

2023 ILD School

* 일 시 : 2023년 6월 24일(토) 14 : 00 ~ 14 : 30

* 장 소 : 양재 aT센터 4층 창조룸 I

ILD 환자의 진단 호흡기내과적 접근

경희대병원 내과

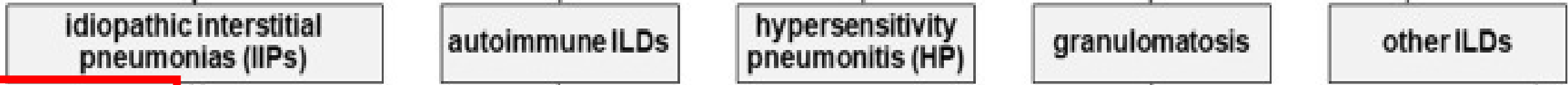
최혜숙

발표내용

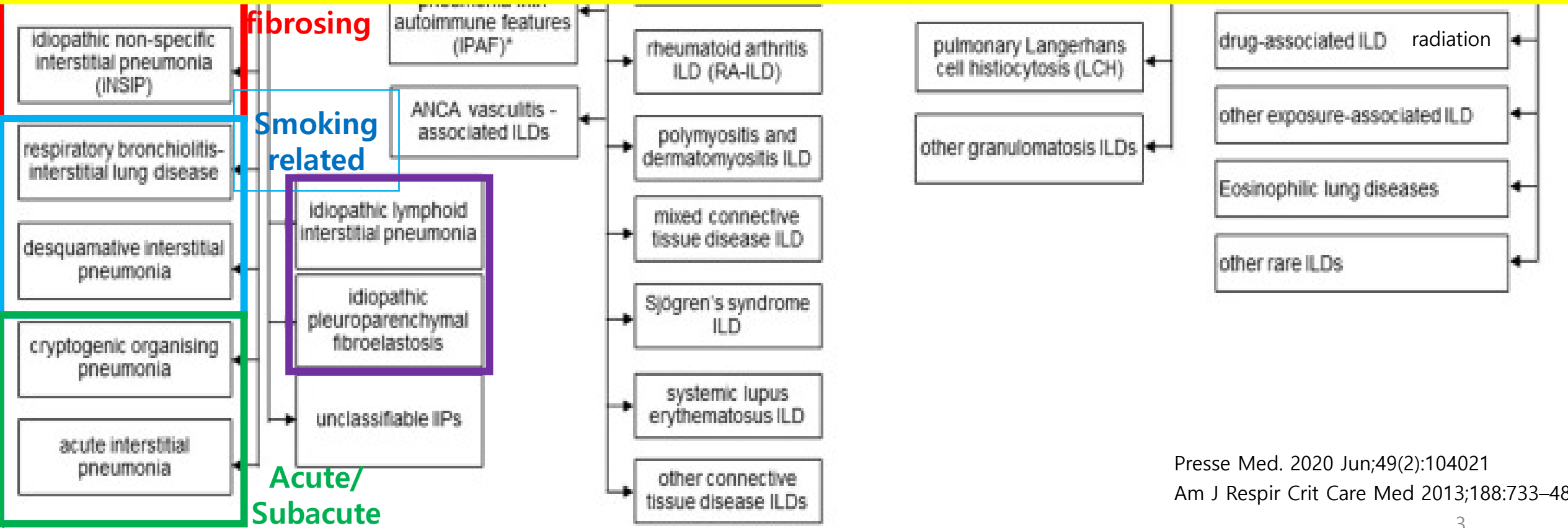
- **ILD의 분류**
- **ILD의 증상/진단**
 - IPF
 - NSIP
 - OP/AFOP
 - CTD ILD
 - Drug ILD

Interstitial Lung Diseases : diffuse parenchymal lung diseases

: heterogeneous group of disorders

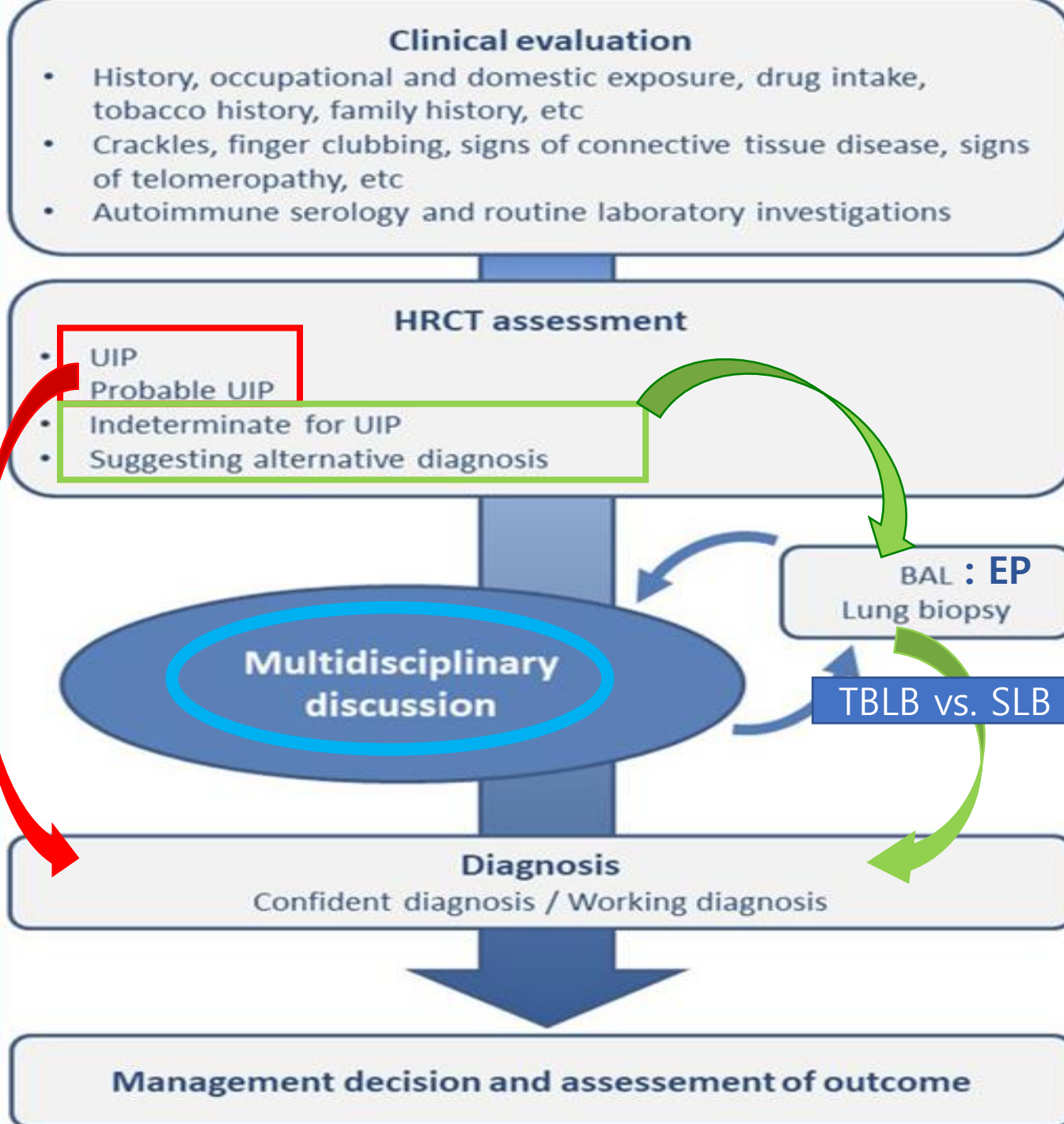


similar clinical, radiographic, physiologic, or pathologic manifestations



Presse Med. 2020 Jun;49(2):104021
Am J Respir Crit Care Med 2013;188:733-48

Algorithm for the diagnosis of ILD



ILD 임상적 발현

- **진행성 호흡곤란 (DOE)**
 - 가래/객혈/흉통/천명음
 - 폐외 증상들 (열, 근육관절통, 결체조직질환의 증상들)
- **기침 (nonproductive)**
- **Velcro crackles:** Fine crackles, crepitant rales *Mod Treat 1970; 7: 821*
- **Clubbing finger:** late/advanced fibrosis
- **노출력** (직업/환경/흡연/거주지/조류/환기/가족력/약물력/방사선등)

ILD 검사

- 폐기능검사

↓ FVC, ← ↑ FEV₁/FVC, ↓ DLCO, 6MWT

- HRCT

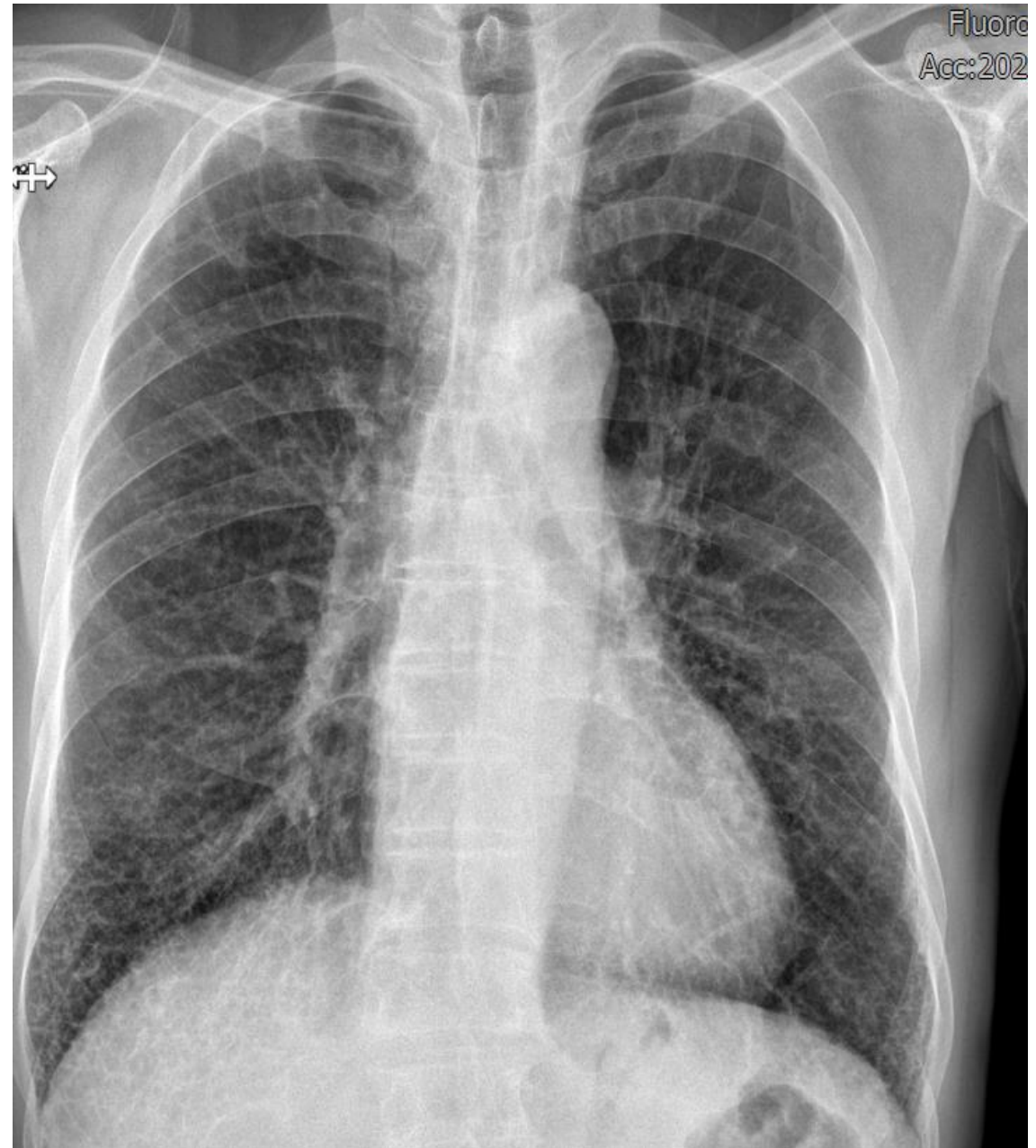
- 혈액검사

: CBC, Chemistry, CRP, ESR, ANA, RF, anti-CCP, ANCA, myositis panel, ACE.....

: KL-6

증례 1

- 66세 남자
- CXR 이상
- DOE MMRC I
- Bibasilar inspiratory fine crackles:
Velcro crackles
- 과거흡연
1년전 중단 1.5갑/45년=90갑년



How Long: Quit: No

Spirometry

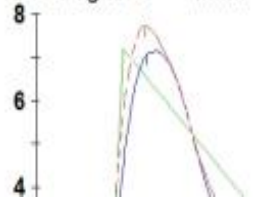
- FVC Liters
- FEV1 Liters
- FEV1/FVC %
- FEF25-75% L/sec
- FEV6 Liters
- FEV3 Liters
- PEF L/sec
- FET100% Sec
- FIVC Liters
- PIF L/sec

Lung Volume

- VC Liters
- TLC Liters
- FRC PL Liters
- RV Liters
- RV/TLC %
- IC Liters
- ERV Liters

Diffusion

- DLCO mL/min/mmHg
- DLCO/VA mL/min/mHg/l
- DLVA Adj mL/min/mHg/l
- VA Liters
- BHT Sec
- IVC Liters
- FlowKroghs K 1/min



P
P
P

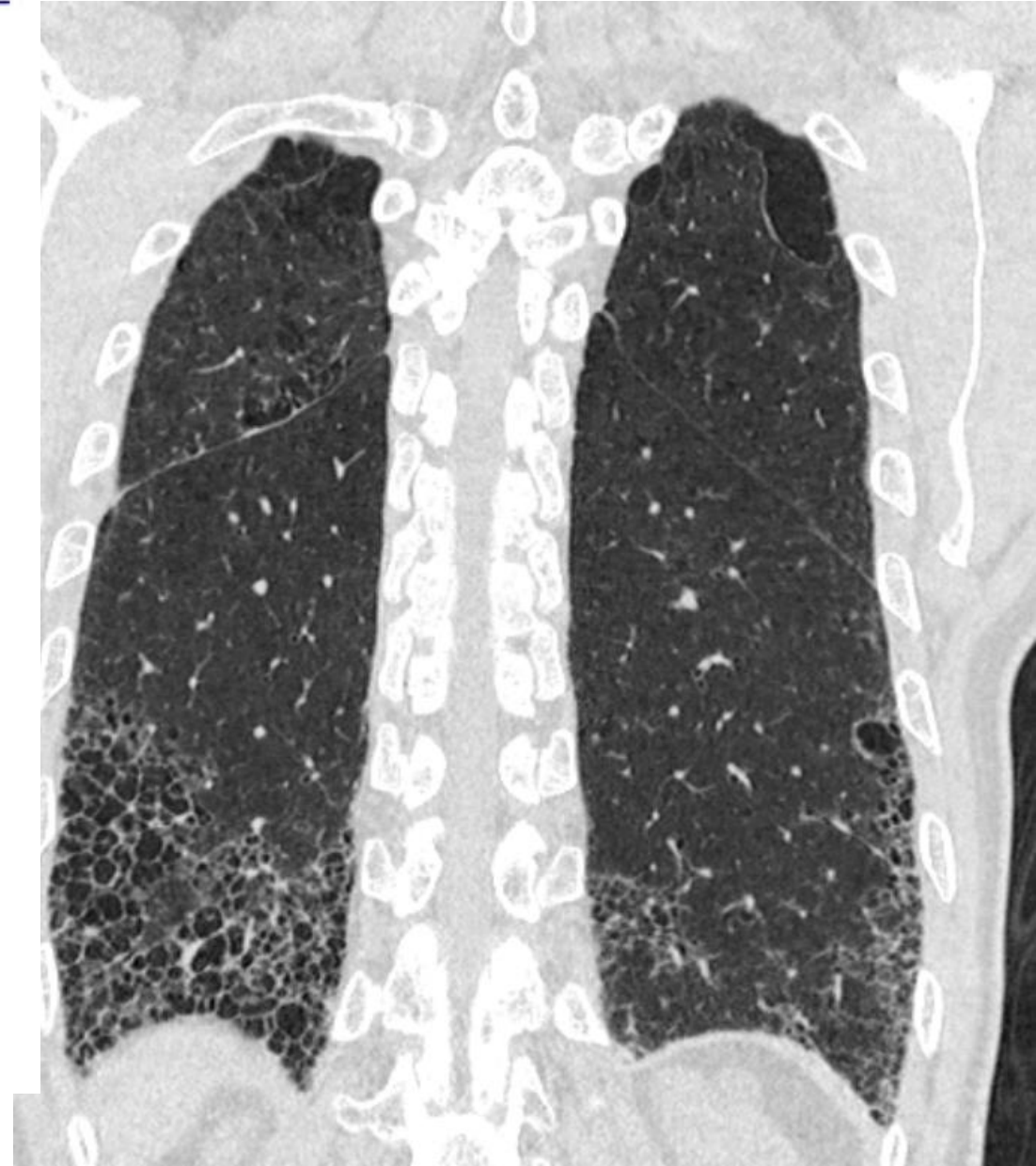
6-minute walking distance test

| Time | SpO2 % | Heart Rate | Borg scale |
|-------|--------|------------|------------|
| 0'00" | 96 | 83 | |
| 0'30" | 95 | 90 | |
| 1'00" | 94 | 93 | |
| 1'30" | 93 | 97 | |
| 2'00" | 94 | 97 | |
| 2'30" | 94 | 97 | |
| 3'00" | 94 | 99 | |
| 3'30" | 94 | 99 | |
| 4'00" | 93 | 100 | |
| 4'30" | 94 | 102 | |
| 5'00" | 94 | 102 | |
| 5'30" | 94 | 100 | |
| 6'00" | 94 | 102 | |
| 7'00" | 95 | 97 | Post |

최소 SpO2: 96 %

6 Minutes walking distance : 393 M

Borg scale : 2



Diagnostic algorithm for IPF

Patient suspected of having IPF

- >60 years, Sx+/-
- Bibasilar inspiratory crackles
- Bilateral fibrosis

Potential cause/associated condition

- History, PEx.
- Occupation
- Exposure
- Serology for CTD

No

Yes

Chest HRCT pattern

Confirmation of specific diagnosis (including with HRCT)

No

Yes

UIP or probable UIP*

Indeterminate for UIP or alternate diagnosis

MDD

BAL[†] ± TBLC[‡]

SLB[‡]

MDD

IPF

Alternative diagnosis

- : CBC, Chemistry
- : **CRP, ESR, ANA, RF**
- : anti-CCP, ANCA
- : myositis panel, ACE
- : KL-6

증례 2

- 52세 여자
- 건강검진 CXR 이상으로 의뢰됨
- **Bilateral inspiratory fine crackles**

ILD: HRCT, PFT

European Respiratory Review 2018 27: 180076



Spirometry

| | (BTPS) | PRED | BEST | %PRED |
|-----------|--------|------|------|-------|
| FVC | Liters | 3.14 | 2.23 | 71 |
| FEV1 | Liters | 2.66 | 1.84 | 69 |
| FEV1/FVC | % | 81 | 82 | |
| FEV3 | Liters | | 2.15 | |
| FEV6 | Liters | | | |
| FEF25-75% | L/sec | 2.70 | 1.96 | 73 |
| PEF | L/sec | 5.65 | 4.07 | 72 |
| FIVC | Liters | 3.01 | 0.20 | 7 |
| PI max | cmH2O | 77 | | |
| PE max | cmH2O | 142 | | |

Lung volume

| | | | | |
|--------|--------|------|------|-----|
| TLC | Liters | 4.57 | 4.11 | 90 |
| VC | Liters | 3.01 | 2.23 | 74 |
| FRC PL | Liters | 2.57 | 2.96 | 115 |
| RV | Liters | 1.67 | 1.87 | 112 |
| RV/TLC | % | 36 | 46 | |
| IC | Liters | 1.98 | 1.15 | 58 |
| ERV | Liters | 0.99 | 1.10 | 111 |

Flow

□ -

PRE-RX



HRCT Pattern

CT Findings Suggestive of an Alternative Diagnosis

UIP Pattern

Probable UIP Pattern

Indeterminate for UIP

Level of confidence for UIP histology

Confident (>90%)

Provisional high confidence (70–89%)

Provisional low confidence (51–69%)

Low to very low confidence (≤50%)

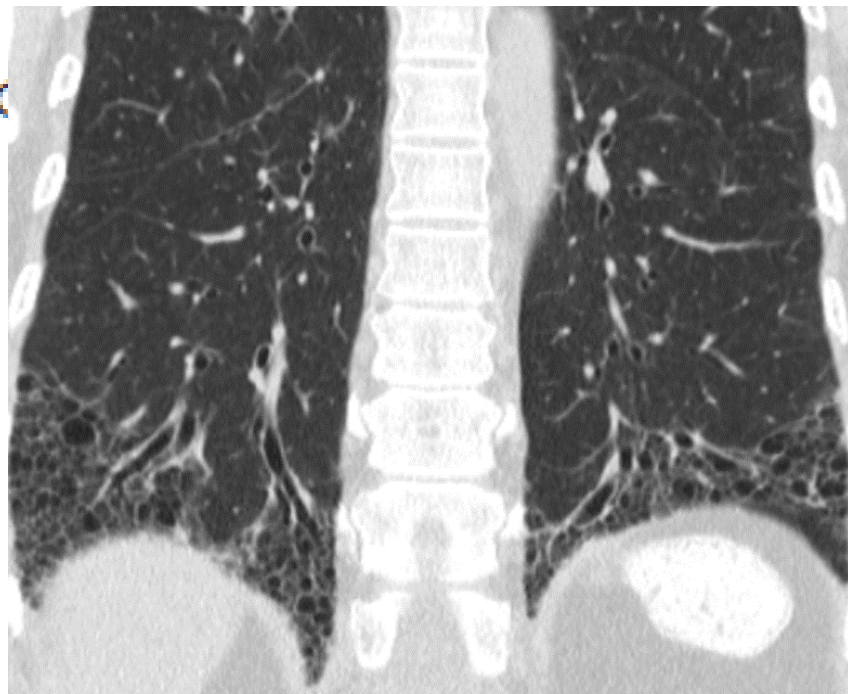
Distribution

- Subpleural and basal predominant
- Often heterogeneous (areas of normal lung interspersed with fibrosis)
- Occasionally diffuse
- May be asymmetric

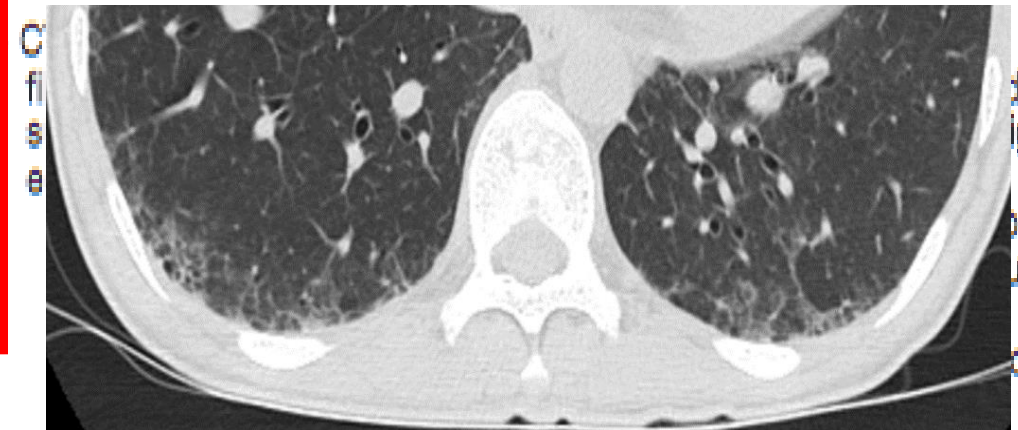
- Subpleural and basal predominant
- Often heterogeneous (areas of normal lung interspersed with reticulation and traction bronchiectasis/bronchiolectasis)

- Diffuse distribution without subpleural predominance

- Peribronchovascular predominant with subpleural sparing (consider NSIP)
- Perilymphatic distribution (consider sarcoidosis)
- Upper or mid lung (consider fibrotic HP, CTD-ILD, and sarcoidosis)
- Subpleural sparing (consider NSIP or smoking-related IP)

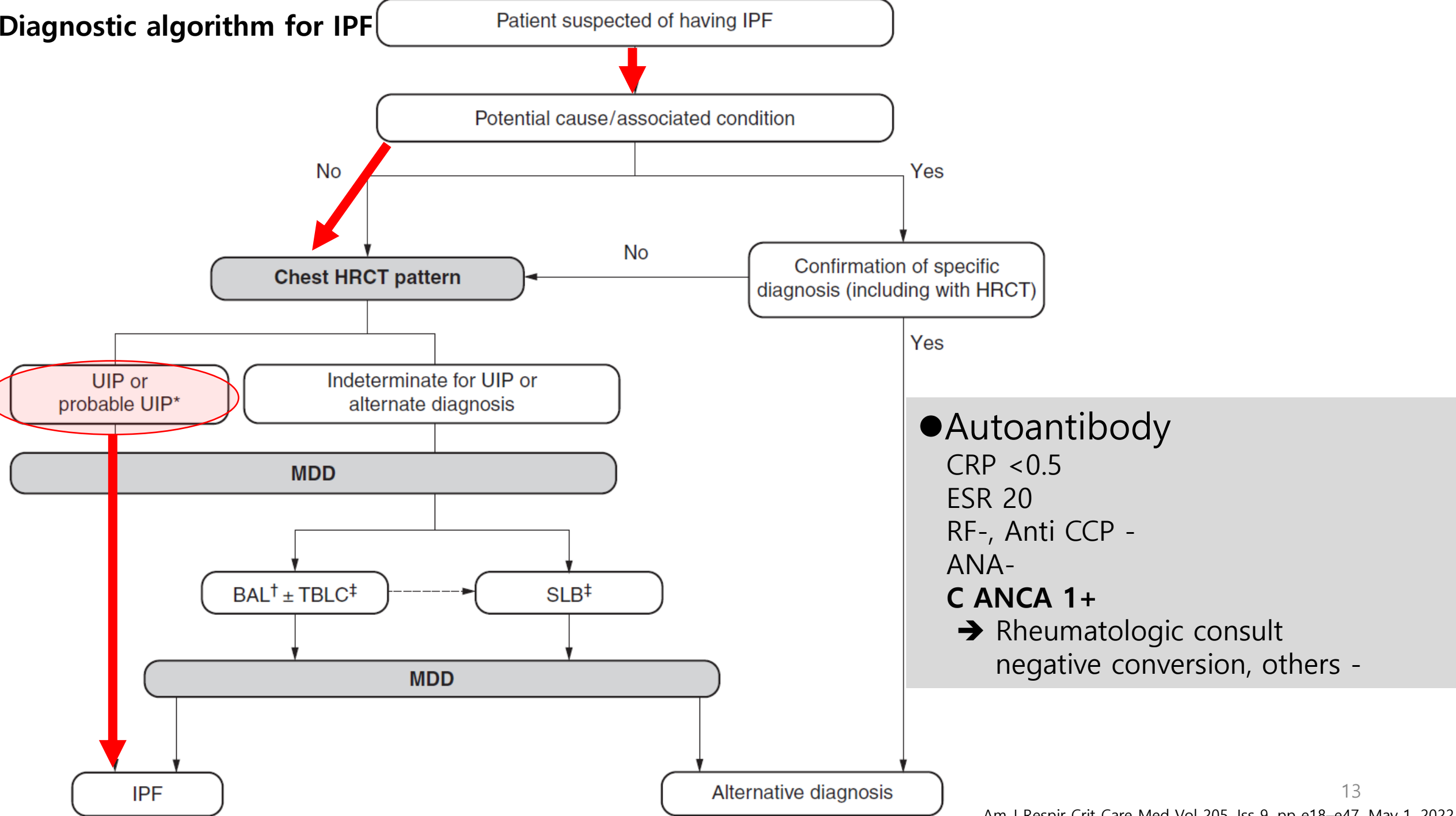


- Reticular pattern with traction bronchiectasis/bronchiolectasis
- May have mild GGO
- Absence of subpleural sparing



- Nodules (consider sarcoidosis)
- Consolidation (consider organizing pneumonia, etc.)
- Mediastinal findings
 - Pleural plaques (consider asbestosis)
 - Bilateral paraseptal emphysema (consider CTD)

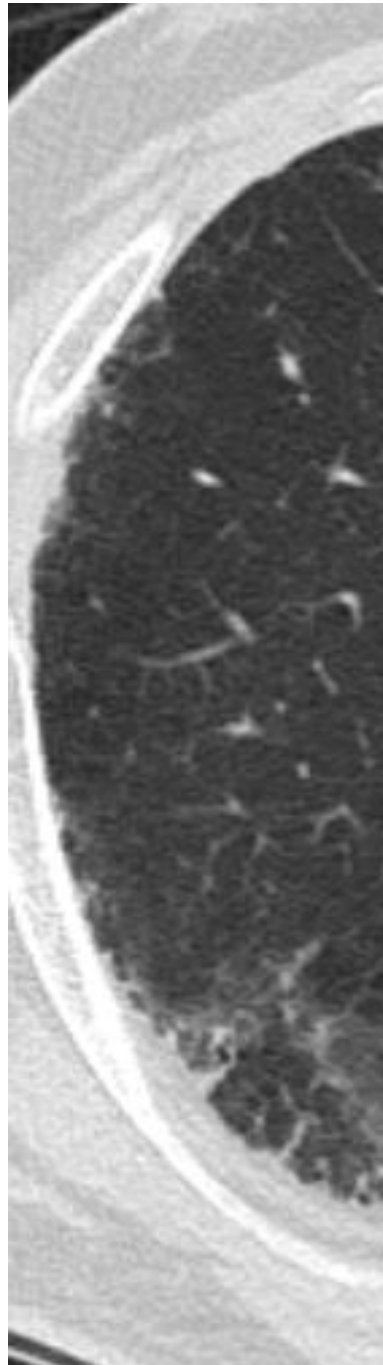
Diagnostic algorithm for IPF



증례 3

- 60세 남자
- ILD로 내원
- 지하철 근무
- DOE MMRC III

대장암 10년전
DM 경구약 조절중 (동네병원)



6-minute walking distance test

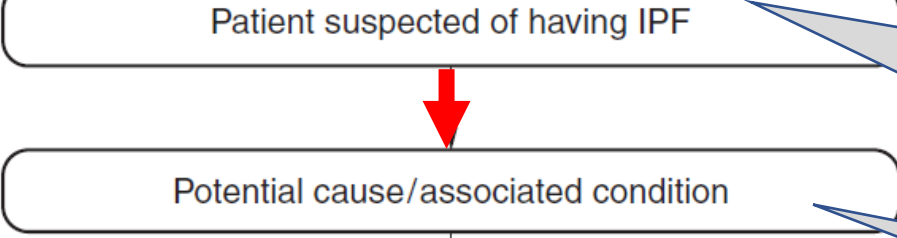
| Time | SpO2 % | Heart Rate | Borg scale |
|-------|--------|------------|------------|
| 0'00" | 94 | 76 | |
| 0'30" | 94 | 79 | |
| 1'00" | 93 | 85 | |
| 1'30" | 92 | 90 | |
| 2'00" | 91 | 90 | |
| 2'30" | 91 | 91 | |
| 3'00" | 92 | 92 | |
| 3'30" | 92 | 91 | |
| 4'00" | 92 | 92 | |
| 4'30" | 92 | 92 | |
| 5'00" | 92 | 94 | |
| 5'30" | 92 | 94 | |
| 6'00" | 92 | 94 | |
| 7'00" | 95 | 88 | Post |

최소 SpO2: 91 %

Minutes walking distance : 456 M

| | PRE-RX | | POST-RX | | % Chg |
|---|--------|-------|---------|-------|-------|
| | BEST | %PRED | BEST | %PRED | |
| 8 | 2.47 | 49 | 2.45 | 48 | -1 |
| 3 | 2.06 | 54 | 2.04 | 53 | -1 |
| 4 | 83 | | 83 | | |
| 3 | 2.41 | 77 | 2.47 | 79 | 2 |
| | 2.45 | | 2.40 | | -2 |
| | 2.33 | | 2.26 | | -3 |
| 8 | 9.78 | 114 | 8.51 | 99 | -13 |
| | 7.93 | | 8.64 | | 9 |
| 0 | 1.78 | 39 | 2.27 | 49 | 27 |
| | 5.26 | | 4.39 | | -17 |
| 0 | 2.47 | 54 | | | |
| 6 | 3.51 | 50 | | | |
| 9 | 2.28 | 63 | | | |
| 8 | 1.04 | 44 | | | |
| 7 | 30 | | | | |
| 1 | 1.23 | 39 | | | |
| 5 | 0.98 | 63 | | | |
| 1 | 15.0 | 57 | | | |
| 9 | 5.37 | 142 | | | |
| 1 | 15.0 | 57 | | | |
| | 2.79 | | | | |
| | 11.17 | | | | |
| | 2.02 | | | | |
| 4 | 4.64 | 131 | | | |

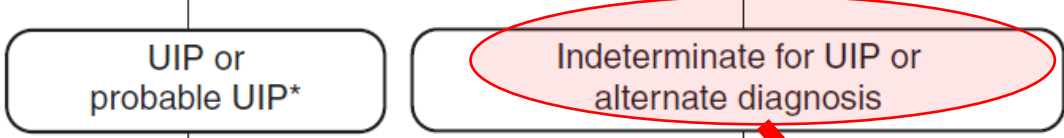
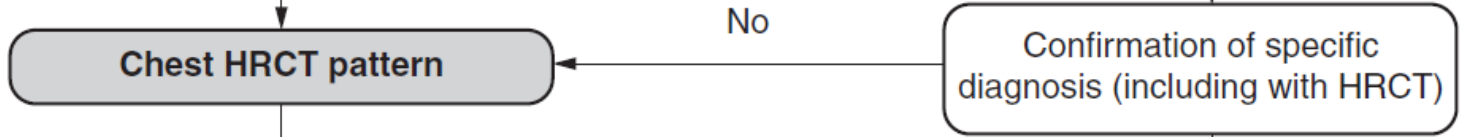
Diagnostic algorithm for IPF



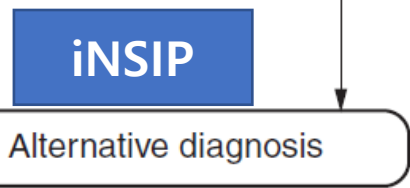
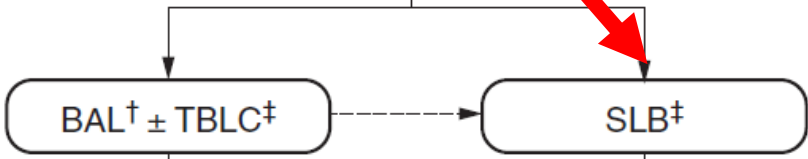
- >60 years, Sx+/-
- Bibasilar inspiratory crackles
- Bilateral fibrosis

No Yes

- History
- Occupation
- Exposure
- Serology for CTD



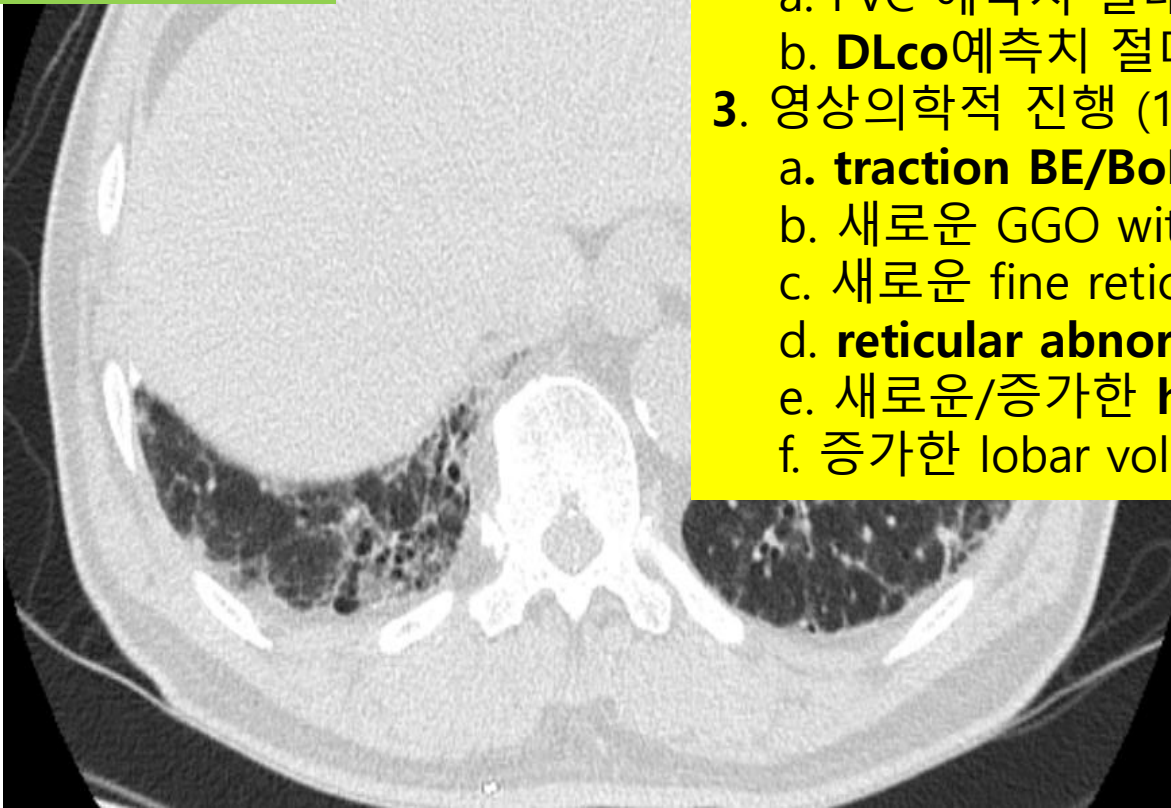
- **BAL lymph 28%**
- **Autoantibody-**
- **ESR 49**
- **CRP <0.5**
- **KL-6 1100**



PPF: Progressive pulmonary Fibrosis

fNSIP on VATS 2021.10.14

FVC 69%, 2.88L
DLCO 113%

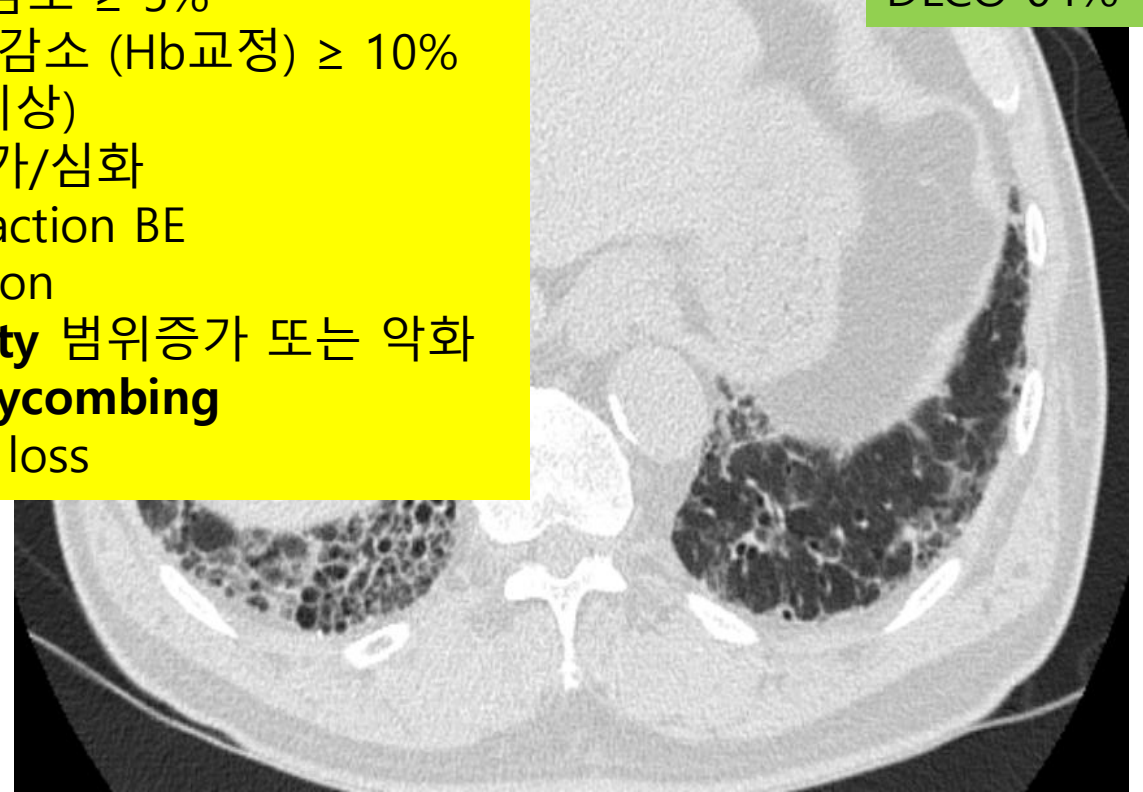


3개중 2개이상 만족시 진단/ 1년간

1. 호흡기증상의 악화
2. 생리학적 진행 (1개 이상)
 - a. FVC 예측치 절대값 감소 $\geq 5\%$
 - b. **DLco** 예측치 절대값 감소 (Hb교정) $\geq 10\%$
3. 영상의학적 진행 (1개 이상)
 - a. **traction BE/BoE** 증가/심화
 - b. 새로운 GGO with traction BE
 - c. 새로운 fine reticulation
 - d. **reticular abnormality** 범위증가 또는 악화
 - e. 새로운/증가한 **honeycombing**
 - f. 증가한 lobar volume loss

On nintedanib 2023.05.16

FVC 65%, 2.75L
DLCO 64%

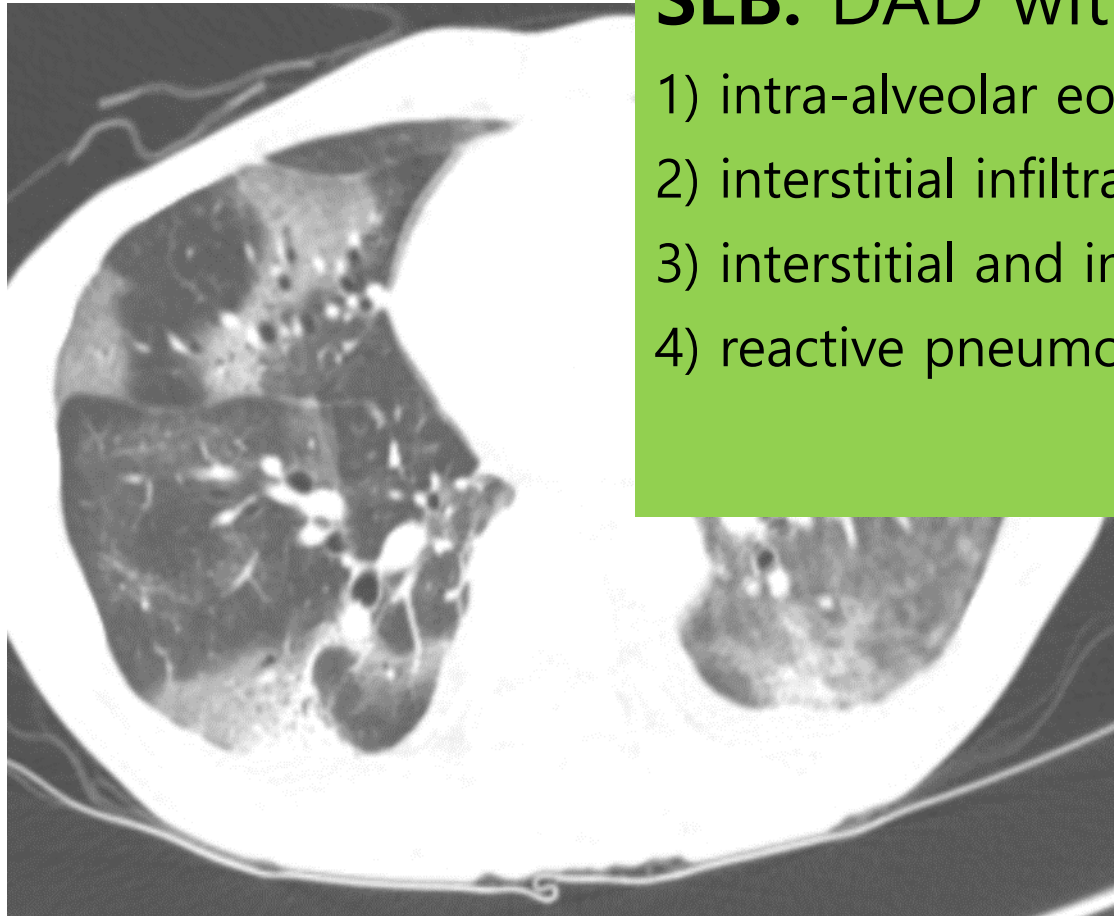


증례 4 55세 남자

6주간 지속되는 열과 폐렴

Lymphoma로 9개월 전 항암 완료 후 CR

Autoantibody-, BAL lymph+



SLB: DAD with partly **acute fibrinous** and **OP** with

- 1) intra-alveolar eosinophilic hyaline membranes
- 2) interstitial infiltration of neutrophils and lymphocytes
- 3) interstitial and intra-alveolar fibroblastic foci
- 4) reactive pneumocytes



AFOP: Acute fibrinous and organizing pneumonia

Arch Pathol Lab Med . 2002 Sep;126(9):1064-70

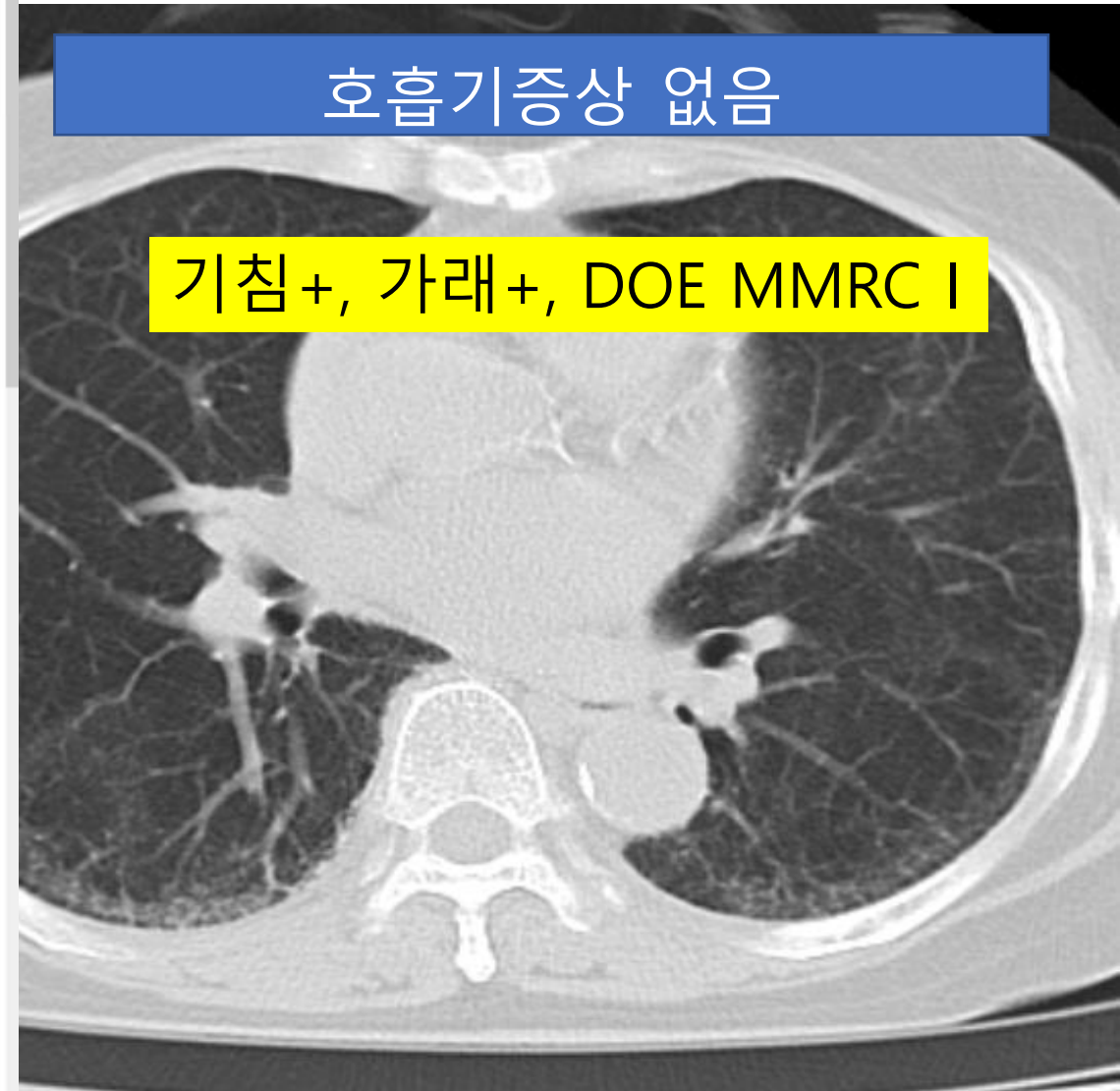
- acute or subacute clinical presentation
- Idiopathic or HP, infection, drug, EP, RA, Malignancy
- Mean age of 62 years (33-78)
- Dyspnea (11), fever (6), cough (3), hemoptysis (2)
- Fulminant with rapid progression to death (n = 9; 52%, mean survival, 0.1 year) and a more subacute illness with recovery (n = 8; 48%)

Radiology Case Reports 2018; 13;4 867
BMC Pulmonary Medicine 2019; 19;141
Diagnostic Pathology 2021; 16; 90
Front. Med., 12 January 2023



증례 5 66세 여자. 검진 CT 이상

| | | PRED | PRE-RX | | POST-RX | | % Chg |
|--------------------|--------------|------|--------|-------|---------|-------|-------|
| | | | BEST | %PRED | BEST | %PRED | |
| Spirometry | | | | | | | |
| FVC | Liters | 2.72 | 1.92 | 71 | 1.99 | 73 | 3 |
| FEV1 | Liters | 2.08 | 1.61 | 77 | 1.66 | 80 | 3 |
| FEV1/FVC | % | 77 | 84 | | 84 | | |
| FEF25-75% | L/sec | 2.12 | 1.93 | 91 | 2.17 | 102 | 12 |
| FEV6 | Liters | | 1.92 | | 1.98 | | 3 |
| FEV3 | Liters | | 1.82 | | 1.89 | | 4 |
| PEF | L/sec | 4.94 | 6.00 | 121 | 5.06 | 102 | -16 |
| FET100% | Sec | | 6.34 | | 6.59 | | 4 |
| FIVC | Liters | 2.34 | 1.78 | 76 | 1.60 | 69 | -10 |
| PIF | L/sec | | 1.84 | | 2.00 | | 9 |
| Lung Volume | | | | | | | |
| VC | Liters | 2.34 | 1.92 | 82 | | | |
| TLC | Liters | 4.05 | 3.43 | 85 | | | |
| FRC PL | Liters | 2.41 | 2.35 | 98 | | | |
| RV | Liters | 1.74 | 1.51 | 87 | | | |
| RV/TLC | % | 41 | 44 | | | | |
| IC | Liters | 1.53 | 1.08 | 70 | | | |
| ERV | Liters | 0.77 | 0.88 | 114 | | | |
| Diffusion | | | | | | | |
| DLCO | mL/min/mmHg | 15.5 | 10.9 | 70 | | | |
| DLCOVA | mL/min/mHg/L | 4.09 | 4.12 | 100 | | | |
| DL Adj | mL/min/mmHg | 15.5 | 10.9 | 70 | | | |
| VA | Liters | | 2.64 | | | | |
| BHT | Sec | | 10.26 | | | | |
| IVC | Liters | | 1.60 | | | | |
| FlowKroghs K | 1/min | 3.31 | 3.56 | 107 | | | |



호흡기증상 없음

기침+, 가래+, DOE MMRC I

Diagnostic algorithm for IPF

Patient suspected of having IPF

Potential cause/associated condition

ANA 1:640

류마티스내과 의뢰

**Anticentromere +
Anti scl 70-**

No

Yes

No

Yes

Chest HRCT pattern

Confirmation of specific diagnosis (including with HRCT)

UIP or probable UIP*

Indeterminate for UIP or alternate diagnosis

MDD

BAL[†] ± TBLC[‡]

SLB[‡]

MDD

IPF

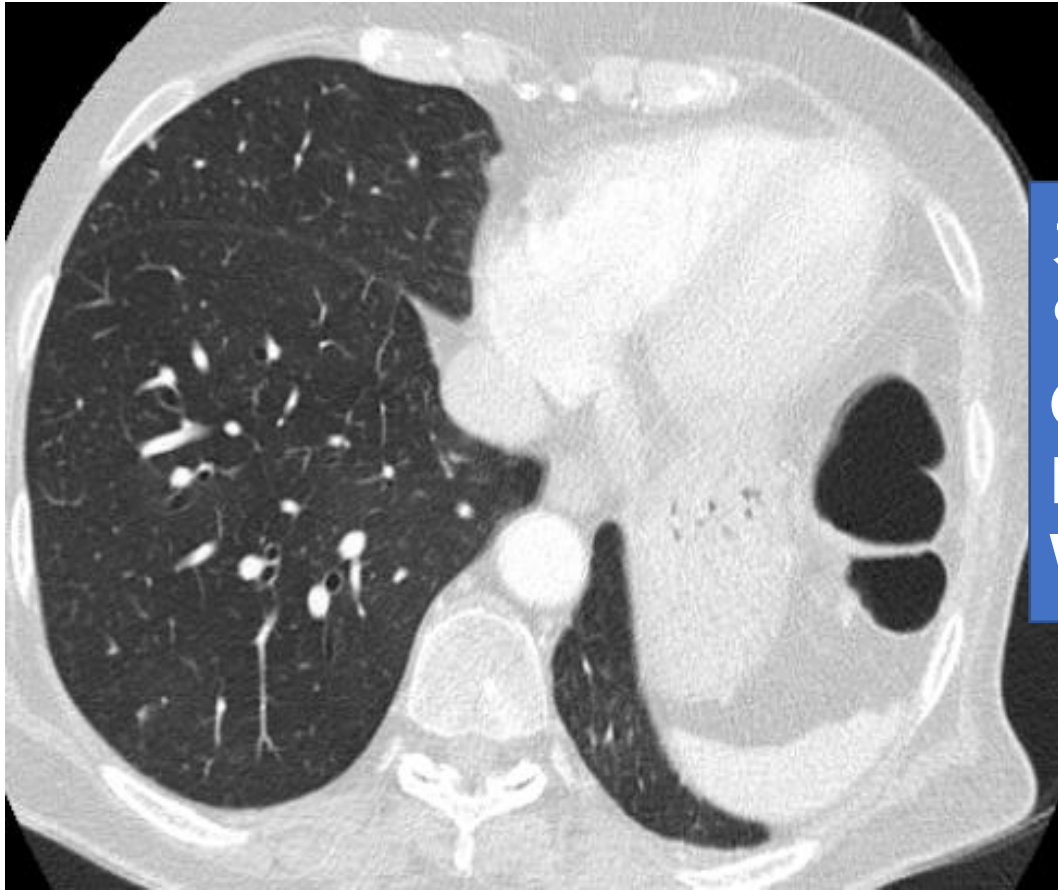
Alternative diagnosis

Limited SSc

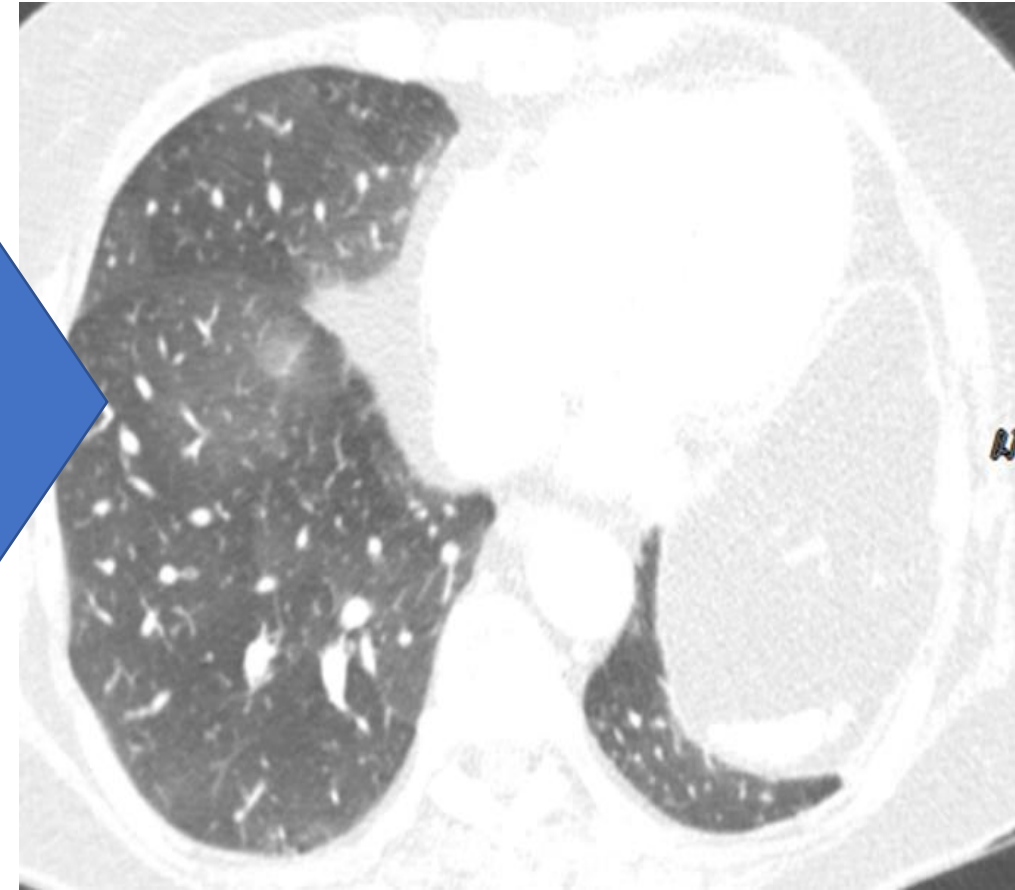
SSc ILD risk factor

- dcSSc
- African–American ethnicity
- older age at disease onset
- shorter disease duration
- the presence of anti-Scl-70/anti-topoisomerase I antibody and/or absence of anticentromere antibody
- ➔ However, none of these risk factors is absolute.
- ILD may develop in patients with limited cutaneous SS

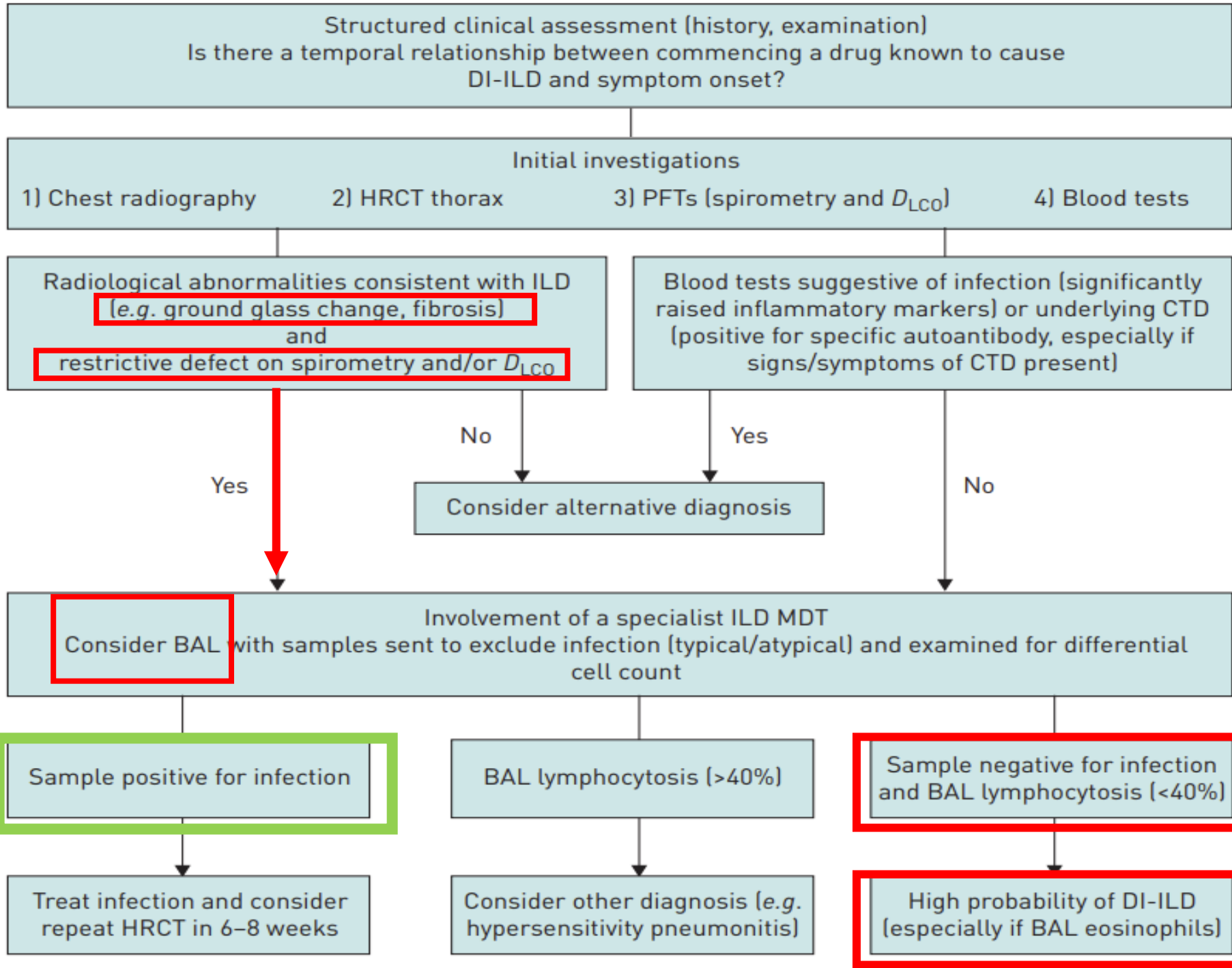
65세 여자, NSCLC, ADC, LLLobectomy 2019.08
2020.07~Afatinib 복용중



기침+, 가래+,
열-
CRP < 0.5
ESR 30
WBC 7,680



Diagnostics for DI-ILD



FVC 73% → 66%
FEV₁ 70% → 40%
DLCO 82% → 49%

..RBC 420
..WBC 189
..Neutrophil(%) 24
..Lymphocyte(%) 38
..Eosinophill(%) 3
..Monocyte(%) 20
..Macrophage(%) 15

Afatinib-ILD: rare
2/232, 4/242 in RCTs

맺음말

◆ILD

- 다양한 질환의 총칭임을 이해해야함.
- 병력청취, 직업력, 노출력, 이학적검사 꼼꼼하게.
- 폐기능 검사 (FVC, DLco): 제한성결과
- 자가면역질환 항체 확인으로 CTD ILD 진단
- HRCT 확진 진단: UIP/probable UIP
- BAL, 폐생검: 다른 ILD진단