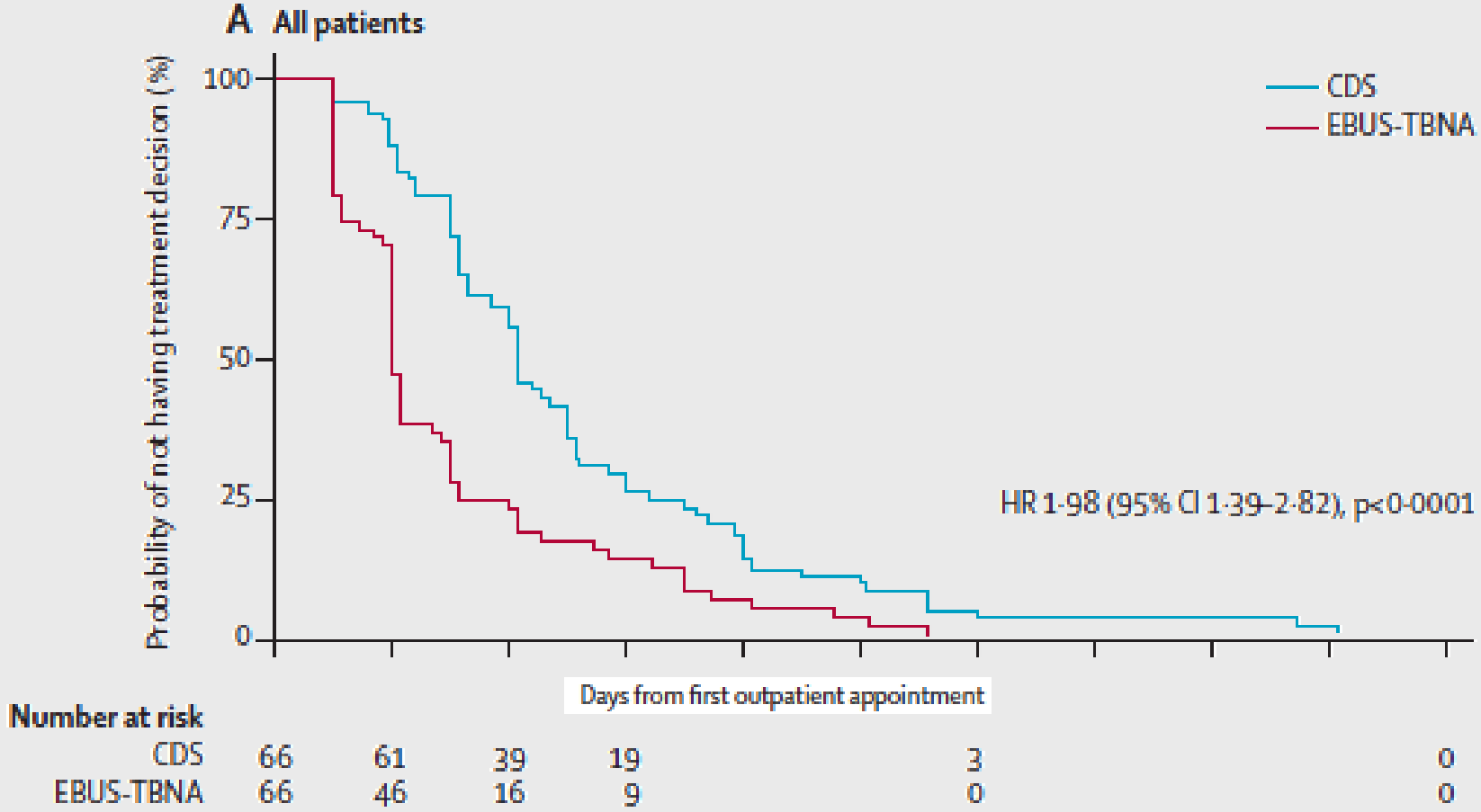
RT conventional staging vs EBUS TBNA

Time until the beginning of the therapy Effect on survival



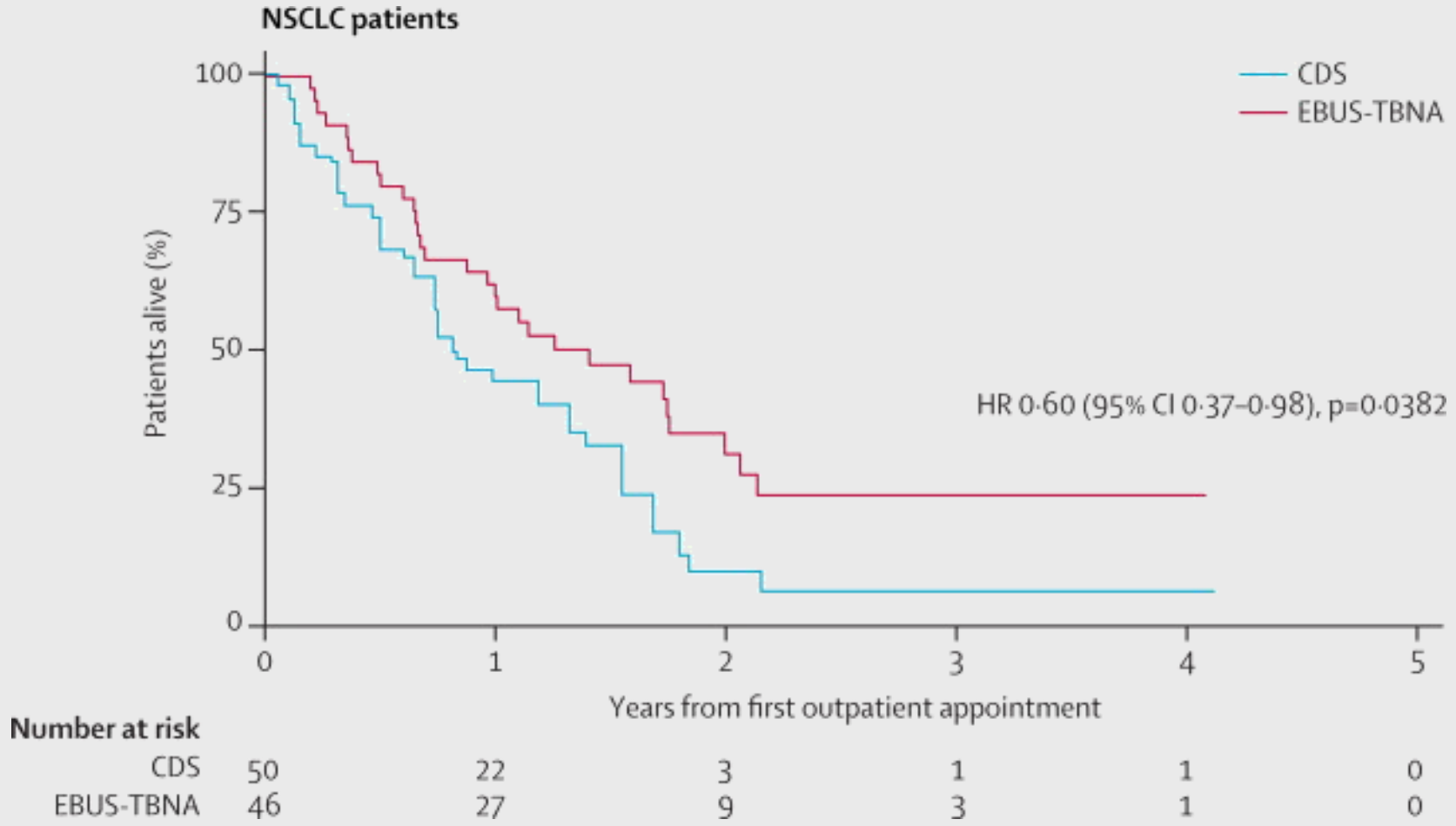
Lancet Respir Med, 2015. 3(4): p. 282-9.

Navani N., et al., Lung cancer diagnosis and staging with endobronchial ultrasound-guided transbronchial needle aspiration compared with conventional approaches: an open-label, pragmatic, randomised controlled trial.



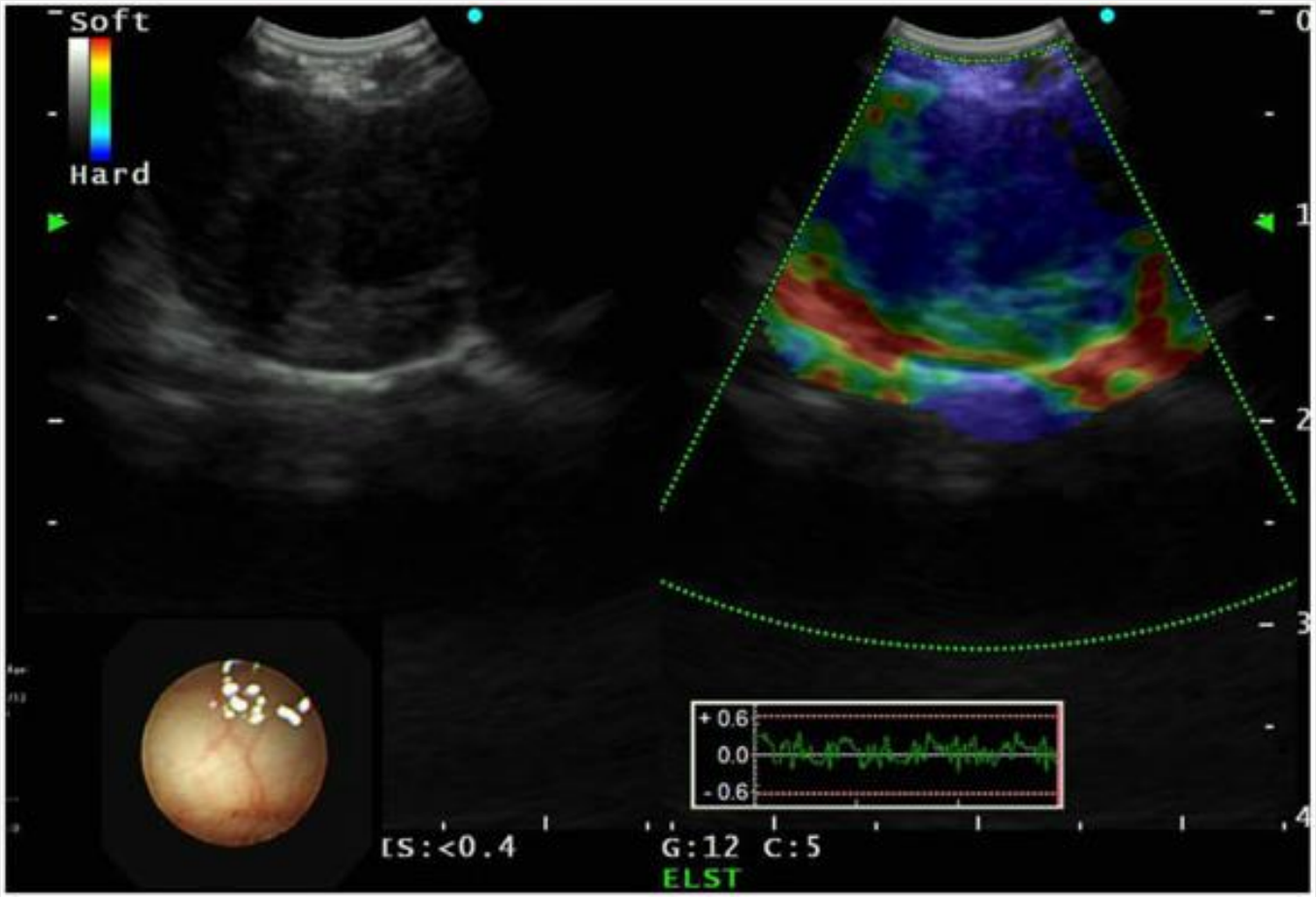
Lancet Respir Med, 2015. 3(4): p. 282-9.

Navani N., et al., Lung cancer diagnosis and staging with endobronchial ultrasound-guided transbronchial needle aspiration compared with conventional approaches: an open-label, pragmatic, randomised controlled trial.



Lancet Respir Med, 2015. 3(4): p. 282-9.

Izumo T., et al., Endobronchial ultrasound elastography in the diagnosis of mediastinal and hilar lymph nodes.



Jpn J Clin Oncol, 2014. 44(10):956-62

Izumo T., et al., Endobronchial ultrasound elastography in the diagnosis of mediastinal and hilar lymph nodes.

EBUS with Elastography 75 LK

Elastography classification vs. Cytology

Value

Type 1: predominantly non-blue
Type 2: part blue, part non-blue
Type 3: predominantly blue

Elastography type	Number of benign LNs/total number (%)	Number of malignant LNs/total number (%)
Type 1 ($n = 24$)	24/24 (100)	0/24 (0)
Type 2 ($n = 14$)	6/14 (42.9)	8/14 (57.1)
Type 3 ($n = 37$)	2/37 (5.4)	35/37 (94.6)

Jpn J Clin Oncol, 2014. 44(10):956-62

additional EBUS-papers

- **ERS-ESTS-ESGE European Guideline EBUS-TBNA and EUS- FNA**

  Vilman P et al., Endoscopy 2015

- **Simulation training improves yield and learning curve**

  Konge L et al., Eur Respir J, 2015

- **Rapid on site Evaluation possible via telepathology**

  Bott MN et al., Ann Thorac Surg, 2015

- **EBUS TBNA superior to classical TBNA also in sarcoidosis**

  Gnass M et al., Arch Med Wewn, 2015

Take-Home Message

EBUS TBNA

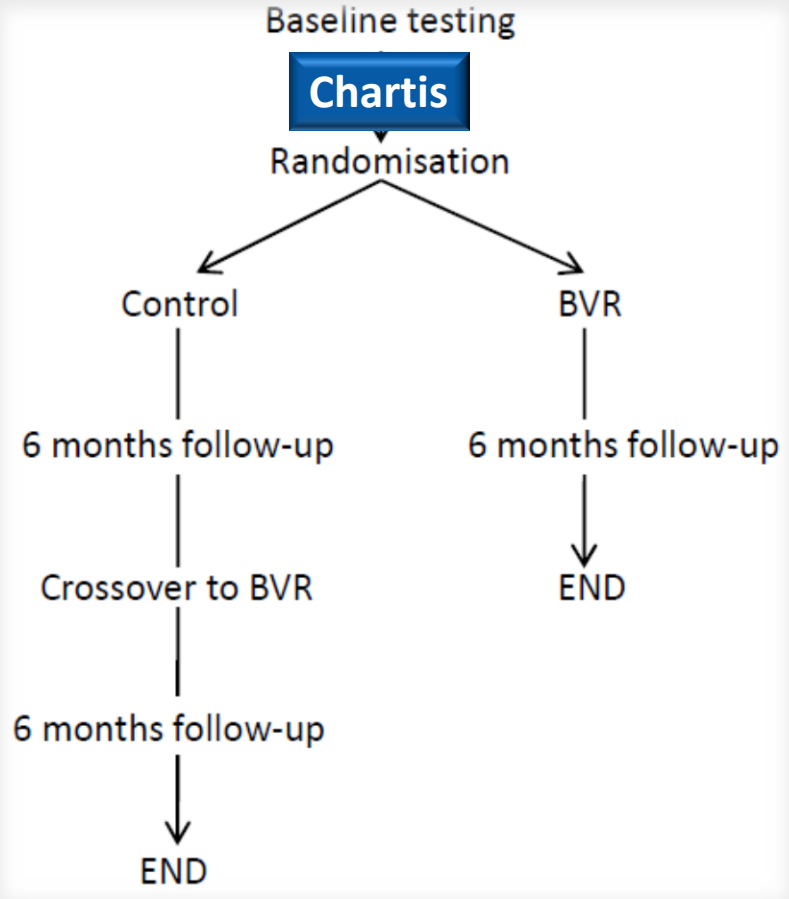
- **yield independent to sedation modality**
- **Elastography as new feature**
- **improves LC survival due to faster staging**
- **Training should be simulator based**

ELVR

Klooster K et al., Endobronchial Valve Treatment Versus Standard Medical Care in Patients with Emphysema Without Interlobar Collateral Ventilation (The STELVIO-Trial)

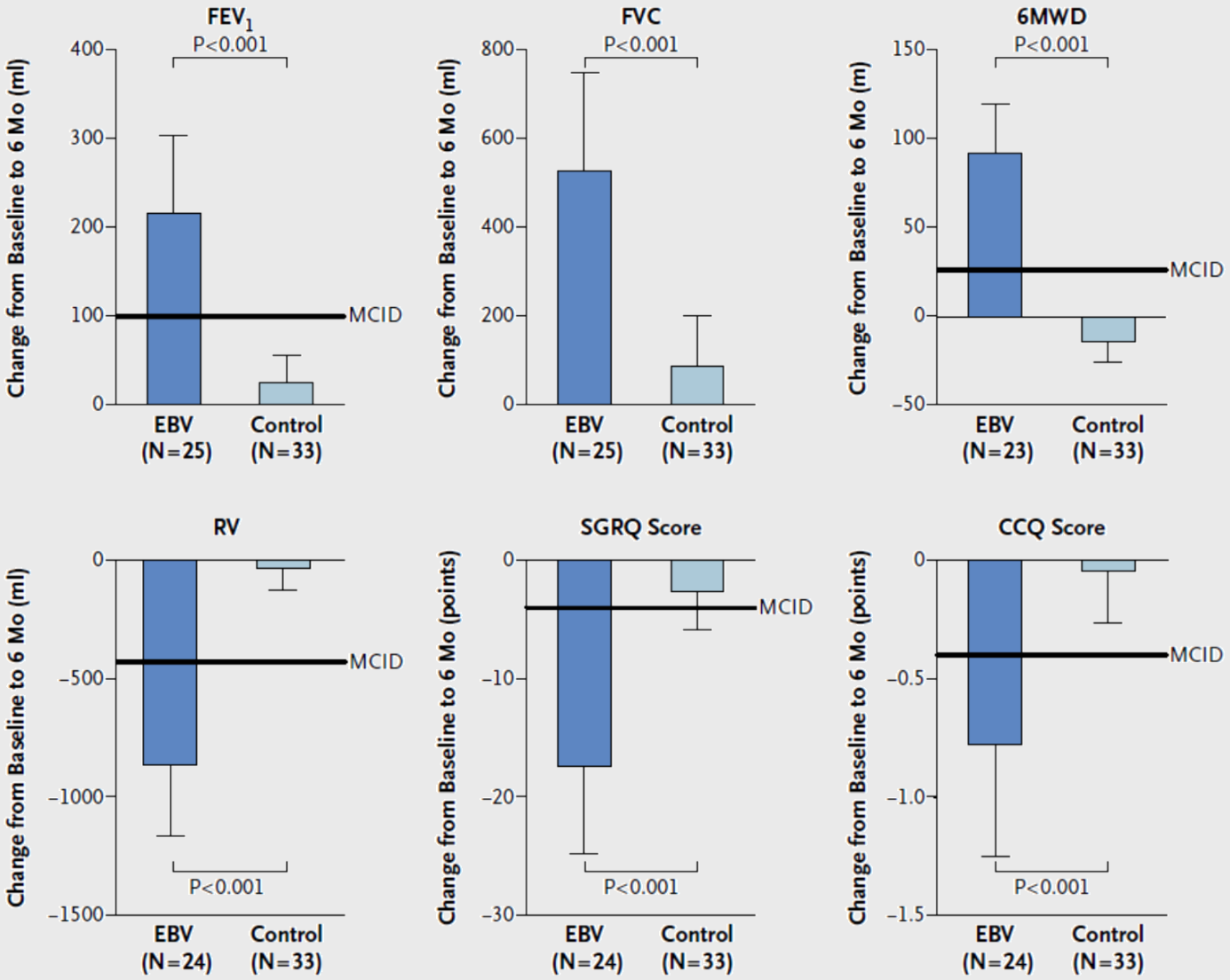
- UMC-Groningen, NL
- RCT, 1:1
- n=68
- 6 month follow-up
- Crossover for control

	EBV (n=34)	CONTROL (n=34)
Age, years	58±10	59±8
FEV_1, % predicted	29±7	29±8
FVC, % predicted	78±16	77±20
RV, % predicted	216±36	220±32
6MWD, meters	372±90	377±84



N Engl J Med 2015;373:2325-35.

Klooster K et al., Endobronchial Valve Treatment Versus Standard Medical Care in Patients with Emphysema Without Interlobar Collateral Ventilation (The STELVIO-Trial)



N Engl J Med 2015;373:2325-35.

Klooster K et al., Endobronchial Valve Treatment Versus Standard Medical Care in Patients with Emphysema Without Interlobar Collateral Ventilation (The STELVIO-Trial)

Event	EBV Group (N=34)	Control Group (N=34)	P Value†
	no. (%)		
Total no. of serious events	23	5	<0.001
Pulmonary events			
Death	1 (3)‡	0	1.00
COPD exacerbation with hospitalization	4 (12)	2 (6)	0.67
Pneumonia	2 (6)	1 (3)	1.00
Pneumothorax	6 (18)	0	0.02
Resolved ≤14 days after onset, without drainage	1 (3)	0	1.00
Resolved ≤14 days after onset, with drainage	2 (6)	0	0.49
Required temporary valve removal	1 (3)§	NA	NA
Required permanent valve removal because of recurrent pneumothorax	1 (3)	NA	NA
Required permanent valve removal, after temporary removal and reimplantation, because of recurrent pneumothorax	1 (3)	NA	NA
Other EBV-related events requiring permanent removal of all valves			
Torsion of the bronchus	2 (6)¶	NA	NA
Pneumonia distal to valve	1 (3)‖	NA	NA
Increased sputum, dyspnea, or coughing without patient-perceived treatment benefit	2 (6)	NA	NA
Other EBV-related events requiring valve replacement			
Valve migration	2 (6)	NA	NA
Valve expectoration	0	NA	NA
Valve dislocation due to formation of granulation tissue	1 (3)	NA	NA
Increased sputum, dyspnea, or coughing	1 (3)	NA	NA
Stroke	1 (3)	2 (6)	1.00

N Engl J Med 2015;373:2325-35.

Sciurba F et al., Effect of Endobronchial Coils vs Usual Care on Exercise Tolerance in Patients With Severe Emphysema (RENEW Trial). JAMA, 2016 315(20):2178-89

HOT TOPIC ATS 2016

315 COPD patients
RV > 175%
1:1 random

bilateral Coils placement vs. standard of care

Effectiveness
Difference in in 6-MWT
Safety

secondary outcome
6 MWT responder rate difference (25 meter MCID)
SGRQ, FEV_1

- MC-RCT
- n=315
- 158 coil pts., 157 SOC
- bilateral
- 12 month follow-up

	Coil	SoC
Age, years	63 ± 8	64 ± 7
FEV_1, % predicted	26 ± 6	26 ± 7
RV, % predicted	250 ± 40	245 ± 38
6MWD, meters	312 ± 79	303 ± 79
Homogen distribution	77 %	77 %

Sciurba F et al., Effect of Endobronchial Coils vs Usual Care on Exercise Tolerance in Patients With Severe Emphysema (RENEW Trial). JAMA, 2016 315(20):2178-89

HOT TOPIC ATS 2016

End Point	Coil Treatment (n = 158) At 12 mo	Coil Treatment (n = 158) Within-Group Change or Rate[b]	Usual Care (n = 157) At 12 mo	Usual Care (n = 157) Within-Group Change or Rate[b]	Between-Group Difference for Coil Treatment vs Usual Care (97.5% CI)[b]	*P* Value[c]
Primary end point						
Change in 6-minute walk distance, median (IQR), m[d]	319.7 (242.9 to 387.7)	10.3 (−33.0 to 45.0)	300.0 (233.2 to 350.0)	−7.6 (−40.0 to 26.0)	14.6 (0.4 to ∞)	.02[e]
Secondary end points						
6-minute walk distance response rate, No. (%) [95% CI][f]	NA	63 (40.0) [31.0 to 49.0]	NA	42 (26.9) [18.9 to 35.0]	11.8 (1.0 to ∞)[g] OR: 1.8 (1.1 to ∞)[h]	.01[i]
Change in FEV_1, median (IQR), %[d]	0.71 (0.58 to 0.88)	3.8 (−6.3 to 16.1)	0.68 (0.54 to 0.82)	−2.5 (−8.9 to 4.4)	7.0 (3.4 to ∞)	<.001[e]
Change in St George's Respiratory Questionnaire score, mean (95% CI)[j]	51.9 (49.5 to 54.4)	−8.1 (−10.2 to −6.0)	58.4 (55.9 to 60.9)	0.8 (−1.2 to 2.9)	−8.9 (−∞ to −6.3)	<.001
Other end points						
St George's Respiratory Questionnaire response rate, No. (%) [95% CI][f]	NA	97 (61.2) [50.9 to 71.4]	NA	43 (27.7) [18.6 to 36.8]	31.6 (20.5 to ∞)[g] OR: 4.1 (2.4 to ∞)[h]	<.001[i]
Change in RV, mean (95% CI), L[j]	4.95 (4.75 to 5.14)	−0.41 (0.57 to −0.25)	5.28 (5.07 to 5.49)	−0.10 (−0.26 to 0.06)	−0.31 (−∞ to −0.11)	.001
Change in RV/TLC, mean (95% CI), %[j]	63.6 (62.4 to 64.8)	−4.0 (−5.1 to −2.9)	67.3 (66.2 to 68.4)	−0.5 (−1.6 to 0.6)	−3.5 (−∞ to −2.1)	<.001

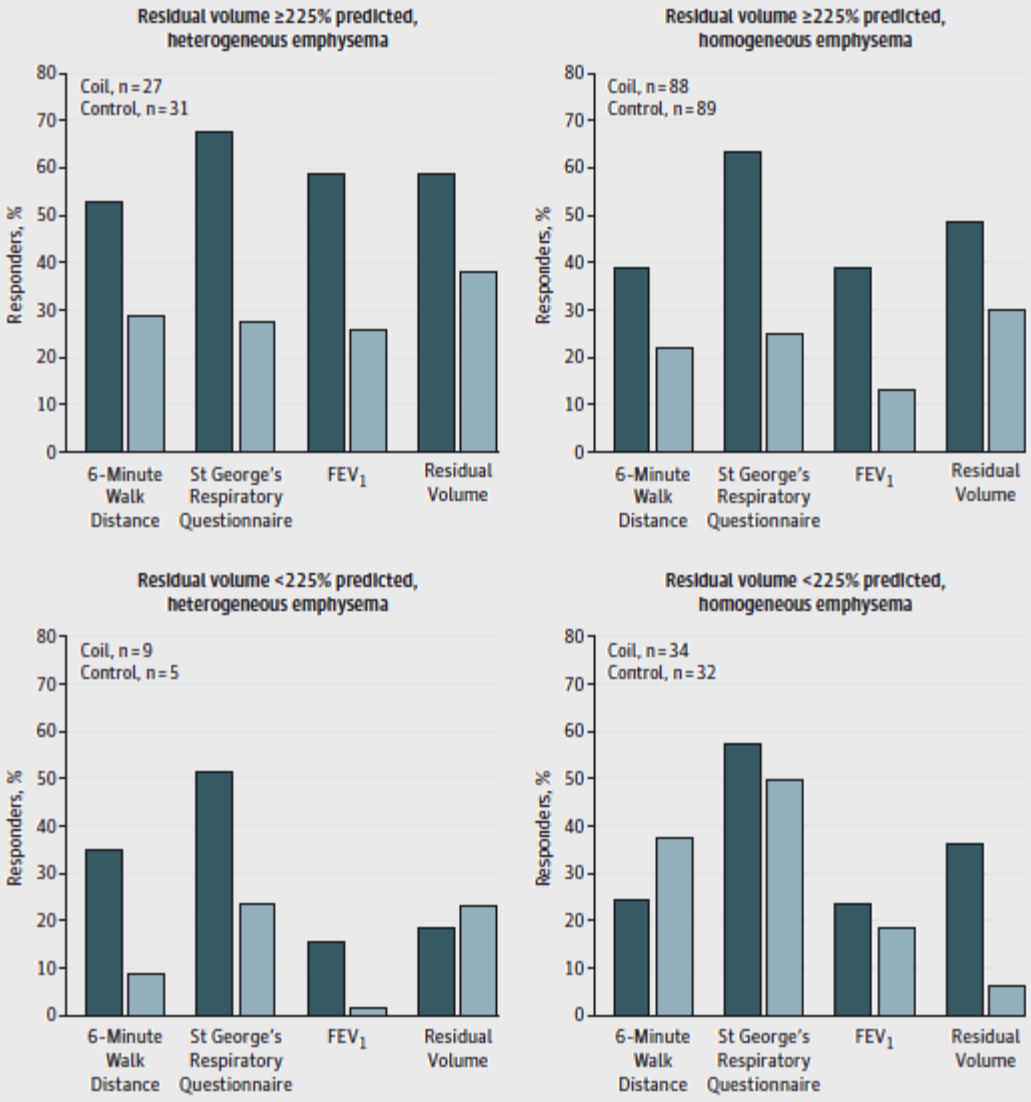
Sciurba F et al., Effect of Endobronchial Coils vs Usual Care on Exercise Tolerance in Patients With Severe Emphysema (RENEW Trial). JAMA, 2016 315(20):2178-89

HOT TOPIC ATS 2016

	No. (%) of Patients[a]			
	Coil Treatment (n = 155)	Usual Care (n = 157)	Difference, % (95% CI)[b]	*P* Value[c]
Major complications				
Any	54 (34.8)	30 (19.1)	15.7 (5.9 to 25.2)	.002
Death	10 (6.5)	8 (5.1)	1.4 (−4.1 to 7.0)	.64
Pneumothorax requiring extended chest tube drainage >7 d	1 (0.6)	1 (0.6)	0.0 (−2.9 to 3.0)	>.99
Hemoptysis requiring intervention	2 (1.3)	0	1.3 (−1.3 to 4.6)	.25
COPD exacerbation requiring extended hospitalization >7 d	18 (11.6)	13 (8.3)	3.3 (−3.4 to 10.2)	.35
Lower respiratory tract infection, including pneumonia, requiring intravenous antibiotics and/or corticosteroids	29 (18.7)	7 (4.5)	14.3 (7.3 to 21.5)	<.001
Respiratory failure requiring mechanical ventilation	6 (3.9)	6 (3.8)	0.0 (−4.7 to 4.8)	>.99
Unanticipated bronchoscopy	0	0	NA	
Other important serious adverse events[d]				
Pneumonia[e]	31 (20.0)	7 (4.5)	15.5 (8.4 to 22.9)	<.001
COPD exacerbation	43 (27.7)	32 (20.4)	7.4 (−2.1 to 16.7)	.15
Hemoptysis	4 (2.6)	0	2.6 (−0.3 to 6.4)	
Pneumothorax[f]	15 (9.7)[f]	1 (0.6)	9.0 (4.3 to 14.7)	<.001

Sciurba F et al., Effect of Endobronchial Coils vs Usual Care on Exercise Tolerance in Patients With Severe Emphysema (RENEW Trial). JAMA, 2016 315(20):2178-89

HOT TOPIC ATS 2016



Herth FJF et al., Sequential Segmental Treatment of Emphysema with Upper Lobe Predominance Trial (STEP-UP)

- MC-RCT
- n=69
- 45 treated, 24 SOC
- bilateral
- 12 month follow-up

	baseline
Age, years	62 ± 7
FEV_1, % predicted	33 ± 8
FVC, % predicted	78±16
RV, % predicted	237 ± 40
6MWD, meters	358± 90

69 patients
RV > 175%
core lab

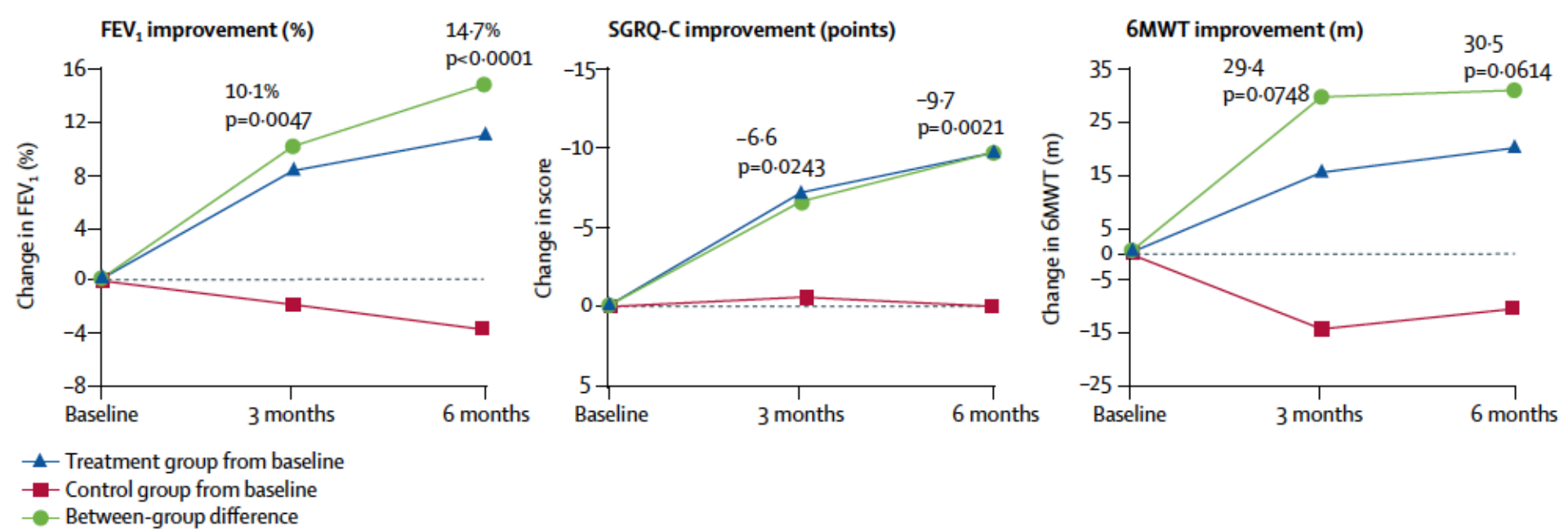
step up protocol
2 sessions
max 3 segments
vs. standard of care

primary outcome
change in FEV1%
change in SGRQ

secondary outcome
6MWT, SAE rate

Lancet Respir Med. 2016; 4(3):185-93

Herth FJF et al., Sequential Segmental Treatment of Emphysema with Upper Lobe Predominance Trial (STEP-UP)



Lancet Respir Med. 2016; 4(3):185-93

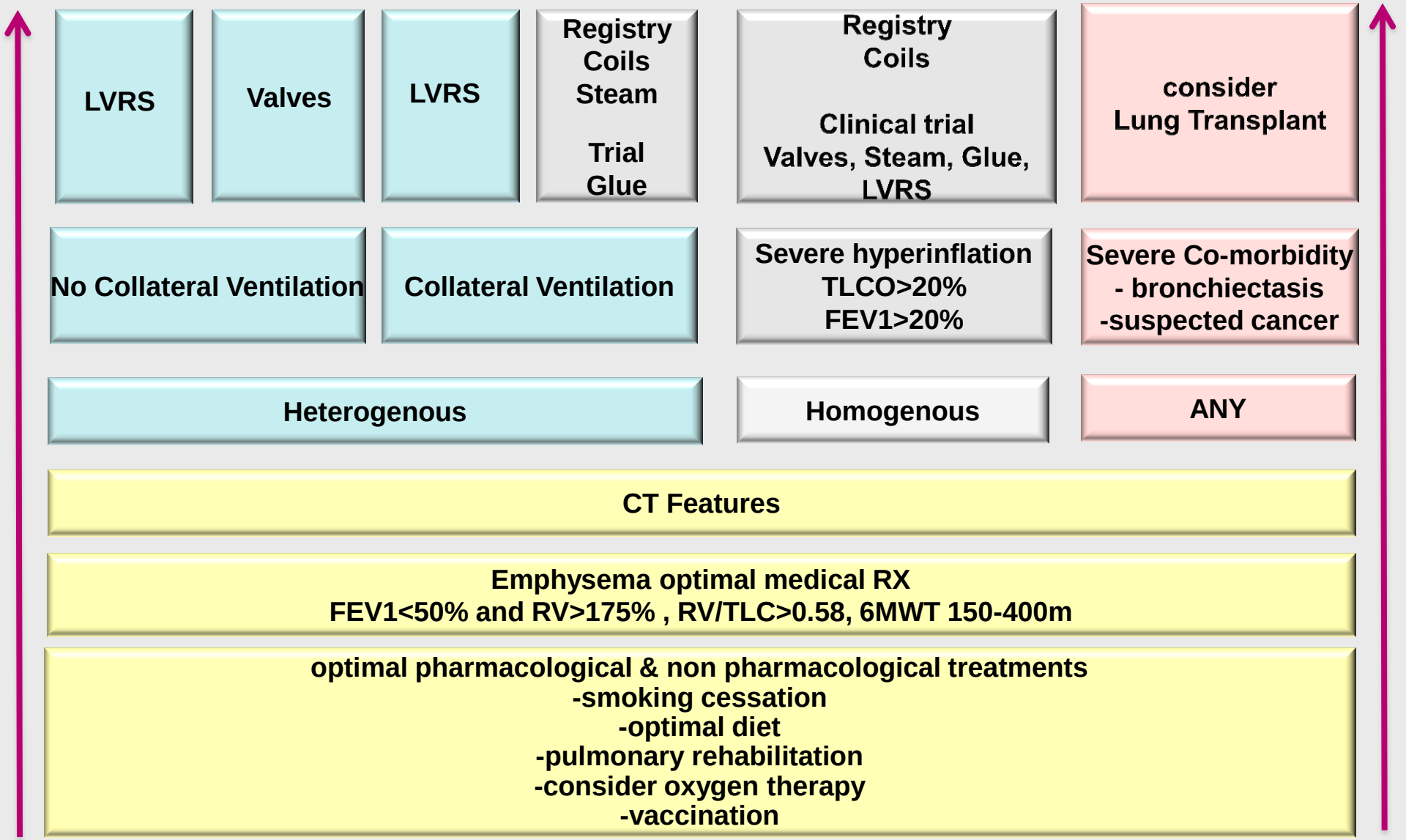
Herth FJF et al., Sequential Segmental Treatment of Emphysema with Upper Lobe Predominance Trial (STEP-UP)

	Treatment group (n=45)			Control group (n=24)
	After treatment session 1	After treatment session 2	0–180 days of treatment (overall)*	0–180 days of randomisation (overall)
COPD exacerbation	6 (13%)	6 (15%)	11 (24%)	1 (4%)
Pneumonia or pneumonitis	6 (13%)	3 (8%)	8 (18%)	2 (8%)
Pneumothorax	0	1 (3%)	1 (2%)	0
Requiring surgery	0	0	0	0
Requiring chest tube(s)	0	0	0	0
Haemoptysis	0	1 (3%)	1 (2%)	0
Death	1 (2%)	0	1 (2%)	0
Any serious respiratory adverse event	10 (22%)	9 (23%)	16 (36%)	3 (13%)

Data are n (%). *180 days after treatment session 1 or 90 days after treatment session 2.

Lancet Respir Med. 2016; 4(3):185-93

Herth FJF et al., Endoscopic lung volume reduction – an expert panel recommendation



Respiration 2016;91(3):241-50

Slebos DJ. et al., Targeted lung denervation for moderate to severe COPD: a pilot study.

22 patients
Positive relative change in FEV1 >15% following administration of ipratropium
FEV1 30%–60%

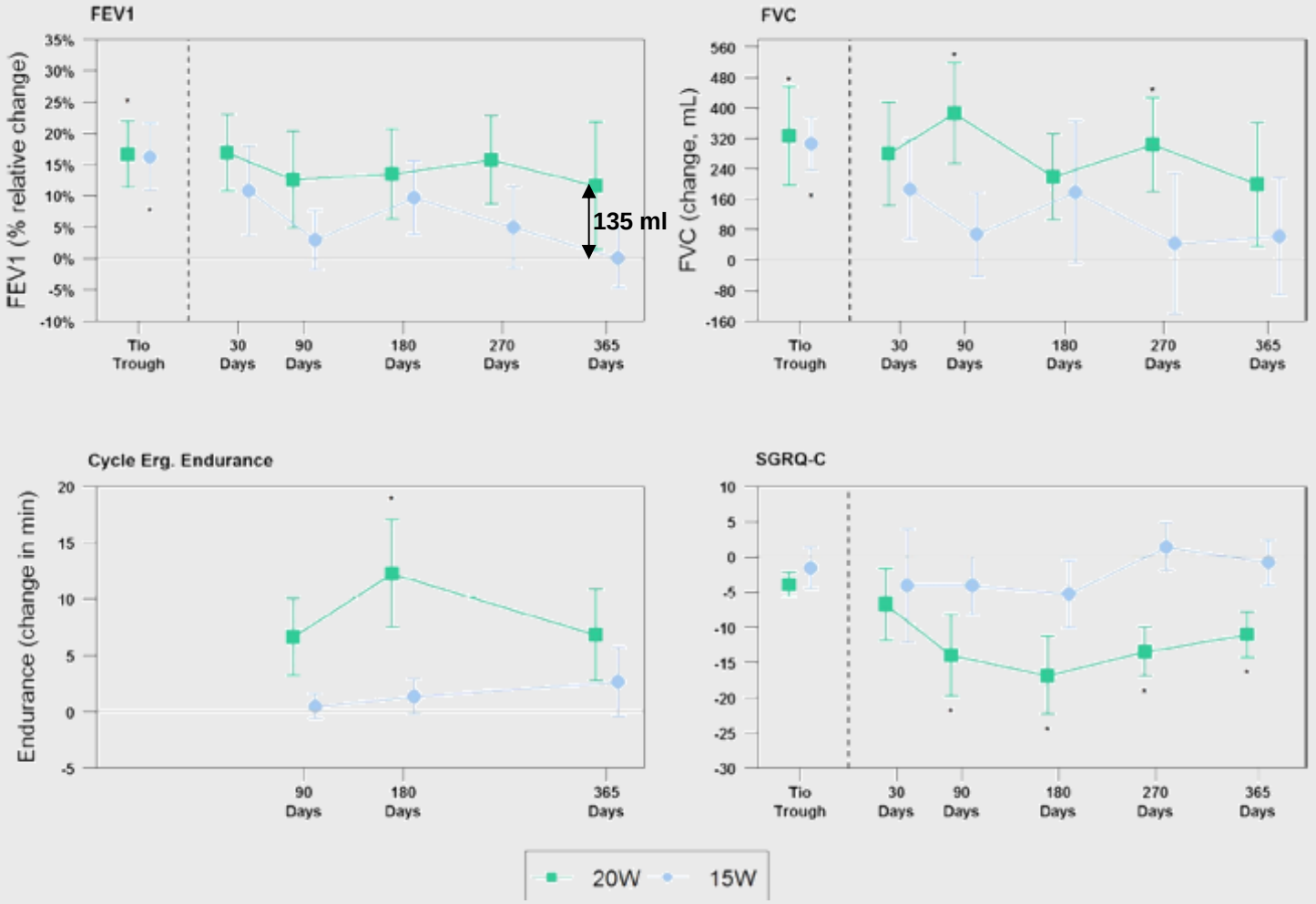
TLD
15 Watt
vs.
20 Watt

primary endpoint worsening of COPD
Secondary endpoints technical feasibility, lung function, exercise capacity, QoL.

	20 W cohort (n=12)	15 W cohort (n=10)
Age (years)	62.92 (11.37)	64.40 (8.87)
Male (n, %)	7 (58)	4 (40)
Ethnic origin (n, %)		
White	12 (100)	8 (80)
Black	0 (0)	2 (20)
History of smoking (n, %)	12 (100)	10 (100)
Pack-years	38.57 (19.97)	44.60 (25.86)
Wash-out prebronchodilator FEV_1 (L)	0.90 (0.28)	0.84 (0.15)
Wash-out prebronchodilator FVC (L)	2.56 (0.59)	2.45 (0.60)
Reversibility peak relative change in FEV_1 (%)	25.95 (7.60)	19.89 (1.91)
Run-in tiotropium trough FEV_1 (L)	1.04 (0.39)	0.98 (0.23)
Run-in tiotropium trough FVC (L)	2.89 (0.76)	2.75 (0.60)
Cycle endurance time @ 75% of max (min)	6.71 (3.26)	4.57 (2.20)
SGRQ-C total score (points)	56.16 (13.71)	56.23 (20.85)
Average diameter: right main bronchus (mm)*	13.42 (1.57)	13.91 (1.62)
Average diameter: left main bronchus (mm)*	12.02 (1.45)	12.33 (1.68)

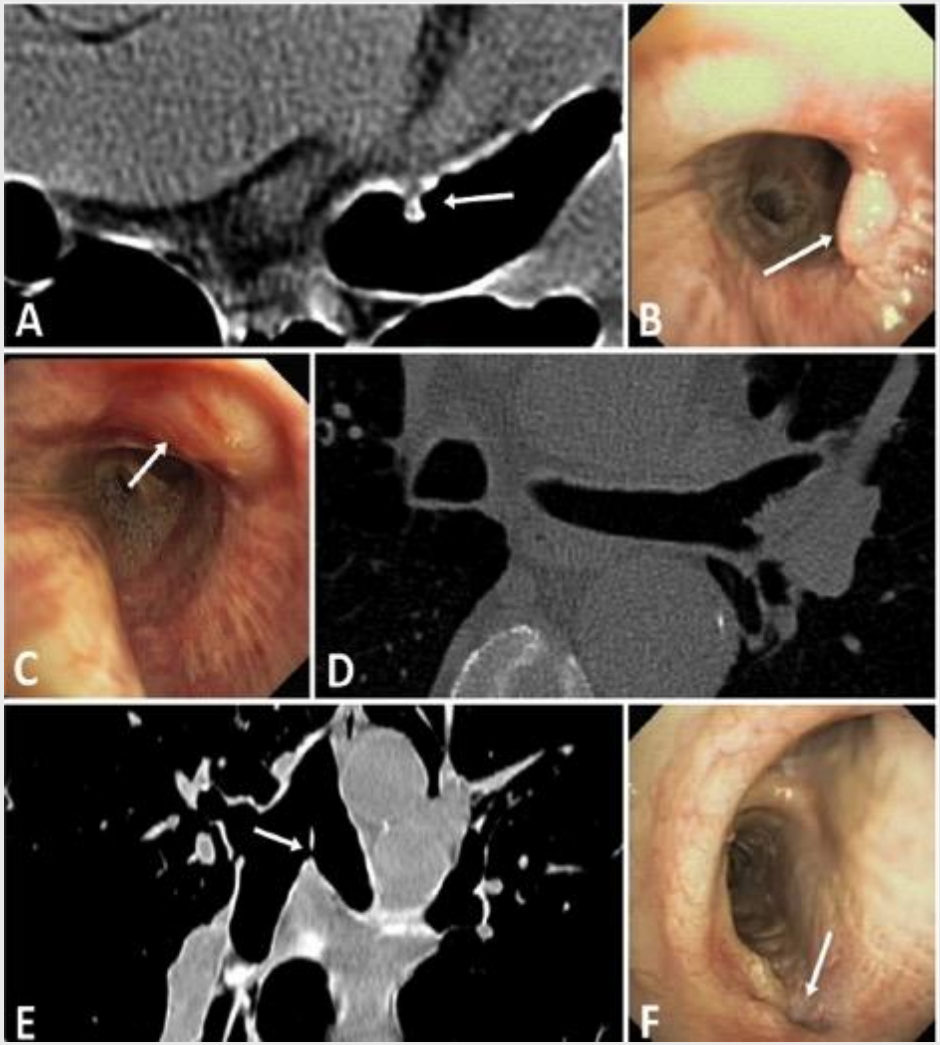
Thorax, 2015. 70(5):411-9.

Slebos DJ. et al., Targeted lung denervation for moderate to severe COPD: a pilot study.



Thorax, 2015. 70(5): 411-9.

Slebos DJ. et al., Targeted lung denervation for moderate to severe COPD: a pilot study.



- 2x Bronchial perforation (carina)
- 1x Bronchial stenosis
- 1x Bronchial ulceration
- 1x Difficulty swallowing
- 1x Gastroparesis

Thorax, 2015. 70(5):411-9.

additional ELVR-papers

- **valves effective in upper- and lower lobe**
  Eberhardt R et al, Respiration 2015
- **LTX after ELVR possible without any sideeffects**
  Fuehner T et al, Respiration 2014
- **RH function improves after valving**
  Pizarro C et al, Plos one, 2015
- **Perfusions scans helpful in patient selection**
  Pizarro C et al, Eur Respir J, 2015
- **Valving possible in severe PH patients**
  Eberhardt R et al, Respiration 2015

Take-Home Message

- valve hypothesis confirmed
- Success rate > 80% in well selected patients

- Coil trials disillusioning
- Need for better patient selection criteria

- steam confirmed efficacy
- stepwise approach reduced AE rate

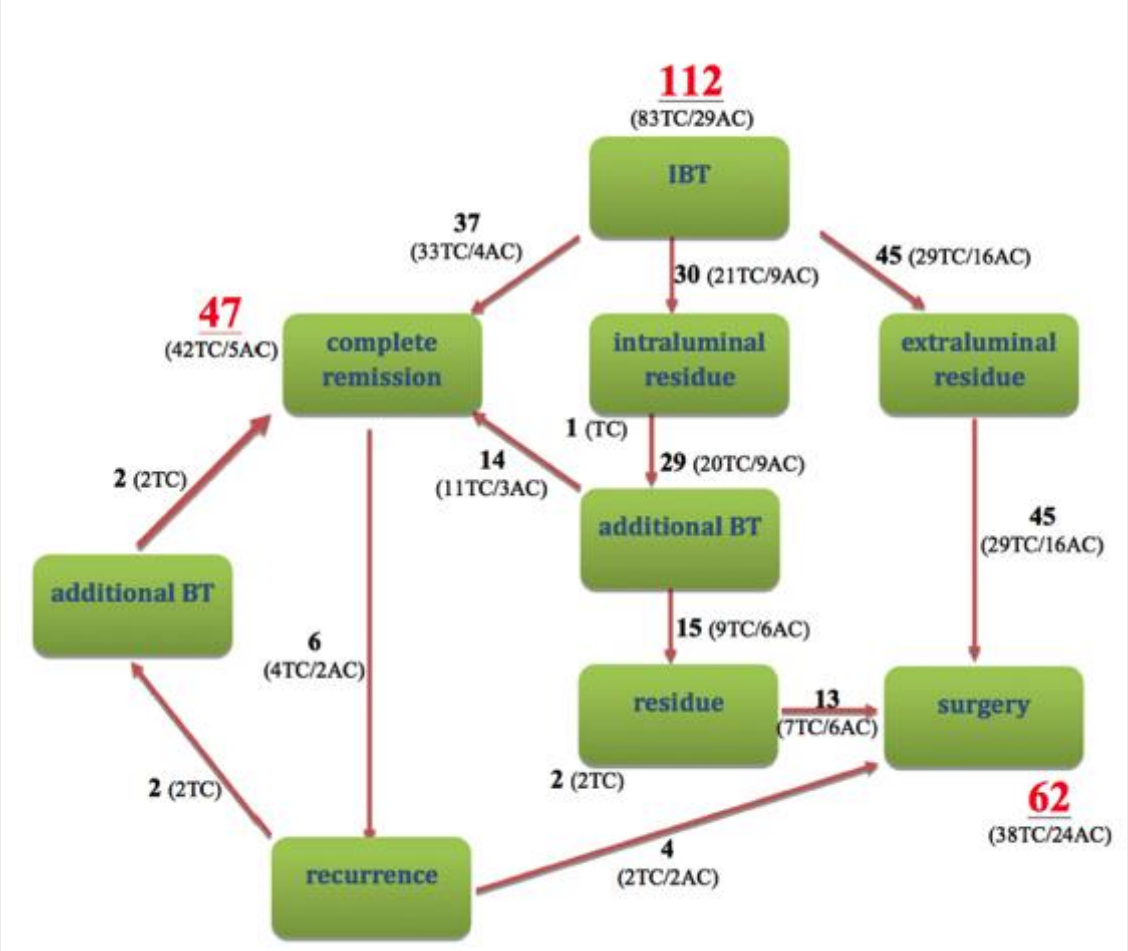
- Targeted lung denervation
- new option for COPD B/C II/III patients
- RCT trial started

The best of the rest

Brokx HA. et al., Long-term follow-up after first-line bronchoscopic therapy in patients with bronchial carcinoids.

Thorax, 2015. 70(5):468-72

Brokx HA. et al., Long-term follow-up after first-line bronchoscopic therapy in patients with bronchial carcinoids.



Thorax, 2015. 70(5):468-72

Brokx HA. et al., Long-term follow-up after first-line bronchoscopic therapy in patients with bronchial carcinoids.

Table 3 Follow-up (FU) of patients still alive in months from initial bronchoscopic treatment (IBT) until July 2014

Carcinoid	Treatment (n)	Outcome (n)	Median FU (mo)	Range FU (mo)	Remarks
Typical (75)	IBT (38)	CR (33)	120	(73–241)	
		Residue (3)	168	(140–205)	1 unfit, 2 refused
		Recurrence (2)	10 and 63		IBT—Recurrence
			98 and 29		BT—July 2014
	Surgery (37)	CR (35)	129	(60–267)	
		Recurrence (2)	47 and 104		IBT—Recurrence
			57 and 111		Surgery—July 2014
Atypical (25)	IBT (5)	CR (5)	109	(83–170)	
	Surgery (20)	CR (18)	88.5	(60–159)	
		Recurrence (2)	116 and 198		IBT—Recurrence
			113 and 79		Surgery—July 2014

No residual tumour detected macroscopically (videobronchoscopy, high resolution CT) and microscopically (biopsy and brush specimens).
CR, complete remission; BT, bronchoscopic treatment.

Conclusions: IBT is justifiable with excellent long-term outcome. IBT made surgery unnecessary in 42% of the cases.

Thorax, 2015. 70(5):468-72

Ost DE. et al., Complications Following Therapeutic Bronchoscopy for Malignant Central Airway Obstruction: Results of the AQuIRE Registry.

Quality Improvement Registry, Evaluation, and Education (AQuIRE)

Registry Interventional or diagnostic BRSC

Complications IP in CAO

RESULTS: Fifteen centers performed 1,115 procedures on 947 patients. There were significant differences among centers in the type of anesthesia (moderate vs deep or general anesthesia, $P < .001$), use of rigid bronchoscopy ($P < .001$), type of ventilation (jet vs volume cycled, $P < .001$), and frequency of stent use ($P < .001$). The overall complication rate was 3.9%, but significant variation was found among centers (range, 0.9%-11.7%; $P = .002$). Risk factors for complications were urgent and emergent procedures, American Society of Anesthesiologists (ASA) score > 3, redo therapeutic bronchoscopy, and moderate sedation. The 30-day mortality was 14.8%; mortality varied among centers (range, 7.7%-20.2%, $P = .02$). Risk factors for 30-day mortality included Zubrod score > 1, ASA score > 3, intrinsic or mixed obstruction, and stent placement.

Six patients (0.5%) died secondary to procedural complications. Four patients had a complication and died within 24 h. Two patients had a complication and died 24 h after the procedure, but the complication was believed to be contributory.

Chest, 2015. 148(2):450-71

Take-Home Message

- **Carcinoids need not always a surgical solution**
- **IP is not without complications**

List of References

1. Tomassetti S, Wells AU, Costabel U, Cavazza A, Colby TV, Rossi G, Sverzellati N, Carloni A, Carretta E, Buccioli M, Tantalocco P, Ravaglia C, Gurioli C, Dubini A, Piciucchi S, Ryu JH, Poletti V. Bronchoscopic Lung Cryobiopsy Increases Diagnostic Confidence in the Multidisciplinary Diagnosis of Idiopathic Pulmonary Fibrosis. Am J Respir Crit Care Med. 2016 Apr 1;193(7):745-52

2. Ravaglia C, Bonifazi M, Wells AU, Tomassetti S, Gurioli C, Piciucchi S, Dubini A, Tantalocco P, Sanna S, Negri E, Tramacere I, Ventura VA, Cavazza A, Rossi A, Chilosi M, La Vecchia C, Gasparini S, Poletti V. Safety and Diagnostic Yield of Transbronchial Lung Cryobiopsy in Diffuse Parenchymal Lung Diseases: A Comparative Study versus Video-Assisted Thoracoscopic Lung Biopsy and a Systematic Review of the Literature. Respiration. 2016;91(3):215-27

3. Minezawa, T., et al., Bronchus sign on thin-section computed tomography is a powerful predictive factor for successful transbronchial biopsy using endobronchial ultrasound with a guide sheath for small peripheral lung lesions: a retrospective observational study. BMC Med Imaging, 2015. 15: p. 21.

4. Chen, A., et al., The effect of respiratory motion on pulmonary nodule location during electromagnetic navigation bronchoscopy. Chest, 2015. 147(5): p. 1275-81

5. Koizumi, T., et al., Bronchoscopy-Guided Cooled Radiofrequency Ablation as a Novel Intervention Therapy for Peripheral Lung Cancer. Respiration, 2015. 90(1): p. 47-55

6. Henne, E., et al., Thermal Vapor Ablation for Lung Lesions in a Porcine Model. Respiration, 2015. 90(2): p. 146-54.

7. Harzheim D, Sterman D, Shah PL, Eberhardt R, Herth FJ. Bronchoscopic Transparenchymal Nodule Access: Feasibility and Safety in an Endoscopic Unit. Respiration. 2016 Mar 24. [Epub ahead of print]

List of References

8. Oki M, Saka H, Ando M, Asano F, Kurimoto N, Morita K, Kitagawa C, Kogure Y, Miyazawa T. Ultrathin Bronchoscopy with Multimodal Devices for Peripheral Pulmonary Lesions. A Randomized Trial. Am J Respir Crit Care Med. 2015 Aug 15;192(4):468-76.

9. Nguyen, P., et al., Grey scale texture analysis of endobronchial ultrasound mini probe images for prediction of benign or malignant aetiology. Respirology, 2015. 20(6): p. 960-6

10. Casal, R.F., et al., Randomized trial of endobronchial ultrasound-guided transbronchial needle aspiration under general anesthesia versus moderate sedation. Am J Respir Crit Care Med, 2015. 191(7): p. 796-803

11. Navani, N., et al., Lung cancer diagnosis and staging with endobronchial ultrasound-guided transbronchial needle aspiration compared with conventional approaches: an open-label, pragmatic, randomised controlled trial. Lancet Respir Med, 2015. 3(4): p. 282-9.

12. Izumo, T., et al., Endobronchial ultrasound elastography in the diagnosis of mediastinal and hilar lymph nodes. Jpn J Clin Oncol, 2014. 44(10): p. 956-62.

13. Vilmann, P., et al., Combined endobronchial and esophageal endosonography for the diagnosis and staging of lung cancer: European Society of Gastrointestinal Endoscopy (ESGE) Guideline, in cooperation with the European Respiratory Society (ERS) and the European Society of Thoracic Surgeons (ESTS). Endoscopy, 2015. 47(6): p. c1.

14. Konge, L., et al., Simulator training for endobronchial ultrasound: a randomised controlled trial. Eur Respir J, 2015 ;46(4):1140-9

15. Bott, M.J., et al., A Prospective Clinical Trial of Telecytopathology for Rapid Interpretation of Specimens Obtained During Endobronchial Ultrasound-Fine Needle Aspiration. Ann Thorac Surg, 2015. 100(1): p. 201-5; discussion 205-6.

List of References

16. Gnass, M., et al., Comaparison of conventional and ultrasound-guided needle biopsy techniques in the diagnosis of sarcoidosis: a randomized trial. Pol Arch Med Wewn, 2015. 125(5): p. 321-8.

17. Klooster K et al., Endobronchial Valve Treatment Versus Standard Medical Care in Patients with Emphysema Without Interlobar Collateral Ventilation (The STELVIO-Trial) N Engl J Med 2015;373:2325-35

18. Sciurba F et al., Effect of Endobronchial Coils vs Usual Care on Exercise Tolerance in Patients With Severe Emphysema (RENEW Trial). JAMA, 2016 315(20):2178-89

19. Deslee G. et al., Lung Volume Reduction Coil Treatment Improves Exercise Capacity at 6 Months in Severe Emphysema (REVOLENS) JAMA. 2016;315(2):175-184

20. Herth FJ, Valipour A, Shah PL, Eberhardt R, Grah C, Egan J, Ficker JH, Wagner M, Witt C, Liebers U, Hopkins P, Gesierich W, Phillips M, Stanzel F, McNulty WH, Petermann C, Snell G, Gompelmann D. Segmental volume reduction using thermal vapour ablation in patients with severe emphysema: 6-month results of the multicentre, parallel-group, open-label, randomised controlled STEP-UP trial. Lancet Respir Med. 2016 Mar;4(3):185-93

21. Herzog D., et al., Modifying Post-Operative Medical Care after EBV Implant May Reduce Pneumothorax Incidence.

PLoS One, 2015. 10(5): p. e0128097

22. Herth FJ, Slebos DJ, Rabe KF, Shah PL. Endoscopic Lung Volume Reduction: An Expert Panel Recommendation. Respiration. 2016;91(3):241-50

23. Slebos DJ. et al., Targeted lung denervation for moderate to severe COPD: a pilot study.

Thorax, 2015. 70(5):411-9

24. Eberhardt, R., et al., Endoscopic lung volume reduction with endobronchial valves in patients with severe emphysema and established pulmonary hypertension. Respiration, 2015. 89(1): p. 41-8.

List of References

25. Pizarro, C., et al., Impact of endoscopic lung volume reduction on right ventricular myocardial function. PLoS One, 2015. 10(4): p. e0121377.

26. Fuehner, T., et al., Lung Transplantation after Endoscopic Lung Volume Reduction. Respiration, 2015.

27. Pizarro, C., et al., Volumetric and scintigraphic changes following endoscopic lung volume reduction. Eur Respir J, 2015. 45(1): p. 262-5.

28. Eberhardt R, Herth FJ, Radhakrishnan S, Gompelmann D. Comparing Clinical Outcomes in Upper versus Lower Lobe Endobronchial Valve Treatment in Severe Emphysema. Respiration. 2015;90(4):314-20

29. Brokx HA. et al., Long-term follow-up after first-line bronchoscopic therapy in patients with bronchial carcinoids.

Thorax, 2015. 70(5):468-72

30. Ost DE. et al., Complications Following Therapeutic Bronchoscopy for Malignant Central Airway Obstruction: Results of the AQuIRE Registry.

Chest, 2015; 148(2):450-71

List of Abbreviations

- EBUS = Endobronchial Ultrasound
- EUS = Endoesophageal ultrasound
- ELVR = Endoscopic lung volume reduction
- SPN = Solitary pulmonary nodule
- LTX = Lung transplantation
- THSK = Medical thoracoscopy
- TBNA = transbronchial ultrasound
- RH = right heart
- PH = pulmonary hyertension