

Initial Diagnostic approach to ILD

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제갈양진



간질성폐질환

직업성 / 환경성

규폐증

석면폐증

베릴륨폐증

과민성 폐렴 ...

의인성

약물 / 방사선

결체조직질환

류마티스 관절염

전신홍반성낭창

전신경화증

쉐그렌증후군 ...

특발성

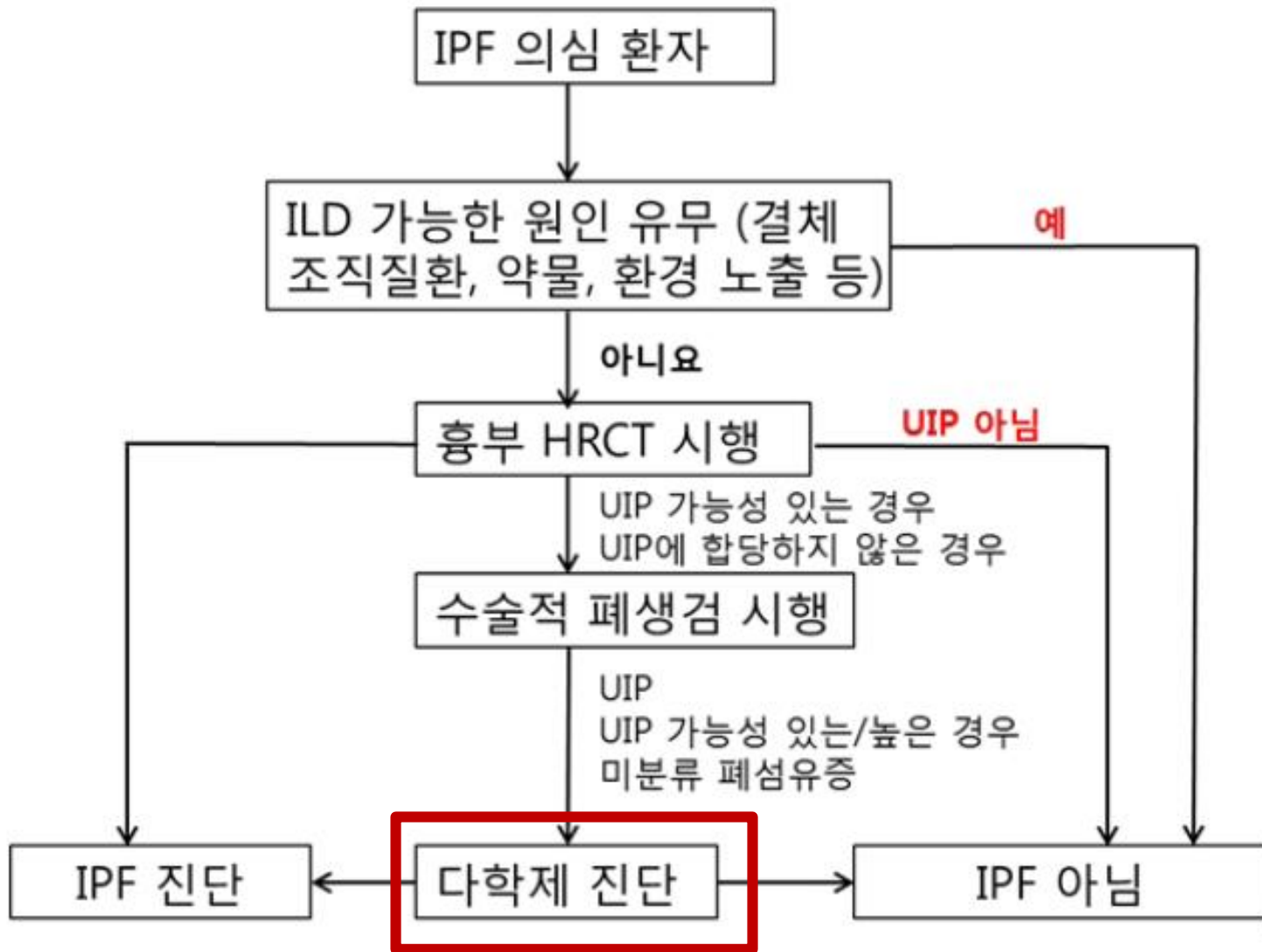


그림 2-3. IPF 진단 알고리즘

TABLE 1. REVISED AMERICAN THORACIC SOCIETY/EUROPEAN RESPIRATORY SOCIETY CLASSIFICATION OF IDIOPATHIC INTERSTITIAL PNEUMONIAS: MULTIDISCIPLINARY DIAGNOSES

Major idiopathic interstitial pneumonias

Idiopathic pulmonary fibrosis

Idiopathic nonspecific interstitial pneumonia

Respiratory bronchiolitis–interstitial lung disease

Desquamative interstitial pneumonia

Cryptogenic organizing pneumonia

Acute interstitial pneumonia

Rare idiopathic interstitial pneumonias

Idiopathic lymphoid interstitial pneumonia

Idiopathic pleuroparenchymal fibroelastosis

Unclassifiable idiopathic interstitial pneumonias*

다학제진단

임상

원인이 뭘까?
CT 찍을까?
PFT 할까?
BAL 할까?
Biopsy 할까?
TBLB? VATS?

간질성
폐질환

영상의학

병리

Multicentre evaluation of multidisciplinary team meeting agreement on diagnosis in diffuse parenchymal lung disease: a case-cohort study

Simon L F Walsh, Athol U Wells, Sujal R Desai, Venerino Poletti, Sara Piciocchi, Alessandra Dubini, Hilario Nunes, Dominique Valeyre, Pierre Y Brillet, Marianne Kambouchner, António Morais, José M Pereira, Conceição Souto Moura, Jan C Grutters, Daniel A van den Heuvel, Hendrik W van Es, Matthijs F van Oosterhout, Cornelis A Seldenrijk, Elisabeth Bendstrup, Finn Rasmussen, Line B Madsen, Bibek Gooptu, Sabine Pomplun, Hiroyuki Taniguchi, Junya Fukuoka, Takeshi Johkoh, Andrew G Nicholson, Charlie Sayer, Lilian Edmunds, Joseph Jacob, Maria A Kokosi, Jeffrey L Myers, Kevin R Flaherty, David M Hansell

Seven MDTMs
(Denmark, France, Italy,
Japan, Netherlands,
Portugal, and the UK)

	Clinicians (κ w)	Radiologists (κ w)	Pathologists (κ w)	MDTM (κ w)
Idiopathic pulmonary fibrosis	0.72 (0.67–0.76)	0.60 (0.46–0.66)	0.58 (0.45–0.66)	0.71 (0.64–0.77)
Connective tissue disease-related interstitial lung disease	0.76 (0.70–0.78)	0.17 (0.08–0.31)	0.21 (0.06–0.36)	0.73 (0.68–0.78)
Non-specific interstitial pneumonia	0.31 (0.27–0.41)	0.32 (0.26–0.41)	0.30 (0.00–0.53)	0.42 (0.37–0.49)
Hypersensitivity pneumonitis	0.42 (0.30–0.47)	0.35 (0.29–0.43)	0.26 (0.10–0.45)	0.29 (0.24–0.40)

Data are median (IQR). MDTM=multidisciplinary team meeting.

Table 4: Weighted kappa values (κ w) for estimation of diagnostic likelihood for individual diagnoses of diffuse parenchymal lung disease

병력청취

- 성별, 나이
- 결체조직질환의 증상
- 직업력(Asbestos, beryllium, metal working, farmer, isocyanates etc.)
- 취미활동, 환경적 병력, 애완동물
- 투약경력(amiodarone, nitrofurantoin)
- 흡연력
- 가족력
- 발병양상 (acute, subacute, chronic)

표 1. ILD환자에서 기저CTD진단을 위한 핵심 증상들⁷¹

장기	확인해야 할 징후들 (manifestations)
말초 순환	레이노현상 (Raynaud's phenomenon)
피부	손발가락경화증(sclerodactyly) (그림 1-3) 손발가락궤양(digital ulcerations) 혹은 scars 혈관확장증 (telangiectasia) (그림 1-4,5) Gottron's sign 눈가 주위의 홍반(rash) 목, 흉부 상부, 어깨 부위의 홍반 (Heliotrope rash) (그림 1-6) 광과민성 기계공 손(Mechanics' hands)
관절	관절통, 관절부종 조조 관절강직 (60분 이상)
근육	근육통, 근력약화
구강, 안구	구강 건조, 안구 건조 (Sicca syndrome)

Autoantibody prevalence

	SLE	RA	SSc	PM/DM	SS	MCTD
ANA	90-98	40	96	25-90	70-95	93
Anti-dsDNA	50-80					
Anti-Smith	20-30					
Rheumatoid factor	15-25	65-90	10-50	10-40	30-70	
Anti-SSA/Ro	20-30				50-90	
Anti-SSB/La	10-20				50	
Anti-Scl-70			30-35			
Anticentromere Ab			40-80			
Anti-Jo-1				10-50		
Anti-RNP	30-40					100
Anti-CCP		50-75				

발병양상

- 급성(수일-수주)

: 급성간질성폐렴(AIP), 급성호산구폐렴(AEP), 과민폐렴(HP), 폐포출혈(DAH)

- 아급성(수주-수개월)

: 특발성 기질화폐렴(COP), 사르코이드증, 만성호산구폐렴(CEP), 약제에 의한 질환

- 만성(수개월-수년)

: IPF, 사르코이드증, PLCH

고민할 필요 없는 환자

80/M

2년 전부터 DOE mMRC 1

1년 전부터 DOE mMRC 2 로 증가 dry cough

30 PY exsmoker 30년 전 금연 농사

Arthragia (-), rash (-)

Finger clubbing (+), bilateral inspiratory crackles (+)

Lt PA



SPIROMETRY

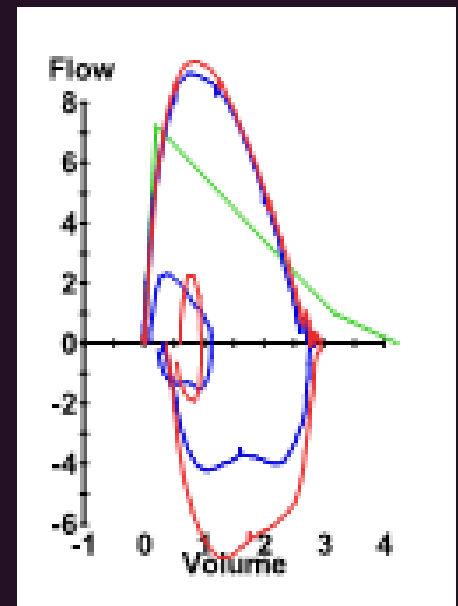
	Pred.	Meas.	%Pred.	Bronchodilator		
				Meas.	%Pred.	%Chg.
FVC	4.24	2.83	67	2.93	69	4
FEV1	2.82	2.76	98	2.80	99	1
FEV1/FVC	68	97		95		
FEF 25~75%	2.10	7.10	338	7.05	335	-1
PEF	7.21	8.97	124	9.34	130	4

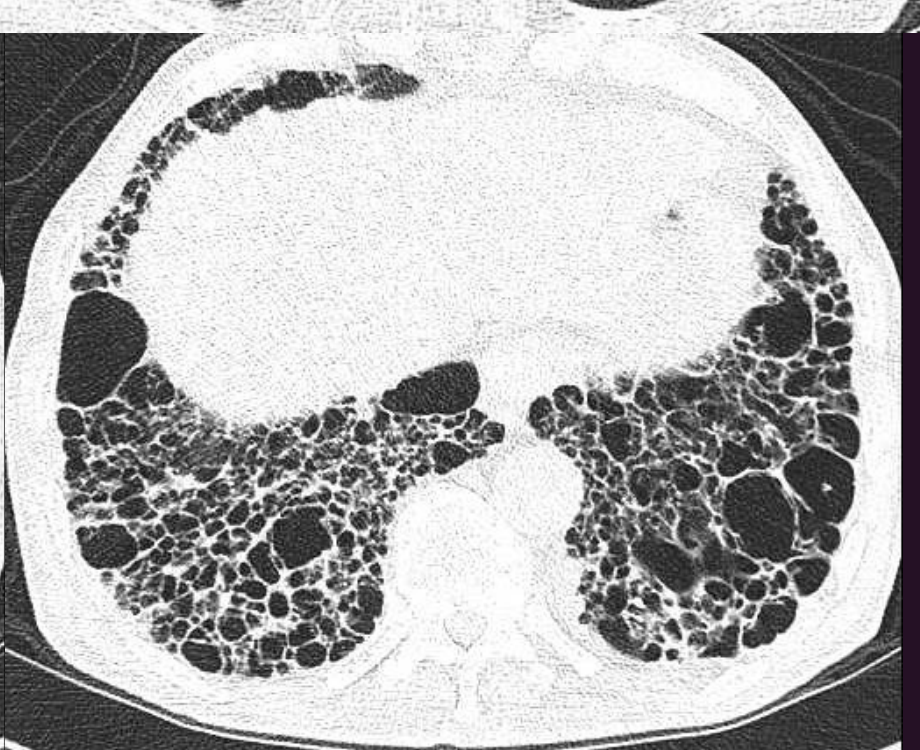
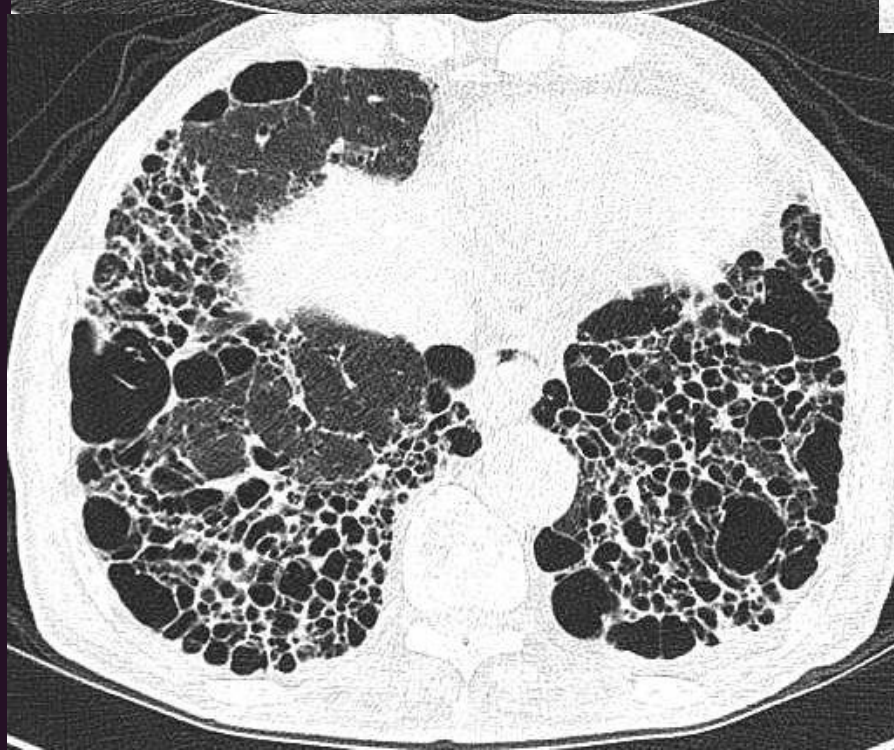
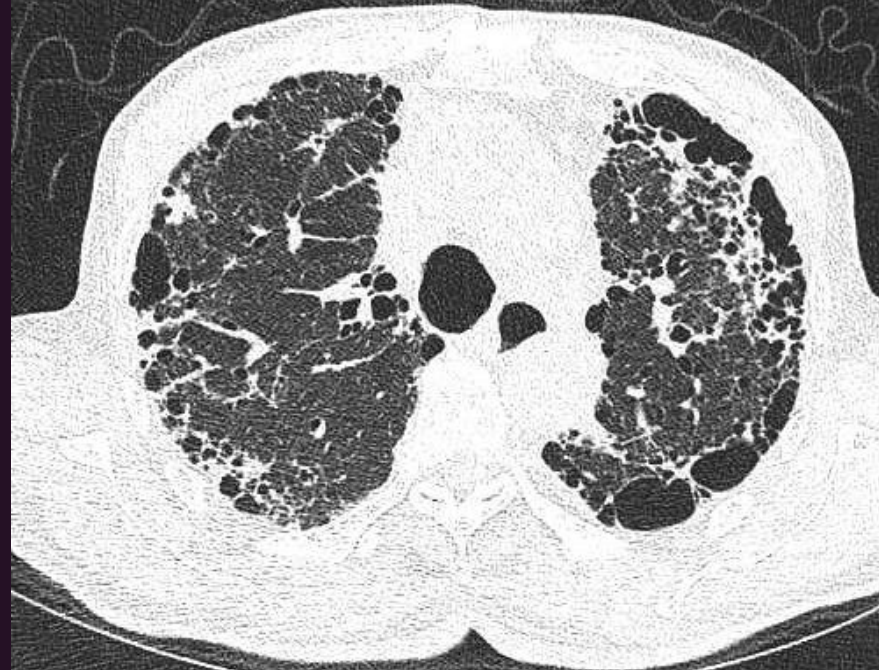
DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	19.40	3.00	15
VA		3.36	
DL/VA	3.37	0.89	26
Corrected	19.40	3.14	16

LUNG VOLUMES

	Pred.	Meas.	%Pred.
TLC	6.51	3.81	59
VC	3.69	2.83	77
FRC	3.61	2.87	79
ERV	1.27	1.80	141
RV	2.73	0.98	36





고민되는 환자

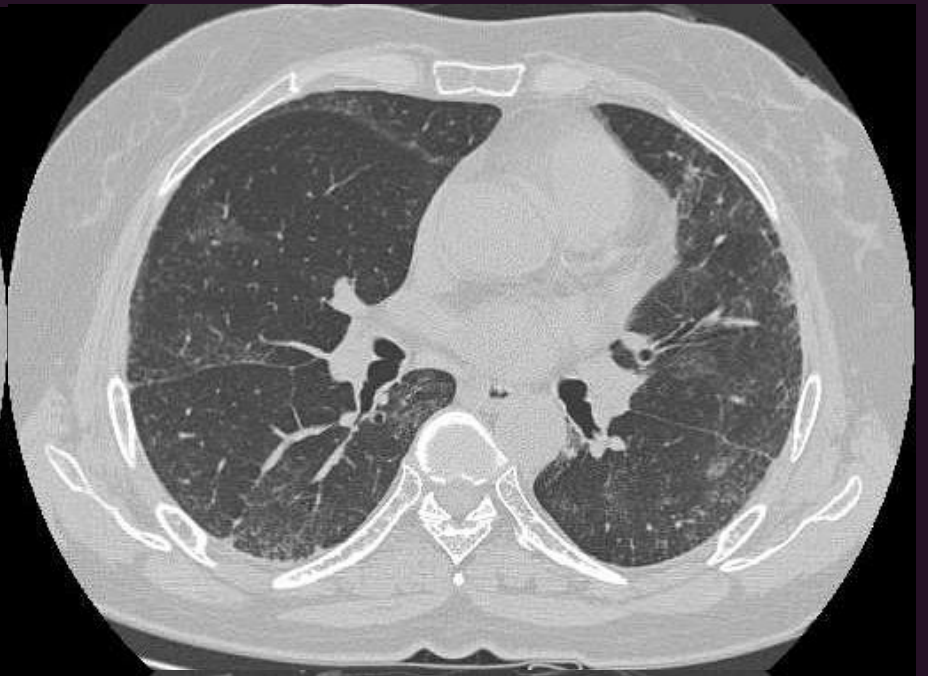
66/F

Nonsmoker

6개월 전부터 마른기침과 호흡곤란 (mMRC₁)

Arthralgia(-), rash(-), dry mouth(-)

Bilateral inspiratory crackles



SPIROMETRY

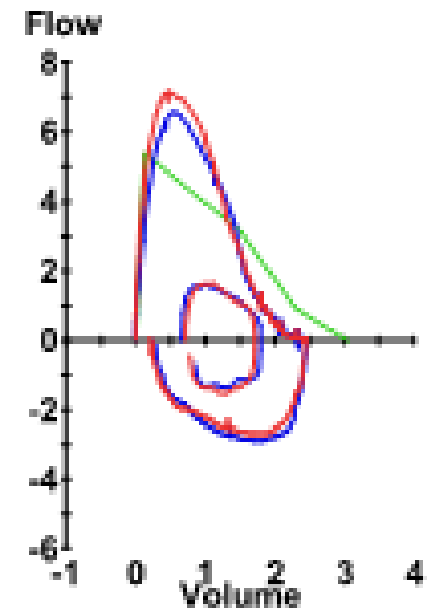
	Pred.	Meas.	%Pred.	Bronchodilator		
				Meas.	%Pred.	%Chg.
FVC	3.05	2.47	81	2.46	81	0
FEV1	2.40	2.10	88	2.11	88	0
FEV1/FVC	78	85		86		
FEF 25~75%	2.38	2.96	124	3.01	127	2
PEF	5.35	6.55	122	7.11	133	9

DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	17.70	8.10	46
VA		3.00	
DL/VA	4.26	2.68	63
Corrected	17.70	8.05	45

LUNG VOLUMES

	Pred.	Meas.	%Pred.
TLC	4.51	3.10	69
VC	2.72	2.47	91
FRC	2.56	1.58	61
ERV	0.90	0.71	79
RV	1.82	0.63	35



Autoantibody

- ANA 1:40
- Rheumatoid factor : negative
- Anti-CCP Ab : negative
- Anti Scl-70 Ab : negative
- Anti Jo-1 Ab : negative
- Anti-Sm/RNP Ab : negative
- Anti-Centromere Ab : negative
- ANCA : negative

Clinical Evidence of Diffuse Infiltrative Lung Disease

Patient history, physical examination, chest radiograph, pulmonary function testing

High-Resolution CT Scan*

Extensive Honeycomb Change Throughout Lung[†]

BAL Cellular Analysis Not Required

Supportive Care and Lung Transplant as Appropriate

Diagnostic HRCT

BAL Cellular Analysis Not Required

Non-Diagnostic HRCT[†]

Bronchoalveolar Lavage Cellular analyses

Supportive features for a specific diagnosis or narrows differential diagnosis

Non-diagnostic

Surgical Lung Biopsy

Normal Adults (Nonsmokers) BAL Differential Cell Counts

Macrophages	85%
Lymphocytes	10–15%
(CD4+/CD8+=0.9–2.5)	
Neutrophils	<3%
Eosinophils	<1%
Epithelial cells	<5%

Lymphocytic cellular pattern

>15% lymphocytes

Sarcoidosis
 Nonspecific interstitial pneumonia (NSIP)
 Hypersensitivity pneumonitis
 Drug-induced pneumonitis
 Collagen vascular diseases
 Radiation pneumonitis
 Cryptogenic organizing pneumonia (COP)
 Lymphoproliferative disorders

Eosinophilic cellular pattern

>1% eosinophils

Eosinophilic pneumonias
 Drug-induced pneumonitis
 Bone marrow transplant
 Asthma, bronchitis
 Churg-Strauss syndrome
 Allergic bronchopulmonary aspergillosis
 Bacterial, fungal, helminthic, *Pneumocystis* infectio
 Hodgkin's disease

Neutrophilic cellular pattern

>3% neutrophils

Collagen vascular diseases
 Idiopathic pulmonary fibrosis
 Aspiration pneumonia
 Infection: bacterial, fungal
 Bronchitis
 Asbestosis
 Acute respiratory distress syndrome (ARDS)
 Diffuse alveolar damage (DAD)

- lymphocyte >25% - granulomatous disease c-NSIP, drug reaction, LIP, COP, or lymphoma.
- lymphocyte >50% - HP, cNSIP
- CD4+/CD8+>4 is highly specific for sarcoidosis.
- neutrophil >50% - acute lung injury, aspiration pneumonia, or suppurative infection.
- eosinophil >25% - virtually diagnostic of acute or chronic eosinophilic pneumonia.

Utility of Transbronchial vs Surgical Lung Biopsy in the Diagnosis of Suspected Fibrotic Interstitial Lung Disease



Jamie S. Sheth, MD; John A. Belperio, MD; Michael C. Fishbein, MD; Ella A. Kazerooni, MD; Amir Lagstein, MD; Susan Murray, ScD; Jeff L. Myers, MD; Richard H. Simon, MD; Thomas H. Sisson, MD; Baskaran Sundaram, MD; Eric S. White, MD; Meng Xia, MS; David Zisman, MD; and Kevin R. Flaherty, MD

TABLE 3] Characteristics of TBB Specimens

Variable	Total N = 33	UIP on SLB n = 15	Non-UIP on SLB n = 18
No. of alveolated	3 (0-7)	3 (0-7)	3 (0-6)

Information from TBB, when combined with clinical and HRCT data, may provide enough information to make a confident and accurate diagnosis in approximately 20% to 30% of patients with ILD.

No. (%)

BAL and TBLB

- BAL

WBC 340/uI (M 62%, N 9%, L 25%, E 4%)

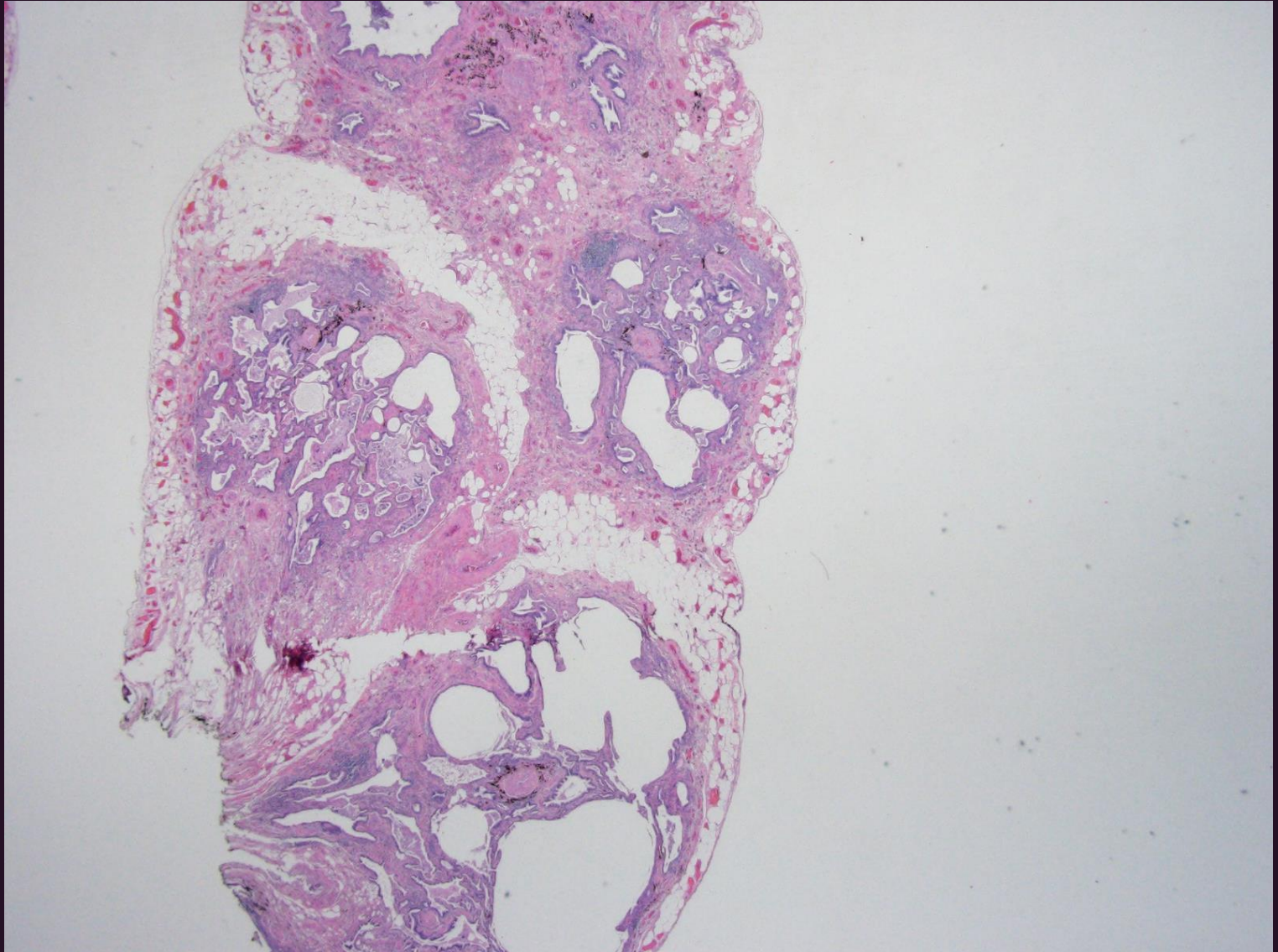
- TBLB (Left lower lobe, post basal segment)

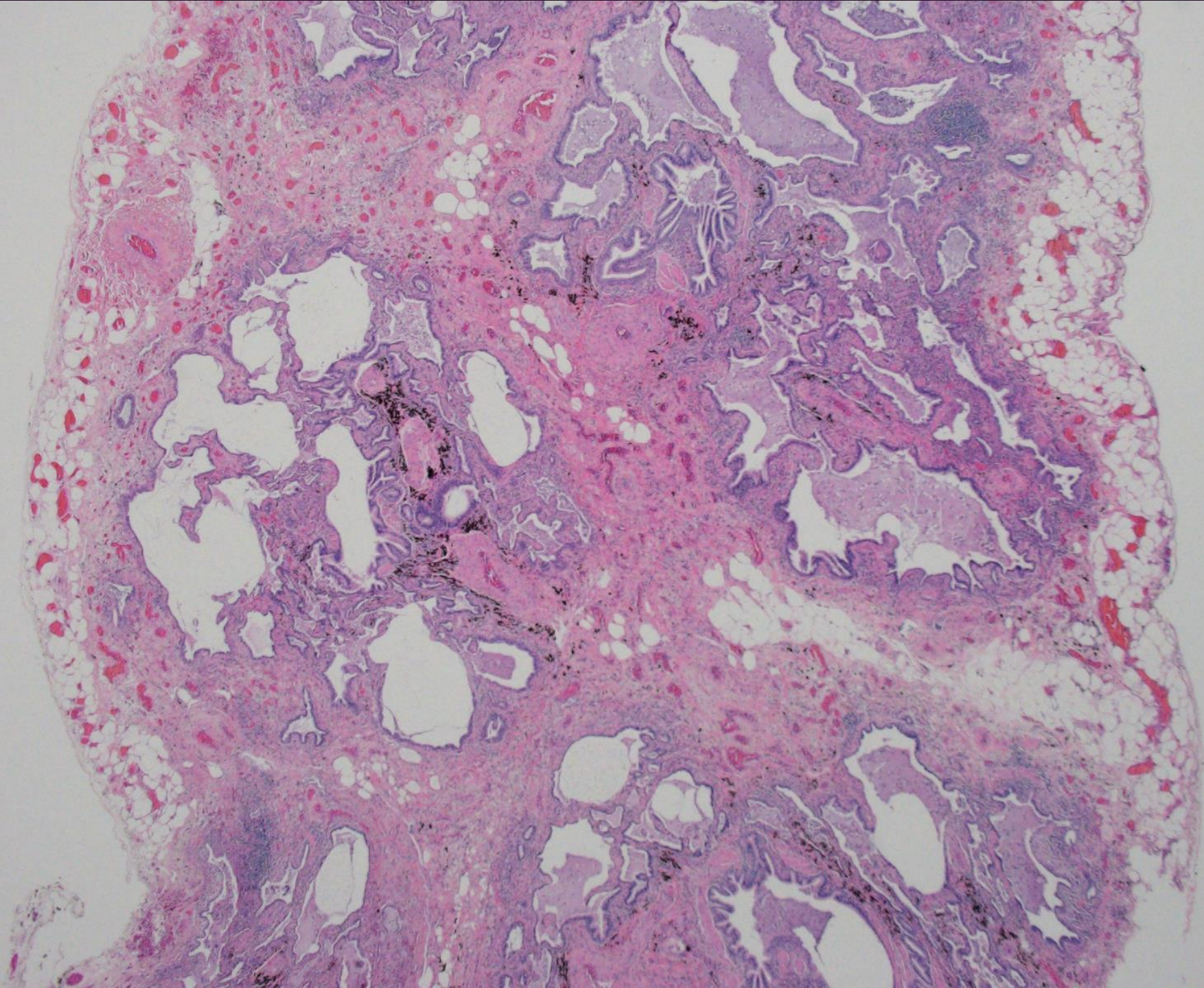
; Mild interstitial fibrosis and mild pneumocytes proliferation.

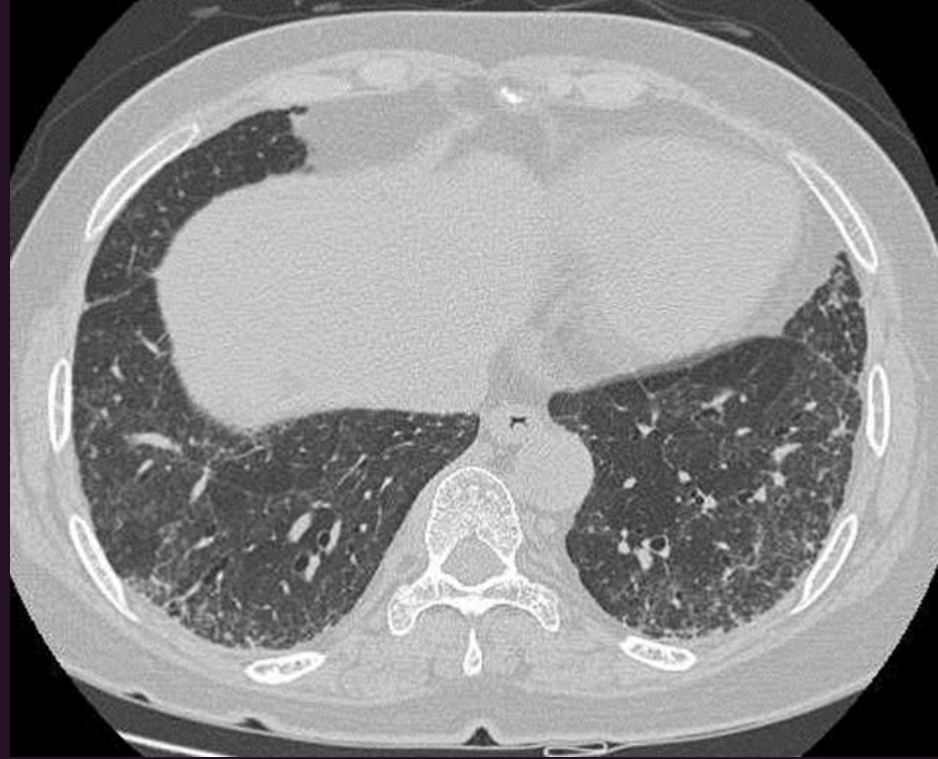
VATS biopsy 결정시 고려해야 할 요소

- CT가 얼마나 진단적인가?
: 조직학적 패턴에 대한 정보가 얼마나 도움이 되나?
- 수술의 위험은 얼마인가?
: 남자, 고령, 동반질환, 폐기능, 전신상태
- 환자의 의견은 어떠한가?

VATS







2014-12-12



2018-02-27

SPIROMETRY

	Bronchodilator					
	Pred.	Meas.	%Pred.	Meas.	%Pred.	%Chg.
FVC	3.05	2.47	81	2.46	81	0
FEV1	2.40	2.10	88	2.11	88	0
FEV1/FVC	78	85		86		
FEF 25~75%	2.38	2.96	124	3.01	127	2
PEF	5.35	6.55	122	7.11	133	9

DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	17.70	8.10	46
VA		3.00	
DL/VA	4.26	2.68	63
Corrected	17.70	8.05	45

2018/03/05

2014/12/17

SPIROMETRY

	Bronchodilator					
	Pred.	Meas.	%Pred.	Meas.	%Pred.	%Chg.
FVC	2.87	1.26	44	1.31	46	4
FEV1	2.23	1.12	50	1.19	53	6
FEV1/FVC	77	89		91		
FEF 25~75%	2.21	2.21	100	2.48	113	13
PEF	5.15	5.07	98	4.90	95	-3

DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	16.60	3.80	23
VA		1.27	
DL/VA	4.14	2.99	72
Corrected	16.60	3.75	23

흔히 생기는 갈등

- 병변이 minimal 하고 증상도 없는데 그냥 follow up 할까? Work up 할까?
- Biopsy 하면 그냥 BAL 하면서 TBLB 할까? 아니면 VATS 할까?
- 그냥 steroid 써 볼까?

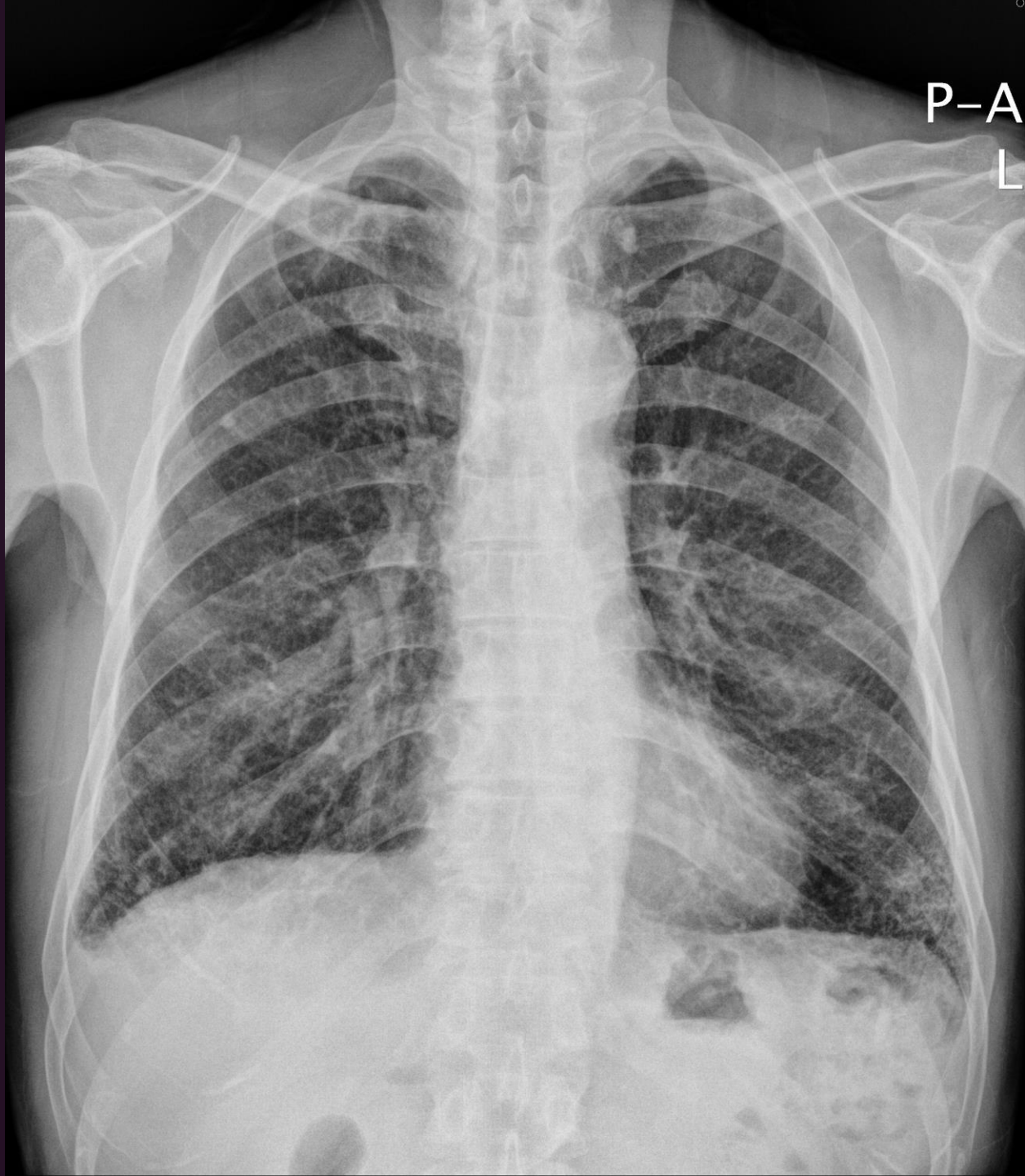
71/M

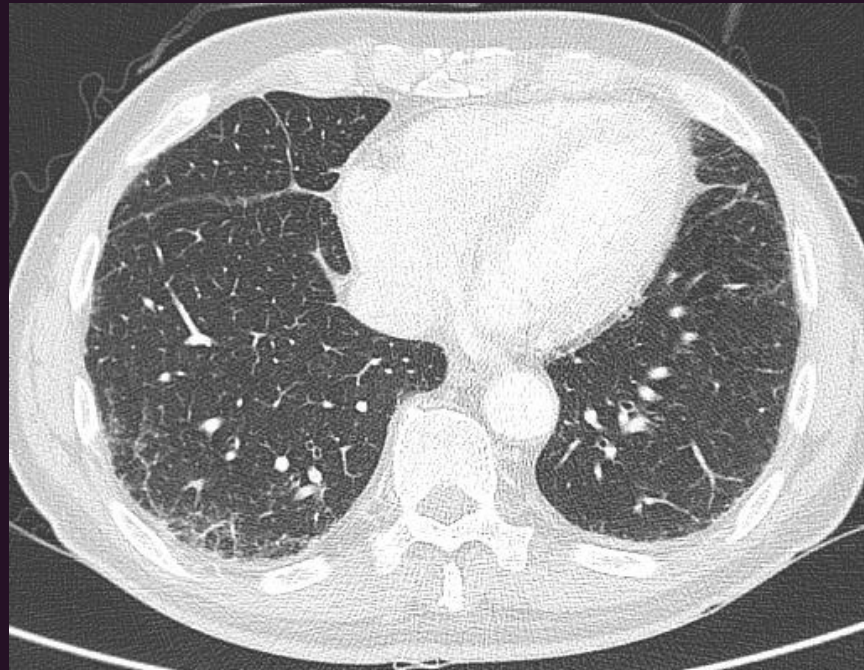
50PY smoker

건강검진에서 간질성폐질환 의심 하에 내원

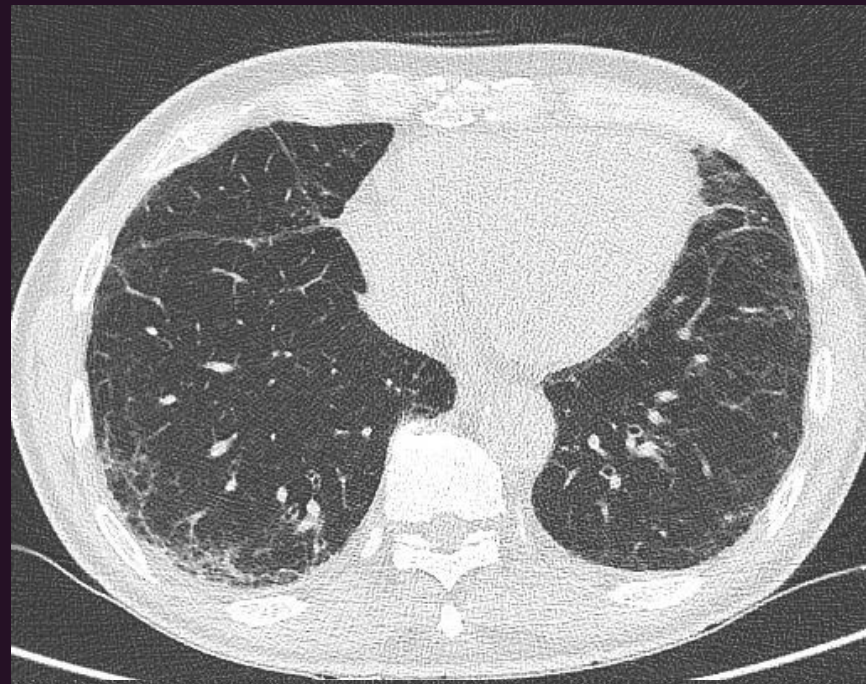
no definite crackles

no respiratory symptoms





2012/06/18



2017/04/18

SPIROMETRY

				Bronchodilator		
	Pred.	Meas.	%Pred.	Meas.	%Pred.	%Chg.
FVC	4.28	3.81	89	3.88	91	2
FEV1	3.07	2.28	74	2.42	79	6
FEV1/FVC	73	60		62		
FEF 25~75%	2.57	0.92	36	1.09	42	18
PEF	7.27	7.12	98	7.11	98	0

DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	20.60	13.30	65
VA		4.50	
DL/VA	3.79	2.95	78
Corrected	20.60	13.30	65

2013/12/04

SPIROMETRY

				Bronchodilator		
	Pred.	Meas.	%Pred.	Meas.	%Pred.	%Chg.
FVC	4.23	3.56	84	3.69	87	4
FEV1	2.97	2.23	75	2.38	80	7
FEV1/FVC	72	63		64		
FEF 25~75%	2.44	0.97	40	1.18	48	21
PEF	7.17	6.20	86	6.79	95	10

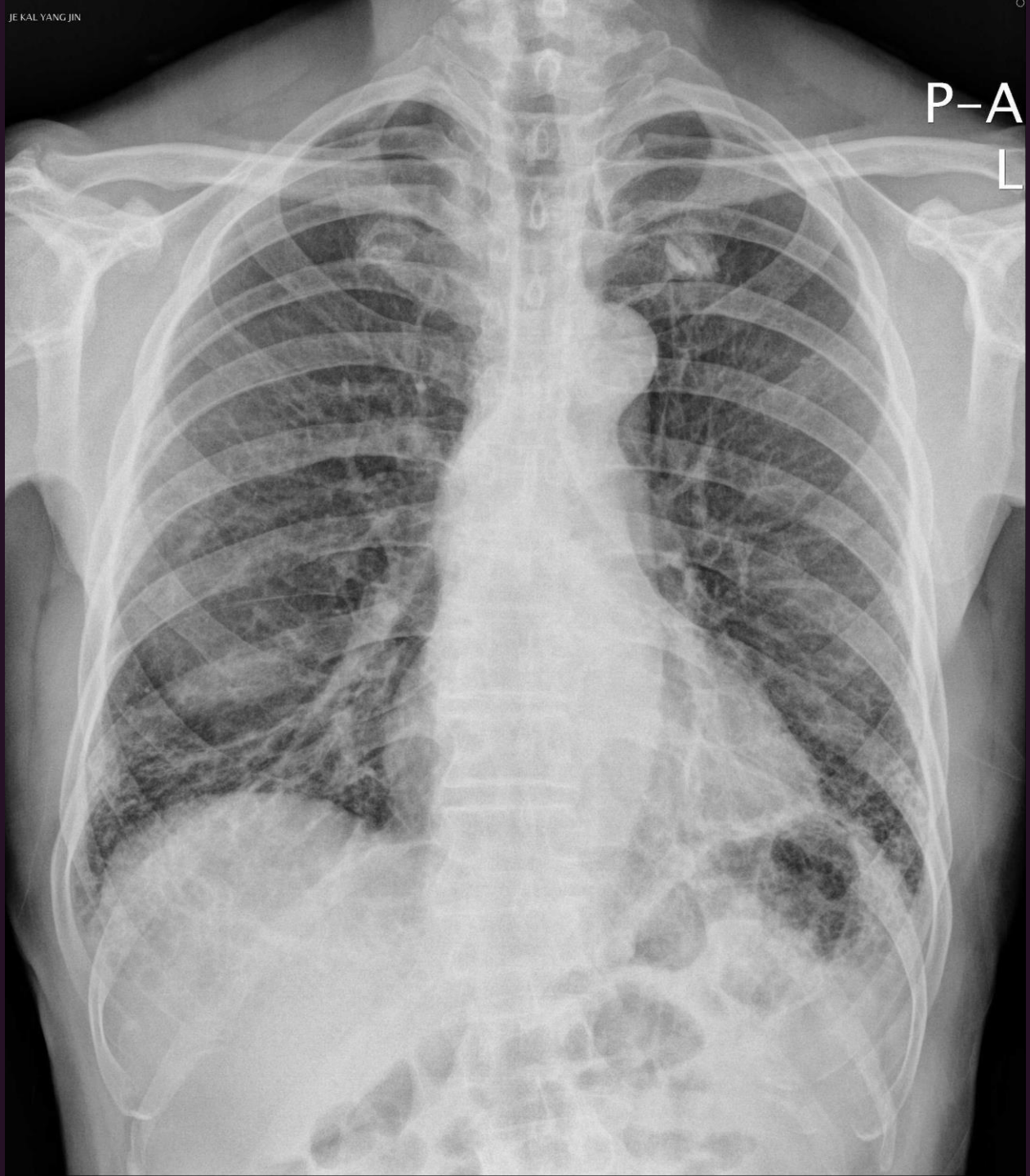
DIFFUSING CAPACITY

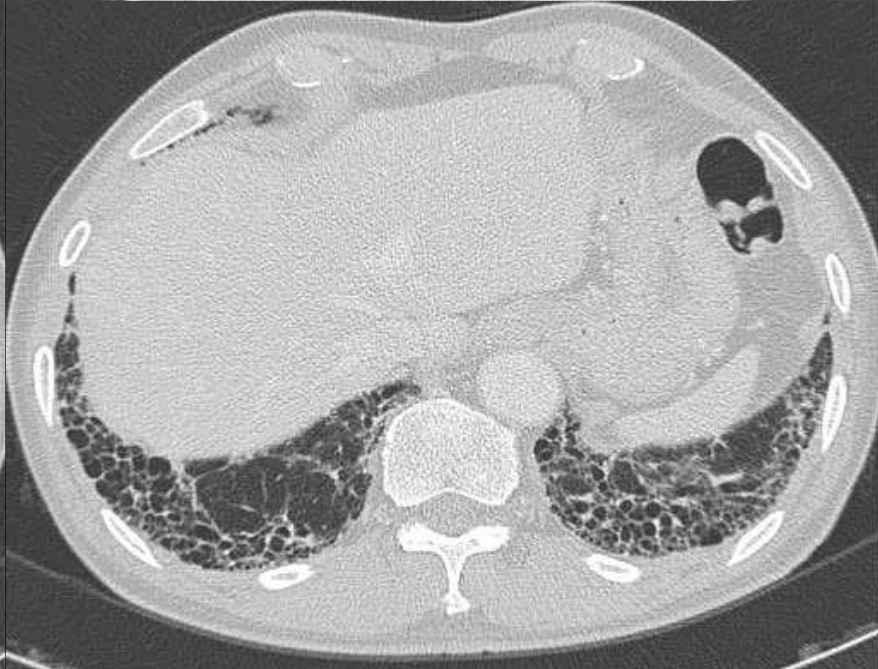
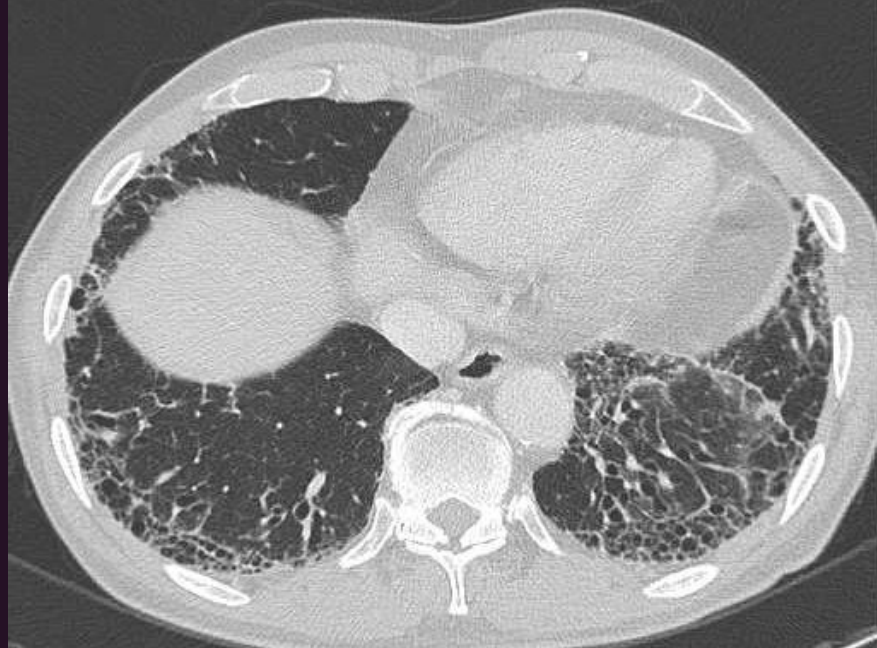
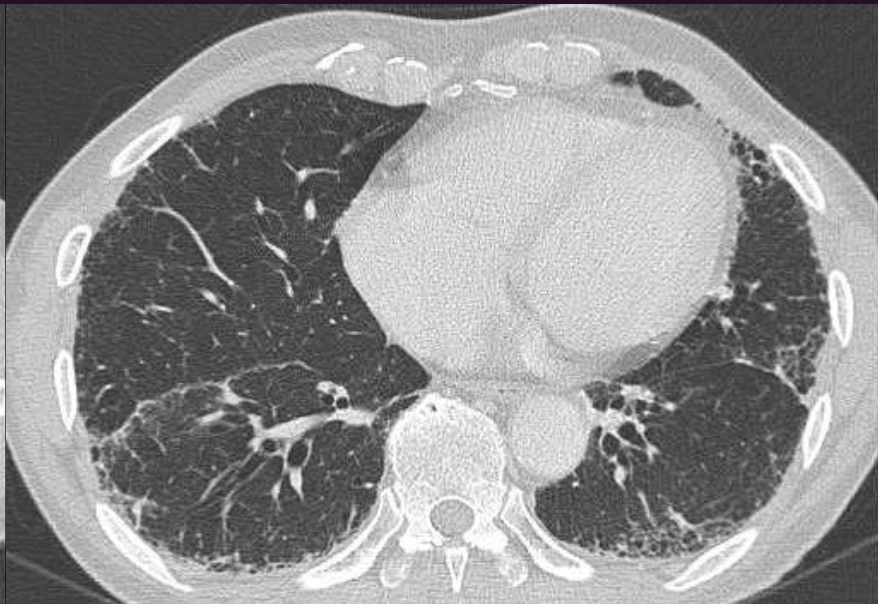
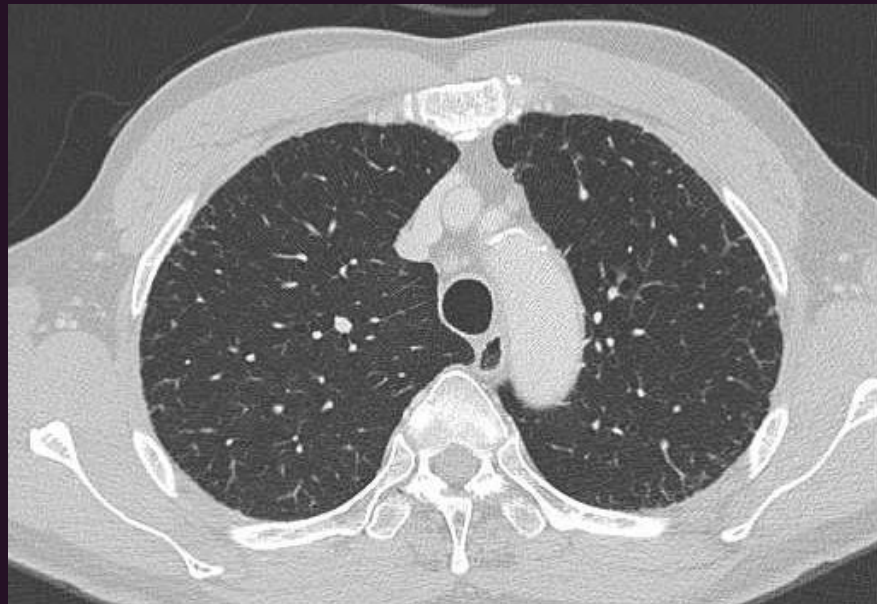
	Pred.	Meas.	%Pred.
DLco	19.90	11.20	56
VA		4.49	
DL/VA	3.71	2.50	67
Corrected	19.90	11.20	56

2017/04/18

- 73/M
- Hematuria 주소로 URO CT- basal lung honeycombing
- Nonsmoker 경찰로 퇴직
- No respiratory symptoms
- Bilateral inspiratory crackles(+), finger clubbing (+)

P-A
L



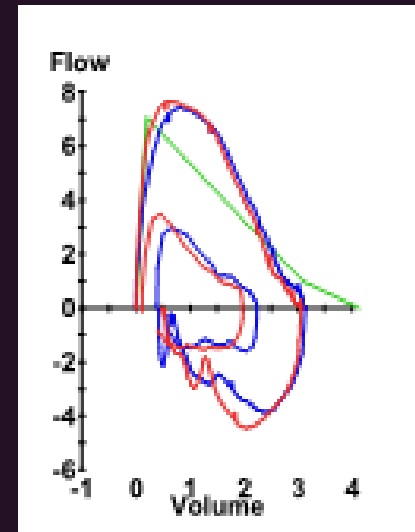


SPIROMETRY

	Pred.	Meas.	%Pred.	Bronchodilator		
				Meas.	%Pred.	%Chg.
FVC	4.16	3.15	76	3.08	74	-2
FEV1	2.83	3.05	108	2.91	103	-4
FEV1/FVC	70	97		95		
FEF 25~75%	2.26	5.38	238	5.23	232	-3
PEF	7.03	7.41	105	7.65	109	3

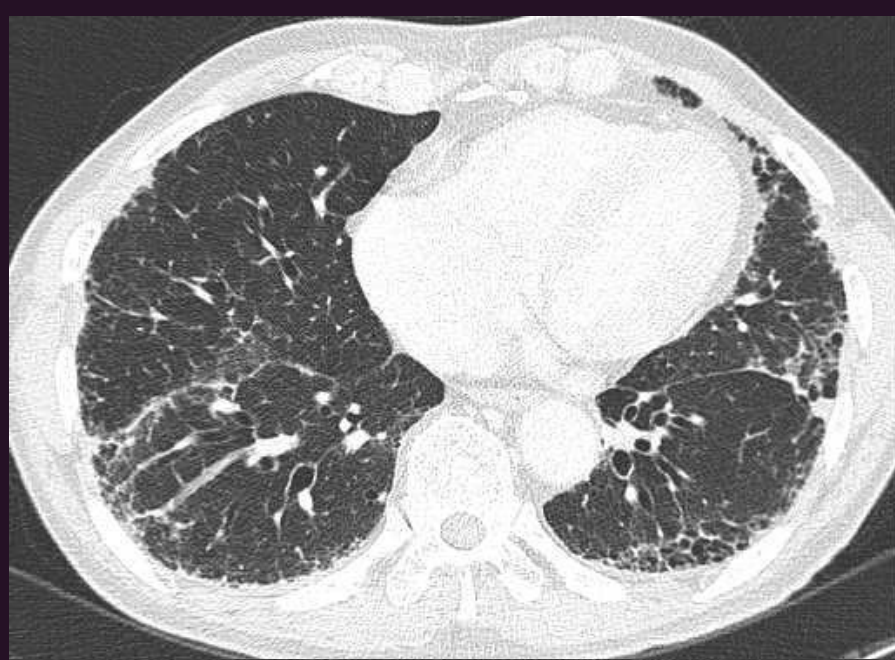
DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	19.00	13.60	71
VA		4.46	
DL/VA	3.59	3.05	85
Corrected	19.00	14.70	77
Hb	12.2	2013-08-11	

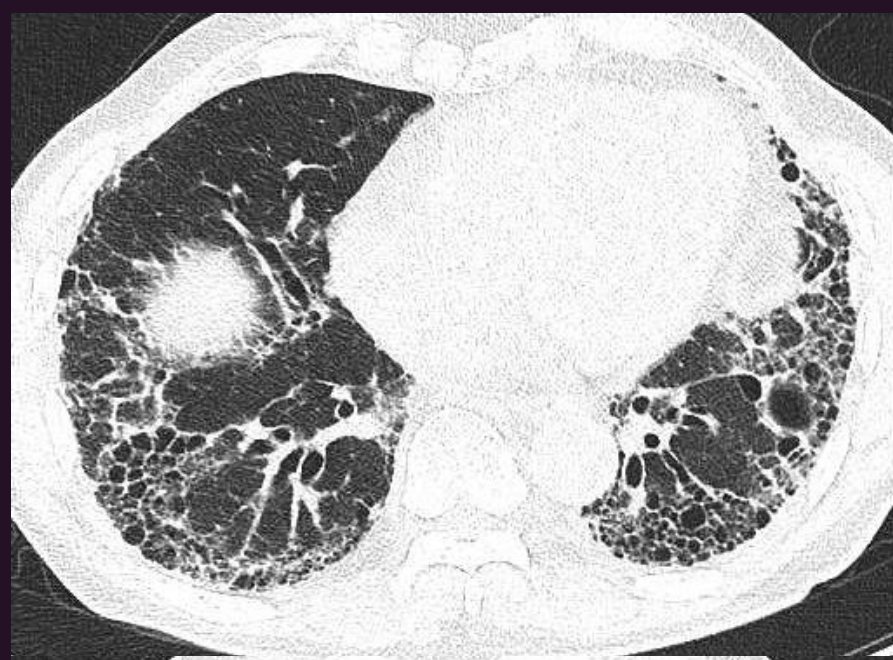


LUNG VOLUMES

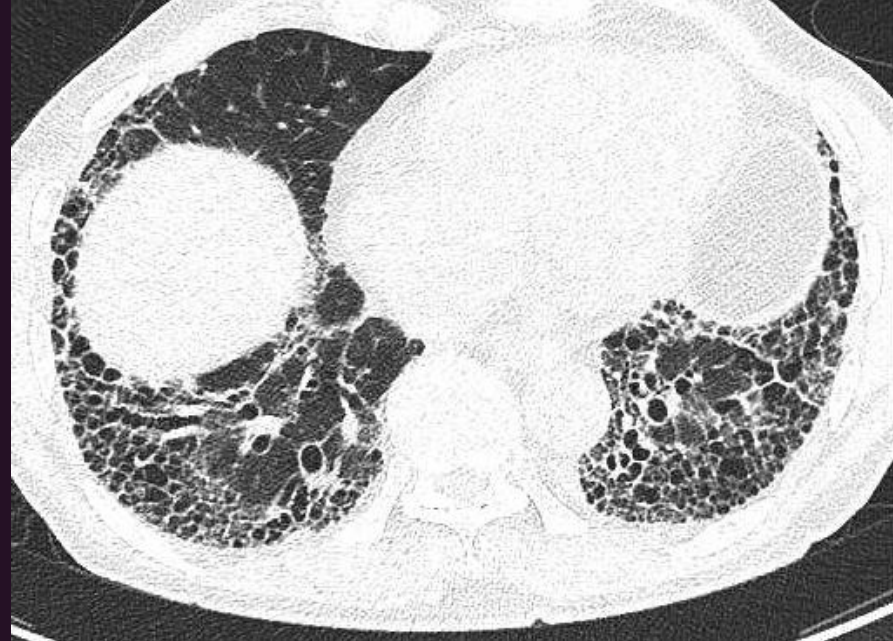
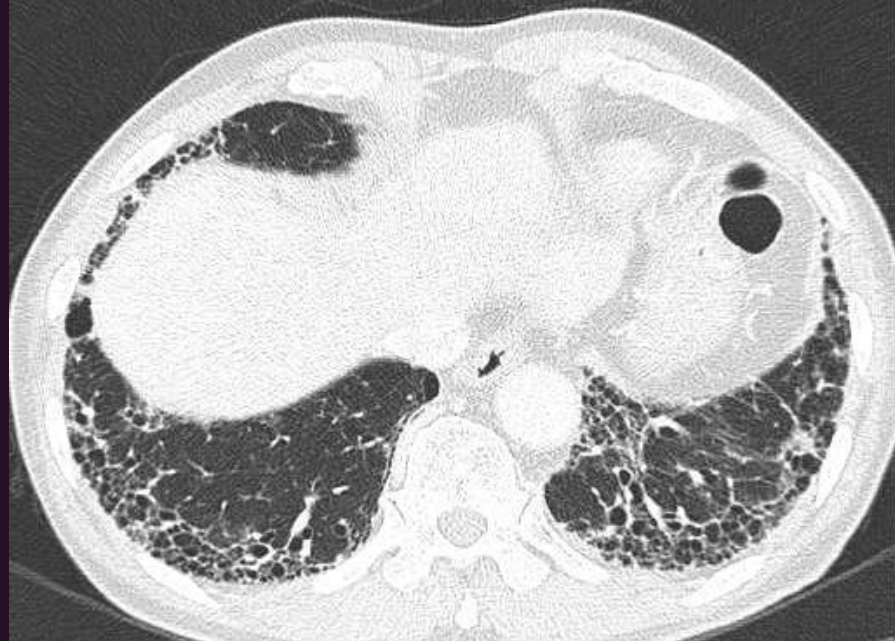
	Pred.	Meas.	%Pred.
TLC	6.19	4.81	78
VC	3.59	3.15	88
FRC	3.32	2.81	85
ERV	1.23	0.75	61
RV	2.29	1.66	73



2013/08/22



2018/03/13

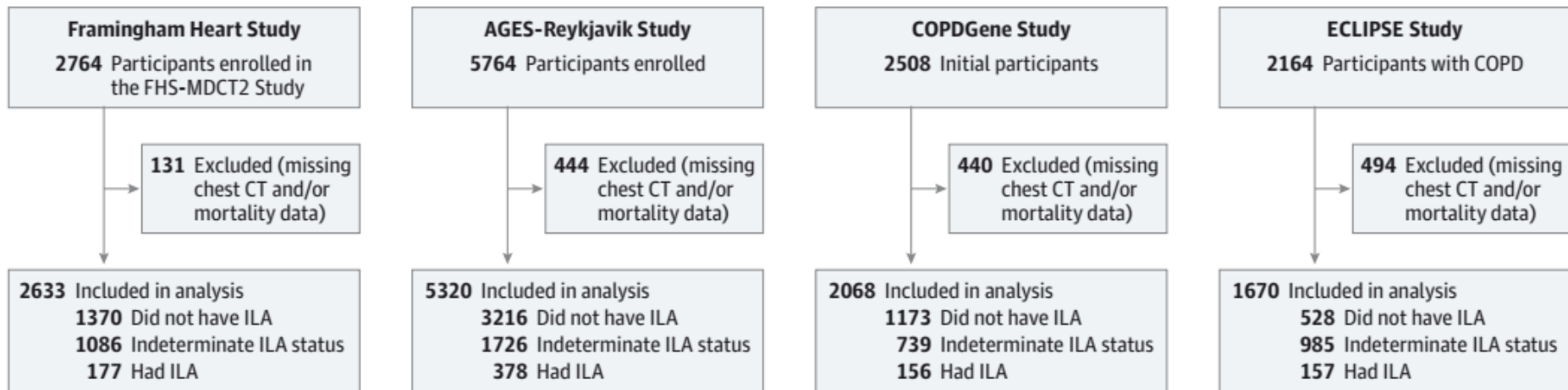


Subclinical ILD

- Radiologic, physiological, histopathologic abnormalities
- Asymptomatic
- Interstitial lung abnormality
- >5%, nondependent portion
- GGO, reticular opacity, diffuse centrilobular nodularity, honeycombing, traction bronchiectasis, nonemphysematous cyst
- Prognosis ?

Incidence of ILA in general population

Figure 2. Participant Flow for the FHS, AGES-Reykjavik, COPDGene, and ECLIPSE Studies



6.7%

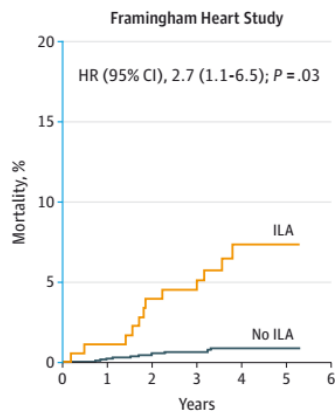
7.1%

7.5%

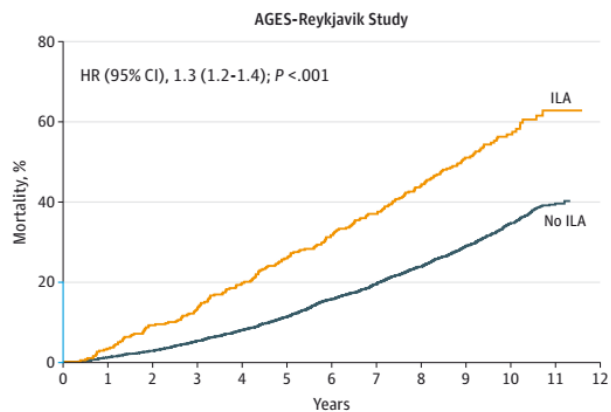
9.4%

Prognosis of ILA

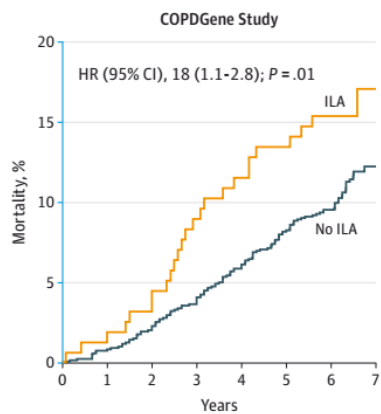
Figure 3. Mortality Rates by ILA Status for the Framingham Heart Study, AGES-Reykjavik, COPDGene, and ECLIPSE Studies



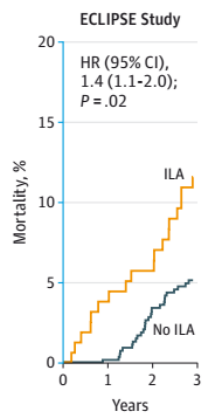
No. at risk						
ILA	177	176	171	170	107	
No ILA	1370	1367	1364	1361	1022	



No. at risk												
ILA	378	365	343	328	304	281	259	239	213	137	68	12
No ILA	3216	3177	3124	3044	2956	2851	2710	2589	2447	1694	862	228



No. at risk							
ILA	156	153	149	142	138	135	131
No ILA	1173	1163	1146	1125	1104	1079	1062



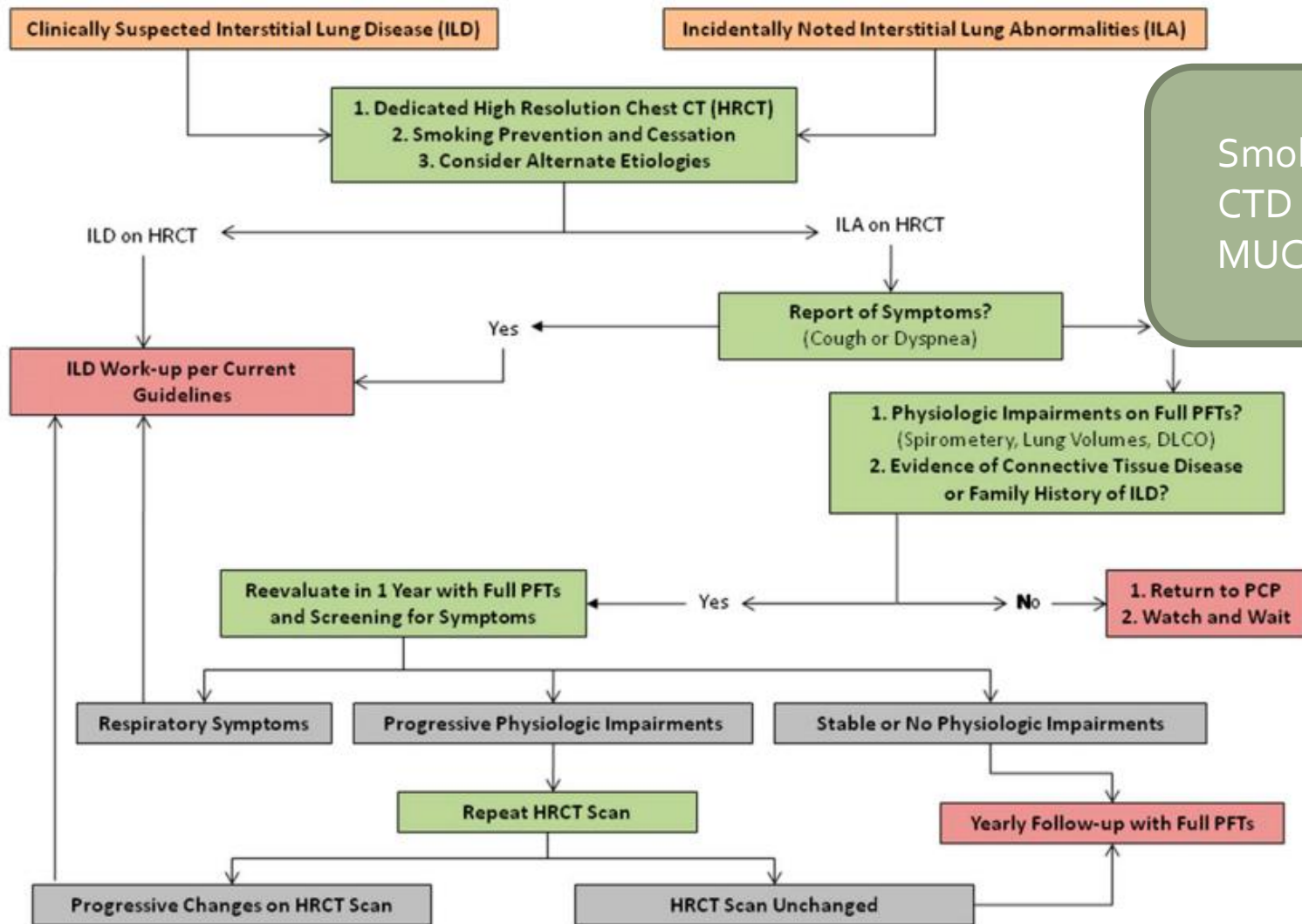
No. at risk			
ILA	156	151	145
No ILA	528	525	505

Table 1. Baseline Characteristics of Participants From Framingham Heart, AGES-Reykjavik, COPDGene, and ECLIPSE Studies Stratified by Interstitial Lung Abnormality Status

Variable	FHS ^{a,b} (N = 2633)			AGES-Reykjavik ^b (N = 5320)			COPDGene ^{a,b} (N = 2068)			ECLIPSE (N = 1670)		
	No ILA 1370 ^c	ILA 177 ^c	P Value	No ILA 3216 ^c	ILA 378 ^c	P Value	No ILA 1173 ^c	ILA 156 ^c	P Value	No ILA 528 ^c	ILA 157 ^c	P Value
Age, mean (SD), y	56 (11)	70 (12)	<.001	76 (5)	78 (6)	<.001	60 (9)	64 (9)	<.001	62 (7)	64 (8)	<.001
Women, No. (%)	675 (49)	89 (50)	.81	1910 (59)	172 (45)	<.001	564 (48)	80 (51)	.50	182 (34)	41 (26)	.05
White race, No. (%)	1370 (100)	177 (100)	NA	3216 (100)	378 (100)	NA	929 (79)	112 (72)	.04	515 (98)	154 (98)	1.0
Body mass index, mean (SD)	29 (6)	28 (5)	.38	27 (4)	27 (5)	.58	28 (6)	30 (7)	.008	27 (6)	26 (5)	.09
Smoking pack-years, median (IQR)	11 (4-23)	19 (9-33)	<.001	0 (0-16)	11 (0-29)	<.001	40 (30-54)	44 (30-64)	.06	45 (33-62)	43 (30-60)	.15
Current smokers, No. (%) ^c	73 (5)	17 (10)	.04	374 (12)	69 (18)	<.001	505 (43)	71 (46)	.61	202 (38)	72 (46)	.10
FEV ₁ % predicted, mean (SD)	98 (15)	98 (17)	.49				75 (28)	78 (22)	.10	44 (15)	47 (14)	.02
FVC % predicted, mean (SD)	101 (13)	101 (15)	.99				87 (19)	88 (17)	.49	79 (19)	80 (20)	.78
FEV ₁ /FVC ratio, mean (SD)	75 (7)	73 (7)	<.001				64 (18)	67 (14)	.03	45 (12)	48 (11)	.006
COPD, No. (%) ^d	84 (6)	19 (12)	.01				561 (41)	63 (33)	.02	528 (100)	157 (100)	NA
GOLD stage, No. (%) ^e			0.04						<.001			.01
Unclassified ^f												
Stage 0												
Stage 1												
Stage 2											76 (48)	
Stage 3											74 (47)	
Stage 4											7 (5)	
TLC, L, mean (SD) ^g	5.2 (1.2)	4.5 (1.3)	<.001	NA	NA		5.8 (1.4)	5.2 (1.4)	<.001	5.9 (1.5)	5.7 (1.4)	.16

Risk factors for ILA : age, male , smoking, family Hx, CTD, HDL-cholesterol, MUC5B, etc.

Follow up of subclinical ILD



Smoking
CTD
MUC5B

VATS vs TBLB

VATS

- 전신마취가 필요
- 충분한 조직
- UIP 진단 가능
- 통증
- 사망률

TBLB

- 전신마취 필요 없음
- BAL 을 동시에
- 비교적 안전
- 조직이 충분하지 않다.
- UIP 진단은 어려움

Postoperative complication and mortality of surgical lung Bx

Cx	IPF			NSIP	COP
	Total	AE at the time of biopsy	Non-AE		
Total number	140	7	133	46	14
30-day mortality	6 (4.3%)	2 (28.6%) ^a	4 (3.0%) ^a	2 (4.3%)	0 (0.0%)
90-day mortality	12 (8.6%)	3 (42.9%) ^{a,b}	9 (6.8%) ^a	4 (8.7%) ^b	1 (7.1%)
Postoperative complication	21 (15.0%)	4 (57.1%) ^{a,b}	17 (12.8%) ^a	4 (8.7%) ^{b,c}	5 (35.7%) ^c
Prolonged air leak	9 (6.4%) ^d	1 (14.3%)	8 (6.0%) ^d	3 (6.5%) ^c	4 (28.6%) ^{c,d}
Induction of AE	2 (1.4%)	0 (0.0%)	2 (1.5%)	1 (2.2%)	0 (0.0%)
Pneumonia	6 (4.3%)	0 (0.0%)	6 (4.5%)	0 (0.0%)	0 (0.0%)
Pleural effusion	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (7.1%)
Empyema	1 (0.7%)	0 (0.0%)	1 (0.8%)	0 (0.0%)	0 (0.0%)
Prolonged ventilation (>72 h)	7 (5.0%)	3 (42.9%) ^{a,b}	4 (3.0%) ^a	0 (0%) ^b	1 (7.1%)

Surgical lung biopsy associated mortality

TABLE 4 Multivariable analysis: associations with death within 90 days of biopsy

	Cases	Deaths	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Sex						
Female	1274	36	1.00	0.005	1.00	
Male	1546	75	1.75 (1.17–2.63)		1.54 (1.02–2.34)	0.038
Age group years						
≤44	576	10	1.00	<0.001 (p _{trend})	1.00	<0.001 (p _{trend})
45–54	636	21	1.93 (0.90–4.14)		1.72 (0.79–3.72)	
55–64	843	31	2.16 (1.05–4.44)		1.85 (0.89–3.82)	
65–74	588	32	3.26 (1.59–6.69)		2.81 (1.35–5.82)	

In-hospital, 30-day and 90-day mortality were 1.7%, 2.4% and 3.9%, respectively. Male sex, increasing age, increasing comorbidity and open surgery were risk factors for mortality.

364.7	812	28	0.84 (0.41–1.77)		0.78 (0.48–1.28)	
J84.8	99	–*	0.18 (0.03–1.32)		0.23 (0.03–1.65)	
RA-ILD	16	0				
CTD-ILD	38	–*	0.99 (0.23–4.20)		0.91 (0.21–3.94)	
HP	162	–*	0.34 (0.11–1.08)		0.45 (0.13–1.55)	
Sarcoidosis	260	–*	0.07 (0.01–0.50)		0.10 (0.01–0.74)	

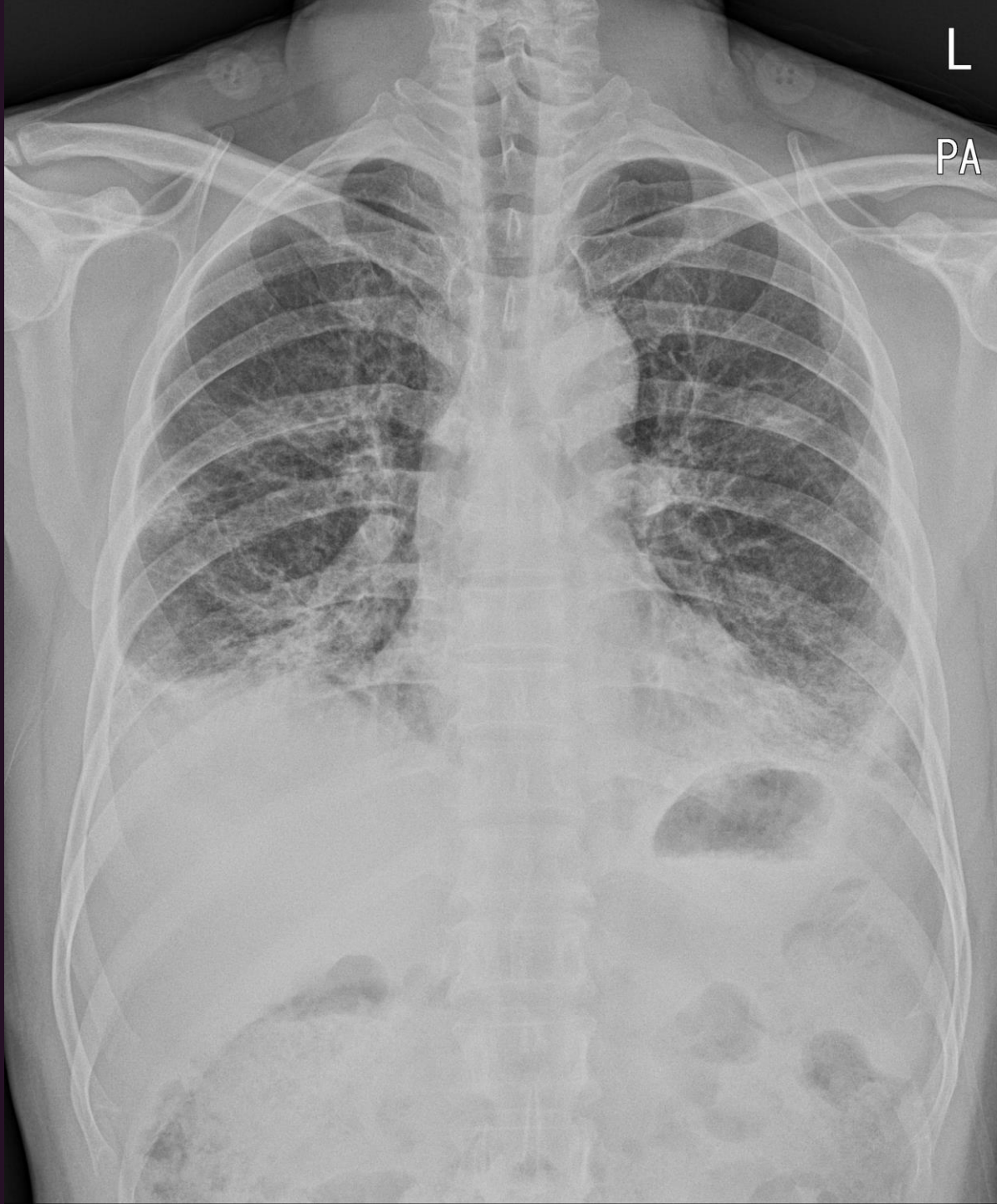
54/M

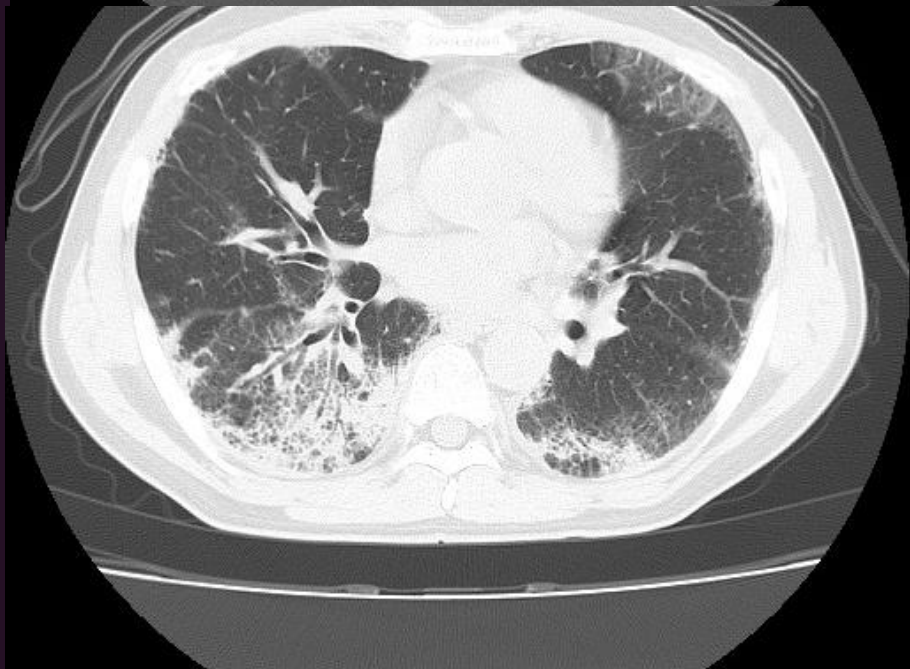
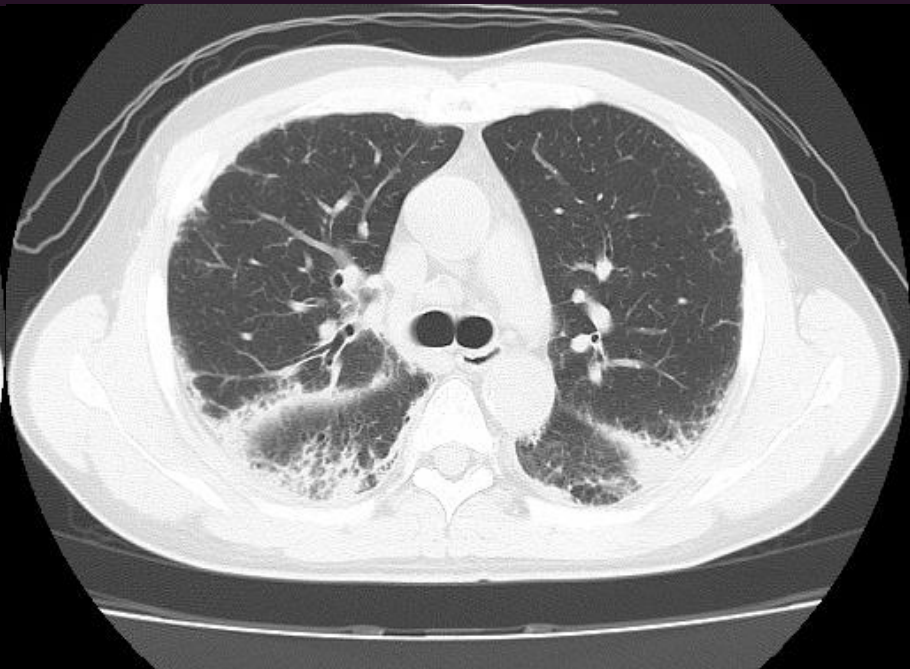
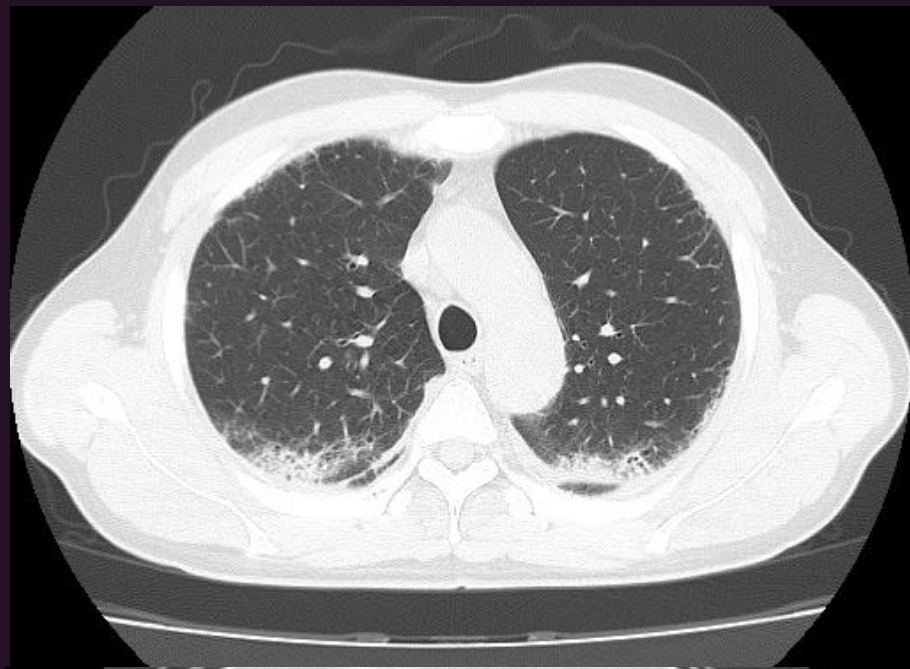
35PY smoker

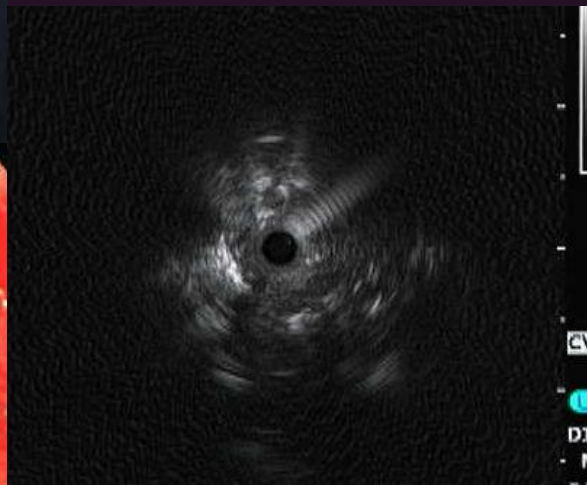
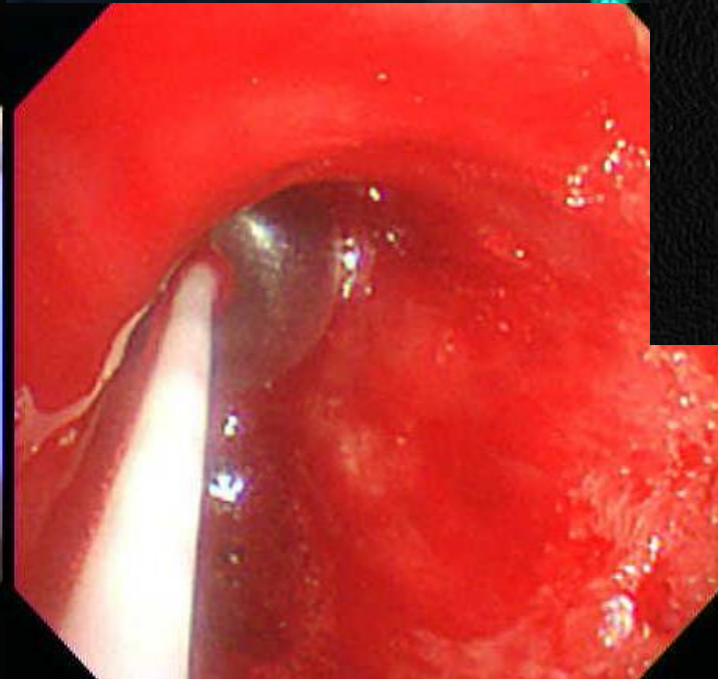
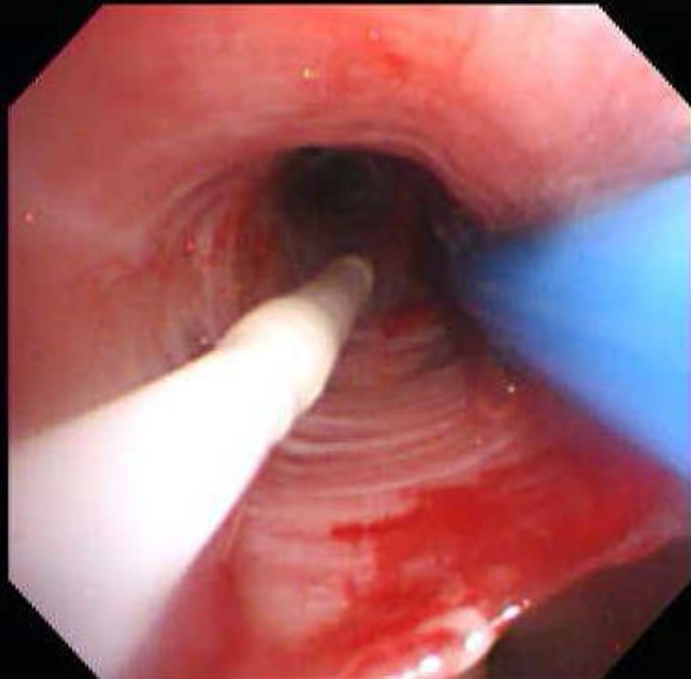
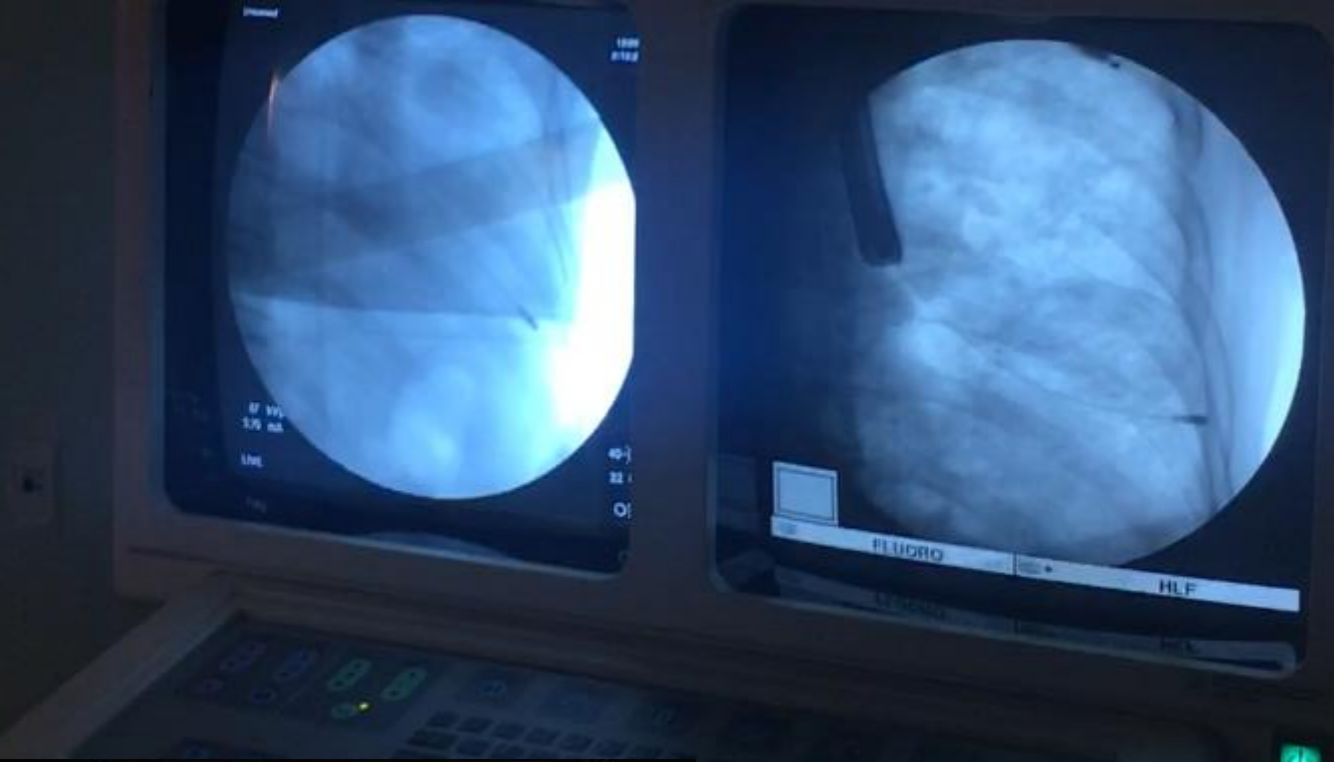
한달 전부터 지속된 DOE mMRC 1, dry cough 주소로
내원함

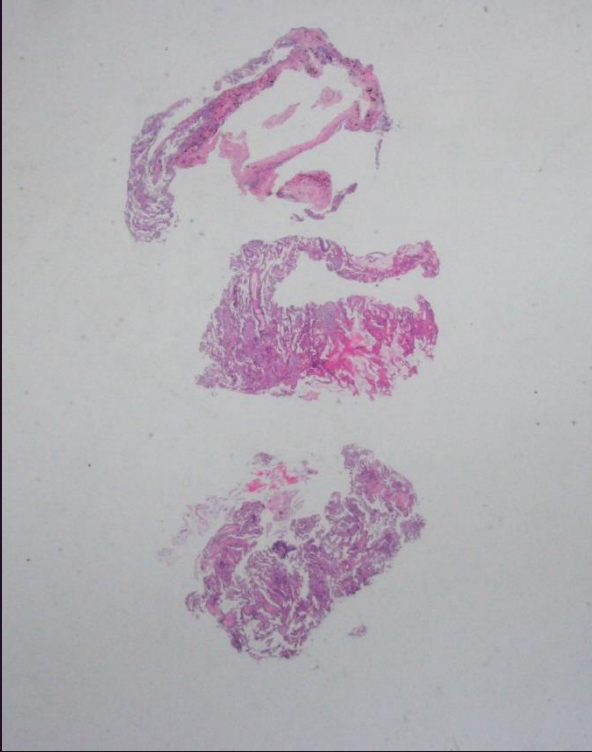
직업: 건설업

bilateral inspiratory crackles

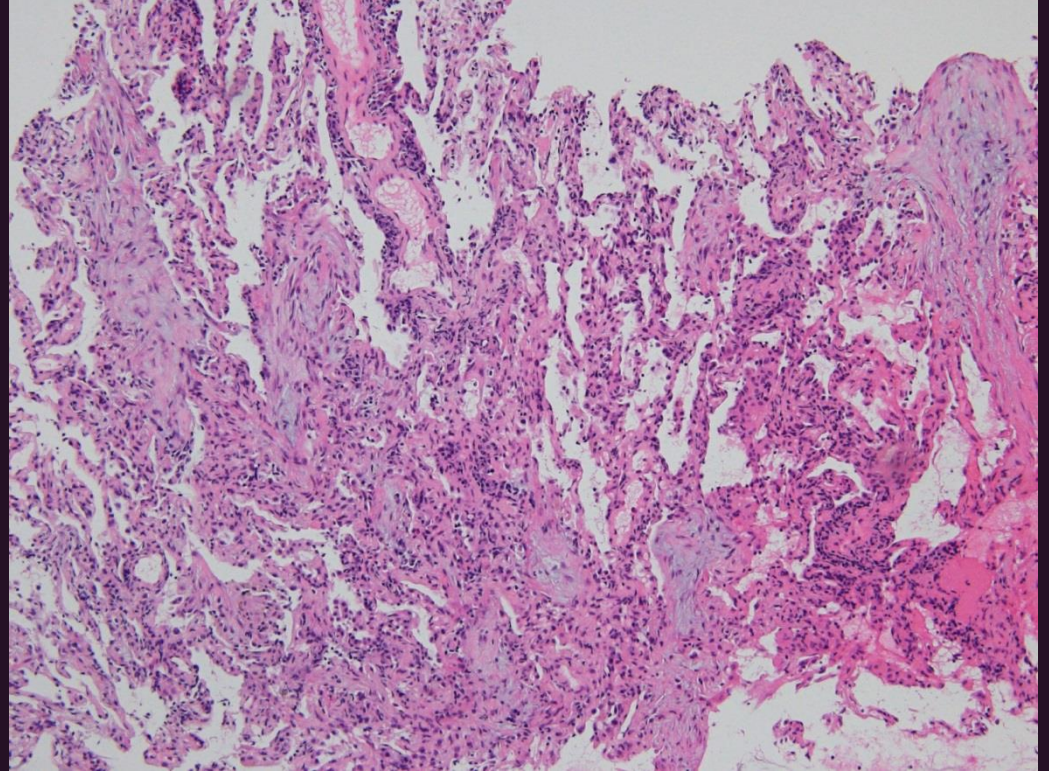








X12.5



X100

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

Table 2. Safety profile results for SLB (VATS) and TBLC

	SLB (VATS) (n = 150)	TBLC (n = 297)	p value
Days of hospitalization	6.1 (3–48)	2.6 (0–17)	<i><0.0001</i>
Adverse events			
Severe bleeding	0 (0.0)	0 (0.0)	
Persistent fever	7 (4.7)	0 (0.0)	
Prolonged air leak	5 (3.3)	1 (0.3)	
Acute exacerbation	5 (3.3)	1 (0.3)	
Pneumonia/empyema	3 (2.0)	0 (0.0)	
Transient respiratory failure	0 (0.0)	2 (0.7)	
Miscellanea	0 (0.0)	2 (0.7)	
Pneumothorax (in total)	NA (NA)	60 (20.20)	
Pneumothorax with drainage	NA (NA)	46 (15.50)	
Days of drainage	3.75 (2–40)	4.65 (2–15)	0.138
Patients with 0 adverse events	131 (87.3)	220 (74.1)	
Patients with 1 adverse event	16 (10.7)	75 (25.3)	
Patients with 2 adverse events	3 (2.0)	1 (0.3)	
Patients with 3 adverse events	0 (0.0)	1 (0.3)	
Time to 1st adverse event after biopsy, days	27.5±73.9	0.6±2.0	<i><0.0001</i>
Mortality due to adverse event	4/150 (2.7)	1/297 (0.3)	0.045
	4/20 (20.0)	1/66 (1.5)	0.01
Survival			
Alive	88 (58.7)	272 (91.6)	
Dead	43 (28.7)	13 (4.4)	
Transplantation	4 (2.7)	1 (0.3)	

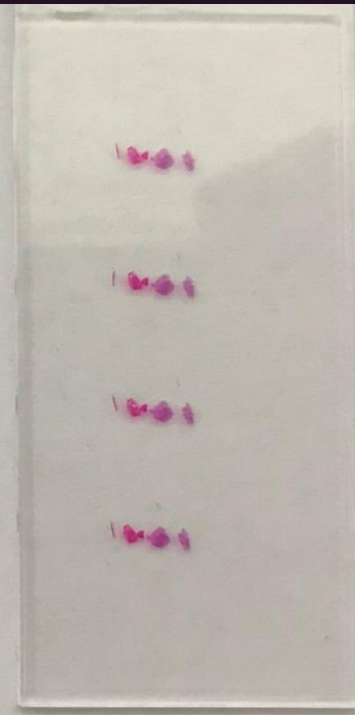
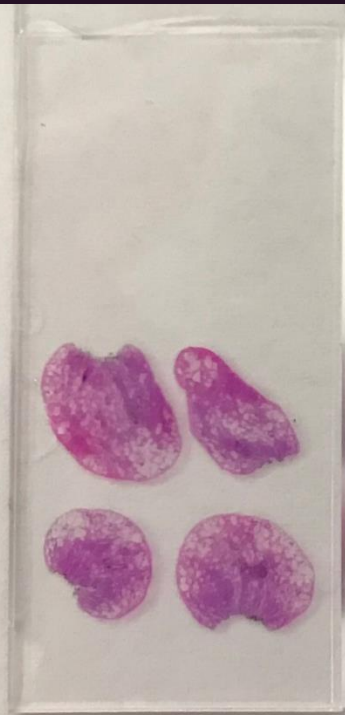
Values are expressed as n (%), mean (range), or mean ± SD. Italics denote significance. NA = Not applicable.

VATS

CryoBx

CryoBx

TBLB

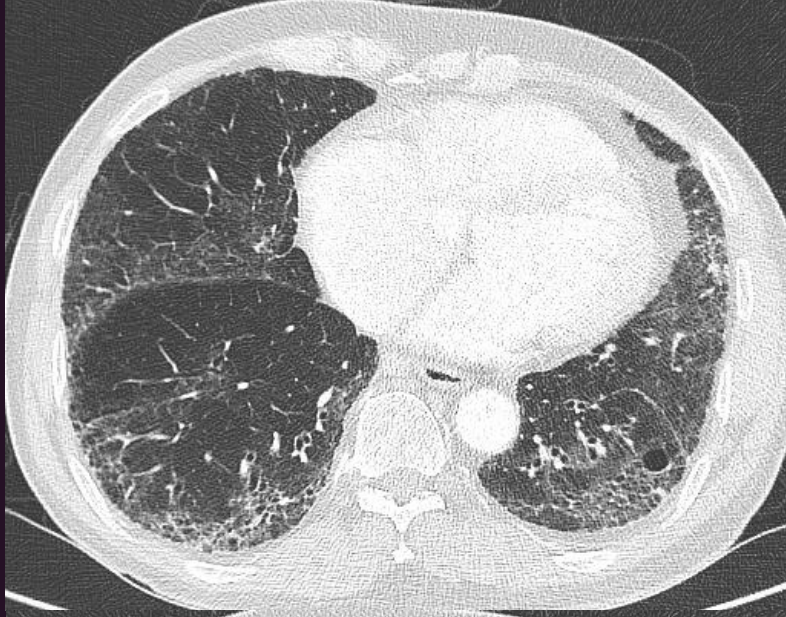


65/M

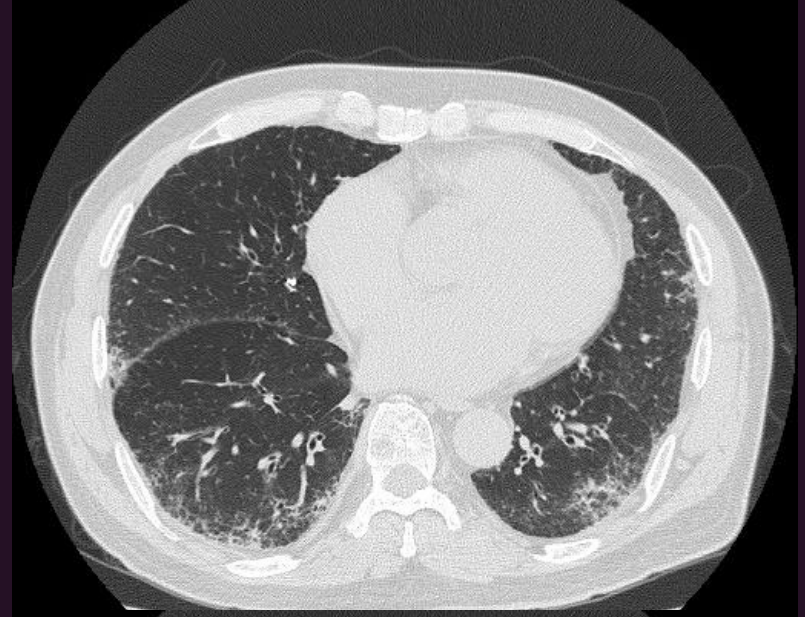
40PY smoker

3년 전 건강검진에서 chest CT 이상, 이후 서서히 악화되는 DOE => 현재 mMRC 1의 DOE

Bilateral inspiratory crackles



2017/05/18



2014/05/20

SPIROMETRY

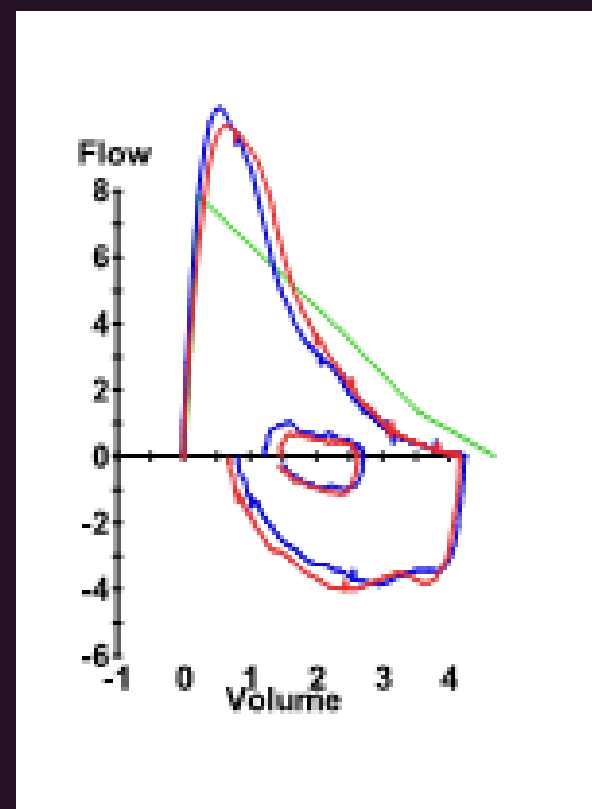
	Pred.	Meas.	%Pred.	Bronchodilator		
				Meas.	%Pred.	%Chg.
FVC	4.70	4.25	90	4.17	89	-2
FEV1	3.40	3.09	91	3.17	93	3
FEV1/FVC	73	73		76		
FEF 25~75%	2.80	2.10	75	2.56	91	22
PEF	7.83	10.46	134	9.95	127	-5

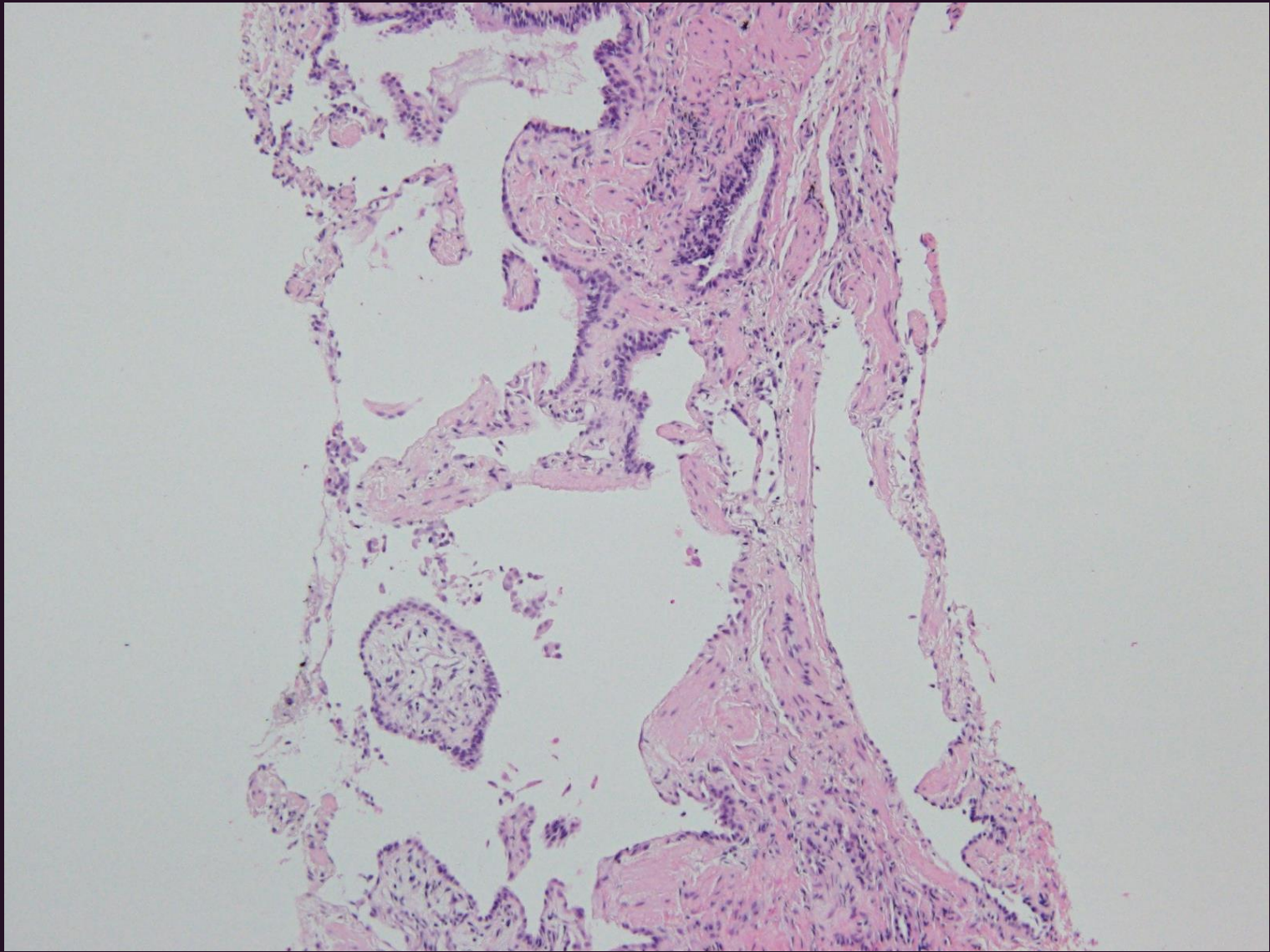
DIFFUSING CAPACITY

	Pred.	Meas.	%Pred.
DLco	23.00	13.10	57
VA		4.53	
DL/VA	3.78	2.90	77
Corrected	23.00	13.67	59
Hb	13.2	2017-08-03	

LUNG VOLUMES

	Pred.	Meas.	%Pred.
TLC	6.59	5.66	86
VC	4.12	4.25	103
FRC	3.50	3.14	90
ERV	1.40	1.01	72
RV	2.42	1.42	59

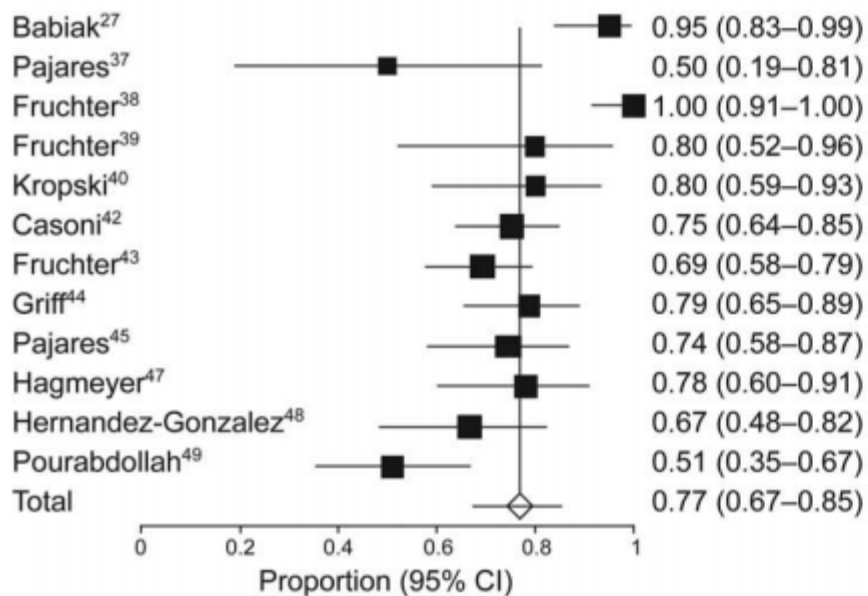




X 100

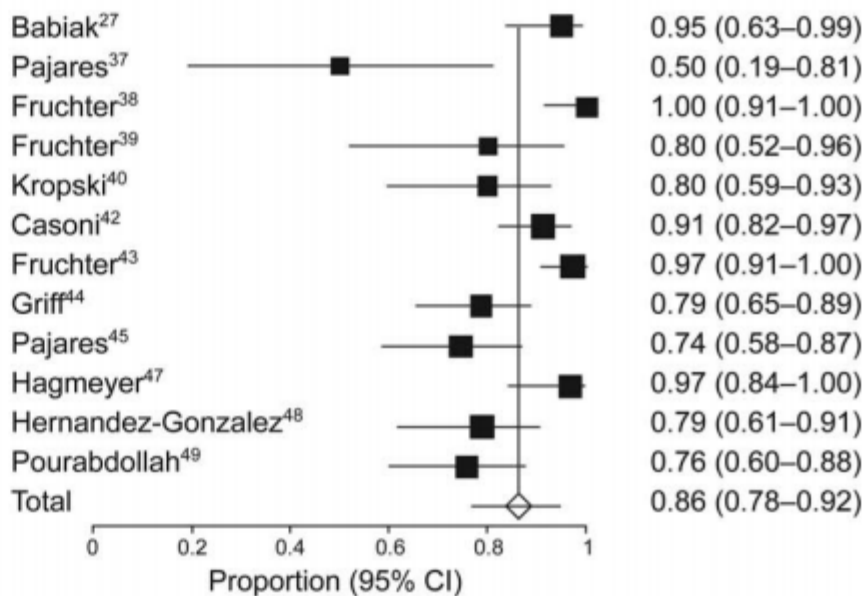
Diagnostic yield of cryoBx

A



definite

B



definite/probable

Diagnostic yield of cryoBx

Table 7. Complications Associated With Transbronchial Biopsy Reported in the Included Studies

Author (Year)	Severe Bleeding	Pneumothorax	Death
Babiak et al (2009) ²⁷	0	2 (due to FFB or CB)	0
Pajares et al (2010) ³⁷	0	0	0
Fruchter et al (2013) ³⁸	0	CB: 0, FFB: 1	0
Fruchter et al (2013) ³⁹	0	0	0
Kropski et al (2013) ⁴⁰	0	0	0
Yarmus et al (2013) ⁴¹	0	1 (due to FFB or CB)	0
Casoni et al (2014) ⁴²	0	19	1
Fruchter et al (2014) ⁴³	0	2	0
Griff et al (2014) ⁴⁴	0	0	0
Pajares et al (2014) ⁴⁵	0	CB: 3, FFB: 2	0
Gershman et al (2015) ⁴⁶	0	CB: 15, FFB: 9	0
Hagmeyer et al (2015) ⁴⁷	2	6/32 (jet ventilation: 3/7 spontaneous breathing: 3/25)	2 (SLB group)
Hernandez-Gonzalez et al (2015) ⁴⁸	0	4	0
Pourabdollah et al (2015) ⁴⁹	NR	NR	NR

FFB = flexible forceps biopsy

CB = cryobiopsy

SLB = surgical lung biopsy

NR = not reported

Take home message

- ILD 의 진단은 다학제 진단이 원칙이다.
- ILD 의 원인을 밝히기 위해 직업력, CTD 의 증상과 징후, 환경 등에 대한 자세한 병력청취와 자가항체 검사가 필요하다.
- HRCT 와 임상양상에 따라 BAL, TBLB, surgical lung biopsy 를 결정한다.
- Subclinical ILD (Interstitial lung abnormality) 는 일부 에서 ILD 로 진행하므로 경과관찰이 필요하다.
- Cryobiopsy 도 조직 검사 시 고려해야 할 방법이다.