

Interactive Learning

-호흡기 병리 검사의 해석-



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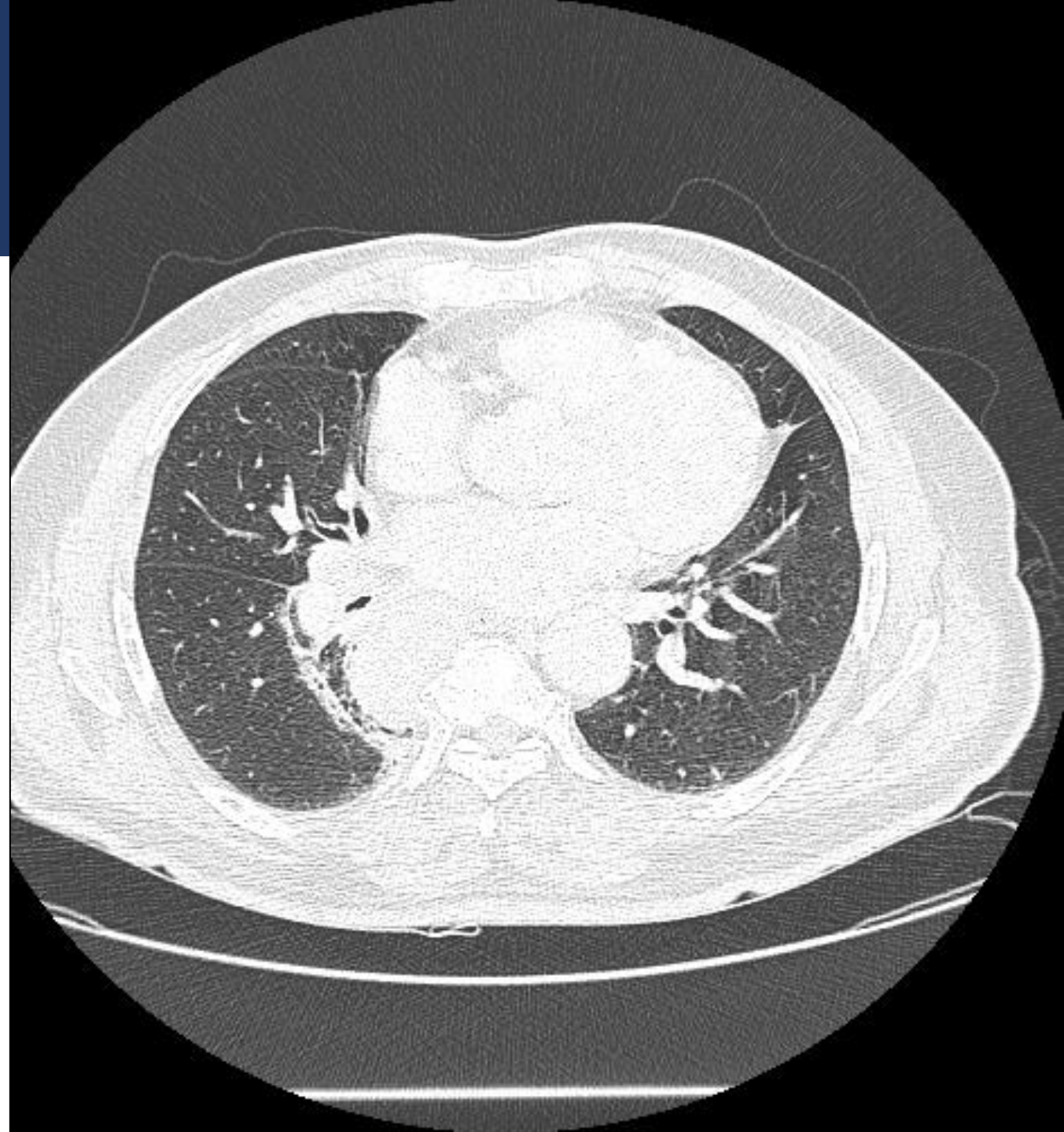
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- **CASE5: Granulomatous disease**

CASE 1

Clinical history

- M/61
- Abdominal pain
- Cough, sputum (+)
- Chest pain, dyspnea (-)
- Current smoker 20 pack years
- Local CT :
 - RLL 3.3cm mass
 - Invasion into carina
 - Subcarinal LN metastasis
- Stage IIIB (cT4N2M0)
- Bronchofibroscopy, EBUS



Pathologic report on small biopsy specimen

Lung, right lower lobe, bronchoscopic biopsy;
Non-small cell carcinoma, NOS

Lymph node, #7, EBUS-TBNA;
Metastatic non-small cell carcinoma

<Result of IHC>

CK7 : positive

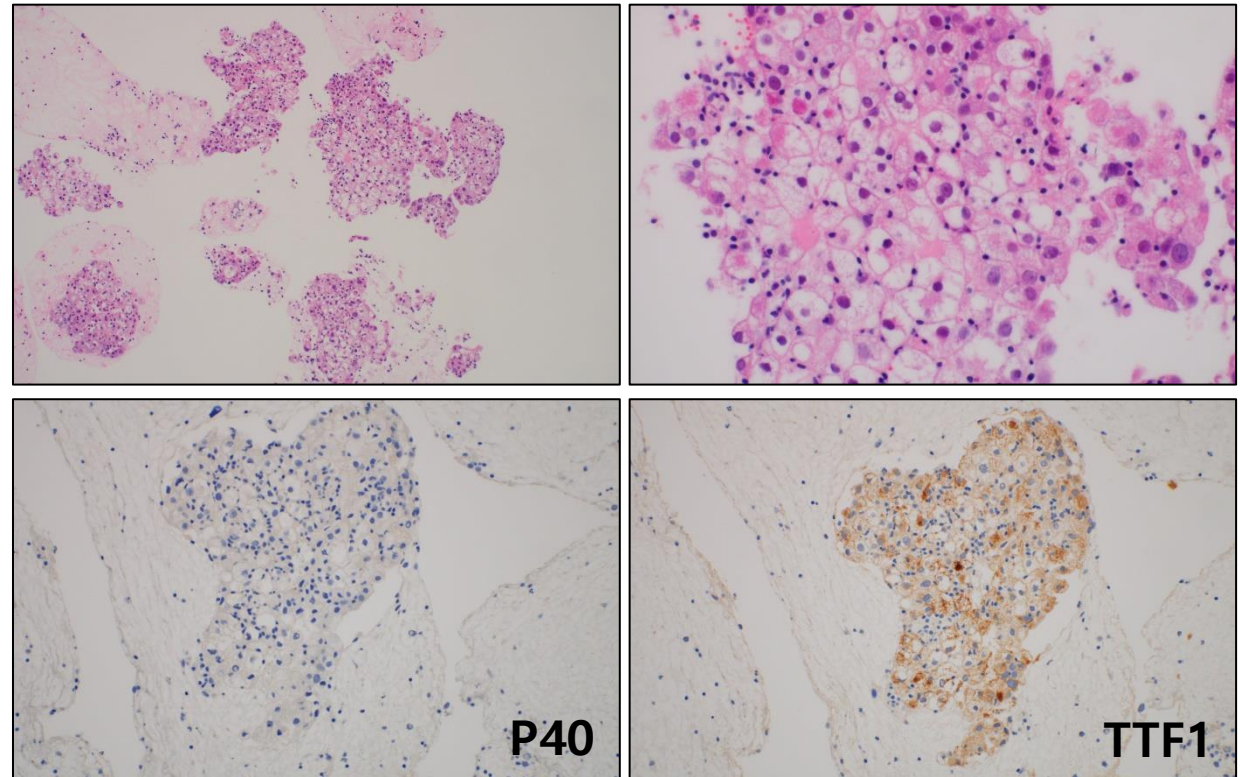
P40, TTF-1, CK20, CK5/6 : negative

PD-L1 (SP263) : Positive (50%)

PD-L1 (SP142) in TC : Positive in 5% (TC2)

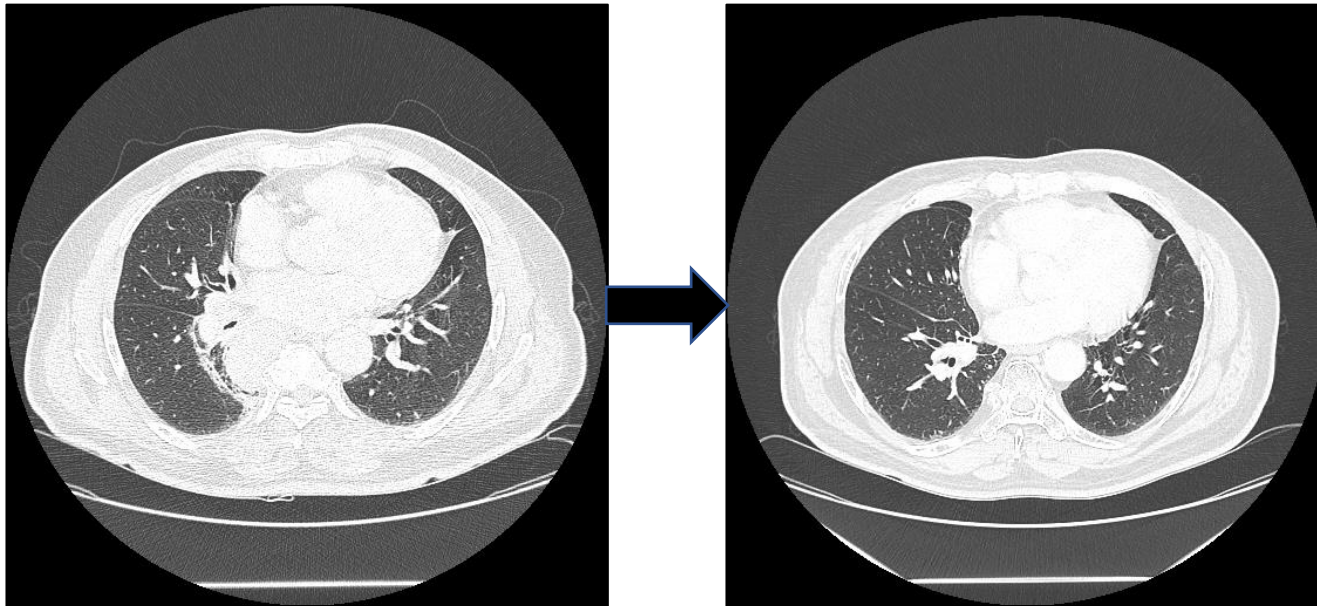
PD-L1 IHC 22C3 pharmDx : Positive (80%)

EGFR/ROS1/ALK/BRAF/KRAS : -/-/-/-/-



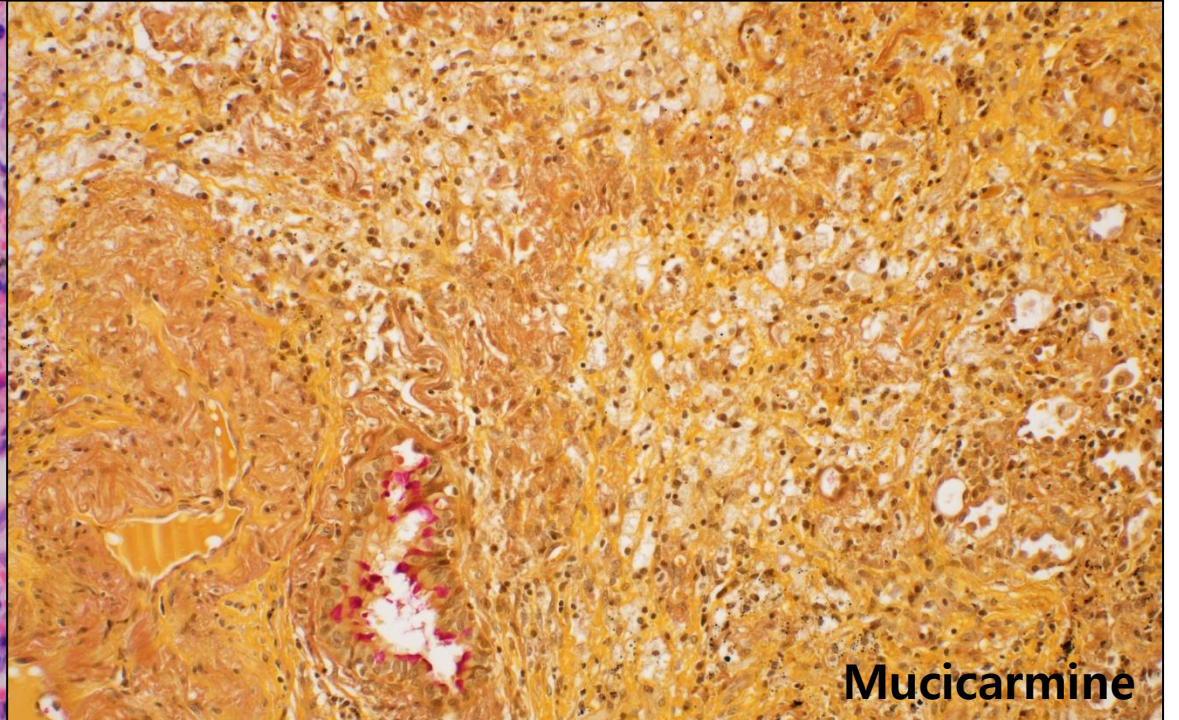
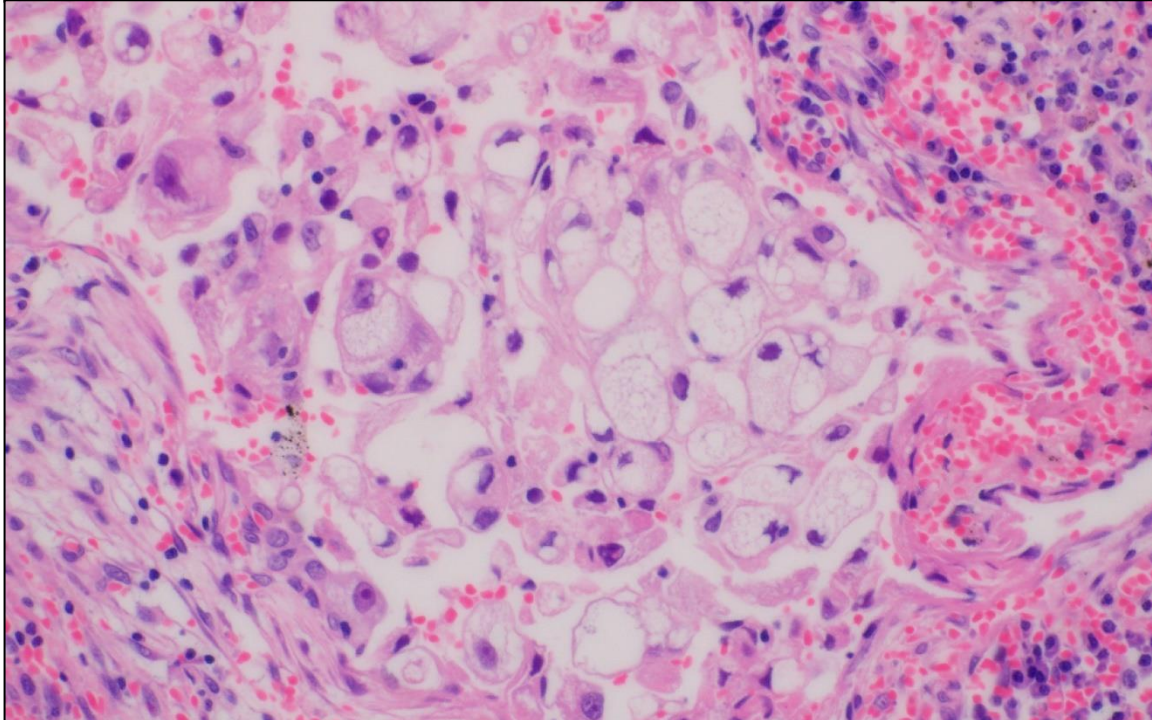
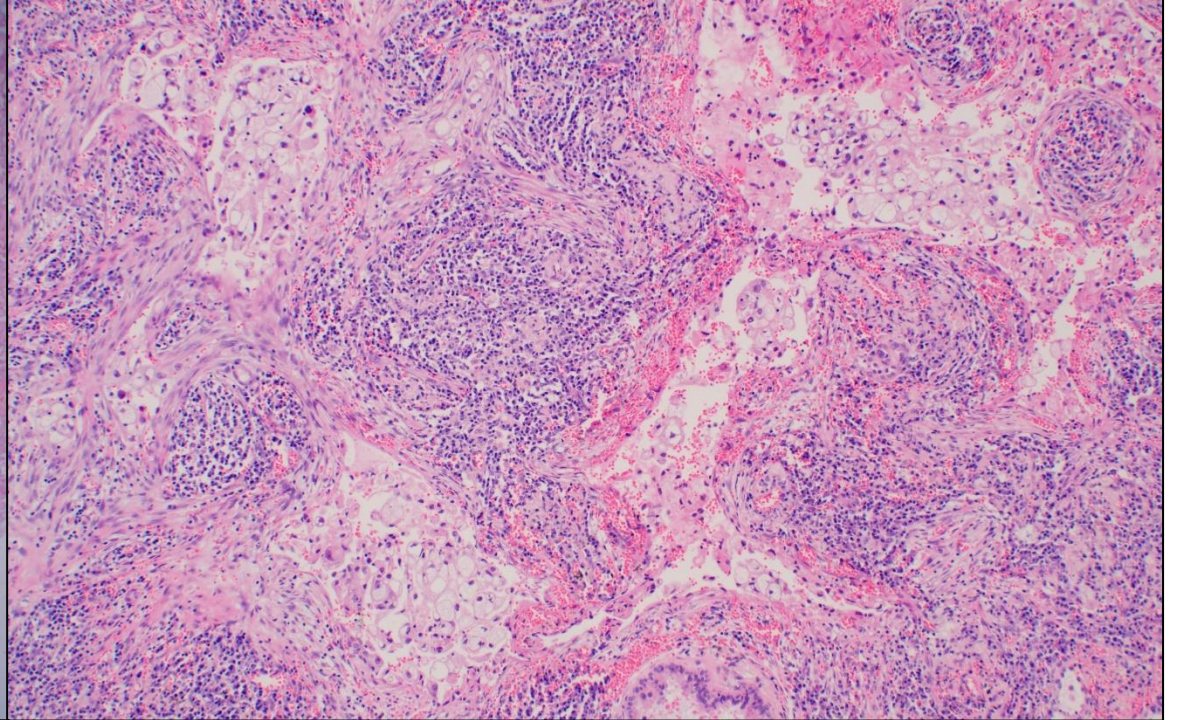
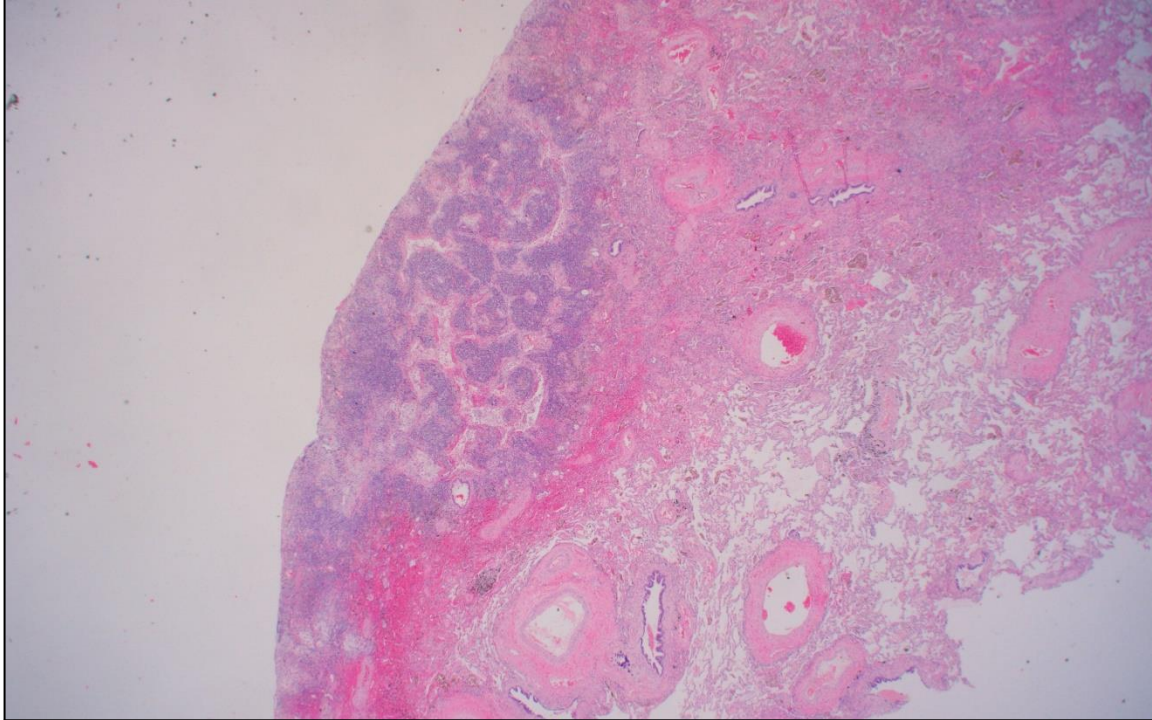
Clinical history

- Neo-adjuvant CCRT (Alimta-Cisp x 3cycles, 60Gy/30fxs)

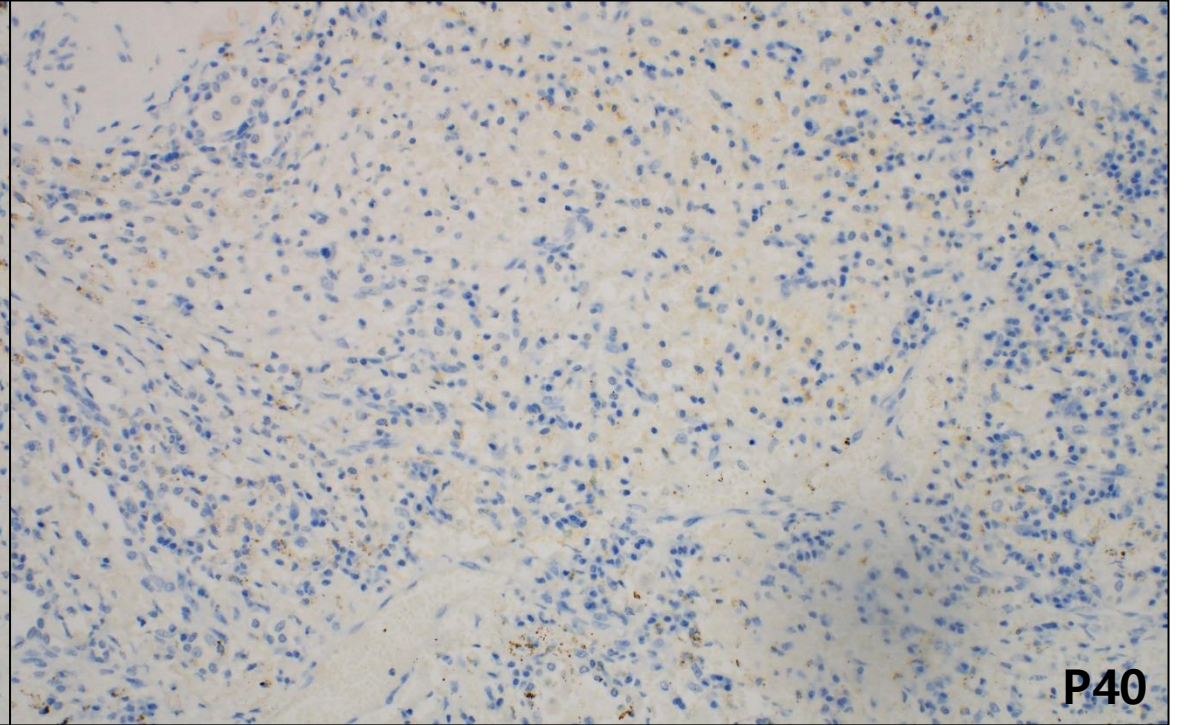
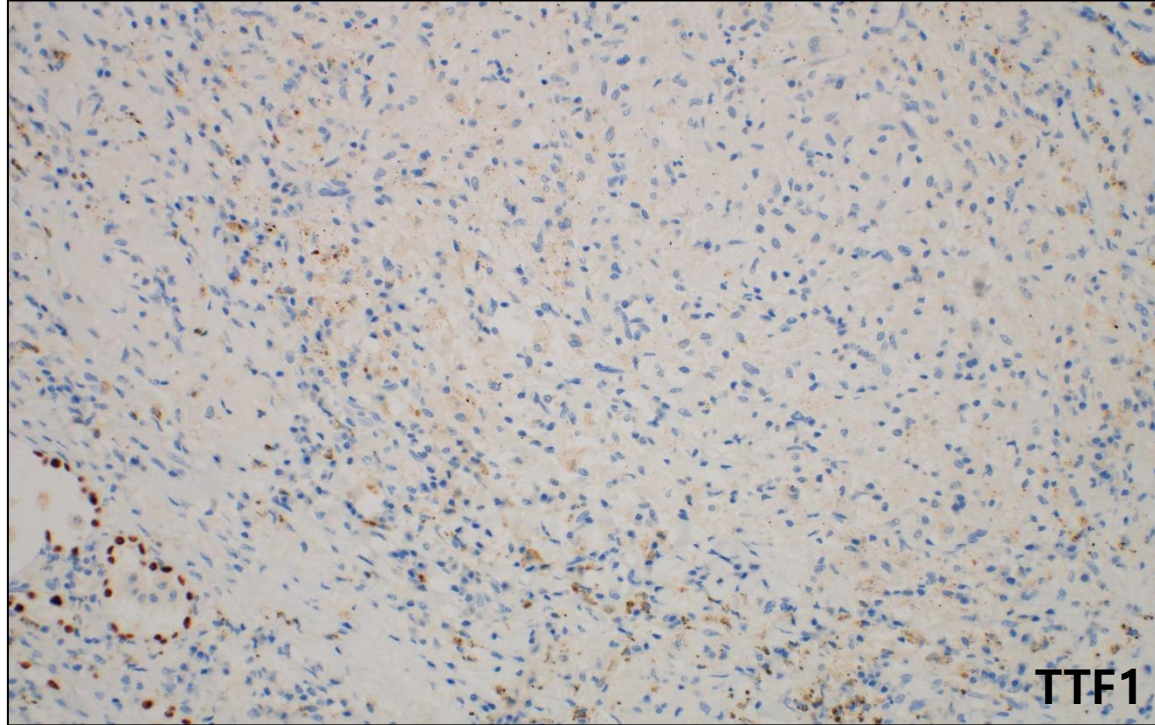


- ycT1bN0M0
- Bilobectomy via VATs





Mucicarmine



Pathologic report on surgical specimen

Lung, RML and RLL, bilobectomy;

Large cell carcinoma, right lower lobe

- with 1) invasive tumor size : 1.0x1.0x0.6cm
- 2) pleural invasion : present (PL2)
- 3) spread through air spaces (STAS) : not identified
- 4) resection margins : clear bronchial RM
- 5) vascular invasion : not identified
- 6) lymphatic invasion : not identified
- 7) perineural invasion : not identified
- 8) necrosis : not identified
- 9) direct invasion of adjacent structures : none
- 10) lymph node : no metastasis in 11 regional LNs (0/11)
- 11) pathologic stage : ypT2aN0
- 12) additional pathologic findings : unremarkable

<Result of IHC and Special stain>

CK7 : positive

TTF-1, P40 : negative

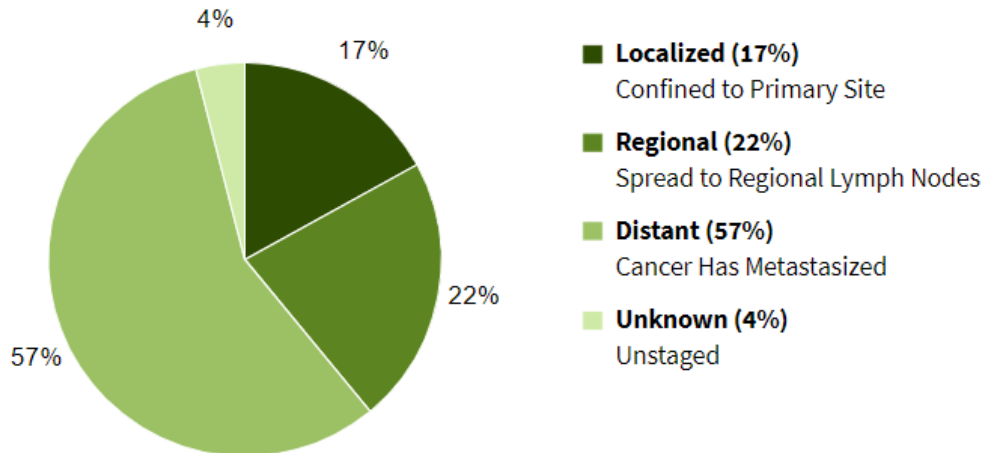
Alcian-blue, Mucicarmine : negative

Elastic stain : positive in pleura

Interpretation of pathologic report in small biopsy specimens

Background

Percent of Cases by Stage



진단 당시 폐암의 70%
수술불가



Small biopsy
Cytology

폐암 systemic Tx 발달
치료에 필요한 병리검사



조직학적 아형 분류
효율적인 추가검사

Diagnostic terminology for lung cancer in small biopsy and cytology specimens

Morphology/stains	Terminology for small biopsies and cytology specimens	Terminology for resection specimens
Morphological Sq cell patterns	Squamous cell carcinoma	Squamous cell carcinoma
Morphological ADC patterns	Adenocarcinoma (list the patterns in the diagnosis)	Adenocarcinoma, predominant pattern
	Adenocarcinoma with lepidic pattern (if pure, list the differential diagnosis on the right and add a comment that an invasive component cannot be excluded.)	MIA, AIS, or an invasive adenocarcinoma with a lepidic component
	Invasive mucinous adenocarcinoma (list the patterns) Mucinous adenocarcinoma with lepidic pattern (if pure lepidic pattern and mention the differential diagnosis listed on the right) Adenocarcinoma with colloid features Adenocarcinoma with fetal features Adenocarcinoma with enteric features	Invasive mucinous adenocarcinoma Minimally invasive adenocarcinoma or adenocarcinoma in situ, mucinous type Colloid adenocarcinoma Fetal adenocarcinoma Enteric adenocarcinoma
Morphological Sq patterns (-) but supported by stains (i.e. p40)	Non-small cell carcinoma, favor squamous cell carcinoma	Squamous cell carcinoma
Morphological Sq patterns (-) but supported by stains (i.e. TTF1)	Non-small cell carcinoma, favor adenocarcinoma	Adenocarcinoma
No clear ADC, Squamous or neuroendocrine morphology or staining pattern	Non-small cell carcinoma NOS	Large cell carcinoma

Useful markers for subtyping of NSCLC (1)

- Adenocarcinoma versus Squamous cell carcinoma -

- The best combination of markers for ADC and SqCC:
 - TTF1 and p40 (if neuroendocrine differentiation is not present)
- **TTF1**
 - Critical single marker for adenocarcinoma (75~80% of pulmonary adenocarcinoma)
 - DDX of
 1. lung adenocarcinoma from squamous cell carcinoma
 2. Primary lung adenocarcinoma from nonpulmonary adenocarcinoma
- **p40 (most specific, most sensitive for squamous cell carcinoma)**
 - p63 (less specific : 1/3 of adenocarcinoma), CK5/6에 비해 높은 민감도와 특이도
 - Cutoff value : 50%
 - 주의! keratinizing component 에서는 음성

Useful markers for subtyping of NSCLC (1)

- Adenocarcinoma versus Squamous cell carcinoma -

Immunohistochemical typing of CK-positive, undifferentiated non-small cell carcinoma (NSCC)

TTF1 ^a	p40	Mucin stains	Diagnosis on biopsy/cell block
Positive (focal or diffuse)	Negative	Positive	NSCC, favor adenocarcinoma
Positive (focal or diffuse)	Positive (focal)	Positive	NSCC, favor adenocarcinoma
Negative	Positive (diffuse)	Negative	NSCC, favor squamous cell carcinoma
Negative	Negative	Negative	NSCC-NOS
Negative	Positive (focal)	Negative	NSCC-NOS
No stain available	No stain available	Negative	NSCC-NOS (no stains available)

Diffuse, >10% of positive tumor cells; focal, 1-10% of positive tumor cells

^a Napsin A may be used as an alternative to TTF1

Useful markers for subtyping of NSCLC (2) - Neuroendocrine tumor (LCNEC) markers-

- The best antibody combination to differentiate NE tumors from other types of NSCC
 - Chromogranin A, synaptophysin, and NCAM 1 (CD56)
 - No clear cutoff
 - Most cases of LCNEC and SCLC : positive for two or more of three NE markers
- Chromogranin A and synaptophysin : true markers of NE differentiation
 - Focal positivity in SCLC → 양성으로 해석
- CD56
 - The most sensitive but not specific for NE differentiation
 - IHC pattern : strong membranous staining in all tumor cells

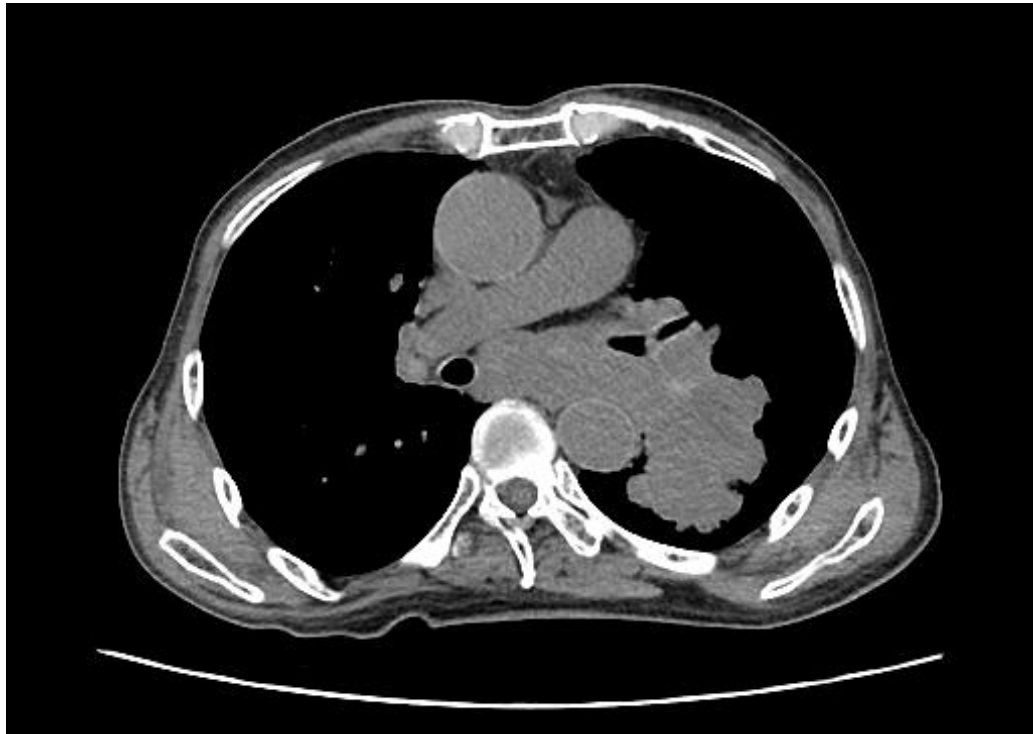
CASE 2

Clinical history

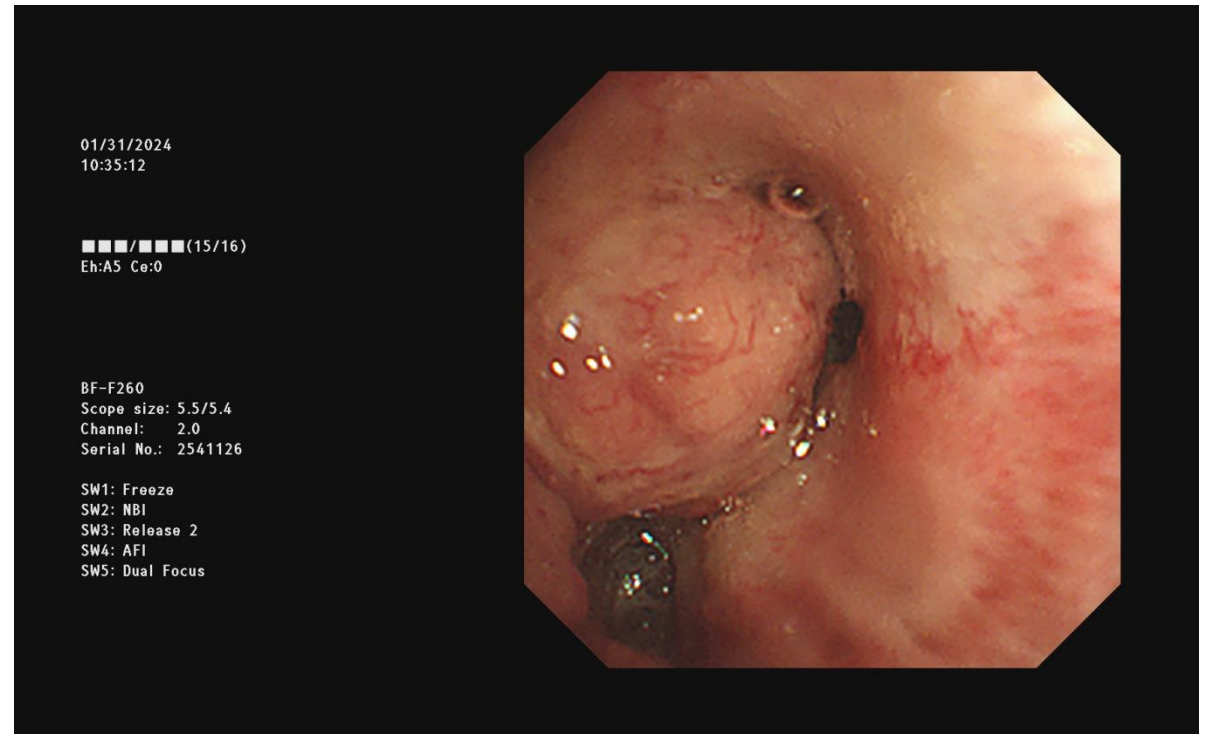
- M/81
- Cough/Dyspnea (+/+) o/s) 2 mo.
- Ex-smoker 85.5 pack years
- Wt loss : 6kg/6mo
- CXR : Large left hilar mass and RUL irregular shaped nodule
- Lab : CEA (50.60), CA19-9 (45.50)
Cyfra21-1 (6.68), CRP (38.06)
- Chest CT
- Bronchoscopy



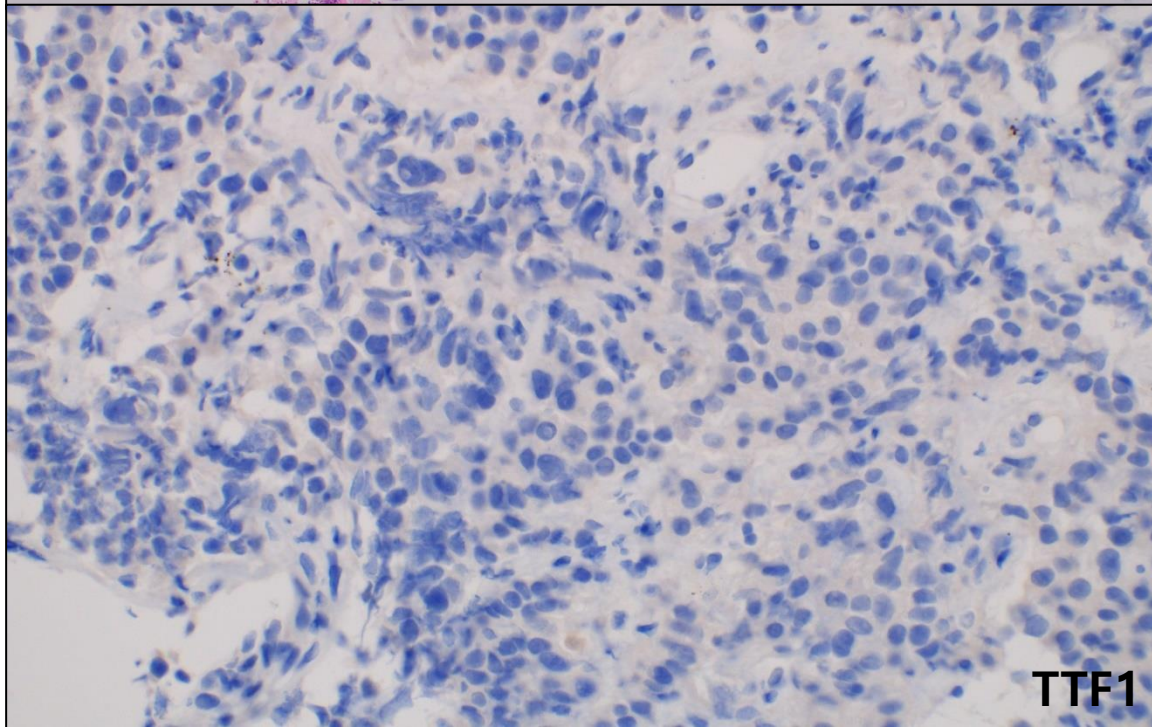
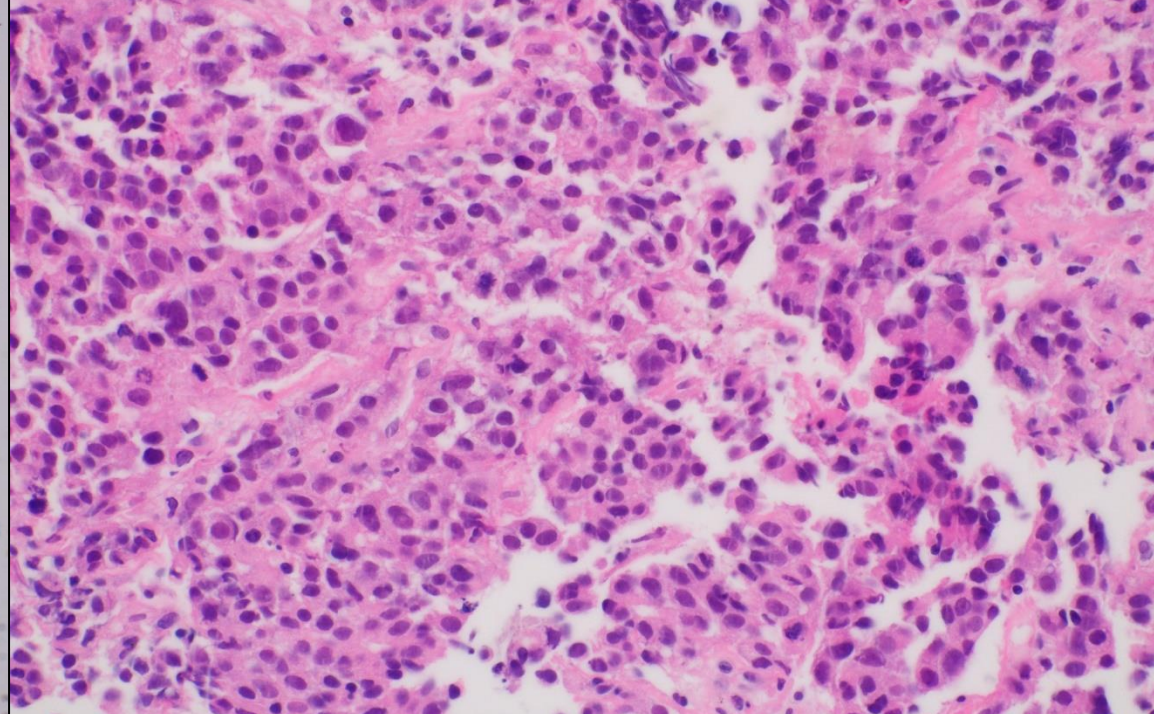
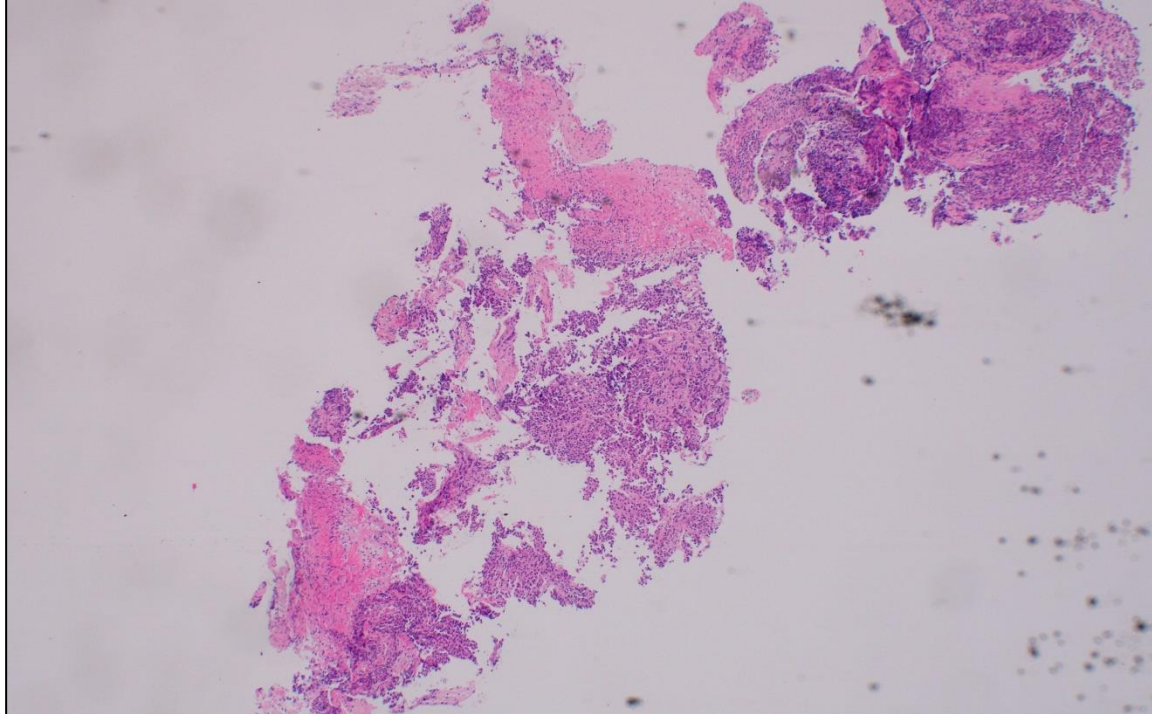
Clinical history



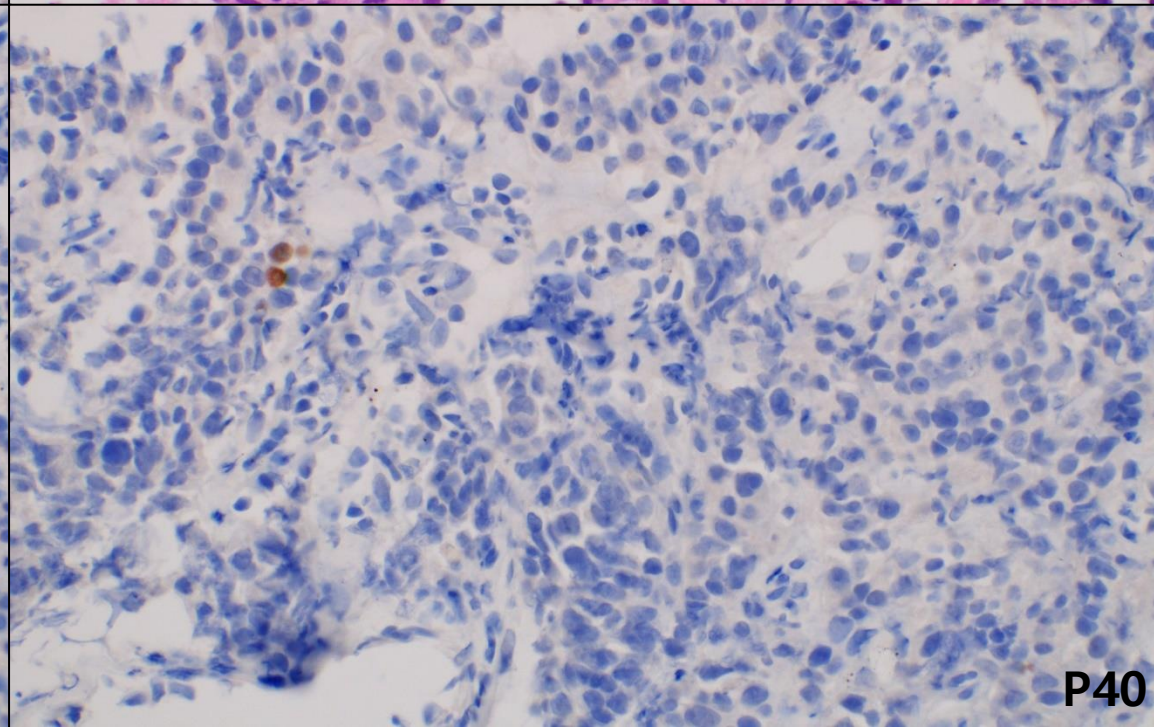
About 7cm sized irregular shaped mass in LLL surrounding Lt. main bronchus and descending thoracic aorta (T4) Metastatic lymph nodes in paraaortic, both paratracheal, subcarina, both supraclavicular areas (N3) Irregular shape with 2.8cm sized mass in RUL(M1a).



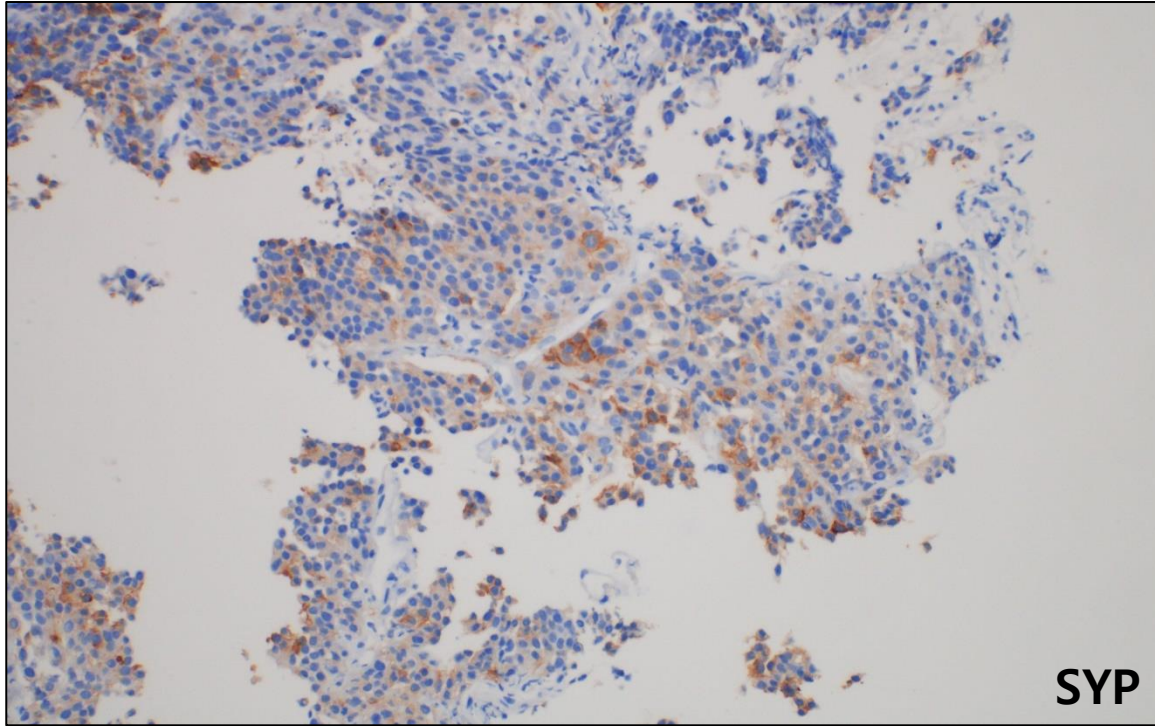
A huge, hypervascular mass at the branch of LUL and LLL which was severe obstructed. Mass biopsy (x7)



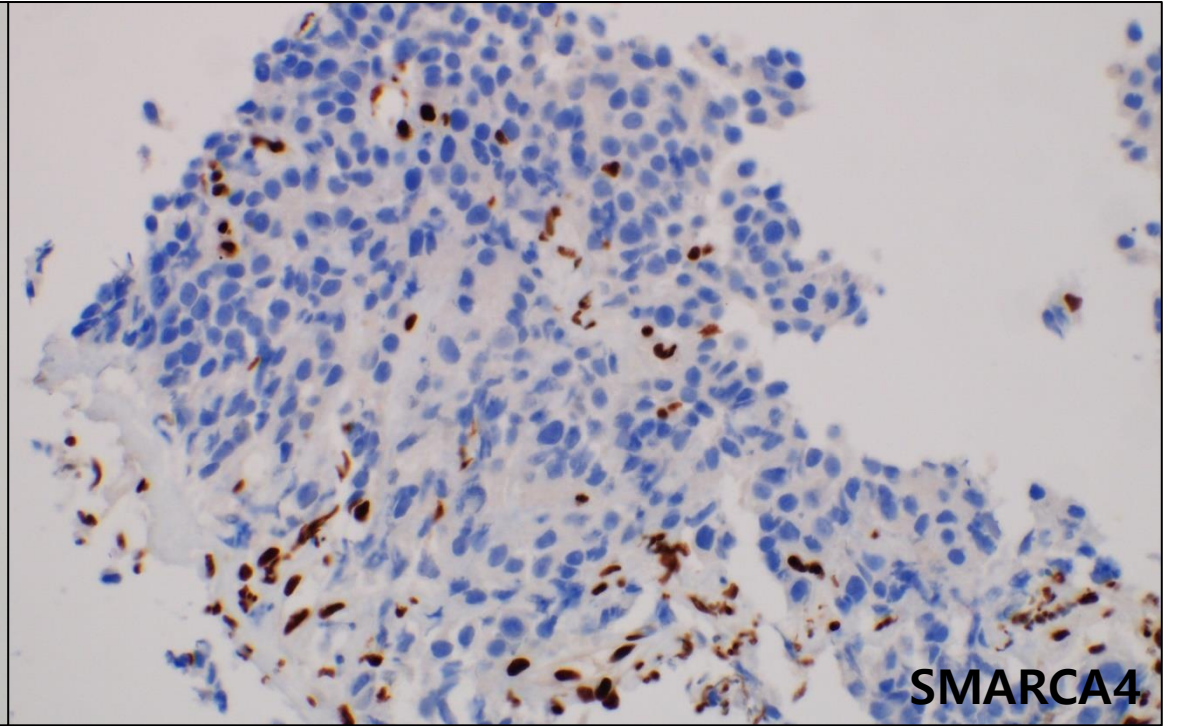
TTF1



P40



SYP



SMARCA4

Pathologic Diagnosis

Lung, left lower lobe, bronchoscopic biopsy;
Thoracic SMARCA4-deficient undifferentiated tumor

<Result of immunohistochemical stain>

SMARCA4 (BRG1) : negative (loss)

Synaptophysin : positive

CD56 : focal positive

NUT, Chromogranin A, P40, INSM-1, TTF-1 : negative

EGFR/KRAS/ALK/ROS1 : -/-/-/-

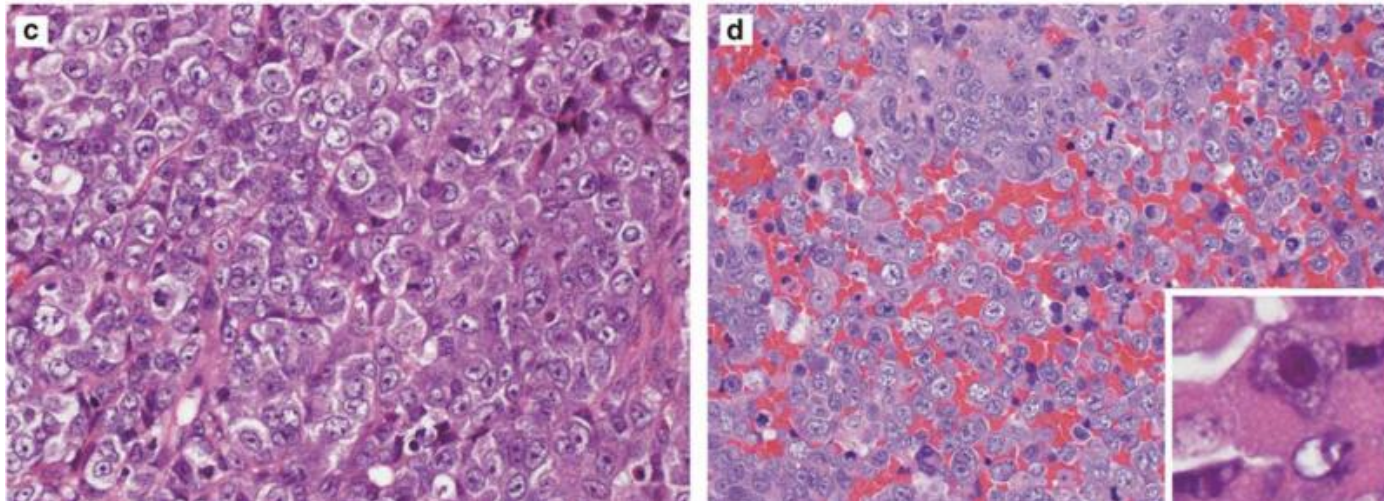
**New Classified Tumor Entity
(WHO Classification of Tumour 5th Edi)**

Thoracic SMARCA4-deficient undifferentiated tumor

- High-grade malignant neoplasm of the thorax and undifferentiated or rhabdoid phenotype and deficiency of SMARCA4
- Epidemiology
 - Young to middle-aged adults (mean age : 48 years, 27-90 years)
 - M>F
 - **Heavy smoker**
- Location
 - **Mediastinum, lung and hilum**, ±pleura or chest wall invasion
- **Dyspnea, chest pain**, bone pain, seizure
- Aggressive behavior, median OS of 4-7 months

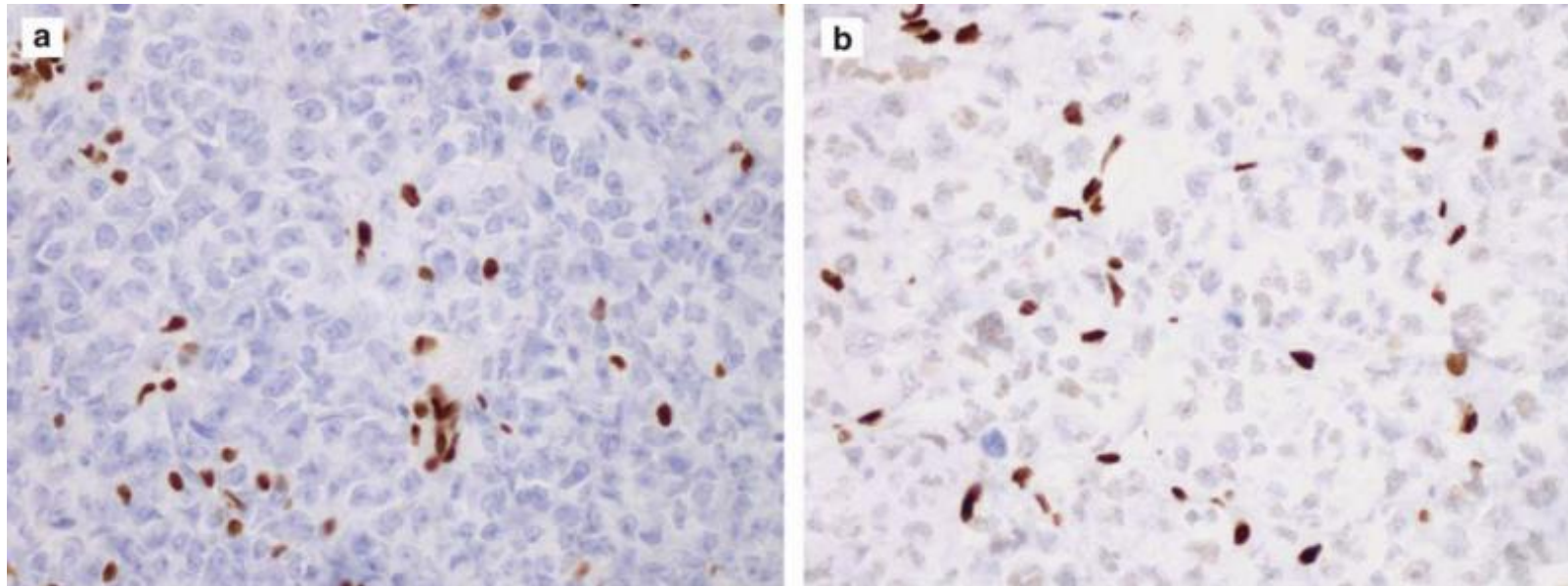
Thoracic SMARCA4-deficient undifferentiated tumor

- Usually large, white-gray, and soft tumors with massive necrosis
- **Diffuse sheets of discohesive, large round to epithelioid cells**
- **Monotonous nuclei with vesicular chromatin and prominent nucleoli**
- **No evidence of epithelial differentiation**
- Rhabdoid cells (may be present)
- Brisk mitosis, geographic necrosis with abundant apoptotic debris



Thoracic SMARCA4-deficient undifferentiated tumor

- **Complete loss of SMARCA4 (BRG1) expression**
- **Diffuse severe reduction of SMARCA4 staining in 25% of cases**
- SMARCA2 (BRM) : Negative in most cases
- Strong expression of stem cell markers (CD34, SOX2, SALL4)

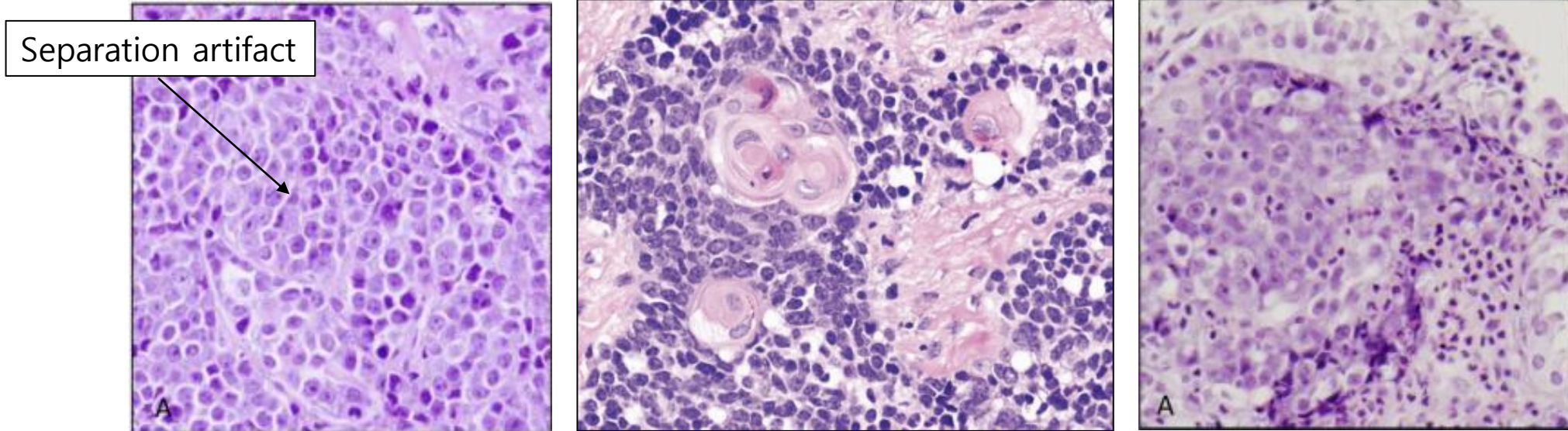


NUT Carcinoma

- A p/d carcinoma with nuclear protein in testis (*NUTM1*) gene rearrangement
- Epidemiology
 - Children and younger adults (median age: 23.6 yrs, 0-80 years)
 - M=F
- Location :
 - **Midline structures of the upper aerodigestive tract and the mediastinum**
 - **Thoracic/mediastinal 51%**, head and neck 41%
- Cough, dyspnea, hemoptysis, lymphadenopathy, bone pain (bony metastasis)
- Median survival time of 6.5 months

NUT Carcinoma

- Sheets and nests of small to medium-sized undifferentiated cells with monomorphic appearance
- Evenly sized nuclei with irregular outlines, vesicular chromatin, and prominent nucleoli
- Pale eosinophilic to basophilic cytoplasm, may have a granular appearance
- Foci of **abrupt squamous differentiation with keratinization**
- Frequent interstitial neutrophilic infiltrate

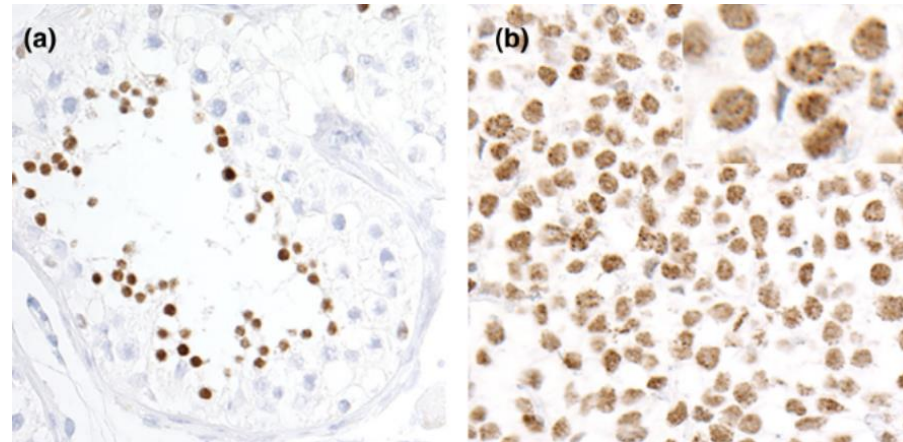


NUT Carcinoma

- **NUT protein Ab : DIAGNOSTIC**

- Rabbit anti-human monoclonal NUT Ab (Clone C52B1) : >50% nuclear staining
- highly specific (100%) and sensitive (87%), a distinctive speckled nuclear positivity
- Weak focal staining in seminoma, dysgerminoma, embryonal carcinoma

Post meiotic spermatids in seminiferous tubules



Diffuse nuclear staining with a speckled pattern in NUT carcinomas

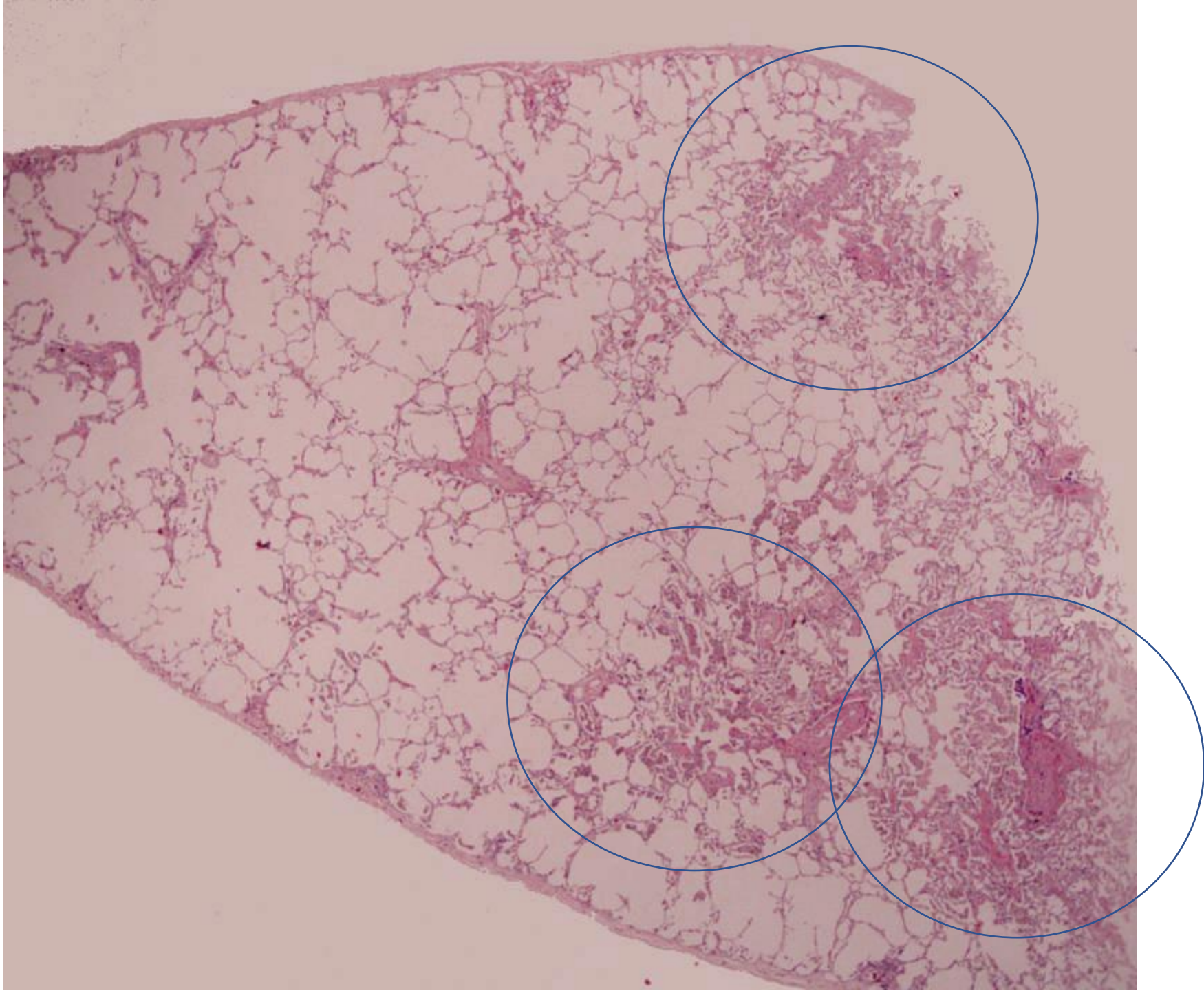
- **CK5/6, p63/p40 : most cases**
- TTF1, CD99, Synaptophysin, FLI1, EGFR, HER2, CD34 may be positive
- Ki-67 : 80~100%

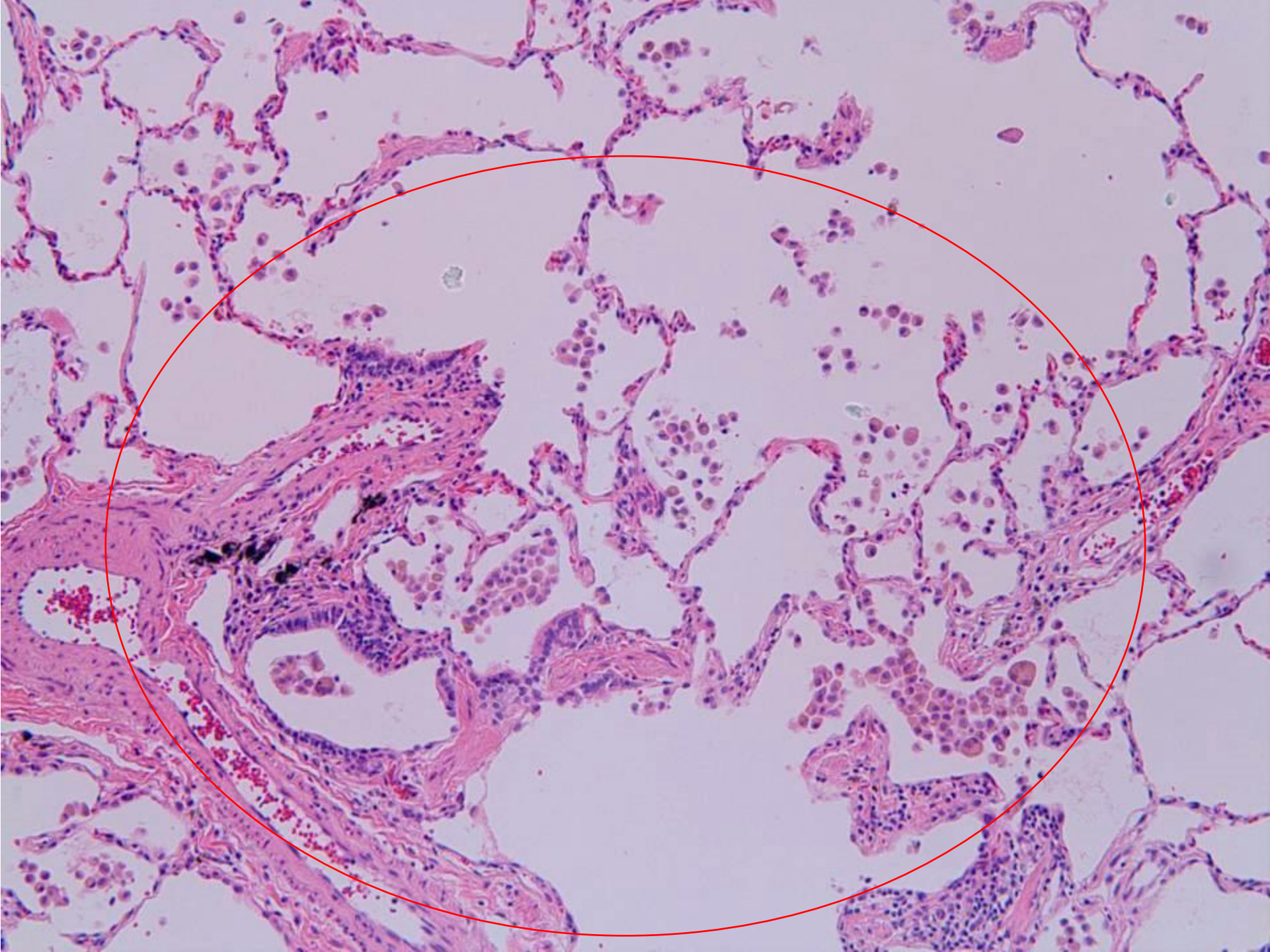
CASE 3-1

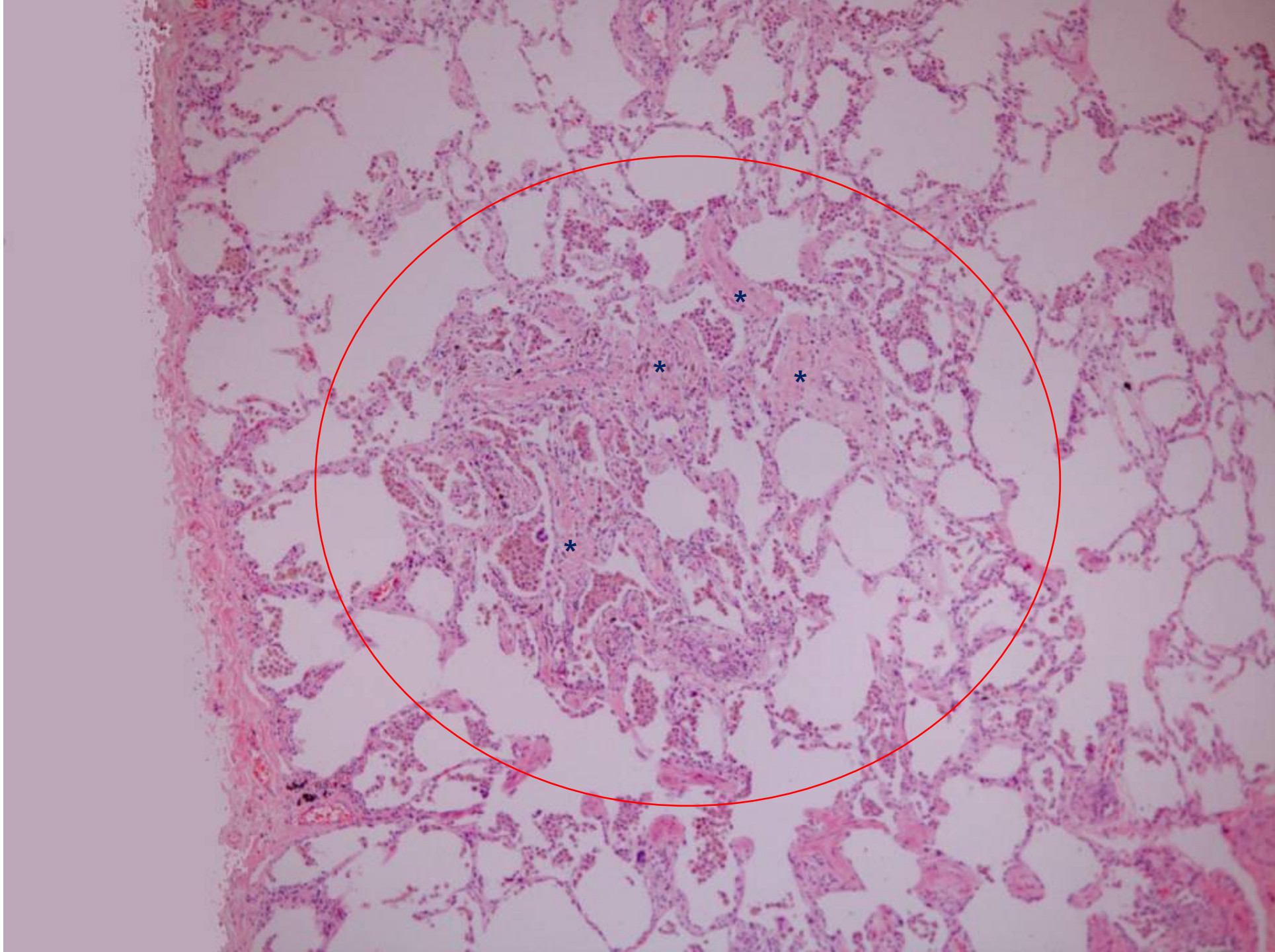
Clinical history

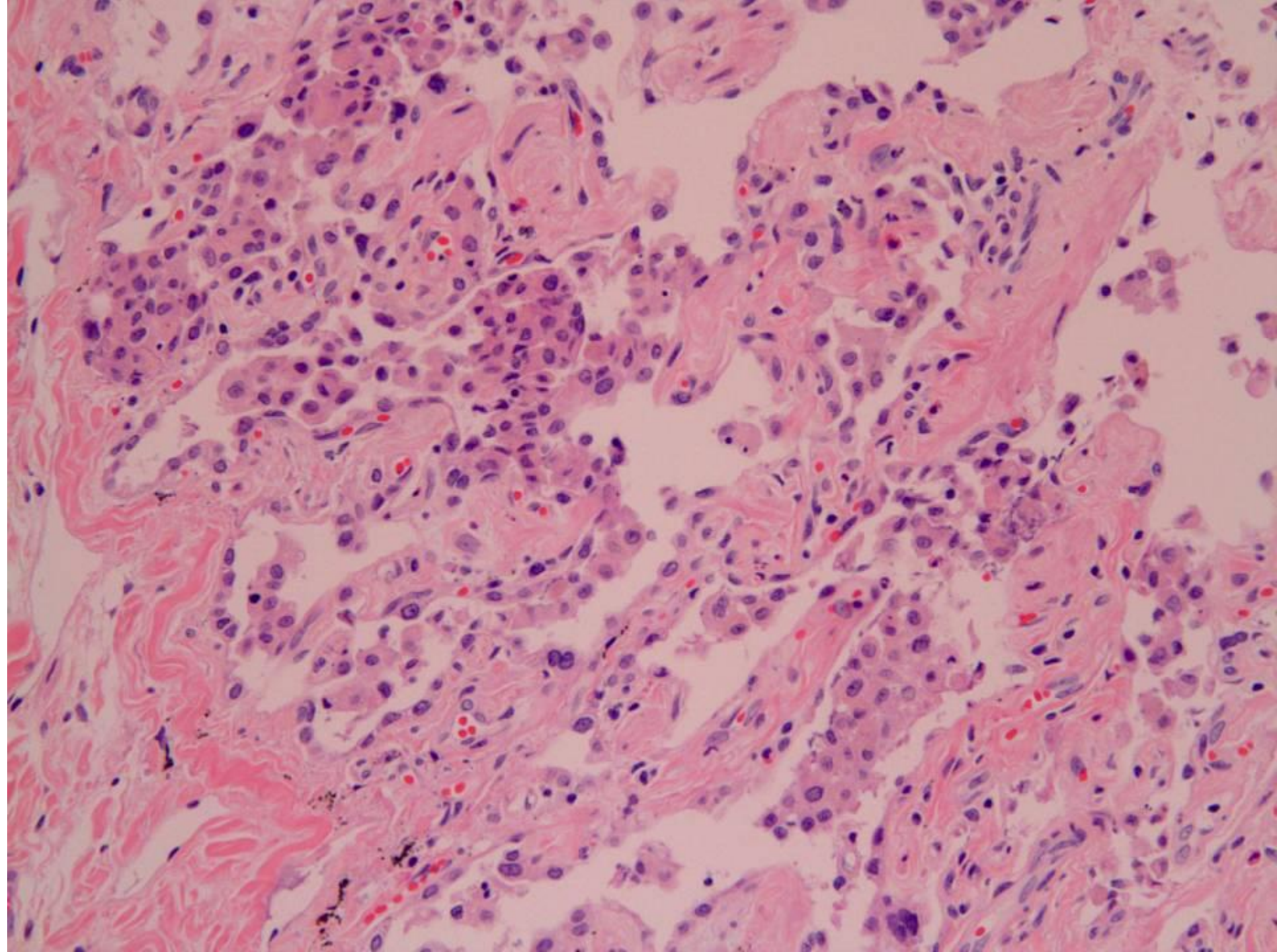
- M/27
- Dyspnea and cough
- Current smoker : 30 pack years
- PFT : restrictive pattern
- HRCT : Ground glass opacity











Pathologic Diagnosis

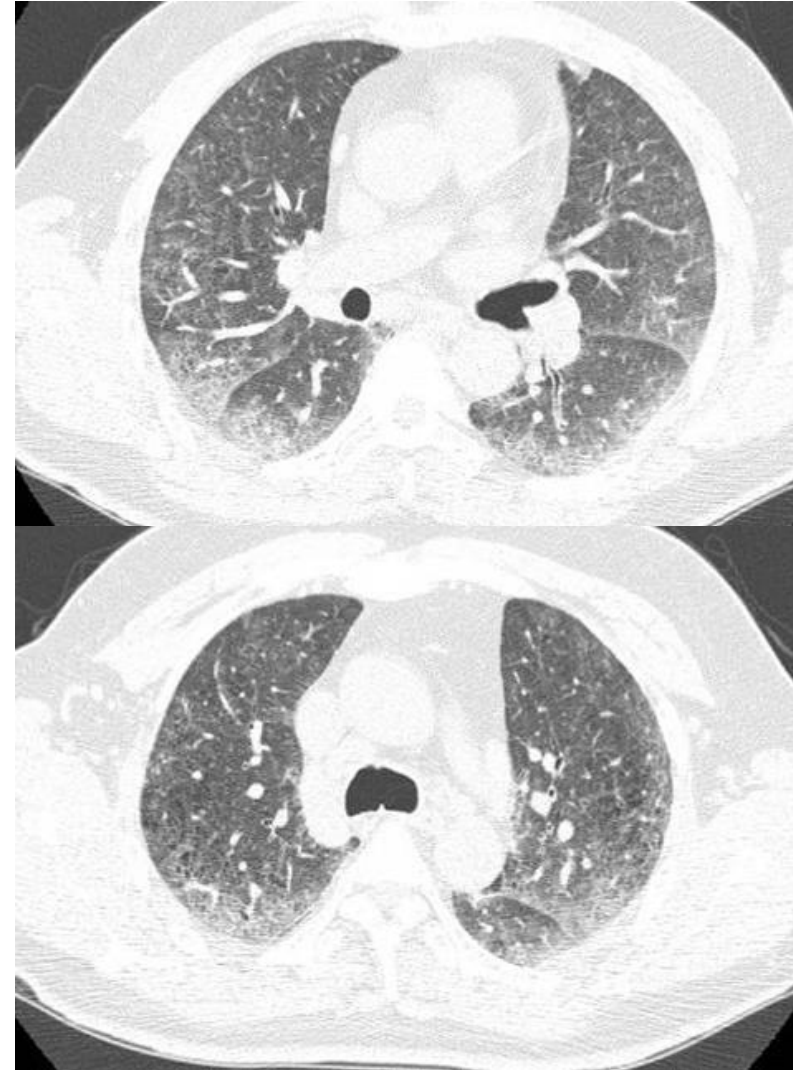
Lung, right lower lobe, wedge resection;

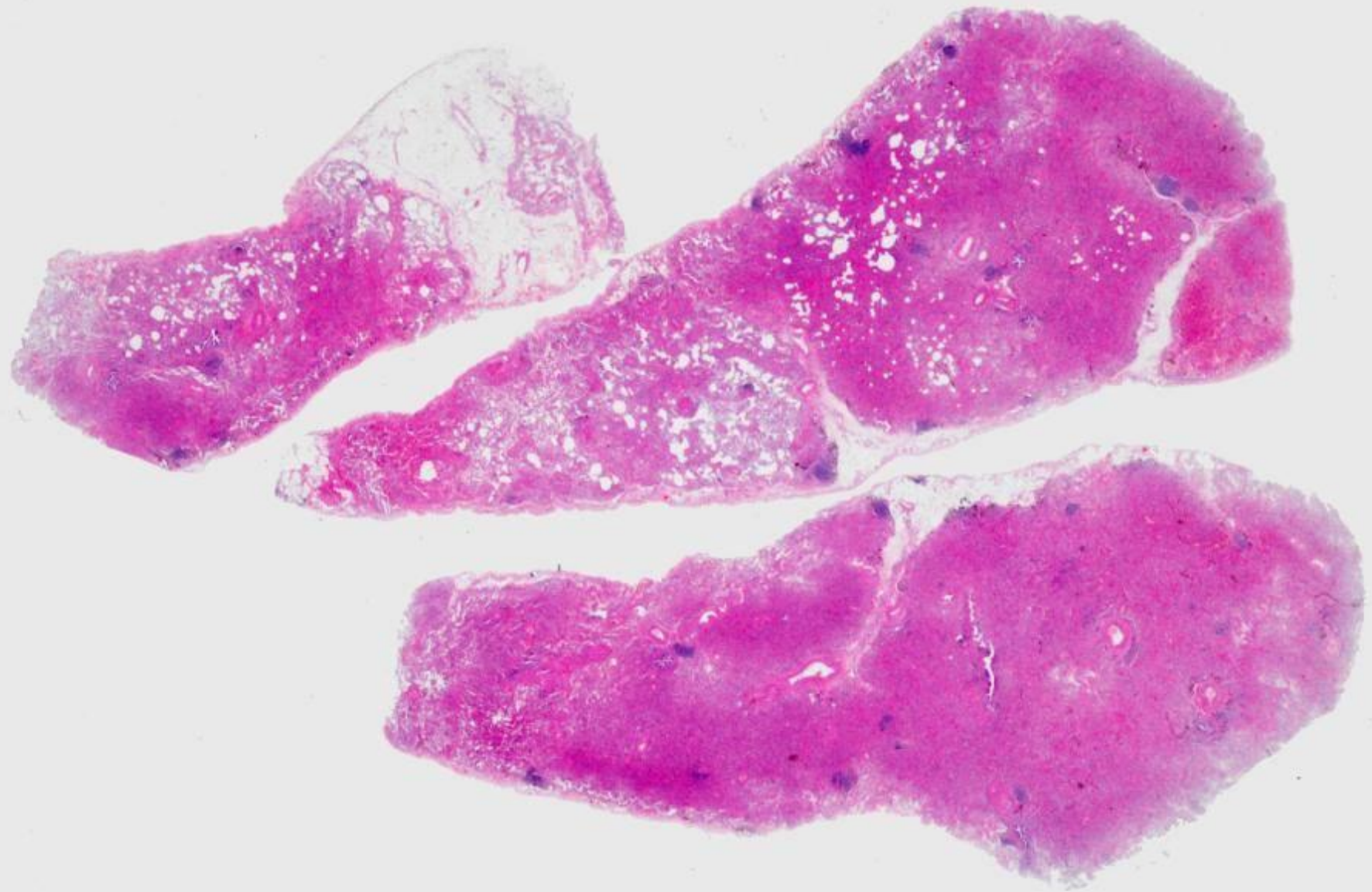
- Multifocal aggregation of fine granular pigmented macrophages in bronchioles and peribronchiolar alveoli
- Mild thickened alveolar septa and fibrosis in the peribronchilar area

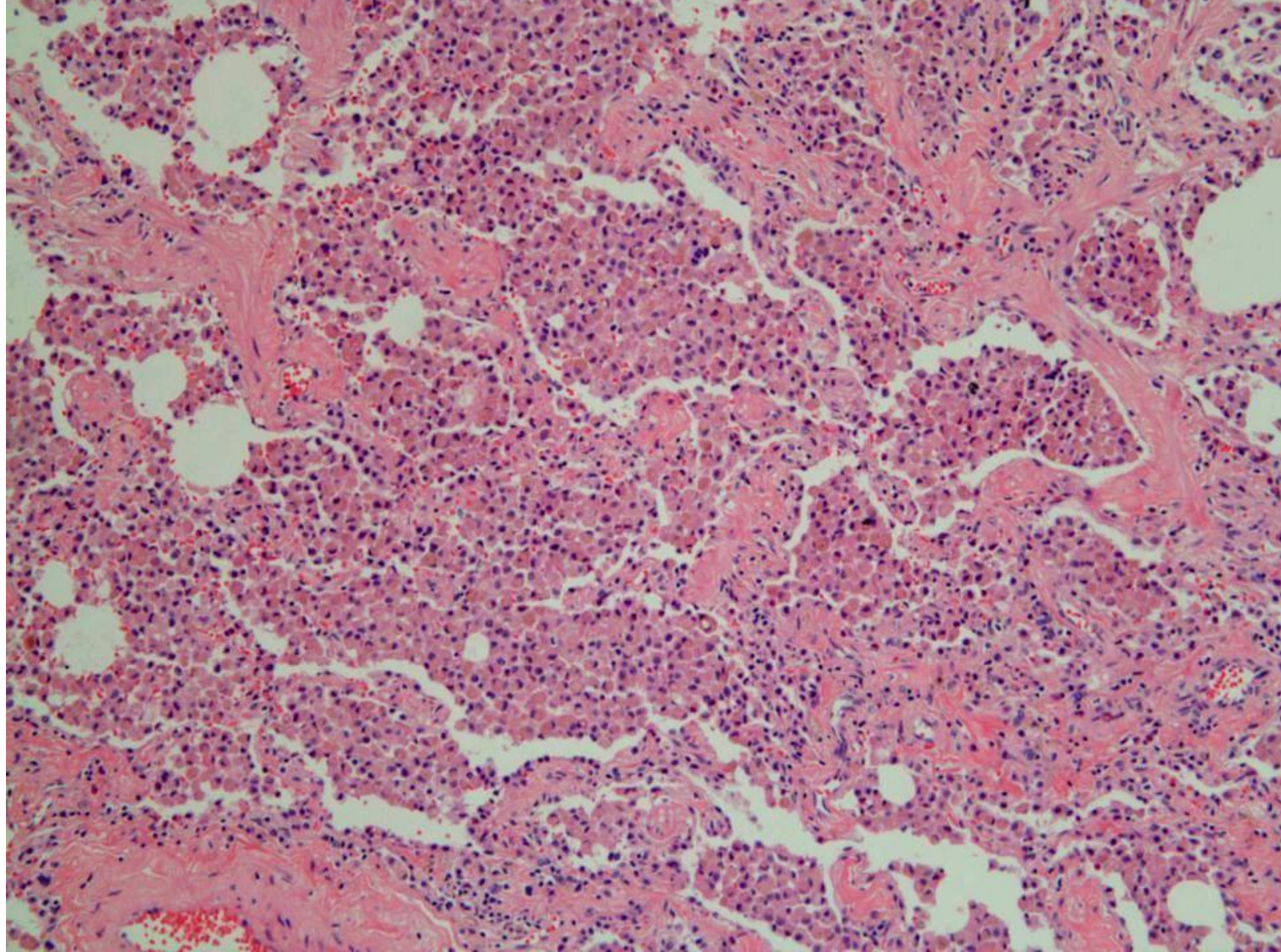
Consistent with respiratory bronchiolitis-associated interstitial lung disease (RB-ILD)

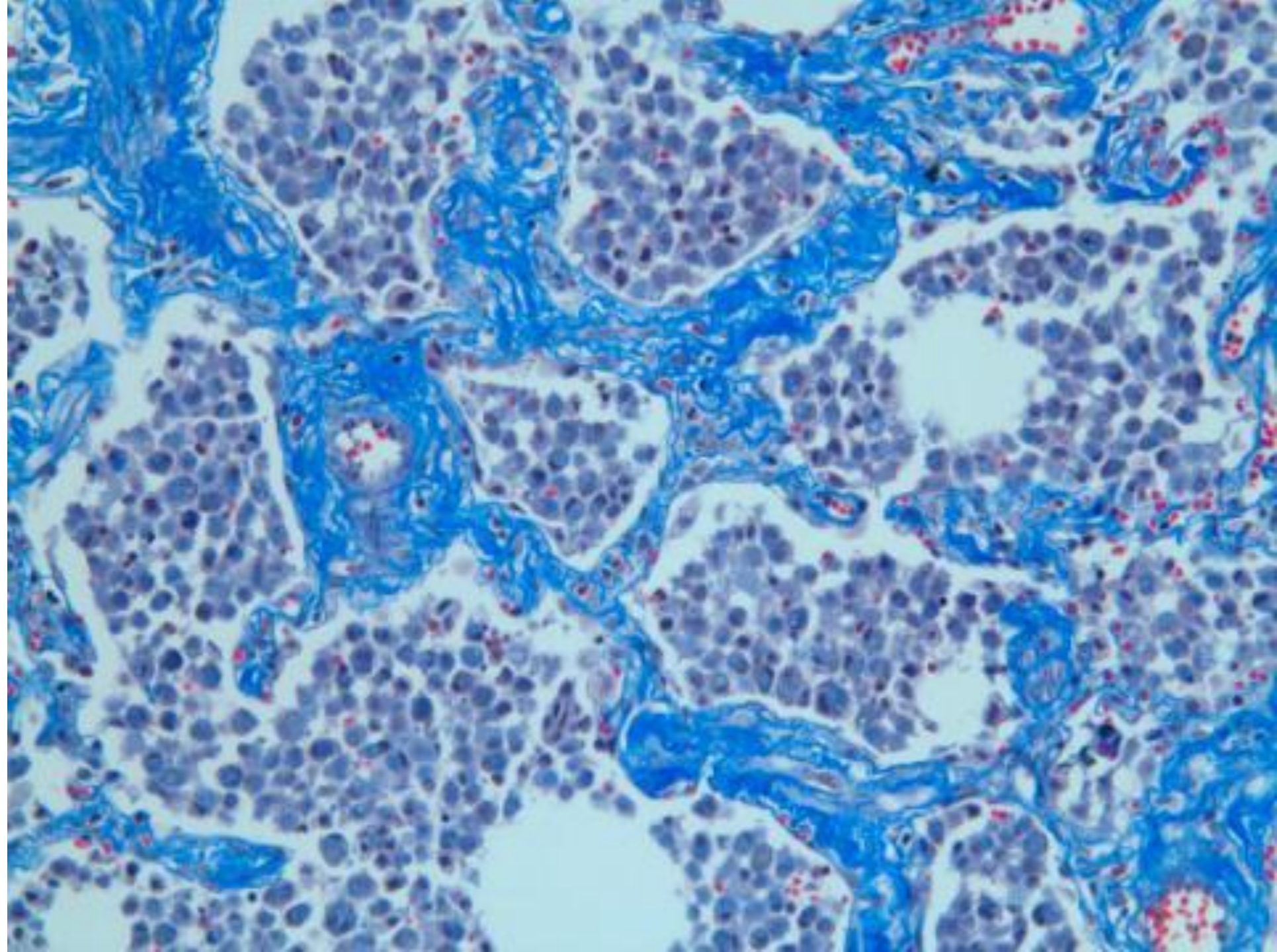
CASE 3-2

- M/51
- Dyspnea on exertion









Pathologic Diagnosis

Lung, right lower lobe, wedge resection;

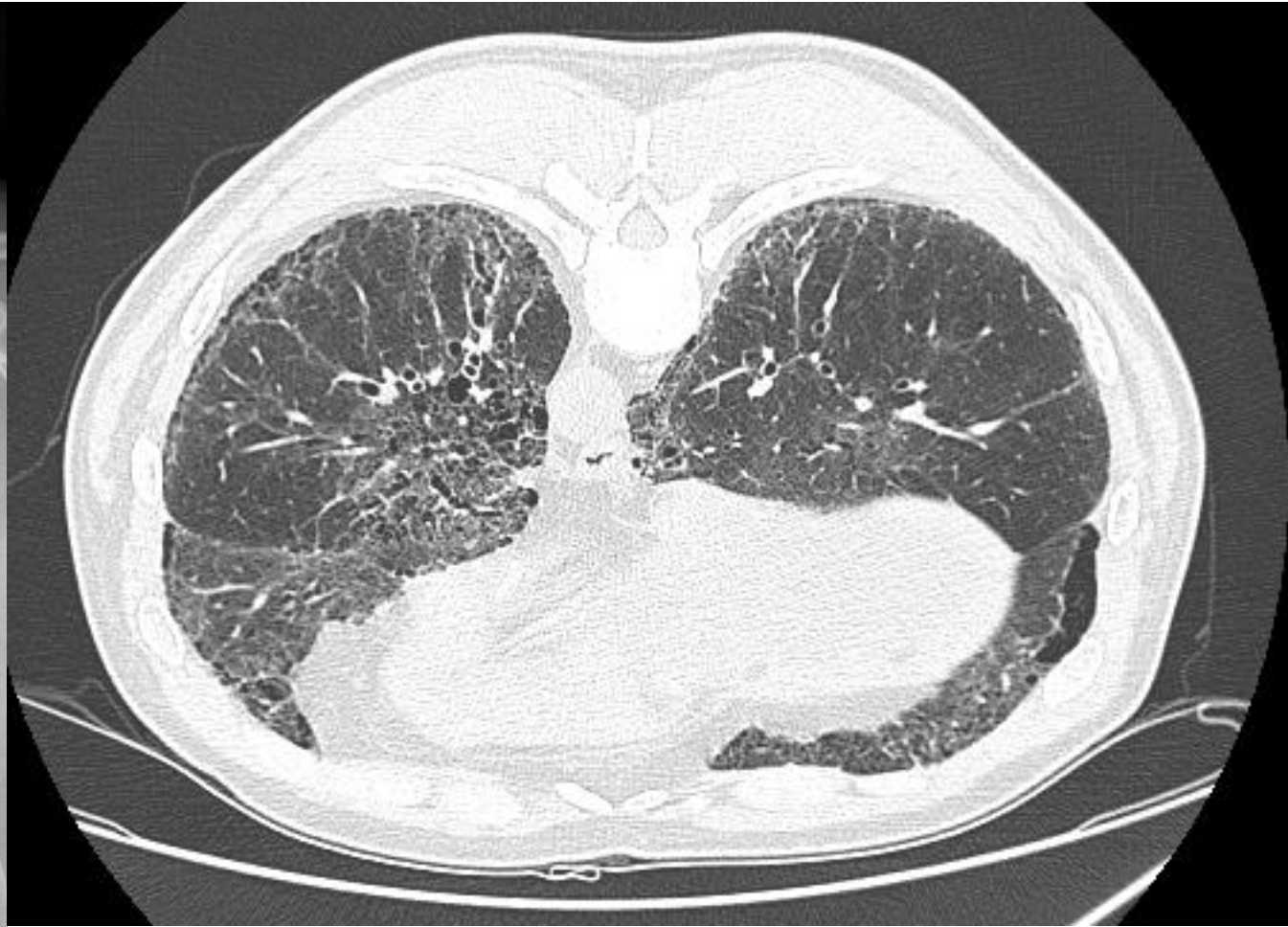
- Diffuse marked intra-alveolar macrophage accumulation
- mild to moderate thickening of alveolar septa with fibrosis

Consistent with desquamative interstitial pneumonia (DIP)

CASE 3-3

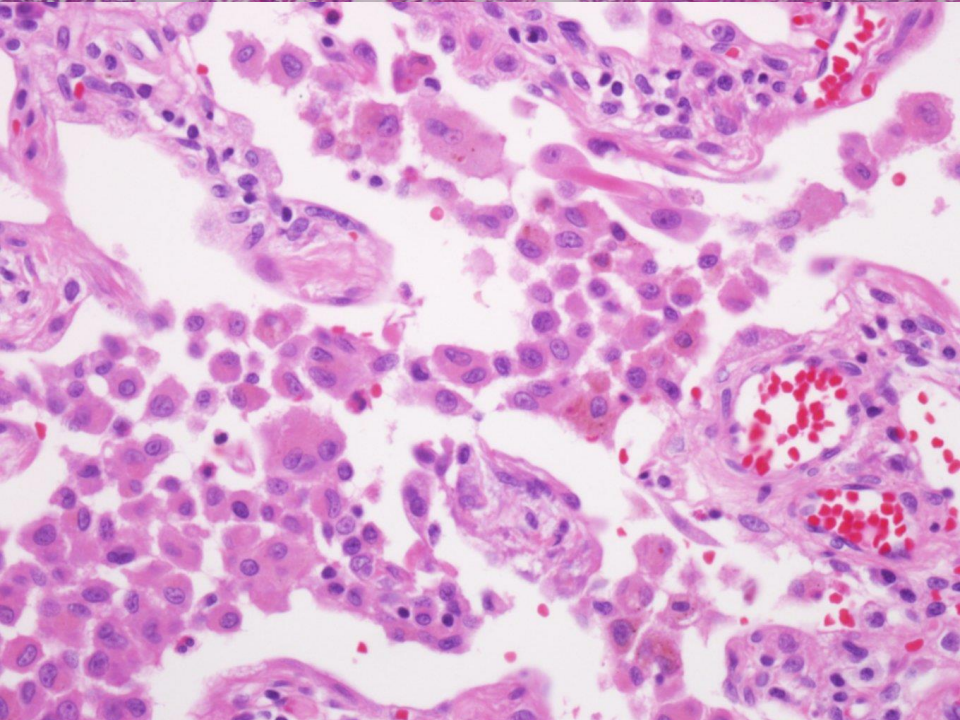
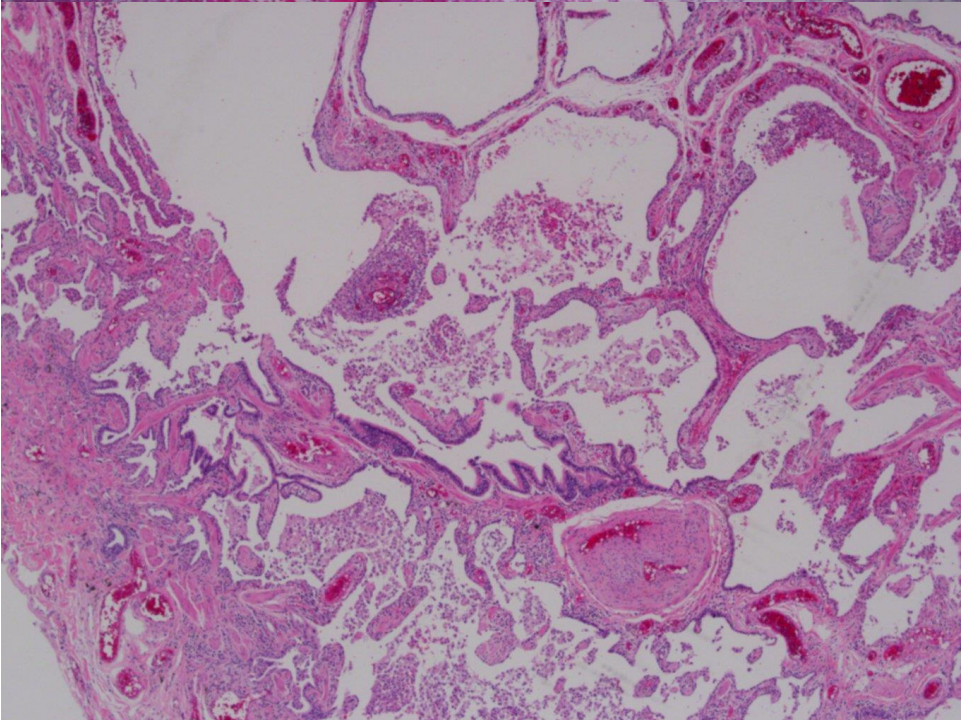
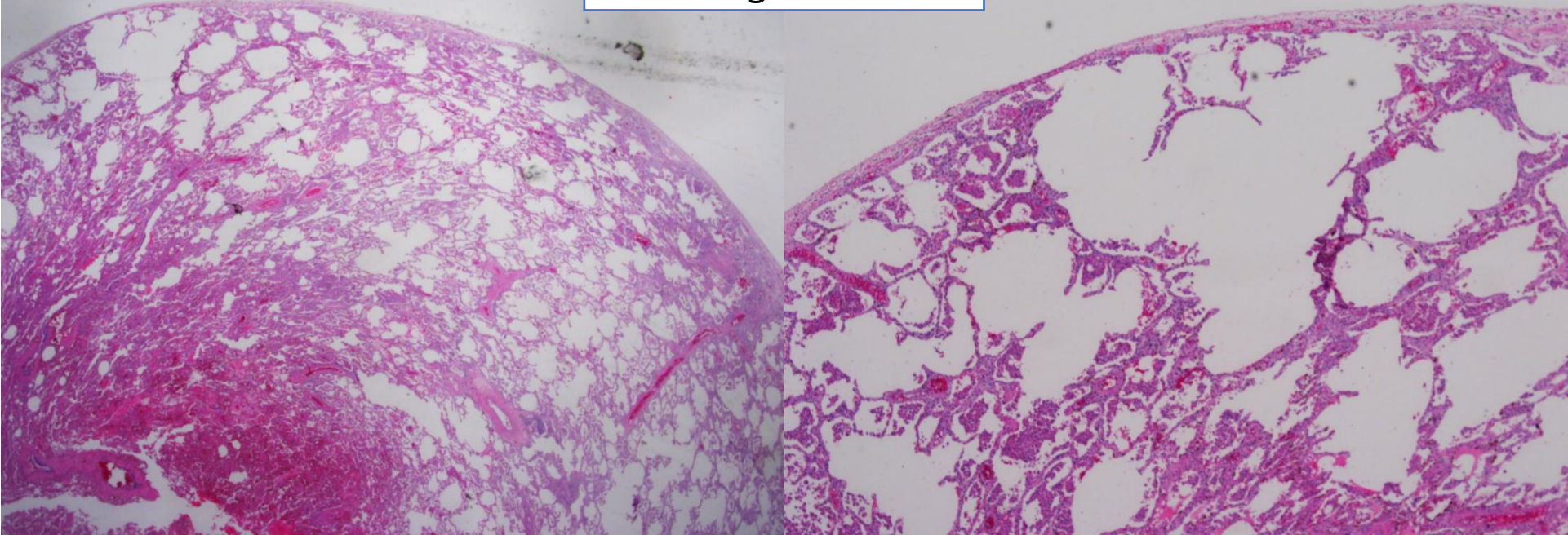
Clinical history

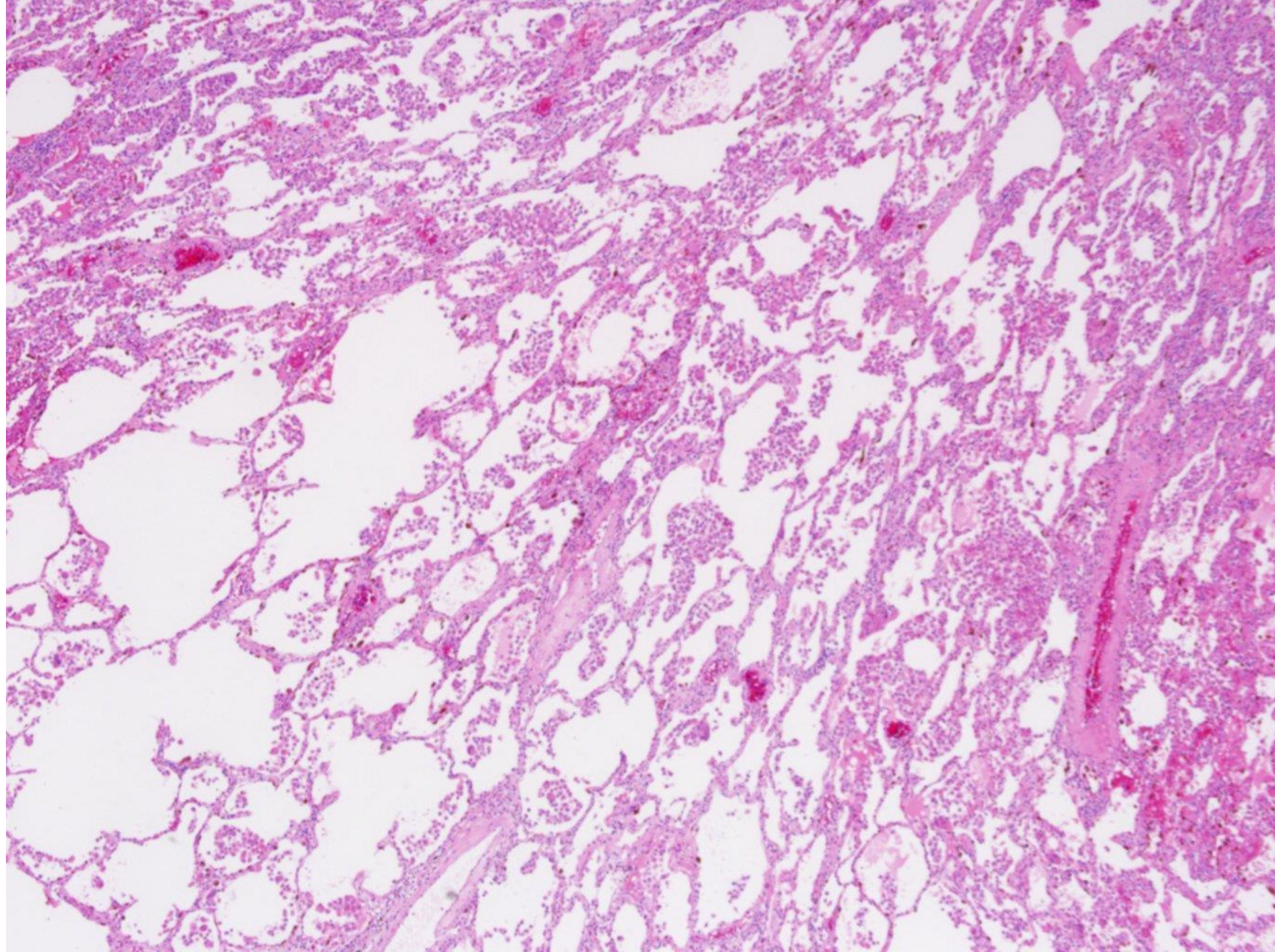
- M/38
- Cough/Sputum (+/+) o/s) 2 mo.
- Ex-smoker 15 pack years
- Blood tingled sputum
- Rale in both lower lung fields
- PFT : unremarkable
- Chest XR and Chest CT:



GGA in peripheral lower lobe dominant distribution with interlobular interstitial thickening. Paraseptal emphysema in both lungs
Smoking induced DILD such as DIP
R/O) connective tissue induced DILD such as NSIP

LLL_wedge resection





Pathologic Diagnosis

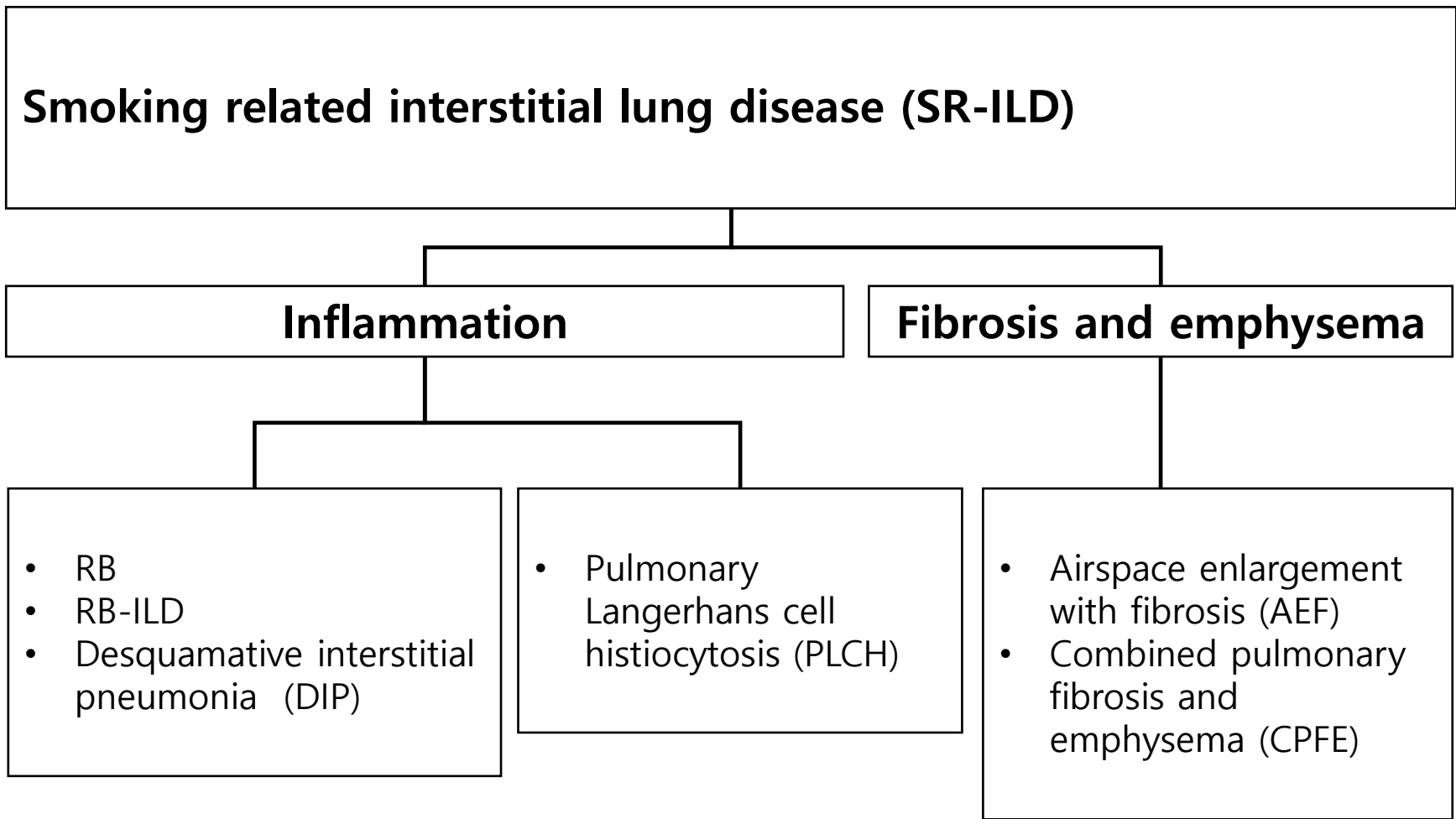
Lung, left lower lobe, wedge resection;

1. Accumulation of intra-alveolar macrophages
with 1) mild interstitial inflammation and septal thickening
2) mild fibrosis
Suggestive of desquamative interstitial pneumonia
2. Emphysematous bullae
with bronchial metaplasia

Steroid Tx

Smoking-related ILD

-Respiratory bronchiolitis and associated diseases-



Respiratory bronchiolitis and associated diseases

1. Respiratory bronchiolitis-associated interstitial lung disease (RB-ILD)
2. Desquamative interstitial pneumonia (DIP)



Respiratory bronchiolitis-associated interstitial lung disease (RB-ILD)

- **Identical histopathologic abnormalities with RB**
- Distinction between RB and RB-ILD :

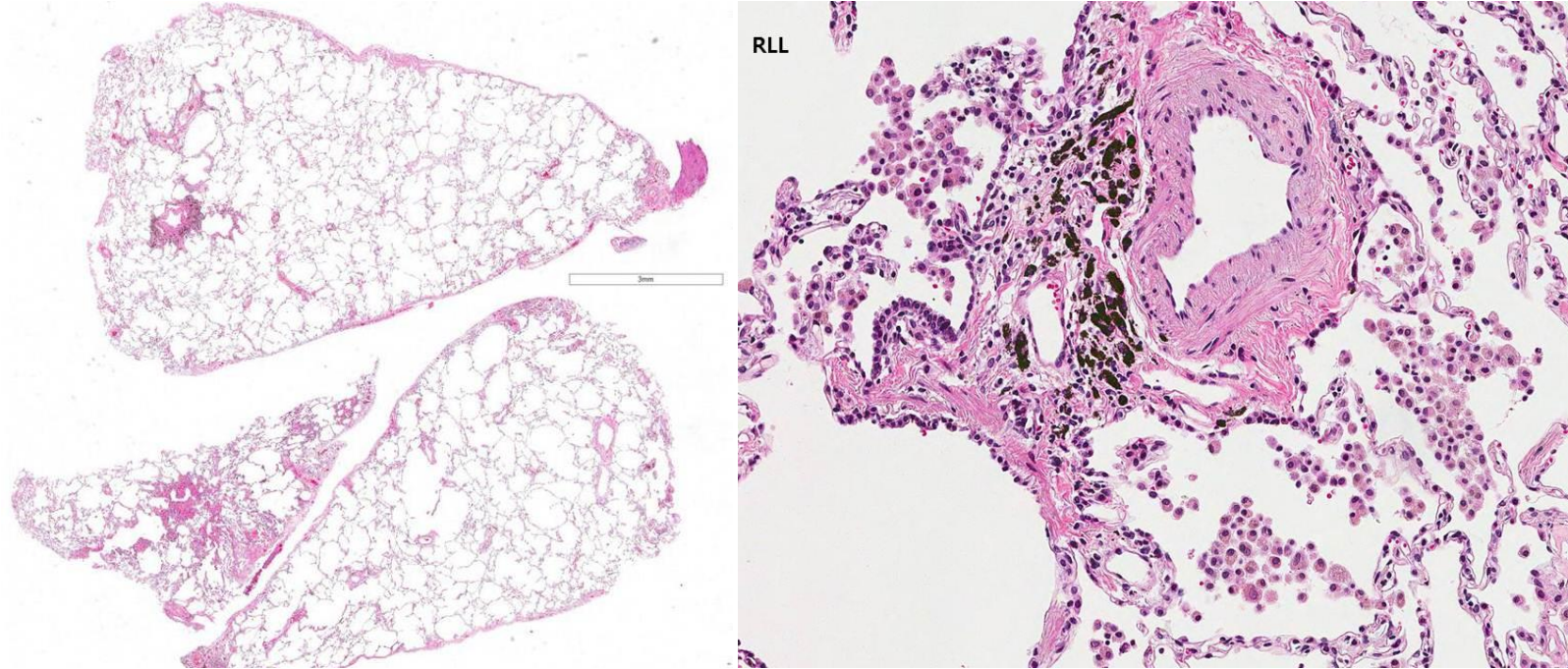
- **Smokers with**

- **Significant pulmonary symptom (Dyspnea, cough)**
- Abnormal pulmonary function
- Imaging abnormalities

AND

- **No other lesions besides RB on biopsy**

Respiratory bronchiolitis-associated interstitial lung disease (RB-ILD)



- **Histologic features**

- Light brown, finely granular pigmented (smoker's) macrophages in bronchioles and peribronchiolar alveoli
- Mildly thickened alveolar septa in the peribronchiolar region with chronic inflammatory infiltrates
- mild fibrosis

Desquamative interstitial pneumonia (DIP)

- A **prominent accumulation of intra-alveolar macrophages**, hyperplasia of type II pneumocytes and **variably diffuse alveolar septal thickening**

Distinct between RB-ILD and DIP

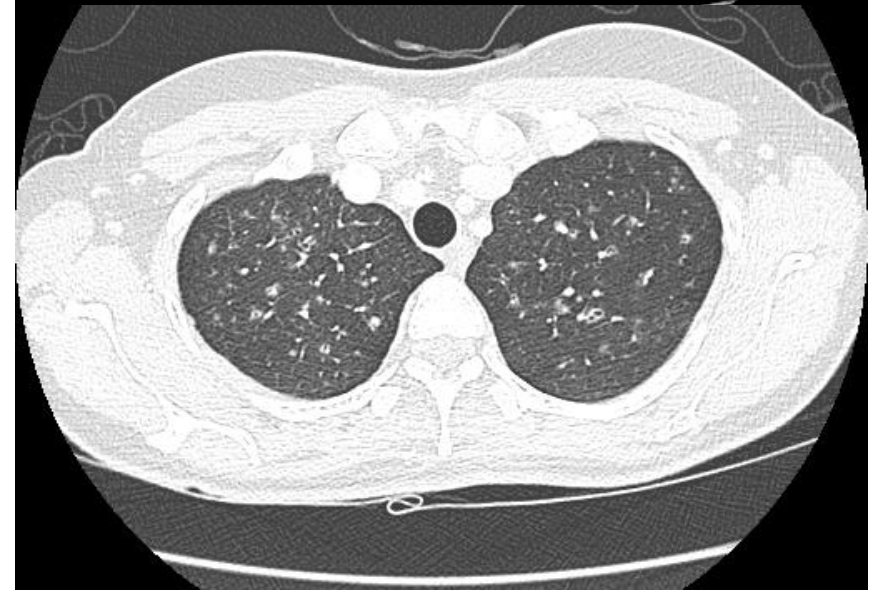
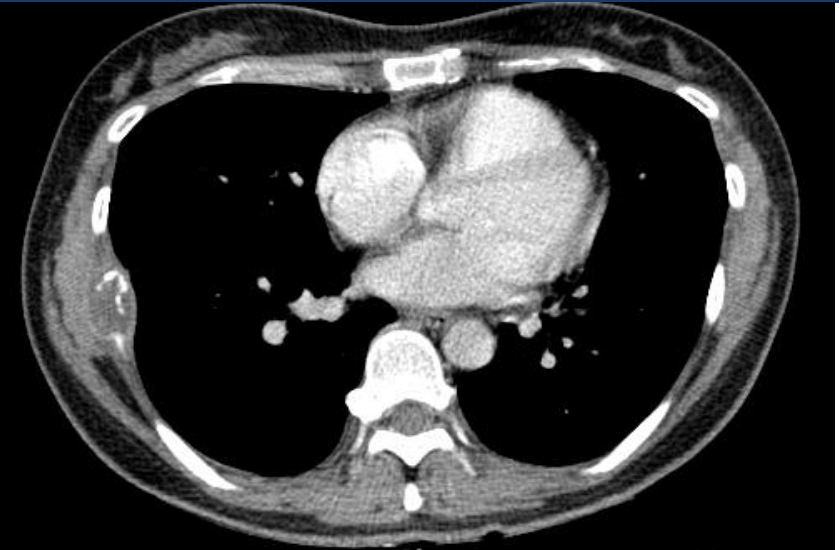
The extent of the inflammatory process

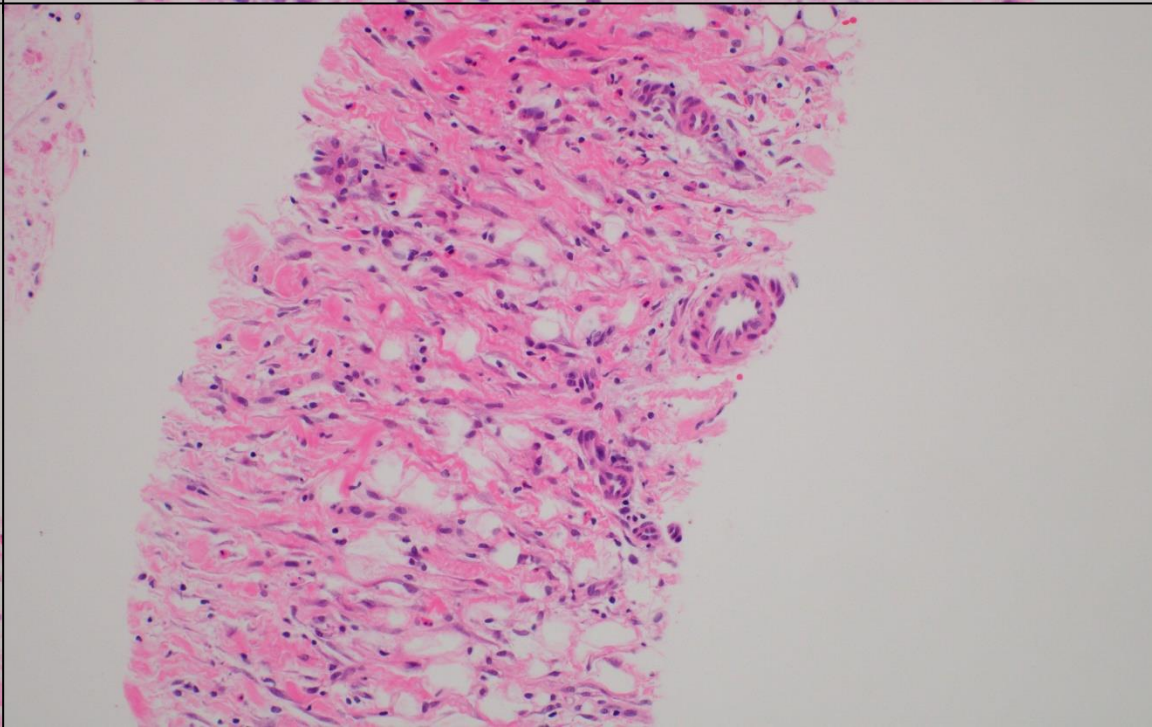
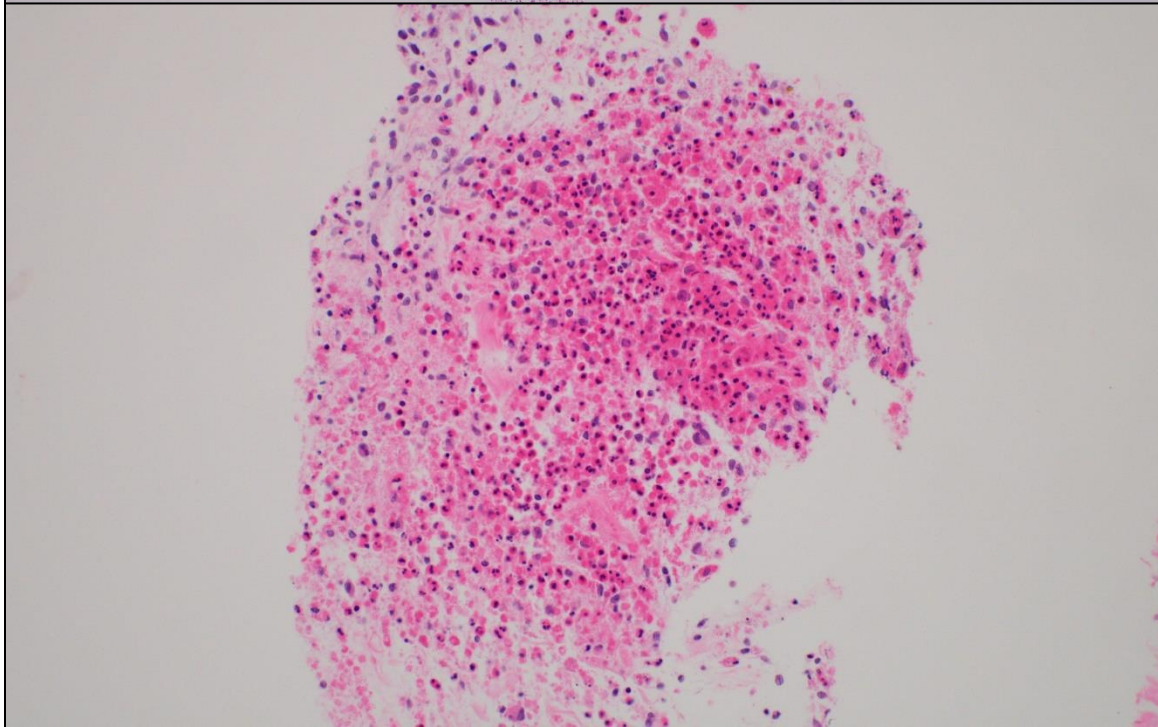
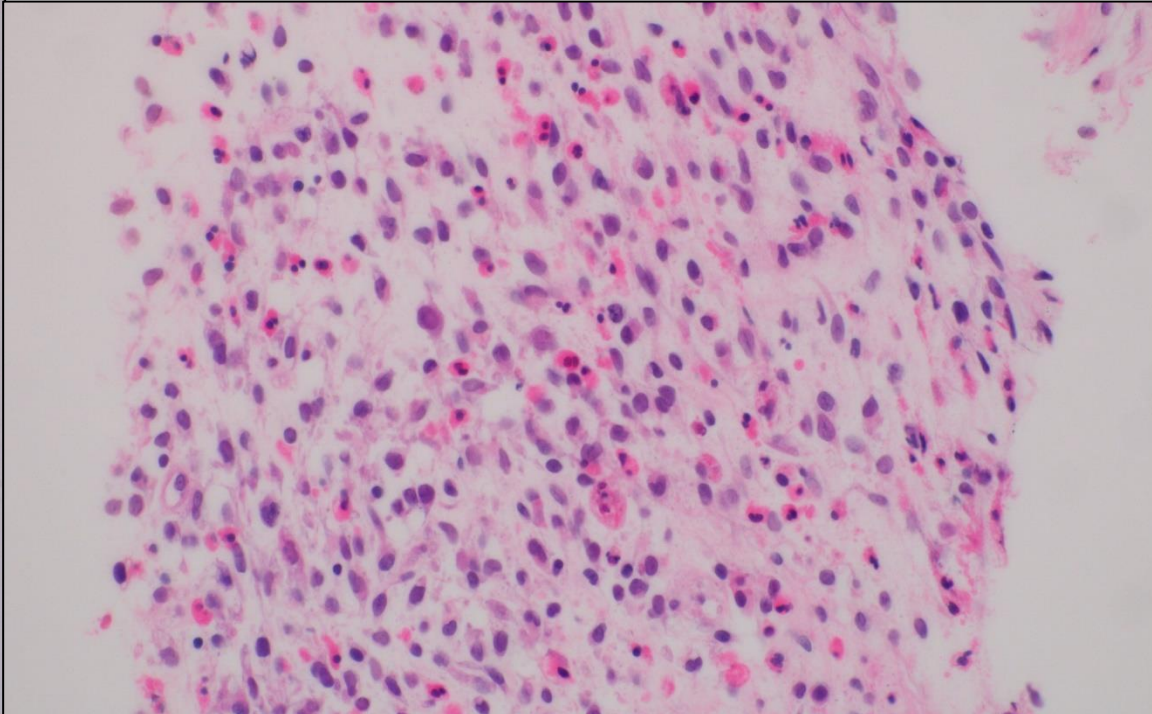
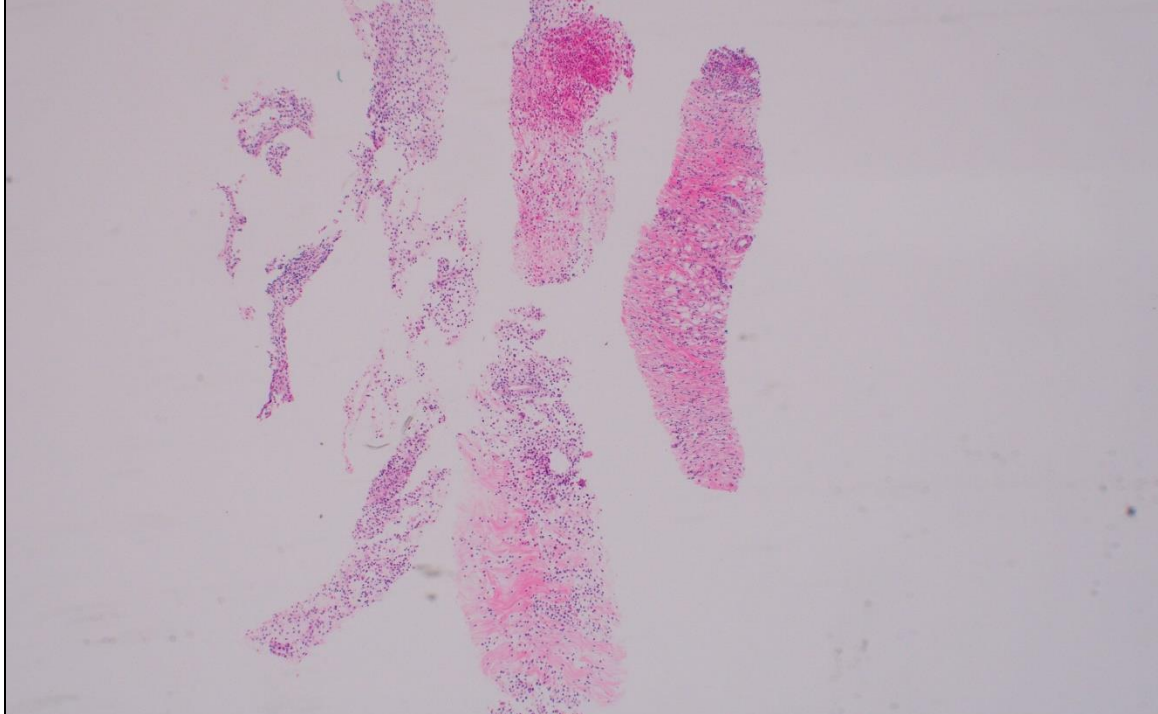
More extensive and diffuse histopathological changes in DIP as compared to RB-ILD

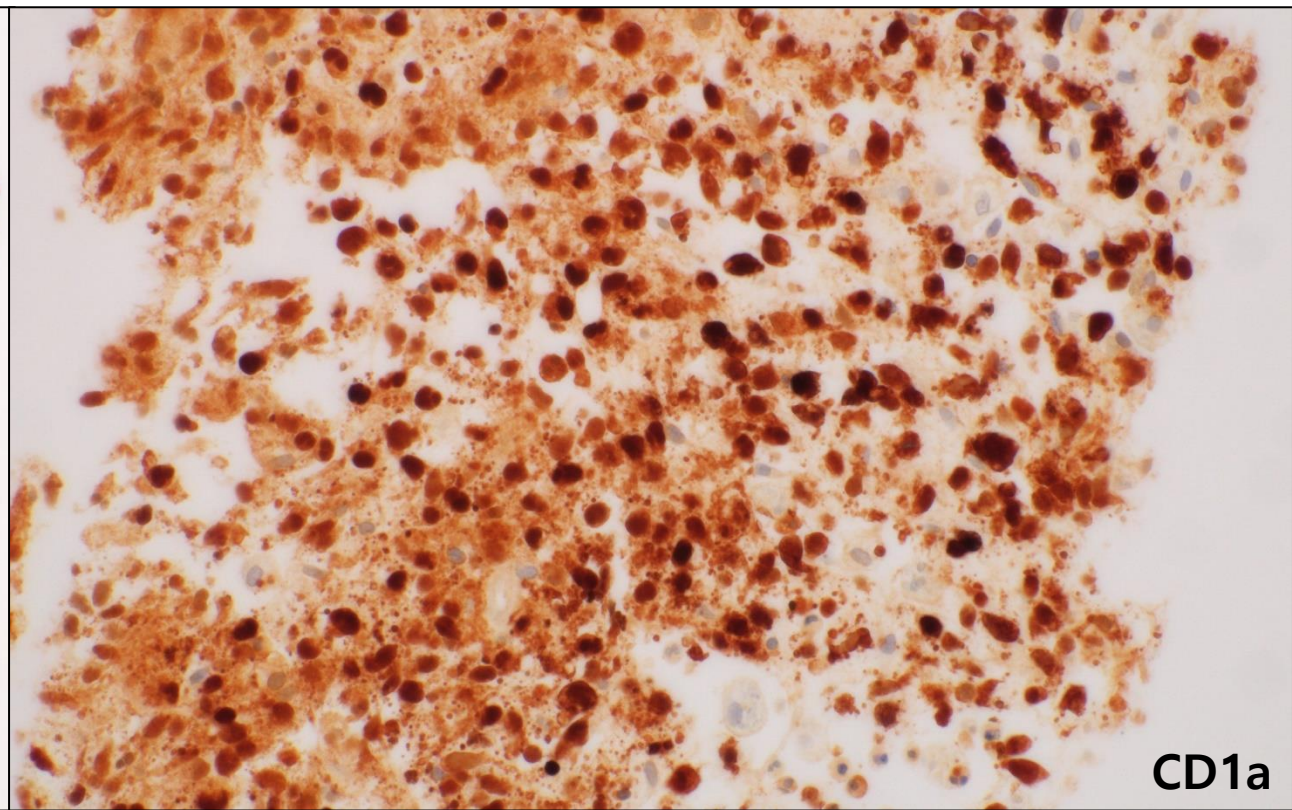
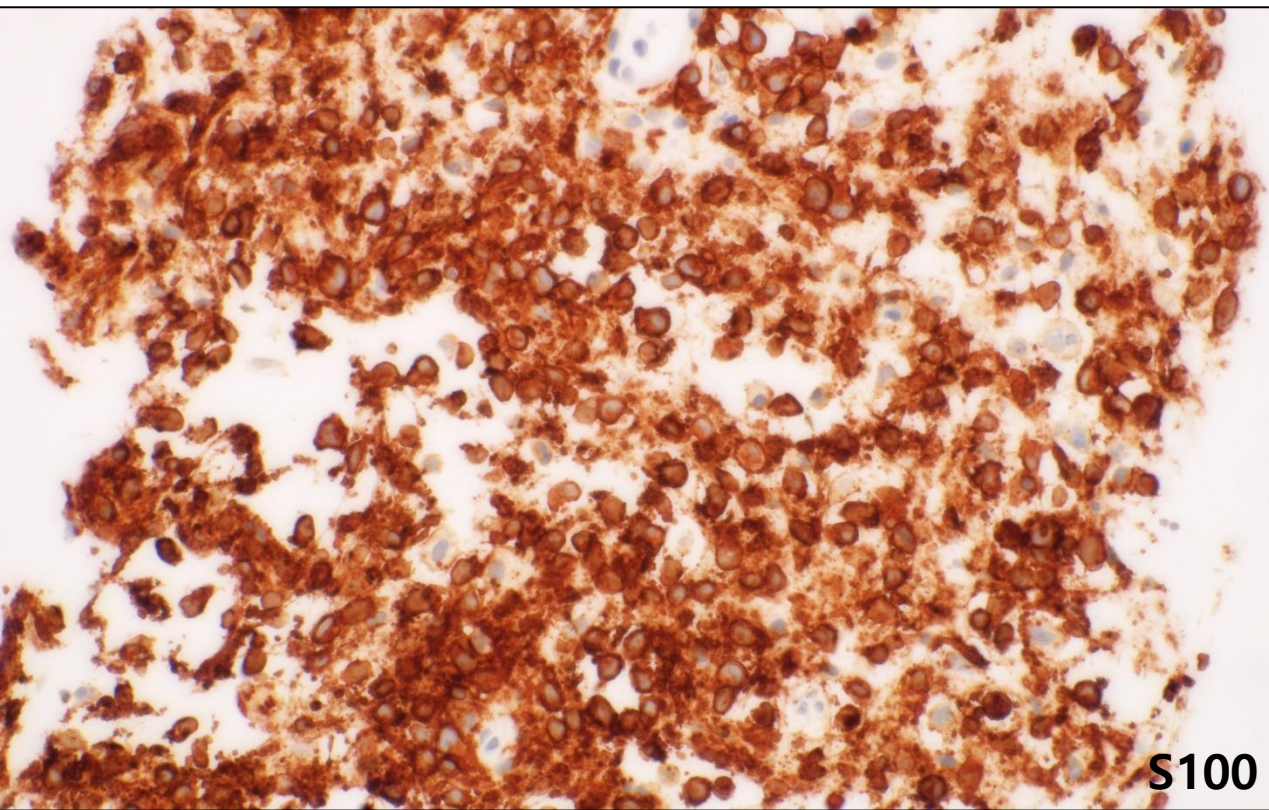
CASE 4

Clinical history

- F/38
- Chest wall mass o/s) 2 mo.
- Current smoker : 18 pack years
- Chest CT
 - 2.6cm size osteolytic rt. 7th rib mass
 - Multiple small lung nodules with cavitation in both lung, upper lung predominant :
 1. Pulmonary LCH
 2. Lung metastasis
 3. Bronchogenic spread of tbc
 4. Granulomatosis with polyangiitis







Pathologic Diagnosis

Lung, right

Atypical discohesive cells with inflammatory background
suspicious for Langerhans cell histiocytosis

<Result of immunohistochemical and special staining>

S100, CD1a : positive

AFB, GMS, PAS : negative

Smoking-related ILD

-Pulmonary Langerhans cell histiocytosis-

Pulmonary Langerhans' cell histiocytosis (PLCH)

- **Definition of PLCH**

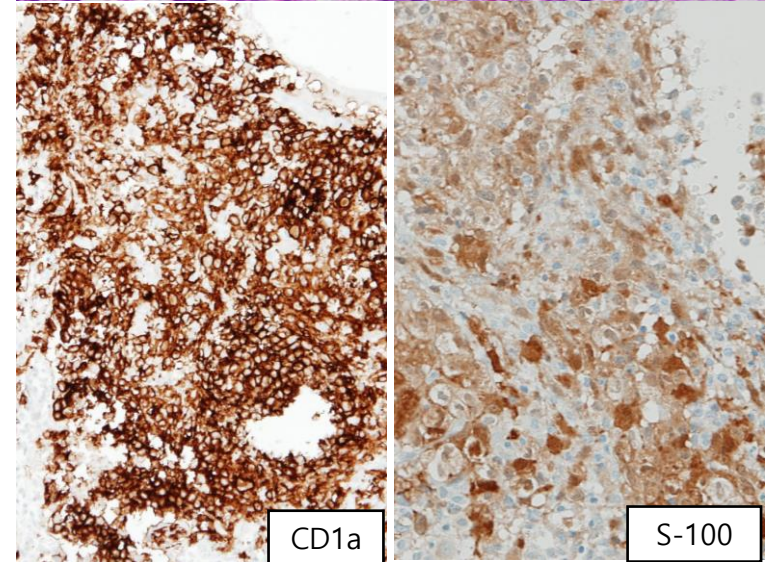
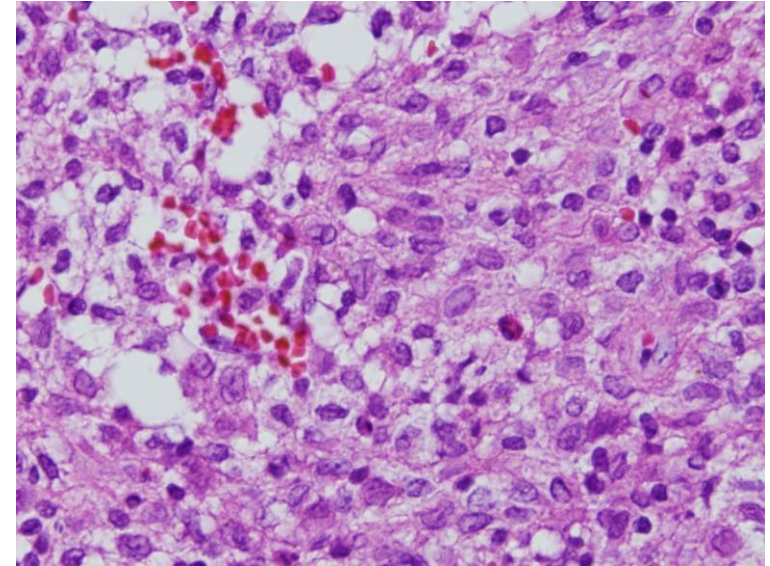
- A chronic, progressive disorder characterized by a proliferation of LC infiltrates forming multiple, bilateral, interstitial, peribronchiolar nodules that frequently cavitate

- **Clinical features**

- 3rd and 4th decades, M=F
- Insidious dyspnea and cough
- Cystic bone lesions in 15% of patients
- PFT : Obstructive, restrictive, mixed
- HRCT : Symmetric, bilateral nodular or reticulonodular pattern, upper and mid lung, centrilobular nodules, thin walled cysts

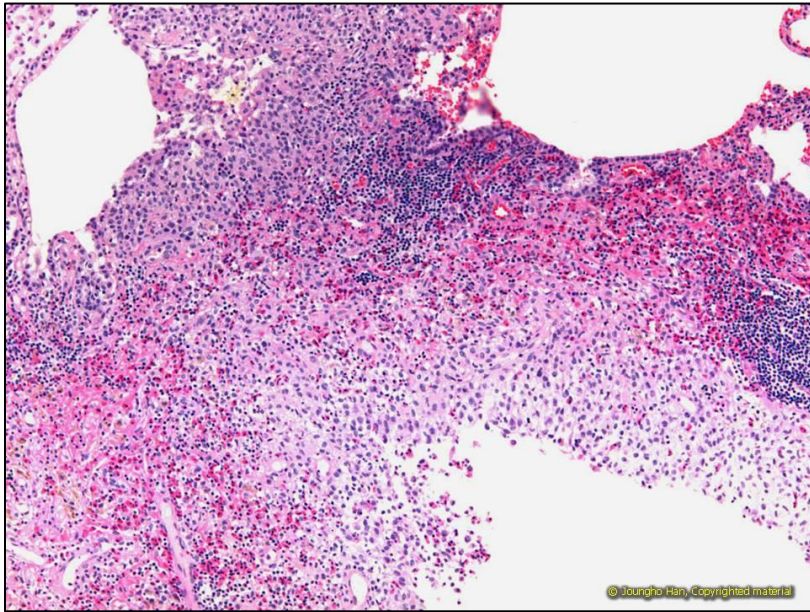
Pulmonary Langerhans' cell histiocytosis (PLCH)

- **Histologic features**
- **Langerhans' cells**
 - Moderate eosinophilic cytoplasm
 - Grooved nuclei with indented nuclear membranes
- S-100 protein, CD1a : positive
- Birbeck granules on EM

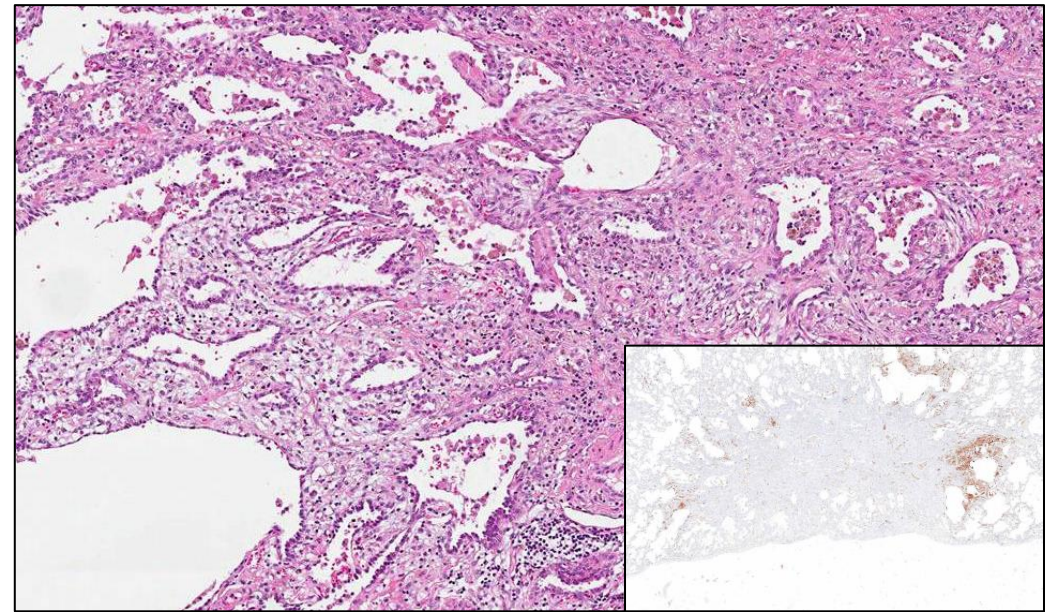


Pulmonary Langerhans' cell histiocytosis (PLCH)

Cellular process

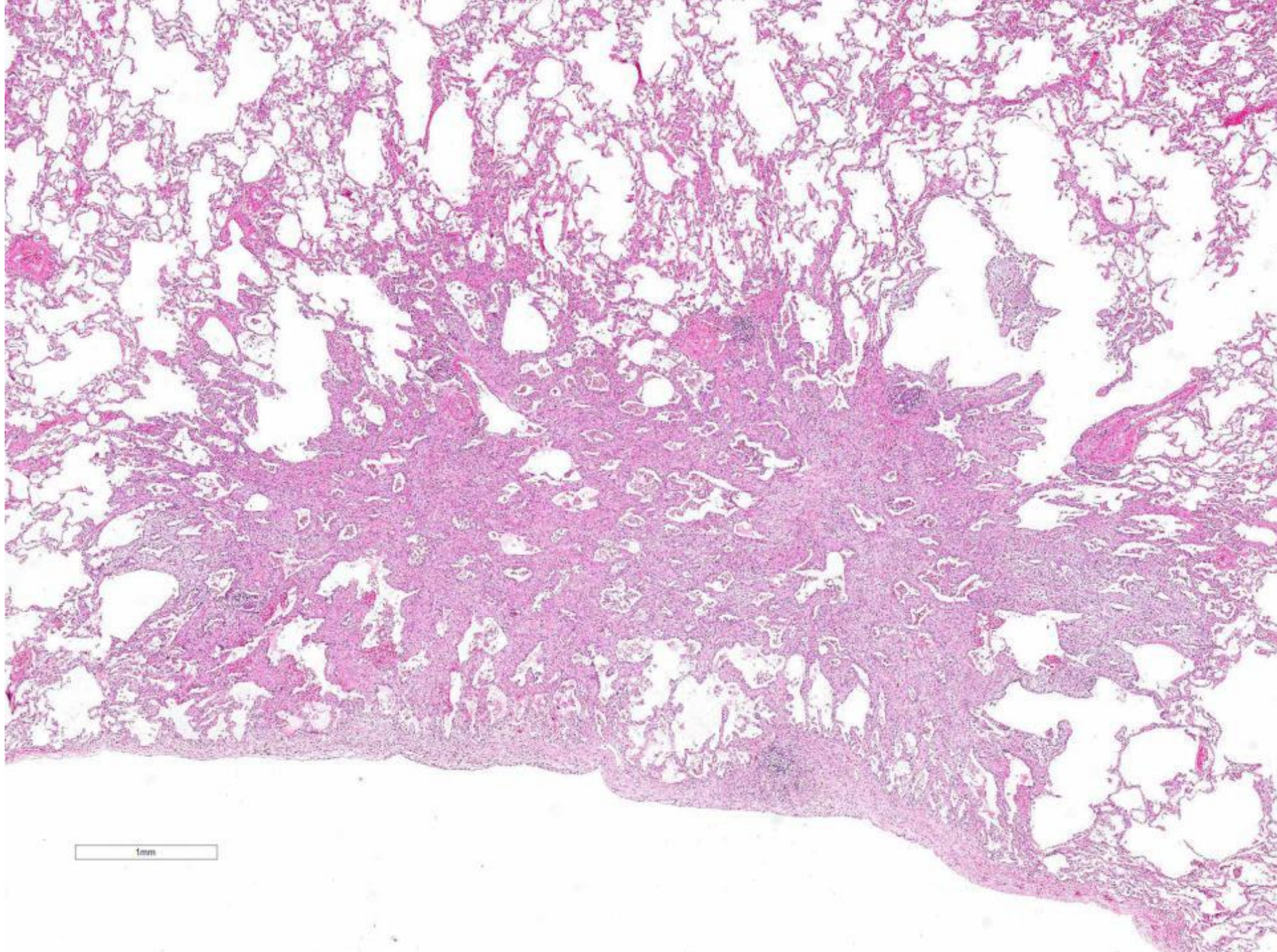


Fibrotic scar



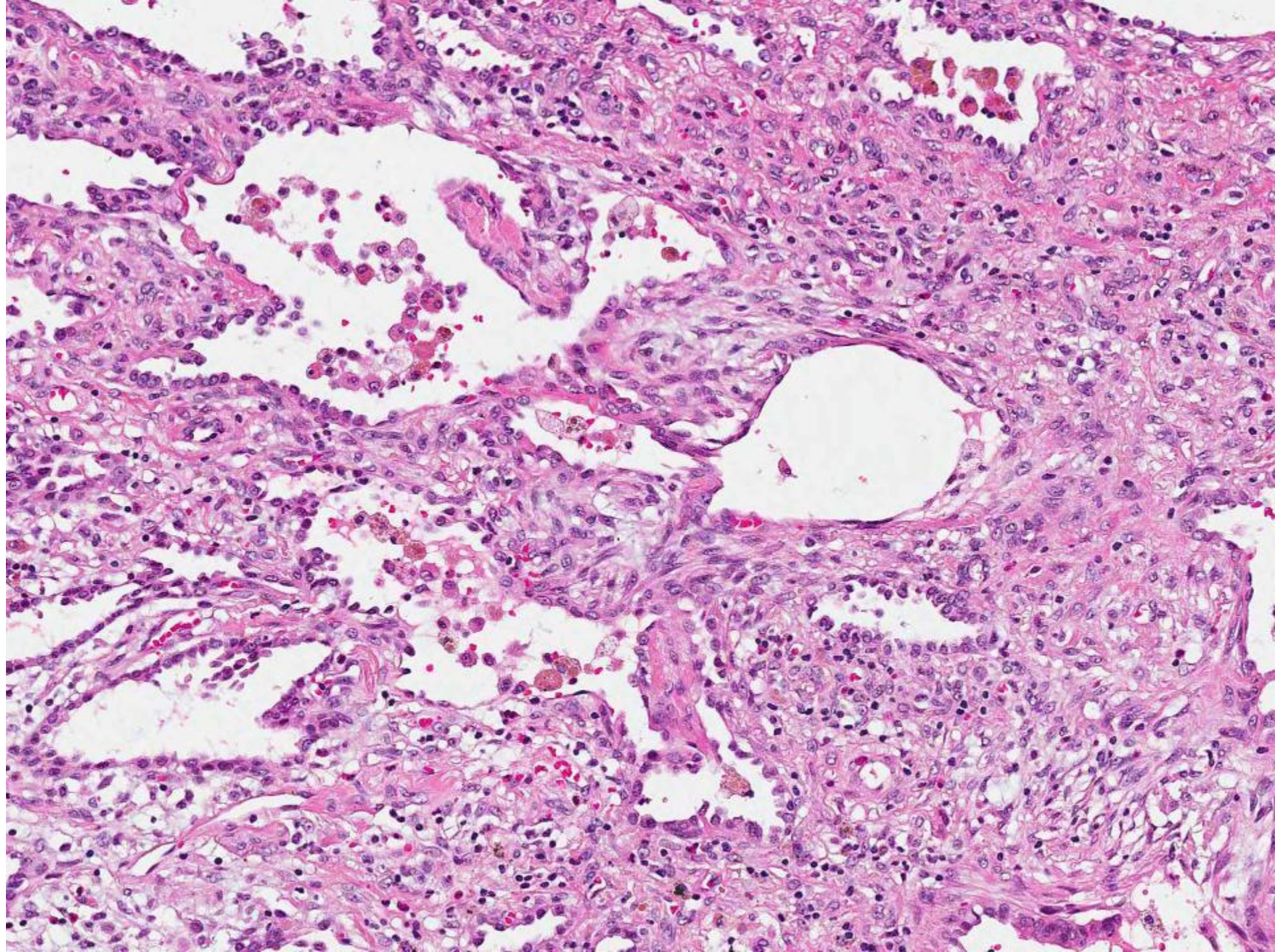
- Numerous Langerhans' cells accumulation in areas adjacent to terminal or respiratory bronchioles
- Invasion into bronchiole with destruction of the bronchiolar wall in an eccentric fashion
- Lymphocytes, alveolar macrophages and eosinophils usually at the periphery of the lesions

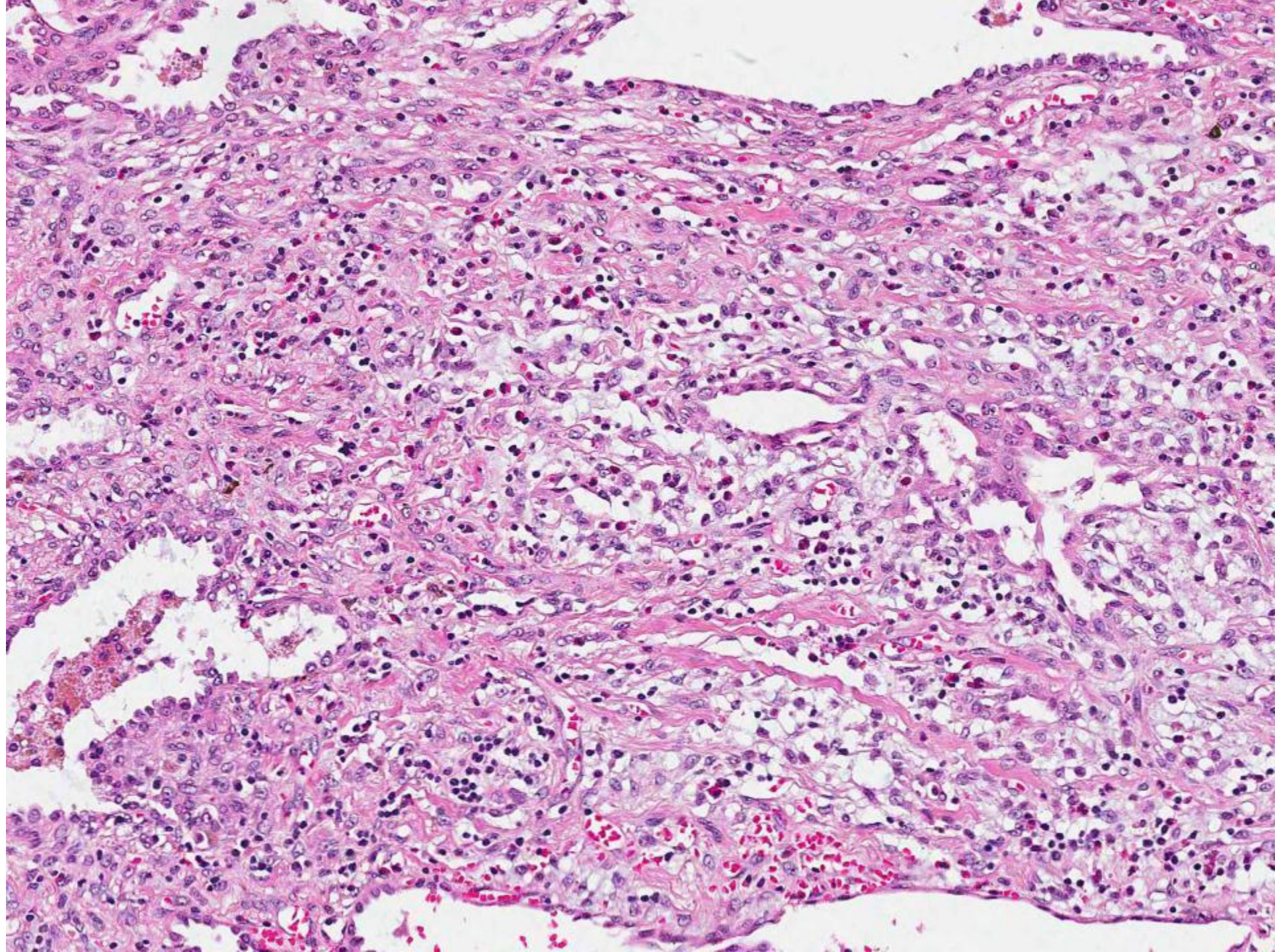
- Less prominent cellular infiltrates
- Fibrosis (stellate scar)
- No Langerhans' cells

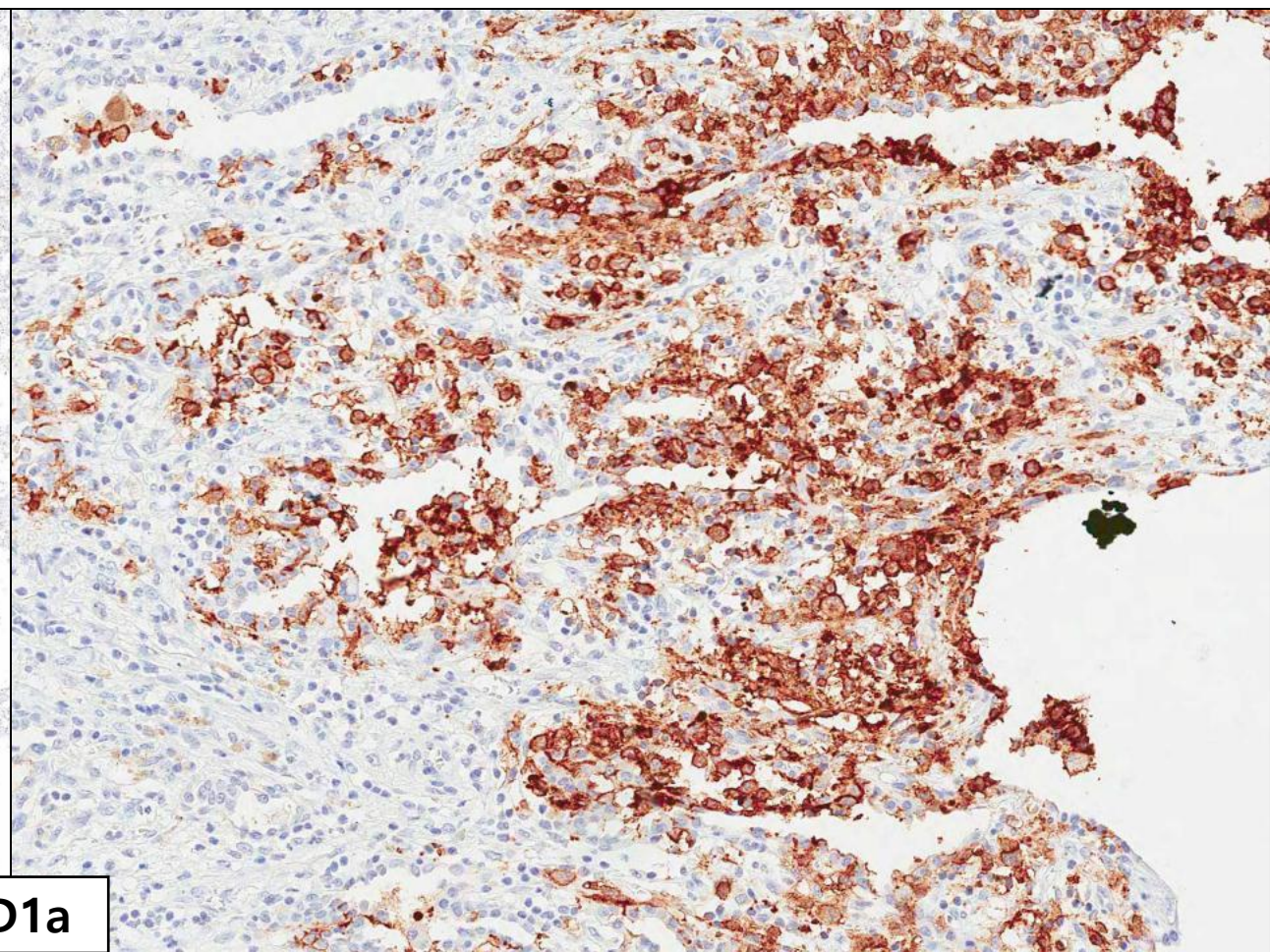
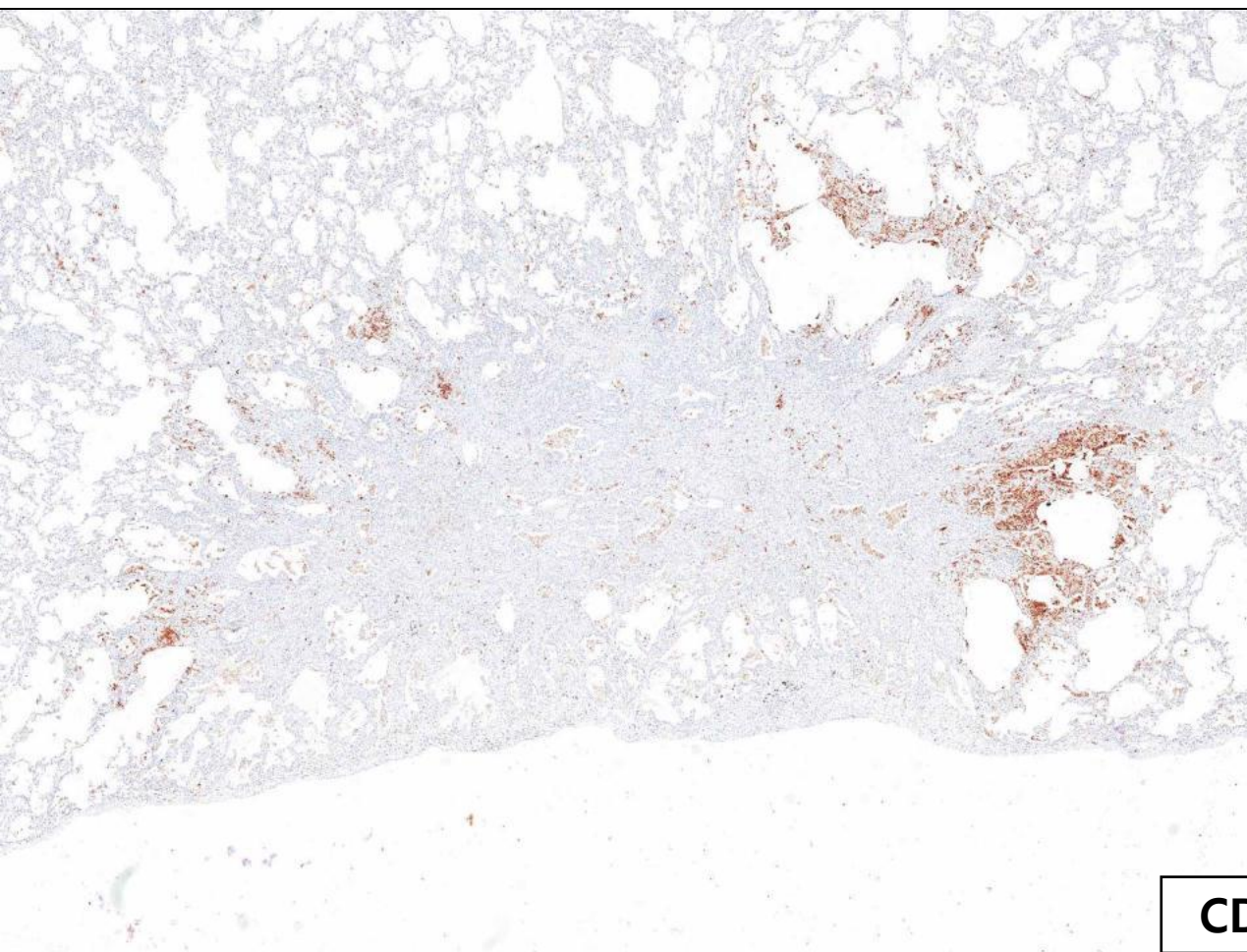


1mm

• F/36







CD1a

Differential Diagnosis of Granulomatous Lung Disease

APPROACH TO THE DIFFERENTIAL DIAGNOSIS OF GRANULOMATOUS LUNG DISEASE

Table 1. Differential Diagnosis of Granulomatous Lung Disease

Infections

Mycobacteria

Mycobacterium tuberculosis

Nontuberculous mycobacteria

Fungi

Histoplasma

Cryptococcus

Coccidioides

Blastomyces

Pneumocystis

Aspergillus

Parasites

Dirofilaria

Noninfectious diseases

Sarcoidosis

Chronic beryllium disease

Hypersensitivity pneumonitis

Hot tub lung

Lymphoid interstitial pneumonia

Wegener granulomatosis

Churg-Strauss syndrome

Aspiration pneumonia

Talc granulomatosis

Rheumatoid nodule

Bronchocentric granulomatosis

- **Step 1: Identifying Organisms**
 - Special stain (GMS, PAS, AFB)
 - PCR reaction
- **Step 2: Identifying Histologic and Clinical Features of Noninfectious Granulomatous Lung Diseases**
- **Step 3: Review of Special Stains and Descriptive Diagnoses**

Table 2. Key Diagnostic Features of Major Noninfectious Granulomatous Lung Diseases

Key Features	Diagnosis
Prominent, well-formed, discrete, nonnecrotizing granulomas in pleura, interlobular septa, and walls of bronchioles ^a Normal lung away from granulomas	Sarcoidosis
Prominent interstitial chronic inflammation Scattered, small, poorly formed granulomas or multinucleated giant cells in interstitium	Hypersensitivity pneumonitis
Granulomas within bronchiolar lumens History of hot tub use ^b	<i>Hot tub lung</i>
Suppurative granulomas with "dirty" necrosis Necrotizing vasculitis	Wegener granulomatosis
Necrotizing granulomas Necrotizing vasculitis Prominent eosinophils	Churg-Strauss syndrome
Vegetable material surrounded by foreign body-type granulomas or multinucleated giant cells	Aspiration pneumonia
Interstitial foreign body-type granulomas containing talc, microcrystalline cellulose, or crospovidone	Talc granulomatosis
Active, seropositive rheumatoid arthritis ^b Multiple, bilateral lung nodules Subpleural necrotizing granuloma	Rheumatoid nodule

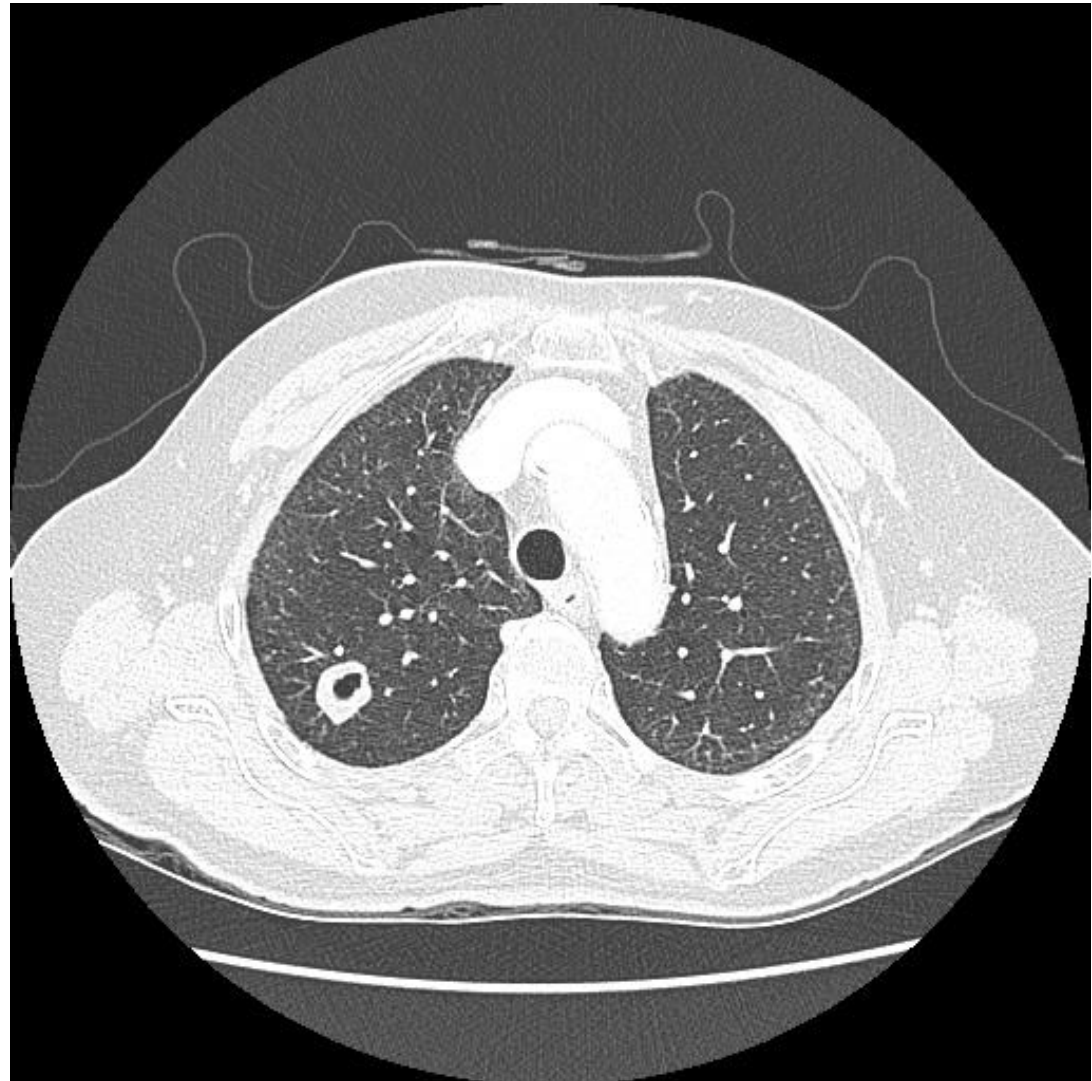
^a Features *not* consistent with sarcoidosis include extensive necrosis or suppuration, interstitial inflammation away from the granulomas, organizing pneumonia, granulomas within alveolar or bronchiolar airspaces, numerous eosinophils, and vegetable material.

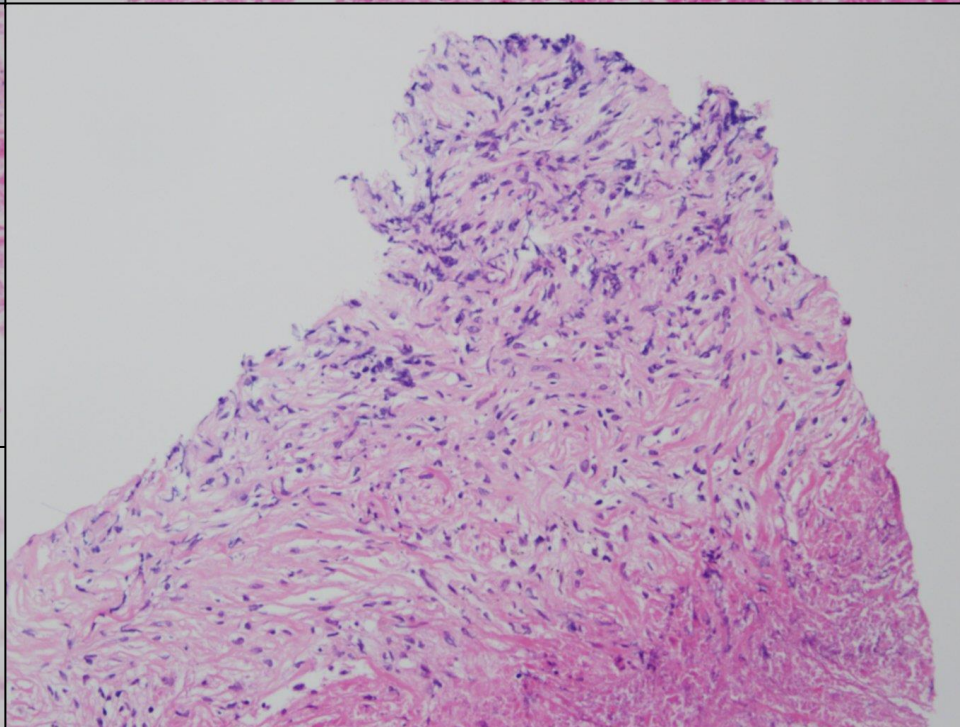
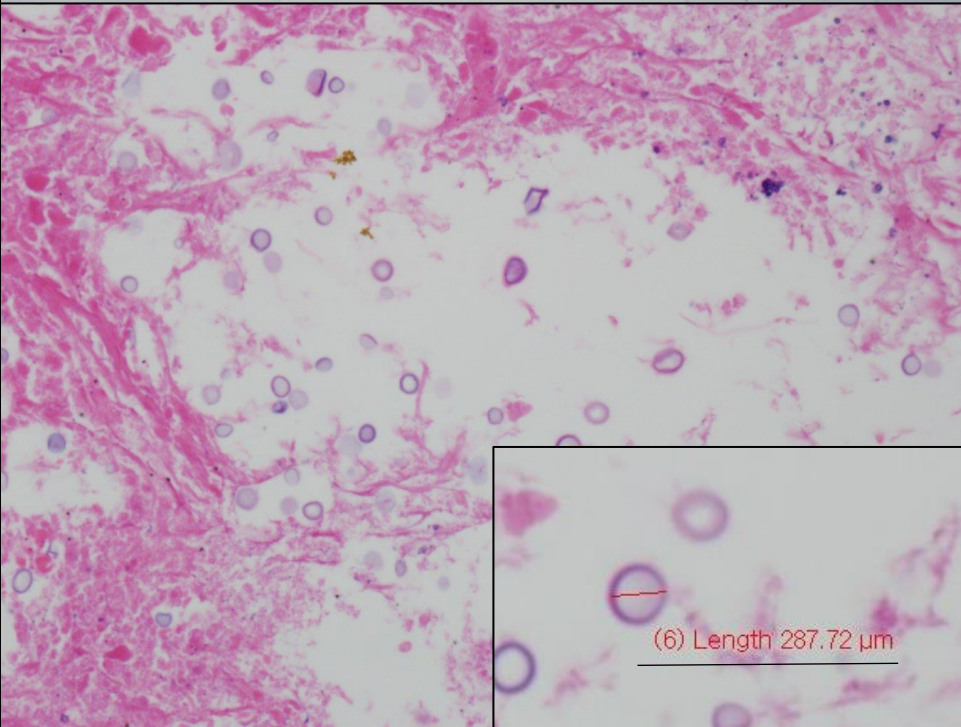
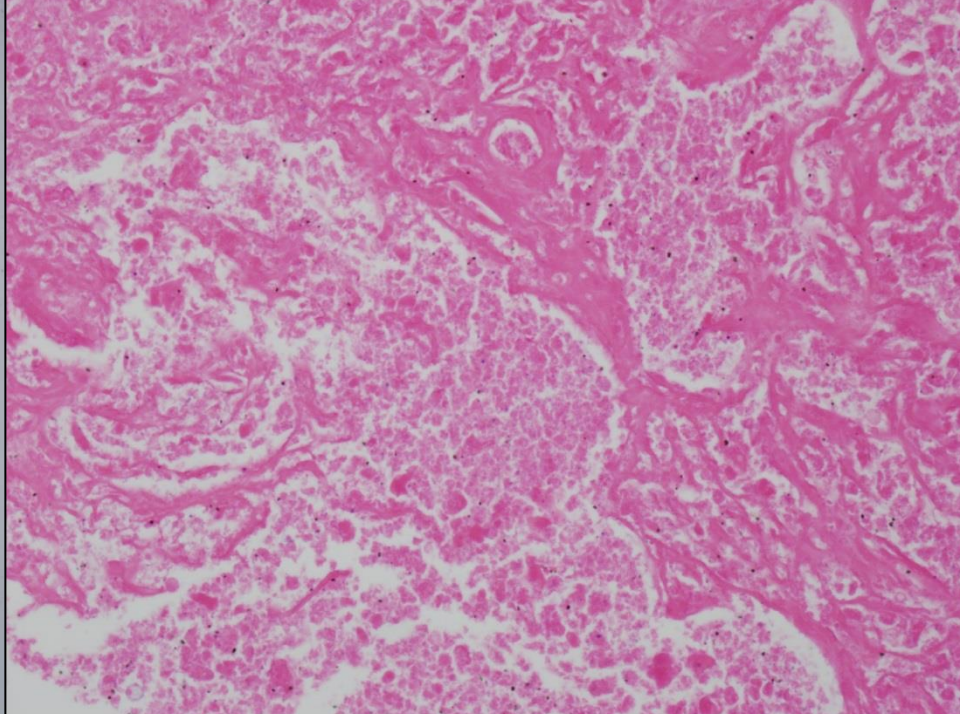
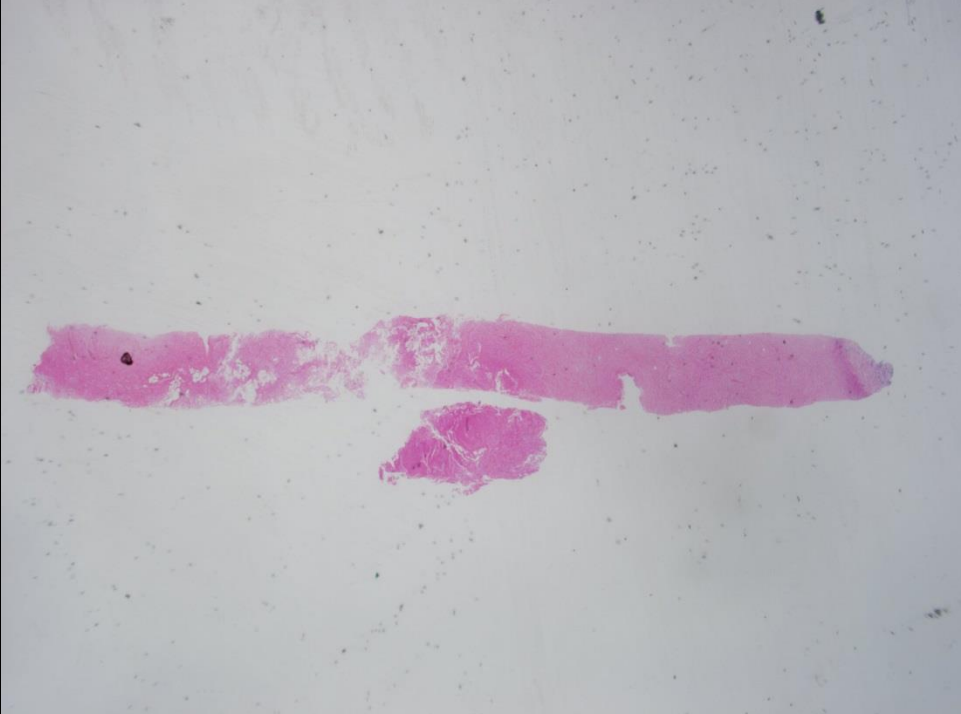
^b Clinical information essential for diagnosis.

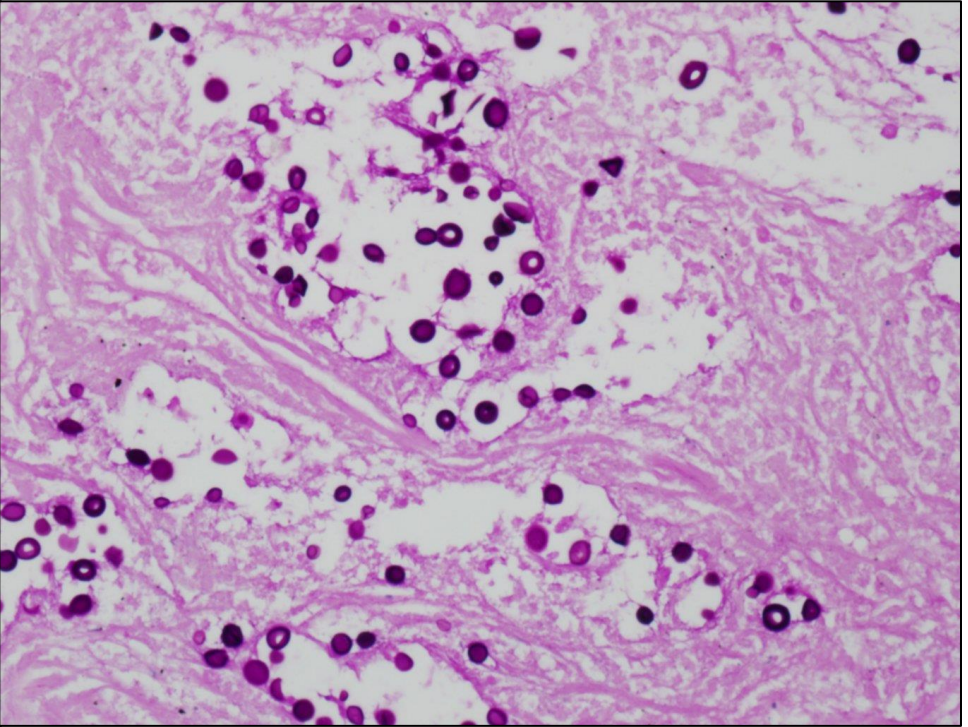
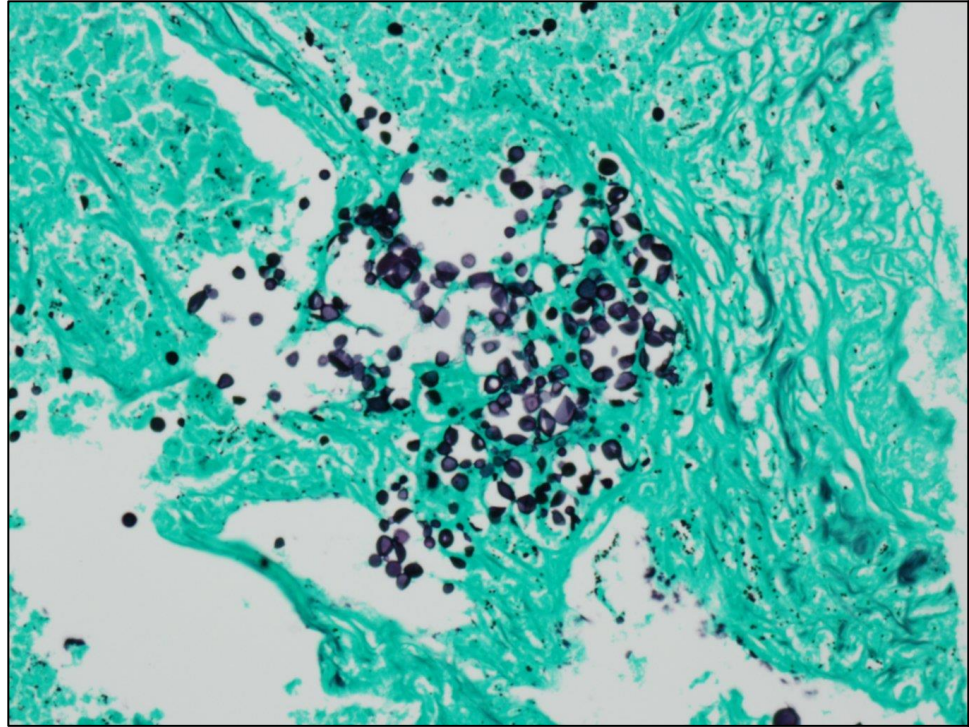
CASE 5-1

Clinical history

- M/79
- Incidental RUL mass (16 mm) during femur neck fracture op. evaluation at local
- Smoking history (-)
- Laboratory finding : Unremarkable
- CXR and chest CT: A well-marginated 1.6cm sized cavitary lesion with smooth inner wall and thin wall (less than 5mm) in posterior segment of RUL, no or minimal contrast enhancement s/o Tuberculoma.







Pathologic Diagnosis

Lung, site unstated, percutaneous thoracic needle biopsy;

1. Extensive necrosis
with vague granuloma (See note #1)
2. Some fungal spores,
morphologically consistent with Cryptococcus species

<Result of immunohistochemical and special stain>

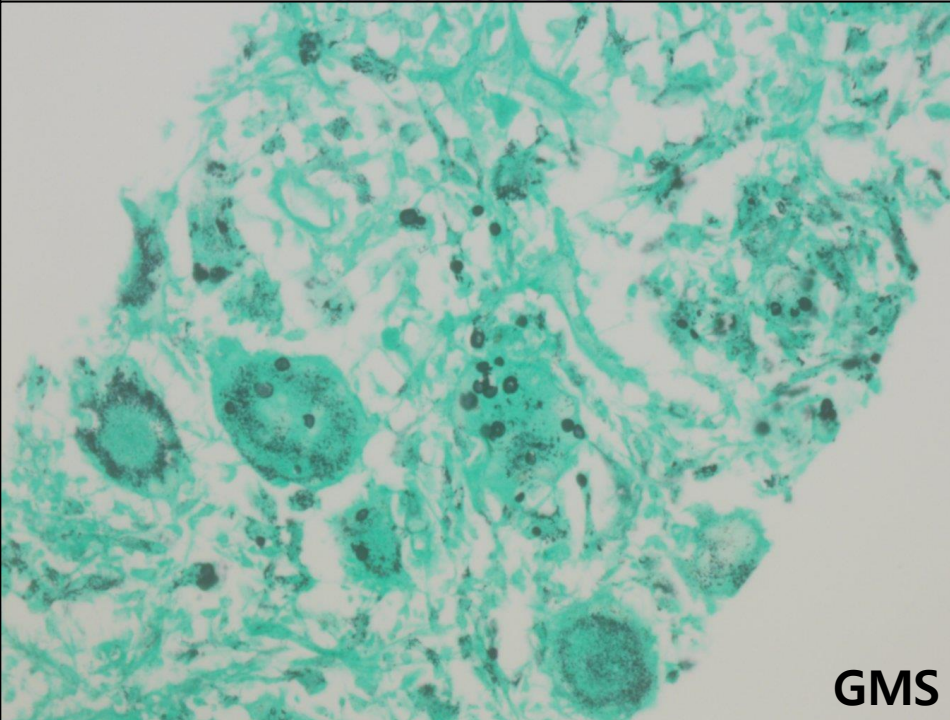
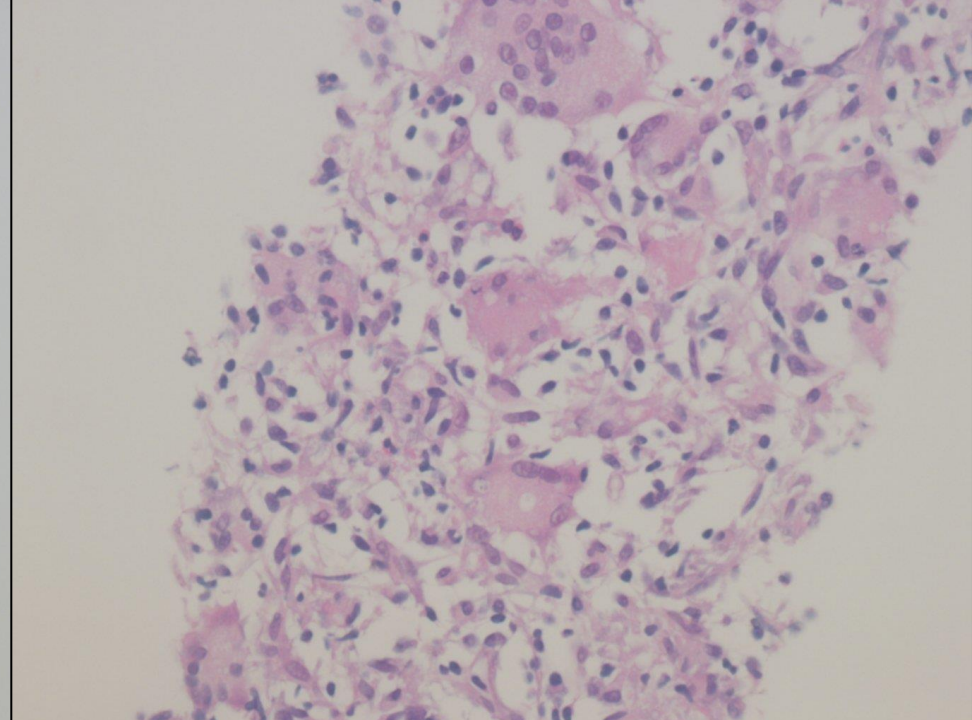
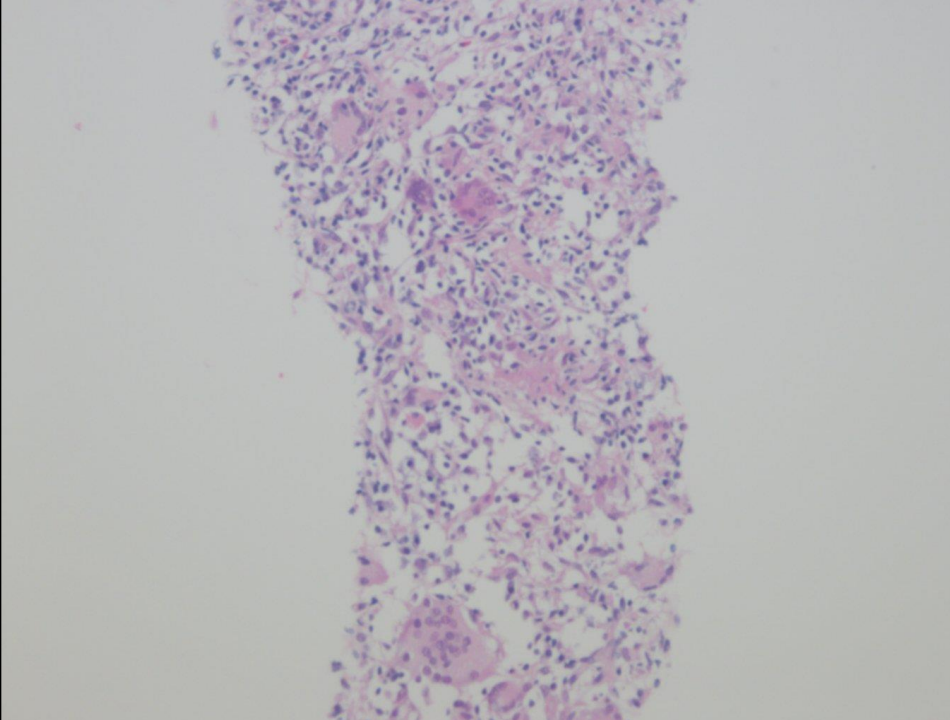
CD68 : negative

AFB : negative

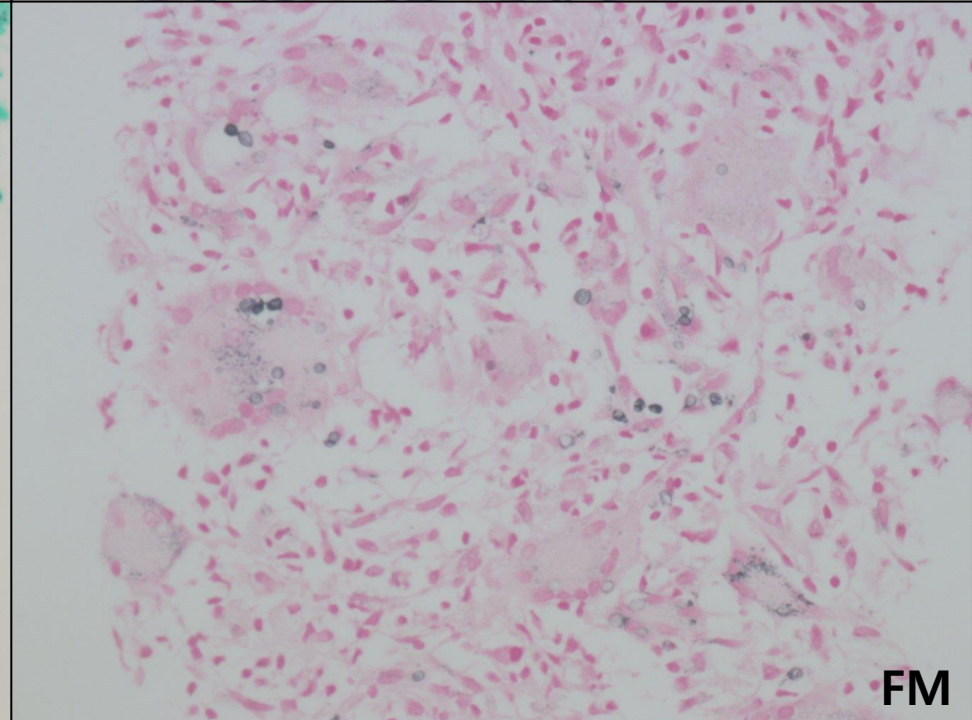
GMS, PAS : positive

MTB & NTM PCR Analysis : (-/-)

Fluconazole Tx.



GMS

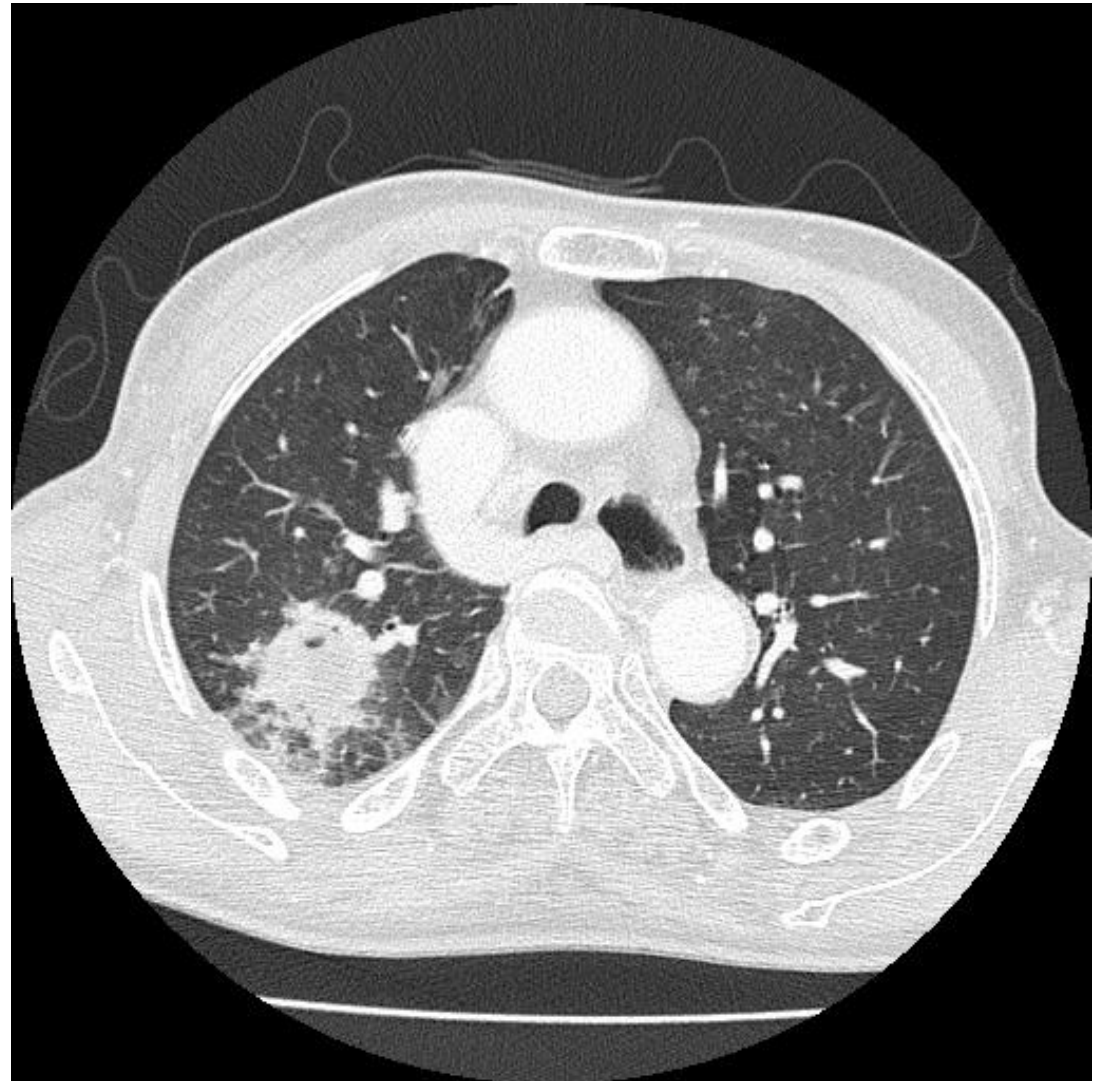


FM

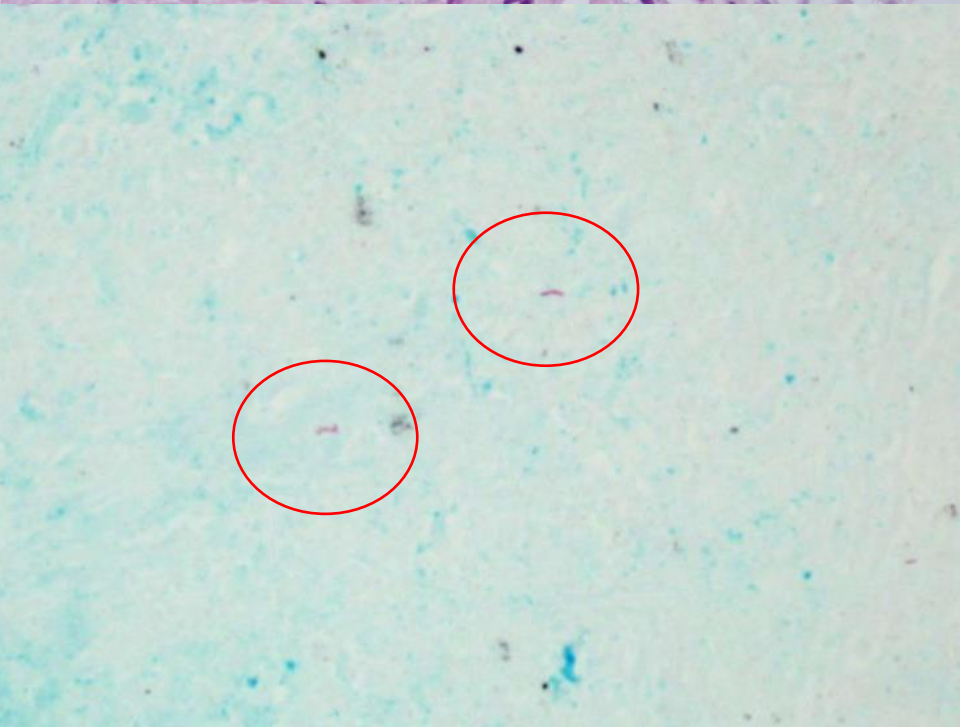
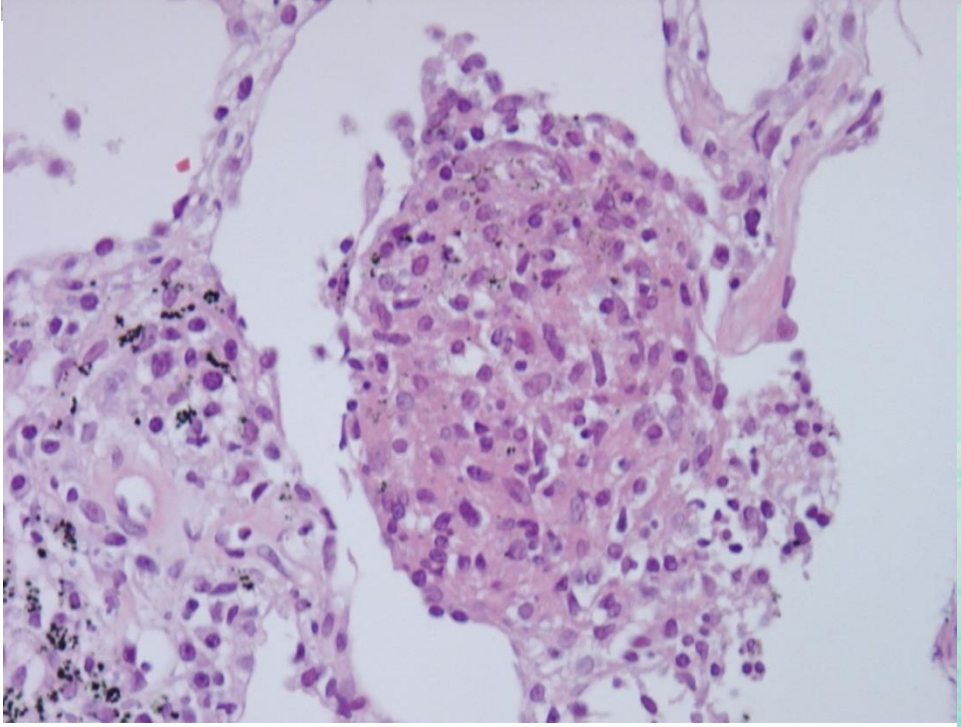
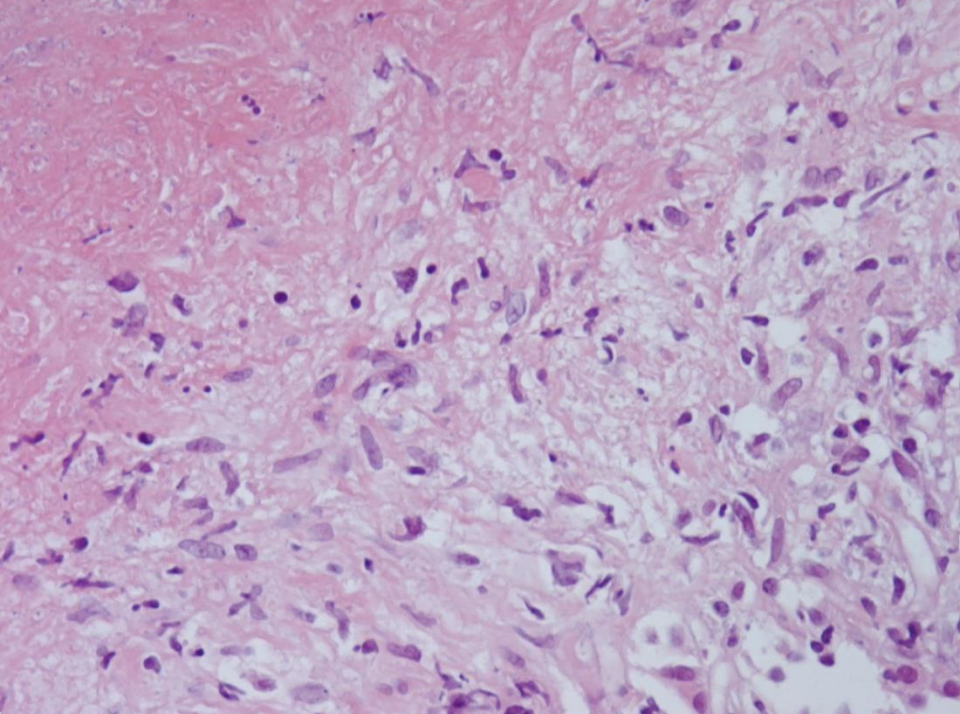
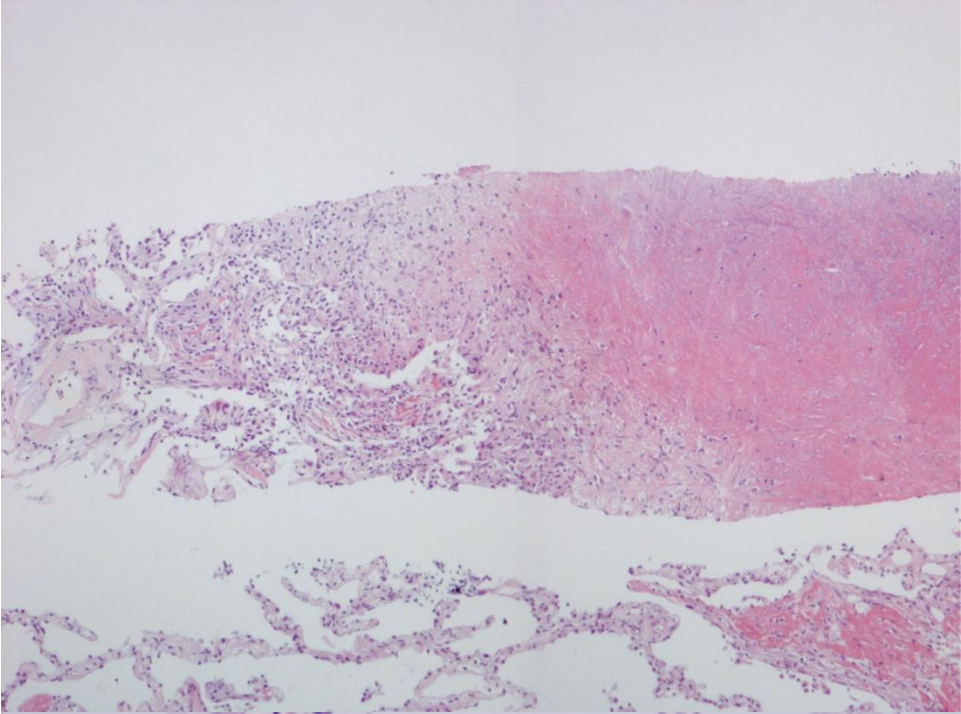
CASE 5-2

Clinical history

- F/75
- Fever o/s) 1mo. ago
- Polymyositis로 steroid Tx 중
- Never-smoker
- Fever/chilling (+/+) 38.8
- Wt loss (+) 3kg/m
- Chest CT : Rt upper lobe mass with satellite nodules







Pathologic Diagnosis

Lung, RUL, PTNB;

**Chronic granulomatous inflammation with necrosis
c/w tuberculosis**

<Result of immunohistochemical stain>

AFB : POSITIVE

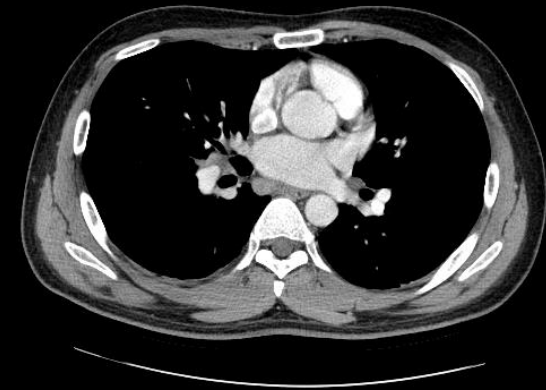
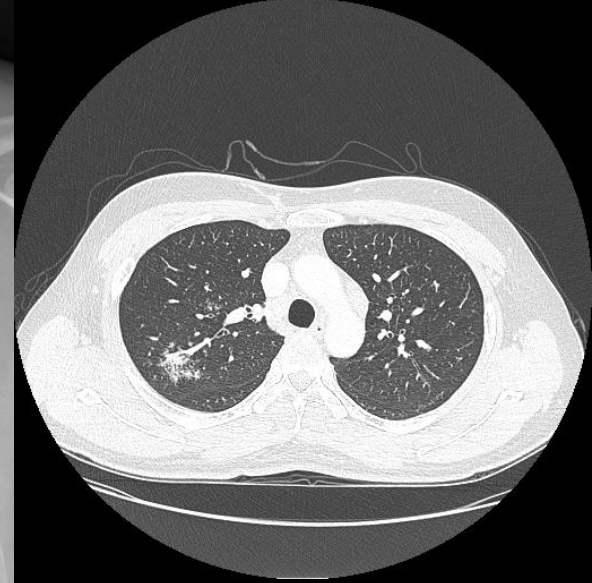
GMS, PAS : negative

CASE 5-3

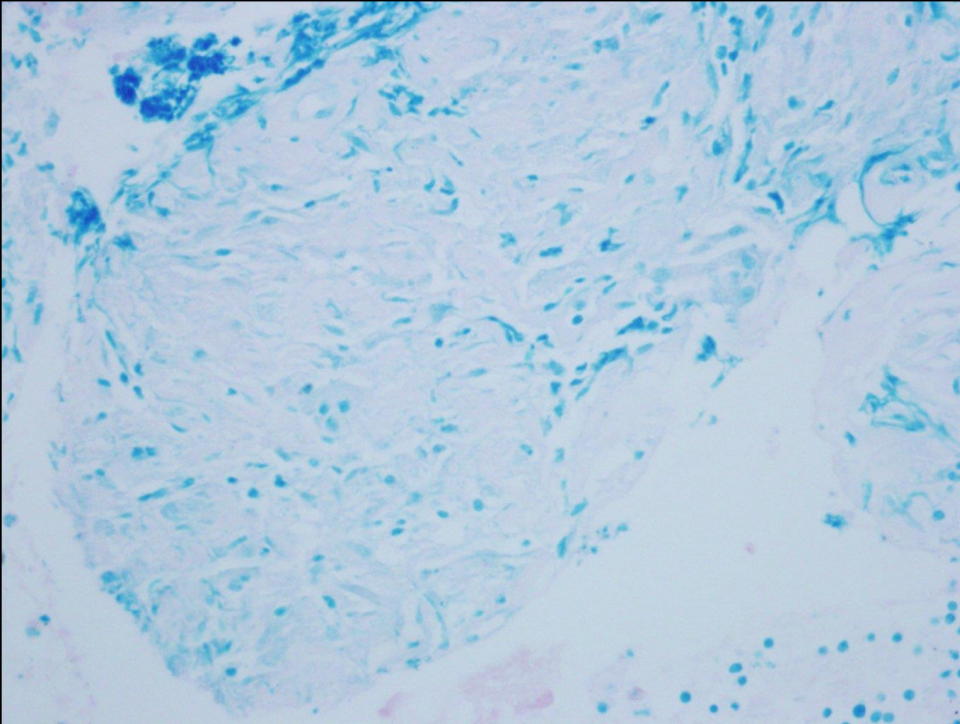
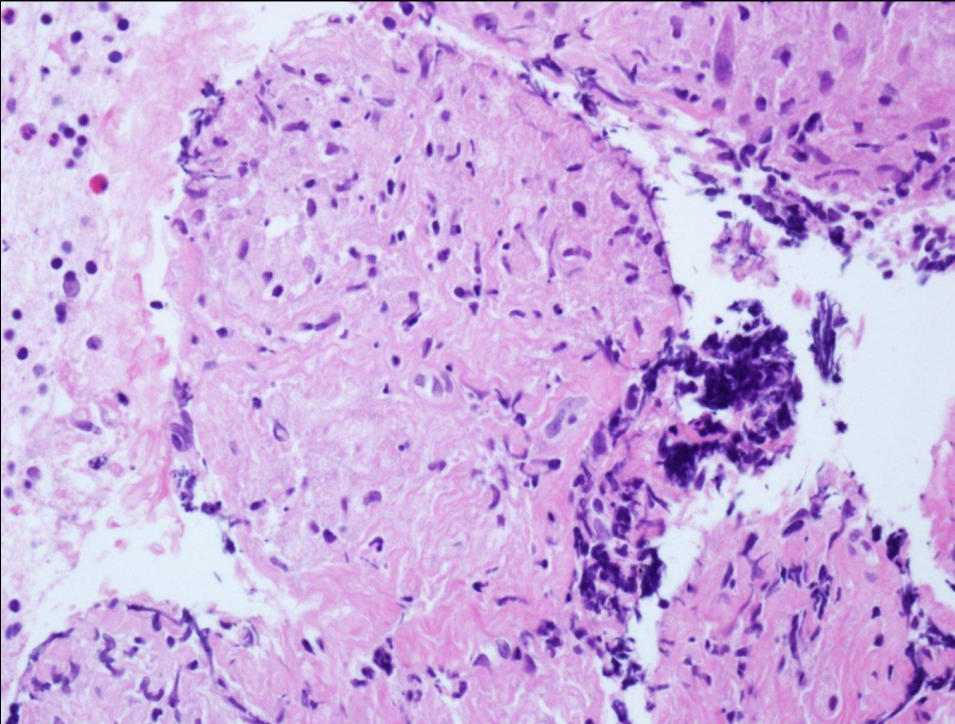
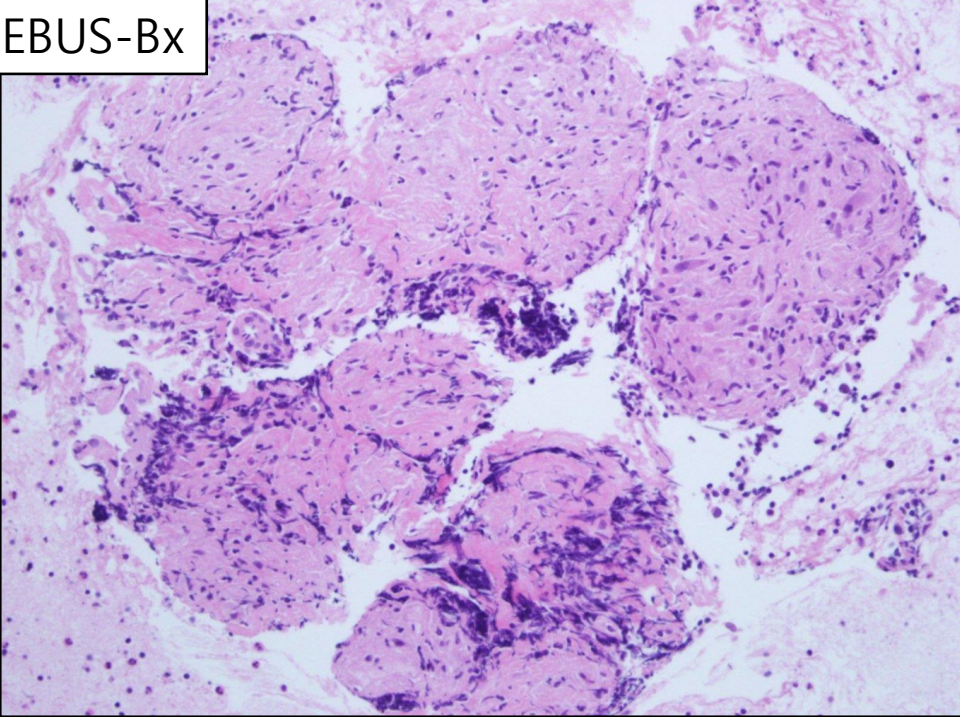
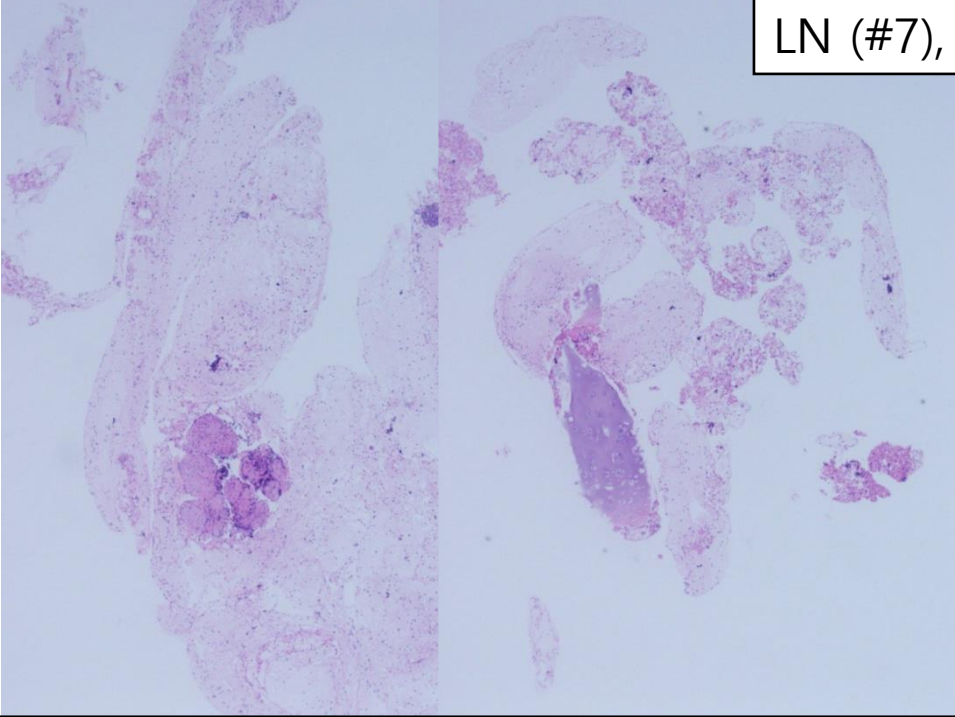
Clinical history

- M/28
- Appendicitis, Incidental lung mass
- No respiratory Sx.
- Lab finding: unremarkable
- CXR and Chest CT :

Conglomerated tiny nodules with multiplicity in BUL.
Bilateral lymphadenopathy in hili and mediastinum
Enlarged lymph node in Lt. supraclavicular area.



LN (#7), EBUS-Bx



Pathologic Diagnosis

Lymph node, subcarinal (#7), EBUS-biopsy;

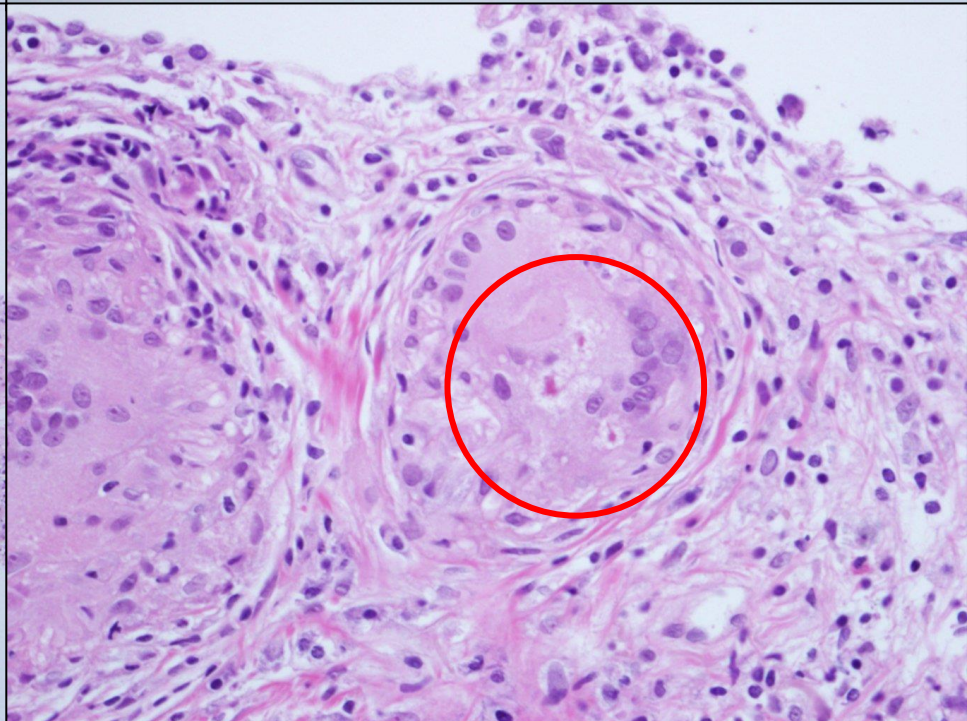
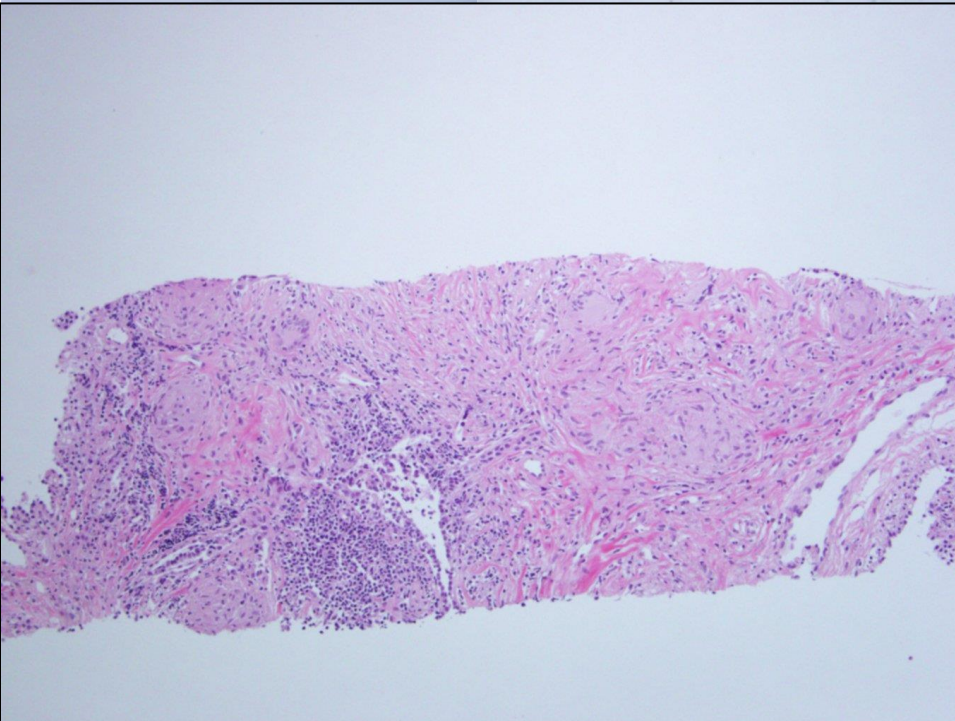
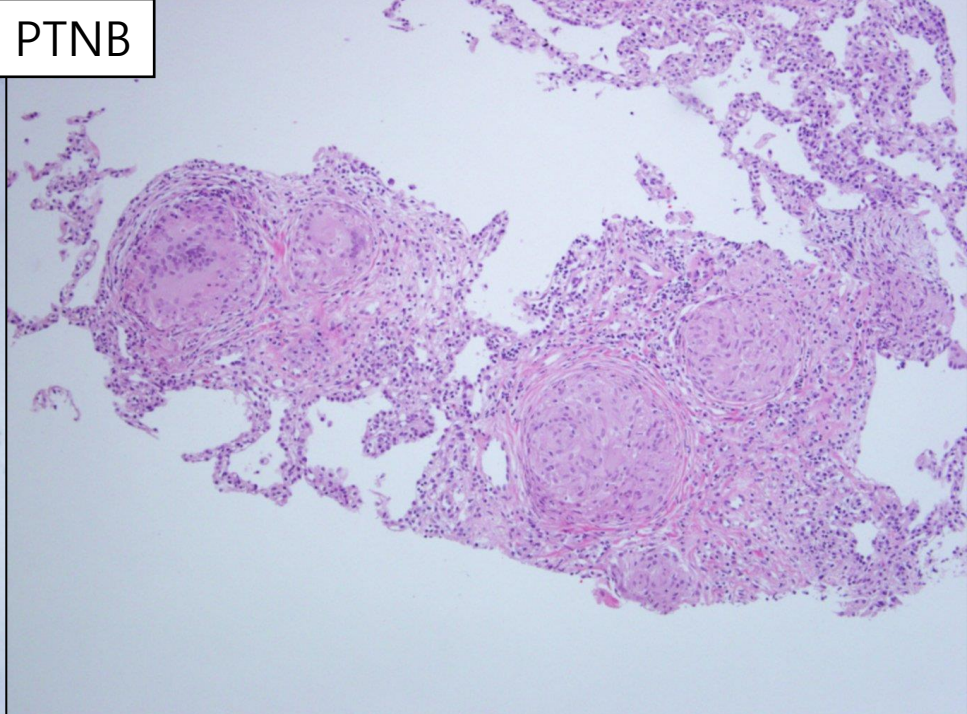
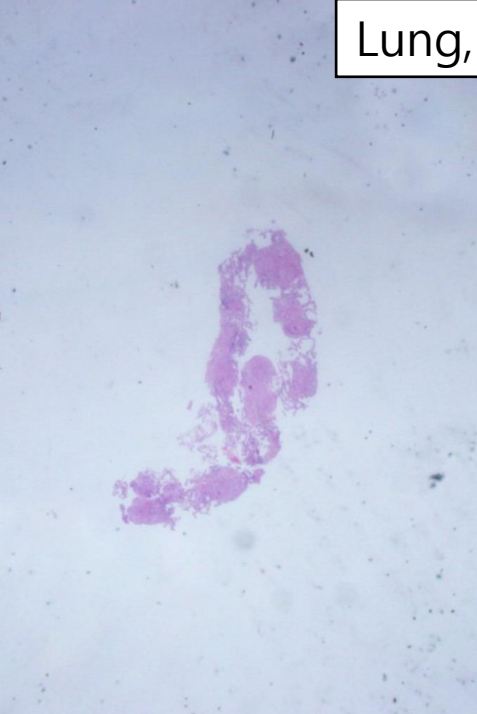
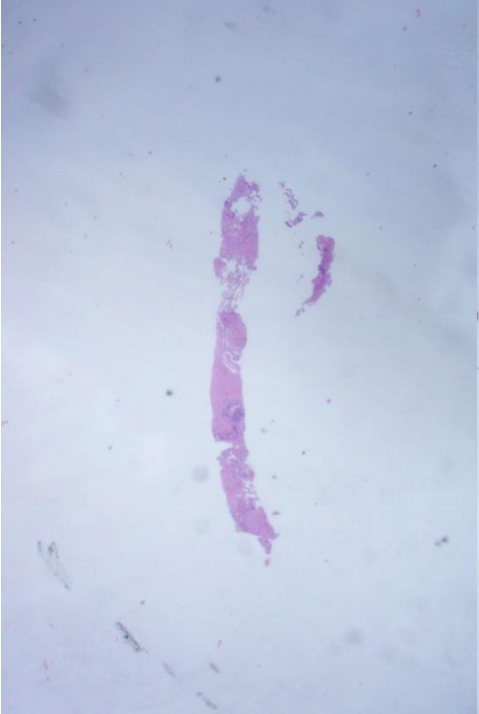
Chronic granulomatous inflammation without necrosis

<Result of immunohistochemical and special stain>

AFB, GMS, PAS : negative

TB PCR (for NTM/MTB): negative

Lung, PTNB



Pathologic Diagnosis

Lung, right upper lobe, percutaneous thoracic needle biopsy;

Chronic granulomatous inflammation

with 1) dispersed giant cells

2) no necrosis

<Result of special stain>

AFB, GMS, PAS : negative



Pulmo-Rad-Pathol Conference



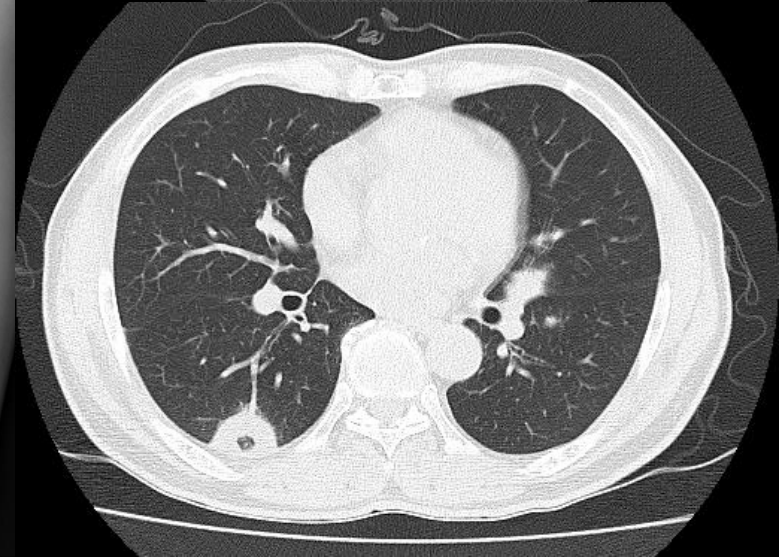
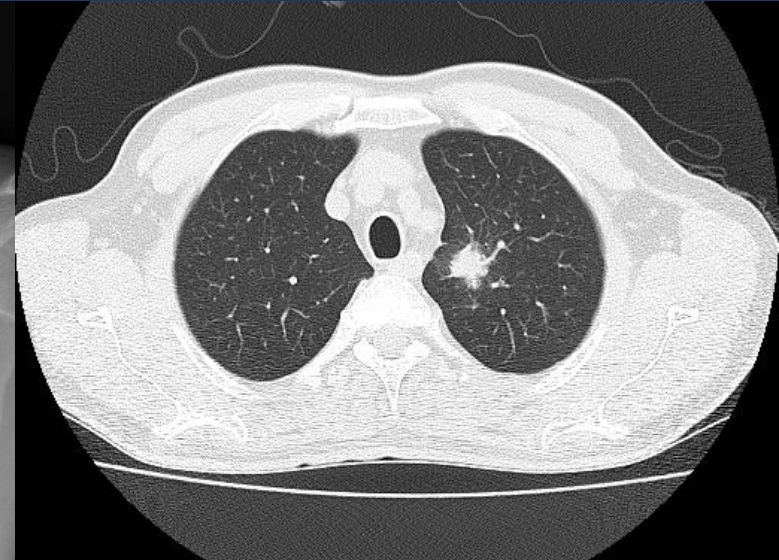
Sarcoidosis

CASE 5-4

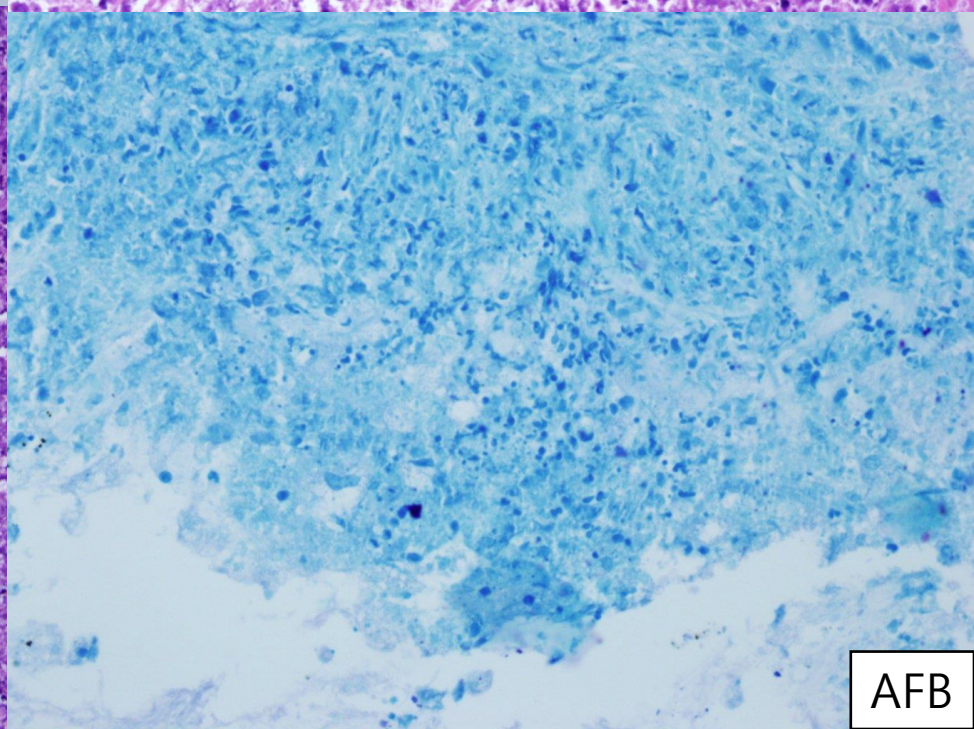
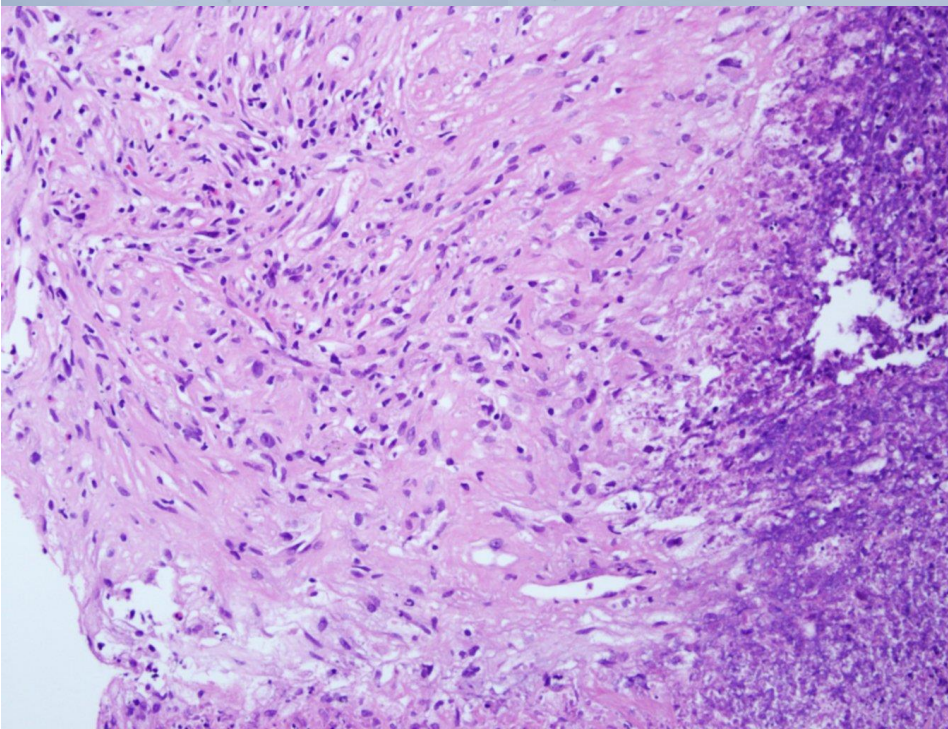
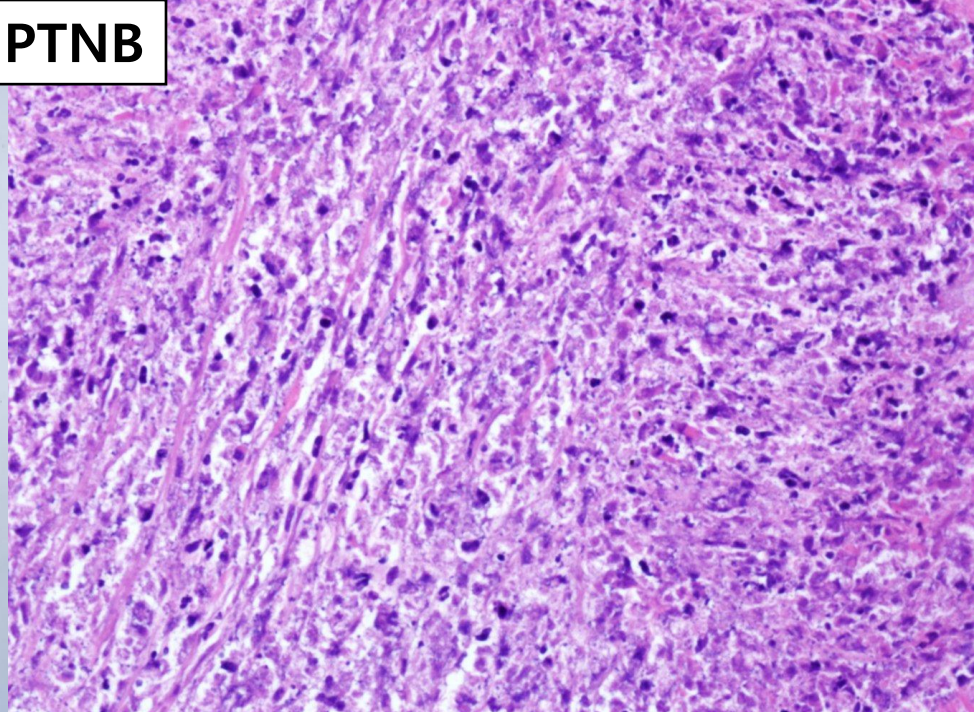
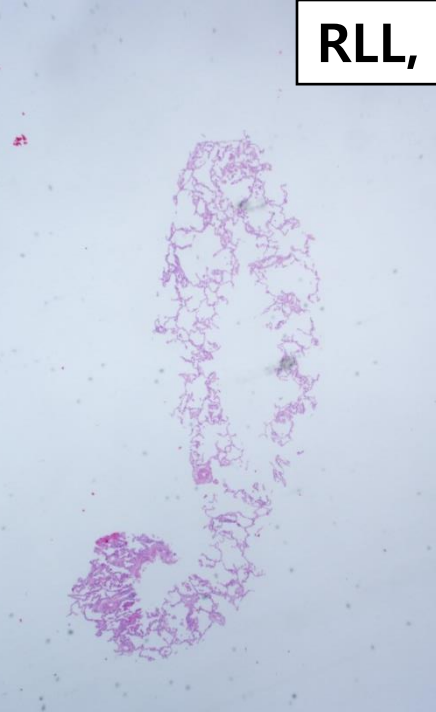
Clinical history

- M/57
- General weakness and cough for 3 mo.
- Smoking : 18.5 py
- Cough/sputum (+/±), Dyspnea (+)
- Fever/chilling (-/-)
- Chest pain (+), nasal obstruction (+)
- Wt loss (+) 7kg/mo

Multiple lung nodules in both lung field in CXR and chest CT



RLL, PTNB



AFB

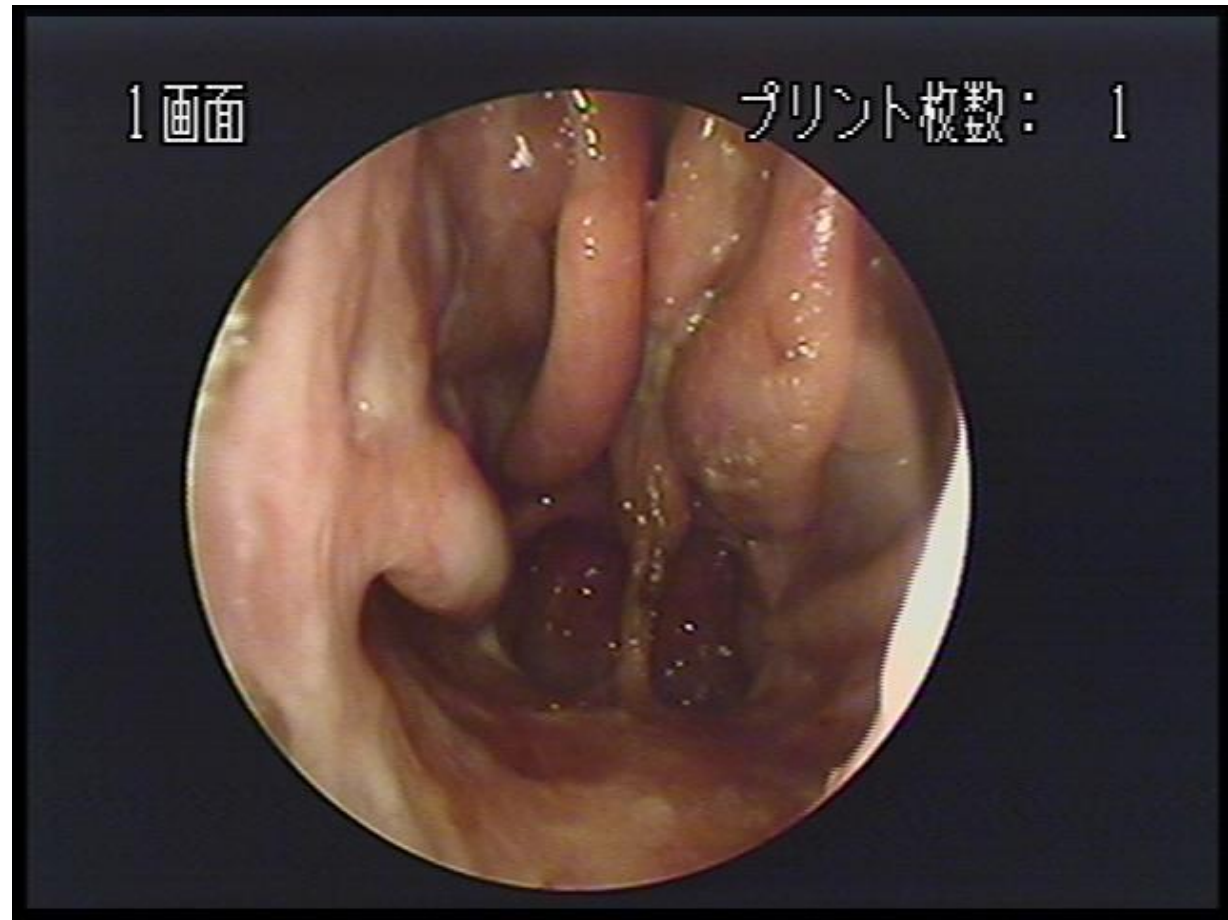
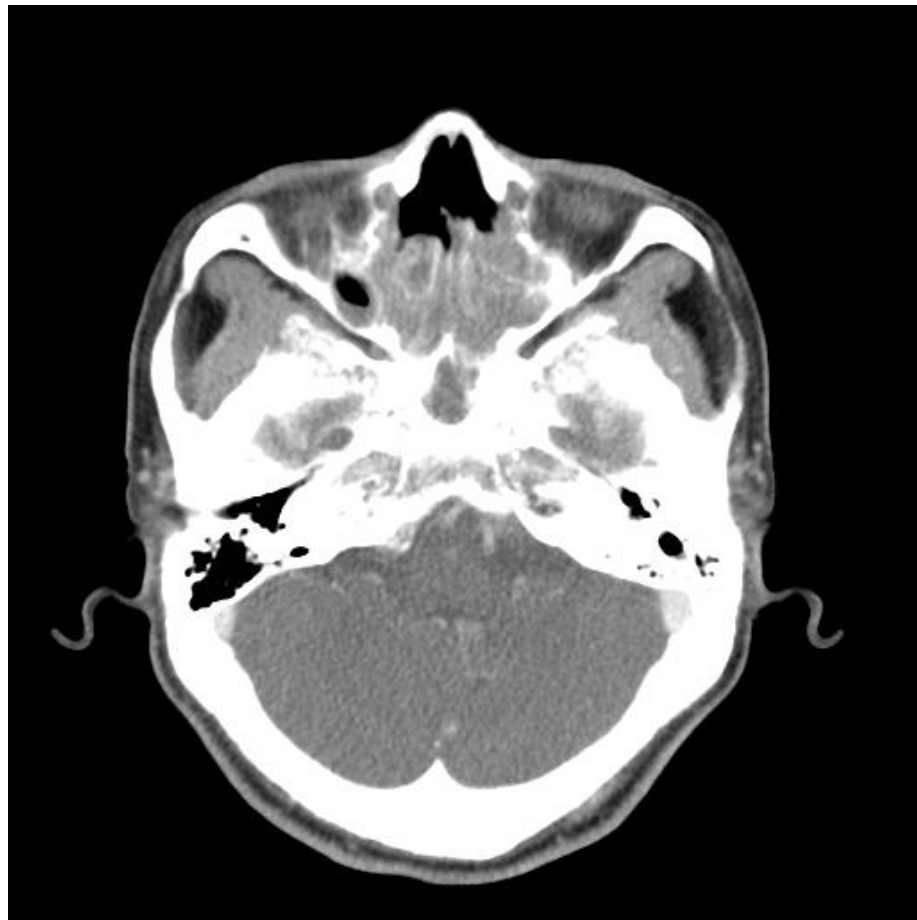
Pathologic Diagnosis

Lung, RLL, superior segment, PTNB;

Chronic nonspecific inflammation, moderate

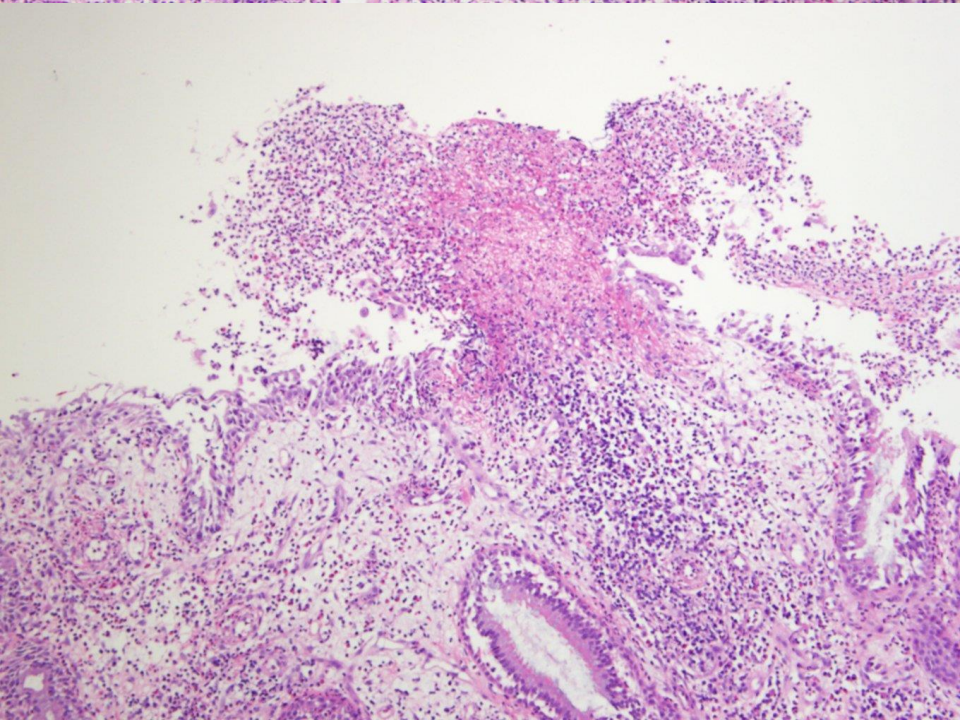
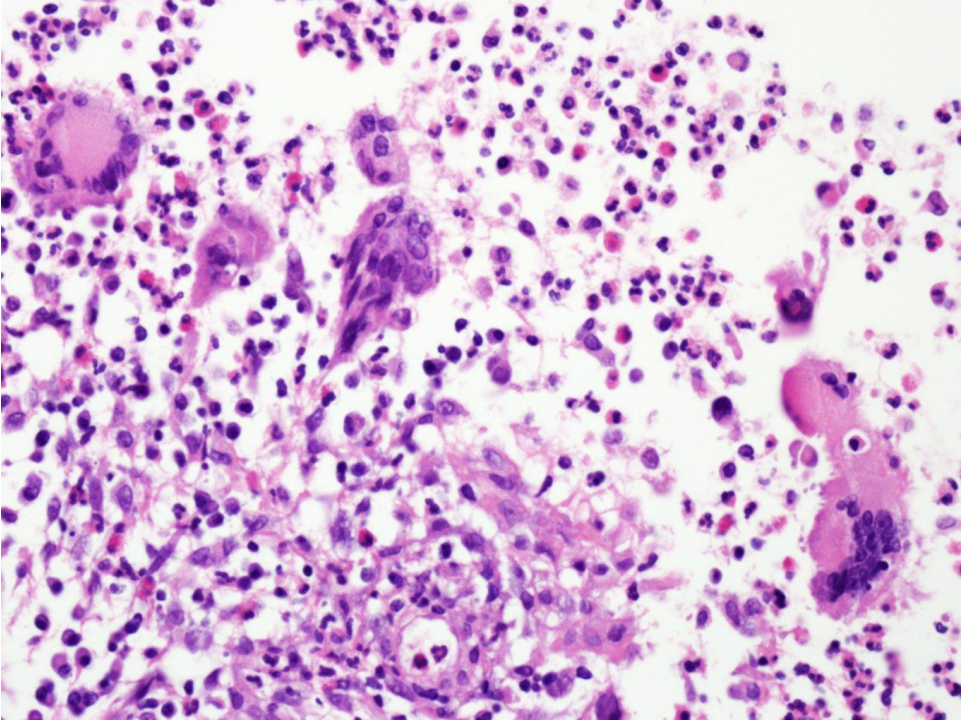
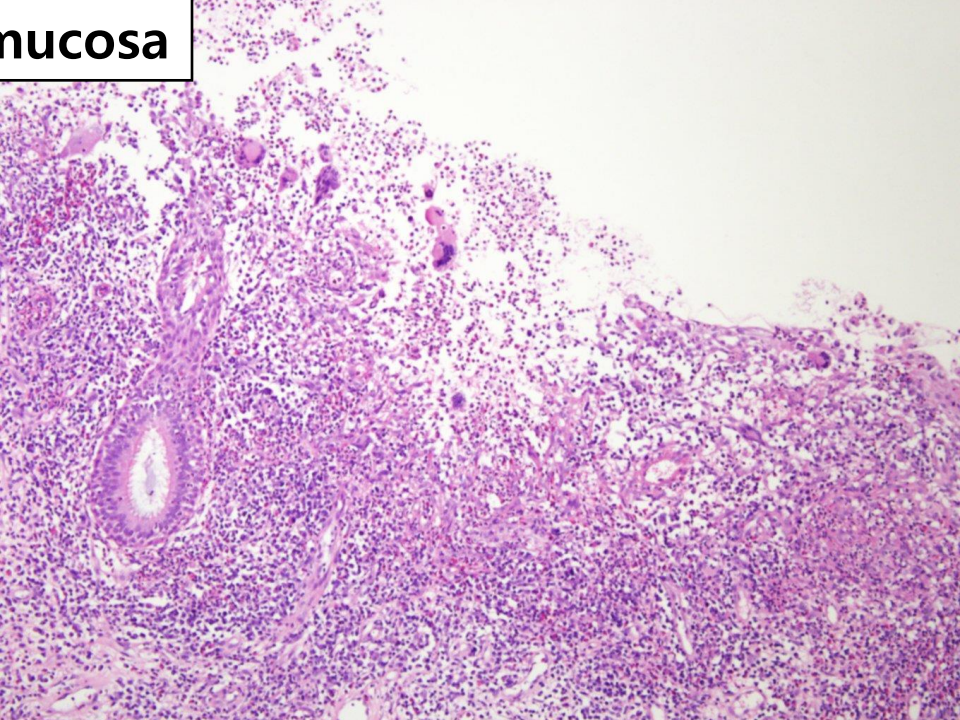
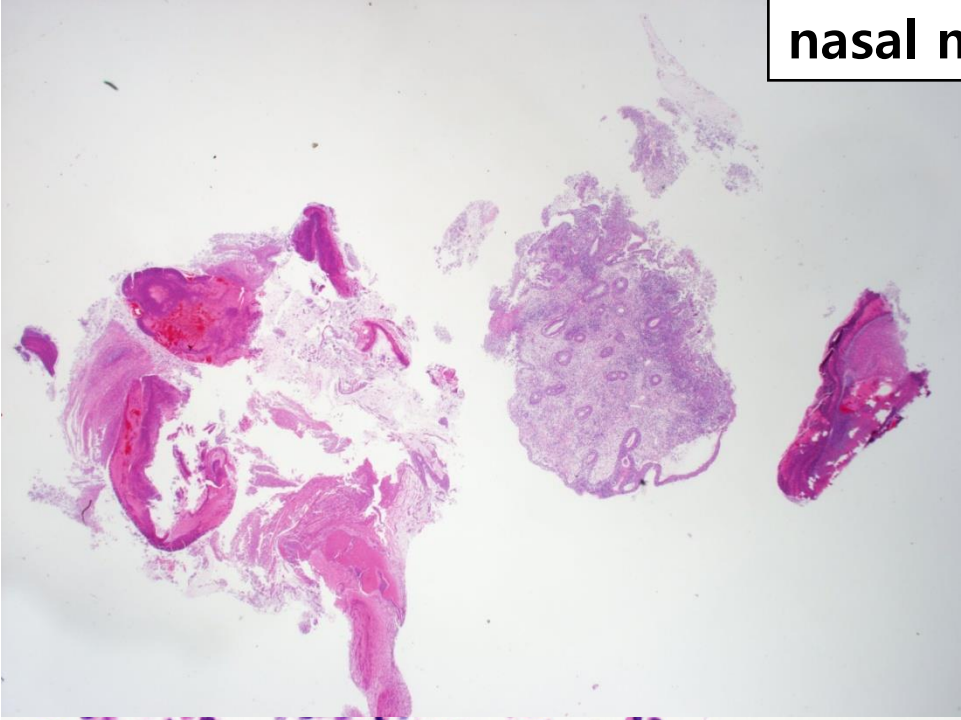
- 1) extensive necrosis
- 2) vague granulomatous reaction

Note) tuberculosis 와 granulomatosis with polyangiitis 등의 가능성이 있습니다. Necrosis 의 양상이 granulomatosis with polyangiitis 를 좀 더 favor 하는 소견입니다.
Clinicopathologic correlation 바랍니다.



RF 75.2 △
FANA : negative
ANCA [Pr III Ab] : POSITIVE
ANCA [MPO ab] : negative

nasal mucosa



Pathologic Diagnosis

Nasal mucosa, site unstated, biopsy;

Chronic active inflammation

- 1) necrosis
- 2) vague granulomatous reaction and disperse giant cells

<Result of special stain>

GMS, PAS : no fungal yeasts and hyphae

APPROACH TO THE DIFFERENTIAL DIAGNOSIS OF GRANULOMATOUS LUNG DISEASE

Table 1. Differential Diagnosis of Granulomatous Lung Disease

Infections

Mycobacteria

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Nontuberculous mycobacteria

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Blastomyces

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Lymphoid interstitial pneumonia

Wegener granulomatosis

Churg-Strauss syndrome

Aspiration pneumonia

Talc granulomatosis

Rheumatoid nodule

Bronchocentric granulomatosis

- **Step 1: Identifying Organisms**
 - Special stain (GMS, PAS, AFB)
 - PCR reaction
- **Step 2: Identifying Histologic and Clinical Features of Noninfectious Granulomatous Lung Diseases**
- **Step 3: Review of Special Stains and Descriptive Diagnoses**

경청해 주셔서
감사합니다.