37. A 68-year-old woman with a medical history of dyslipidemia, chronic back pain, lithotripsy for ureteral stones, and recurrent urinary tract infections presented to the ED for progressively worsening shortness of breath and low-grade fevers. In the ED, her vital signs were a fever of 38.89 °C and an Spo_2 of 54% on room air, with a respiratory rate of 30/min. Her surgical history is significant for back surgery for chronic pain and lithotripsy for ureteral stones. Her home medications were vitamin C, calcium, albuterol, inhaled budesonide, montelukast, gabapentin, and nitrofurantoin.

Her chest radiograph is shown in Figure 1, and representative images from her chest CT scan are shown in Figures 2 through 4. She was admitted to the ICU, and broad-spectrum antibiotics were started. Results from blood cultures, urine *Legionella* antigen testing, COVID-19 testing, and a viral panel were all negative. She had 5% eosinophils, with a total eosinophil cell count of 580/μL (0.58×10^9/L). Her C-reactive protein level was markedly elevated at 5.5 mg/dL (550 mg/L), and her lactate dehydrogenase level was 680 U/L (11.36 μkat/L). Her smooth muscle antibody titer was elevated at 1:20, and her antinuclear factor titer was also elevated at 1:320, with negative results for antinuclear antibody, p-antineutrophil cytoplasmic antibody, and antinuclear ribonucleoprotein. Further history was taken to try to establish a cause for her interstitial lung disease as seen on CT scans. She denied pets, travel, mold in her home, and family history of rheumatologic disease or known history of interstitial lung disease.

What is the best next step in her treatment after stabilizing her vital signs with oxygen and close monitoring?

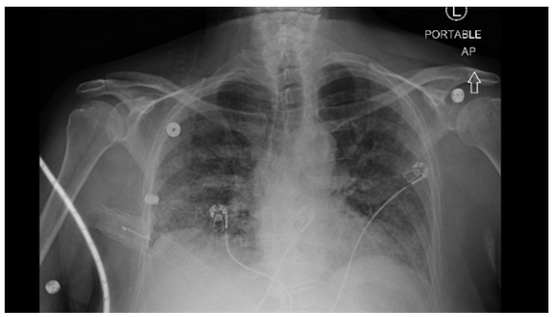


Figure 1. Chest radiograph.

Figure 2. CT scan.

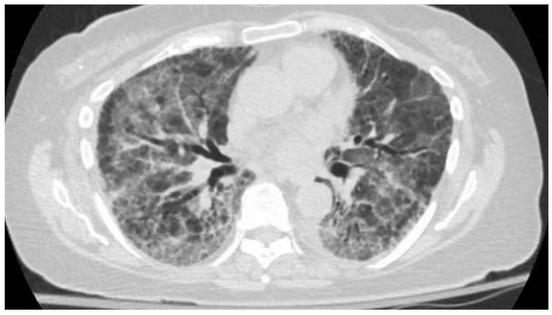


Figure 3. CT scan.

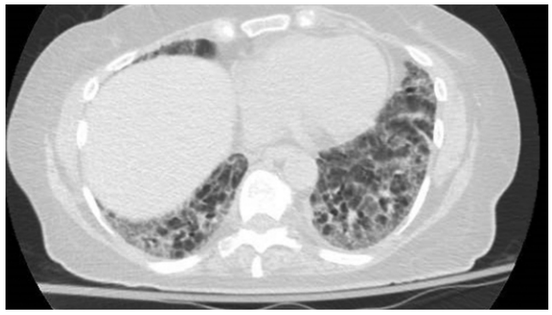


Figure 4. CT scan.

A. Initiate corticosteroids.
B. Discontinue nitrofurantoin.
C. Refer for surgical lung biopsy.
D. Evaluate for lung transplant.

38. Which of the following tools is no longer recommended as a single instrument to screen patients with sepsis or septic shock?

A. SIRS criteria
B. qSOFA
C. NEWS
D. MEWS

39. The 2011 National Lung Screening Trial (NLST) demonstrated that screening with low-dose chest CT scanning can reduce mortality from lung cancer. More than 53,000 participants at high risk for lung cancer were randomly assigned to undergo three annual screenings with either low-dose CT scanning or single-view chest radiography. On the basis of data from that study, 320 patients at high risk would need to be screened to prevent one death over the 3 years of annual CT scanning. Eligible subjects were aged 55 to 74 years with 30 or more pack-years of smoking. Since 2011, the United States Preventive Services Task Force (USPSTF) has recommended expansion of lung cancer screening (LCS) eligibility with low-dose CT scanning to include adults aged 50 to 80 years with at least a 20-pack-year smoking history and who currently smoke or have quit within the past 15 years. Also during this time, there have been improvements in lung cancer therapy, including advances in the use of immune checkpoint inhibitors and stereotactic body radiotherapy. With these changes to screening populations and treatment effectiveness, the number needed to screen (NNS) to prevent one death may be affected.

Which of the following statements is correct?

A. The NNS should go up with new screening guidelines and go down with new treatments.
B. The NNS should go down with new screening guidelines and go up with new treatments.
C. The NNS should go up with both new screening guidelines and new treatments.
D. The NNS should go down with both new screening guidelines and new treatments.

40. A 58-year-old woman with a history of temporal arteritis self-resumed her previous oral prednisone 60 mg/day for the past 8 weeks, when she felt her headaches and jaw pain were worsening. She has had a history of intermittent adherence with her medical regimen. She now presents with fever, dry cough, and dyspnea over 5 days. Her headaches have improved.

Her temperature is 39.8 °C, and her respiratory rate is 16/min. Lung examination reveals crackles without wheezes. Chest imaging reveals bilateral interstitial infiltrates. Her CBC count with a differential count is unremarkable. The result of a 1,3-β-d-glucan assay is positive at 300 pg/mL (negative is <60 pg/mL). Her serum galactomannan result is negative. An HIV serologic result is negative. Bronchoscopy is scheduled.

The most likely diagnosis is infection with which organism?

A. *Pneumocystis*
B. *Cryptococcus*
C. *Mucor*
D. *Aspergillus*

41. A 68-year-old man with history of heart failure with reduced ejection fraction (40%-45%) and chronic kidney disease stage 3A was admitted to the ward for cellulitis and an expedited workup for a potential malignancy. During review of his systems, he endorsed a very poor appetite over the last 3 months, a 40-lb (18.14-kg) weight loss, and frequent night sweats during that period. His examination results were significant for cachexia with severe muscle wasting and cellulitis over the left leg from just above the ankle to the middle of the shin.

Piperacillin-tazobactam and vancomycin were started. He received 2 L of lactated Ringer's solution, and a cardiac-renal diet was started. Initial electrolyte levels and WBC count were within normal limits. Approximately 36 h later, the patient developed ventilatory failure requiring intubation.

Which of the following interventions may have prevented his ventilatory failure?

A. Anticoagulation
B. Aggressive fluid resuscitation
C. Avoidance of the piperacillin-tazobactam and vancomycin combination
D. Frequent electrolyte monitoring and phosphate repletion

42. A 59-year-old woman with no significant medical history is referred to you for a 9-month history of progressive dyspnea on exertion and dry cough. She endorses a history of a severe respiratory infection requiring hospitalization during childhood; however, she denies any other infections or known lung disease. She denies exposure to birds or mold and has never taken any medications regularly. She works part-time as a house cleaner. She currently smokes and endorses a 15-pack-year tobacco history.

Her physical examination results are notable for mild expiratory wheezing and subtle fine inspiratory crackles. There is no clubbing or cyanosis. Pulmonary function test results are shown (Figure 1). Representative chest CT images are shown (Figure 2). Results from basic laboratory testing as well as extensive autoimmune and connective tissue serological testing are unremarkable. An HIV test result is negative. After reviewing the case during a multidisciplinary discussion, you refer her for video-assisted thoracoscopic lung biopsy.

On the basis of these findings, which of the following histopathologic findings would you expect the biopsy specimen to show?

		Ref	Pre	% Ref	Post	% Ref	%Chg
Spirometry							
FVC	Liters	3.44	2.67	78	2.71	79	2
FEV1	Liters	2.89	1.88	65	1.96	68	4
FEV1/FVC	%	85	71		72		
FEF25-75%	L/sec	3.29	1.23	37	1.36	41	11
PEF	L/sec	7.17	5.52	77	4.49	63	-19
FET100%	Sec		7.16		7.56		6
Lung Volumes							
TLC	Liters	5.54	4.40	79			
VC	Liters	3.44	2.67	78			
FRC PL	Liters	3.21	2.38	74			
ERV	Liters	1.31	0.64	48			
RV	Liters	1.76	1.73	98			
RV/TLC	%	30	39				
Diffusing Capacity (Hb 9.2)							
DLCO	mL/mmHg/min	22.3	10.4	47			
DL Adj	mL/mmHg/min	22.3	12.4	56			
DLCO/VA	mL/mHg/min/L	4.59	3.08	67			
DL/VA Adj	mL/mHg/min/L		3.66				
VA	Liters	5.54	3.39	61			
IVC	Liters		2.42				

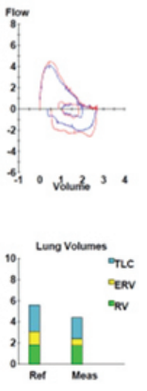


Figure 1. Pulmonary function test results. Abbreviations: FEF, forced expiratory flow; PEF, peak flow measurement; FET, forced expiratory time; TLC, total lung capacity; VC, vital capacity; FRC, functional residual capacity; ERV, expiratory reserve volume; RV, residual volume; VA, alveolar ventilation; IVC, inspiratory vital capacity.

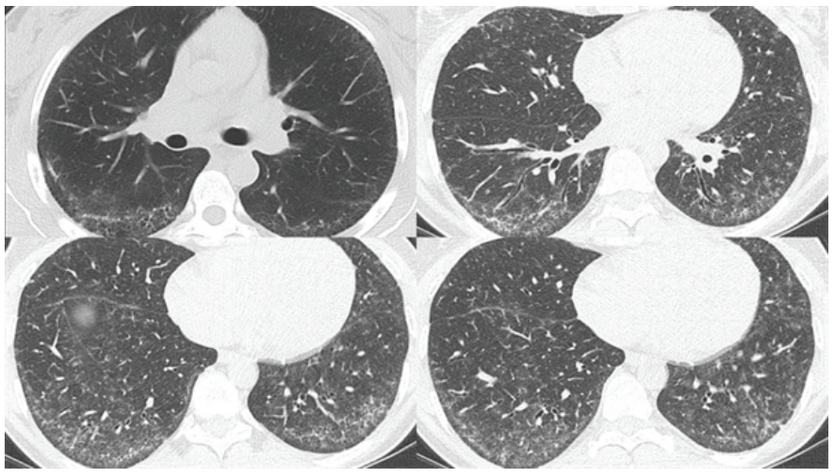
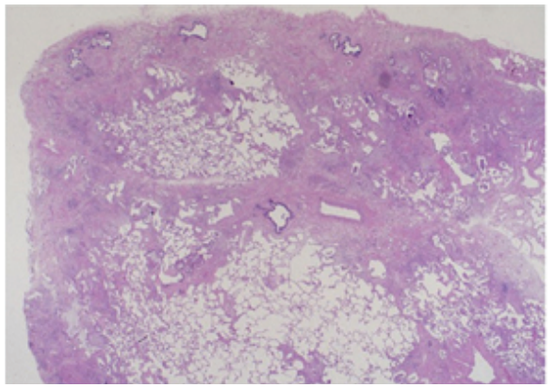
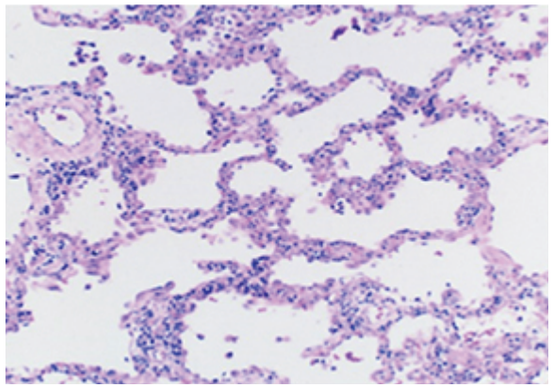


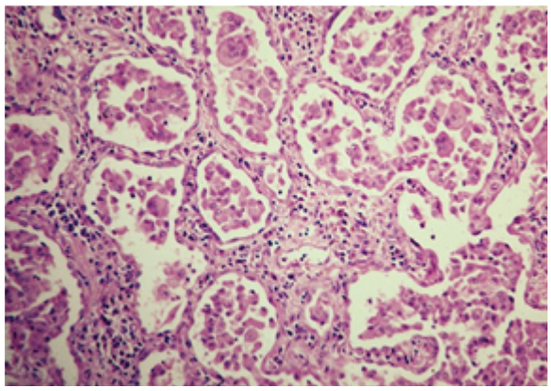
Figure 2. Axial chest CT lung window images.



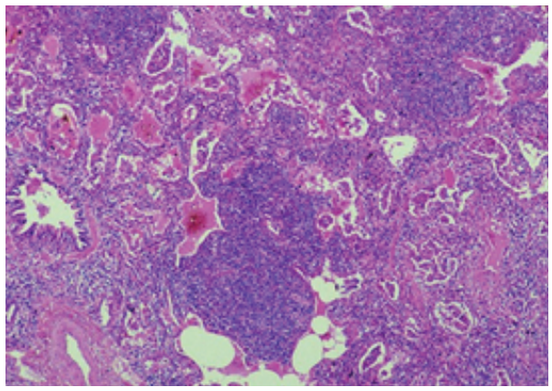
A.



B.



C.



D.

43. A 53-year-old man with a history of stable systemic lupus erythematosus with articular involvement is urgently referred to you for evaluation of an abnormal chest CT scan after presenting to his internist with 2 months of cough, subjective fevers, and malaise. He is now experiencing progressive dyspnea with mild exertion and cough with trace hemoptysis during the past week. He also endorses a 20-lb (9.07-kg) weight loss over the course of the past 2 months. His only medications are hydroxychloroquine and aspirin.

At physical examination, he is febrile to 38.3 °C, and his heart rate is 105/min, BP is 105/68 mm Hg, respiratory rate is 20/min, and Spo_2 is 92% on breathing room air. His lungs are clear with the exception of reduced breath sounds at the right middle-to-lower fields posteriorly. He has multiple pink-to-purple, subcutaneous nodules (some with ulceration) over his elbows and thighs (Figure 1).

Laboratory data are notable for a WBC count of 3,500/μL (3.5×10^9/L) with a normal differential count and a C-reactive protein level of 20.1 mg/dL (201 mg/L). Urinalysis results are normal with no casts. Results of extensive serological testing for autoimmune disease, including myeloperoxidase and proteinase 3 antineutrophil cytoplasmic antibodies, are negative. Serological infectious test results are negative with the exception of an elevated Epstein-Barr virus (EBV) IgG level and EBV DNA polymerase chain reaction result of 120 IU/mL.

His chest radiograph (Figure 2) and representative chest CT images (Figure 3) are shown. The patient undergoes a skin biopsy, but the results are nondiagnostic. You perform bronchoscopy with BAL and transbronchial biopsies. BAL and transbronchial biopsy findings exclude any obvious infections, although tissue samples are insufficient to provide a conclusive diagnosis. You refer the patient for a surgical lung biopsy (Figure 4).

What is the most likely diagnosis?

Figure 1. Skin examination shows multiple pink-to-purple, subcutaneous nodules.

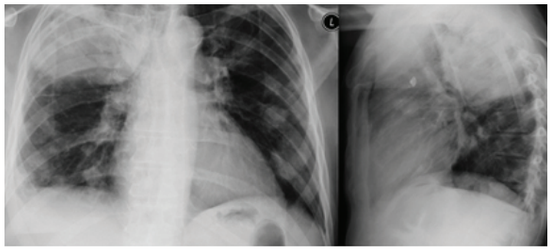


Figure 2. Posteroanterior and lateral chest radiographs.

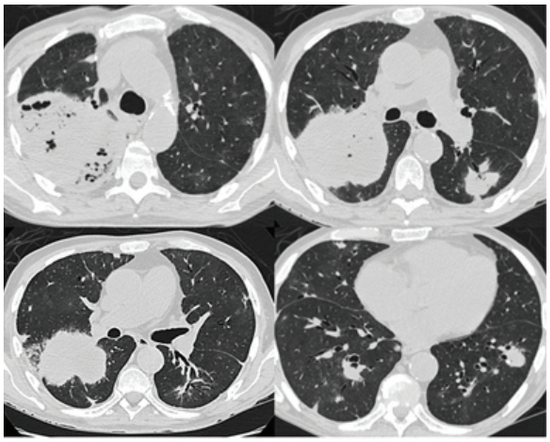


Figure 3. Axial CT lung window scans of the chest.

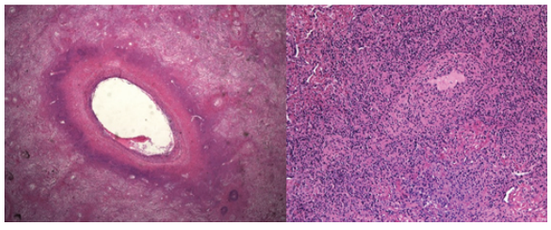


Figure 4. Surgical lung biopsy specimen. Hematoxylin and eosin stain (×20 and ×50 magnification).

A. Granulomatosis with polyangiitis (GPA)
B. Pulmonary lymphomatoid granulomatosis (PLG)
C. Sarcoidosis
D. Cryptogenic organizing pneumonia (COP)