

79 i. The chest radiograph shows bilateral pleural thickening which blunts the costophrenic angles and extends up the lateral chest wall internal to the ribs (79a). The pleural thickening is calcified on the right, with a rather well-circumscribed, straight border medially. Parenchymal bands can be seen contacting both pleural surfaces. The HRCT shows predominantly right-sided, smooth, diffuse pleural thickening which was more extensive posterobasally where bilateral pleural thickening was also seen (lower images not shown) (79b, c). There is volume loss of the right hemithorax and increased extrapleural fat. There are parenchymal bands contacting the pleural surface, so-called 'crow's feet'. There is also thickening of both oblique fissures. There is some parenchymal distortion related to the pleural disease, but no parenchymal interstitial fibrosis.

ii. The appearances are typical of diffuse pleural thickening secondary to asbestos exposure. The differential diagnosis of symmetrical, bilateral, uniform pleural thickening is limited but includes drug-related disease (particularly amiodarone) and the rare condition of cryptogenic fibrosing pleuritis.

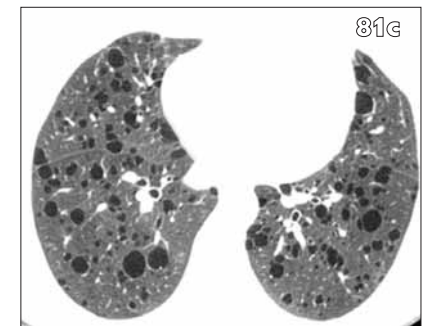
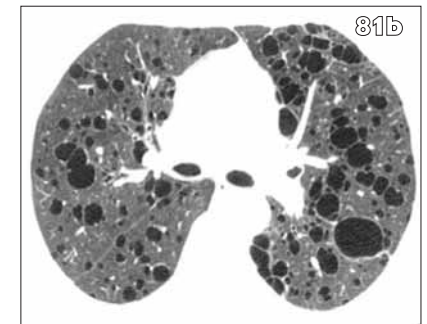
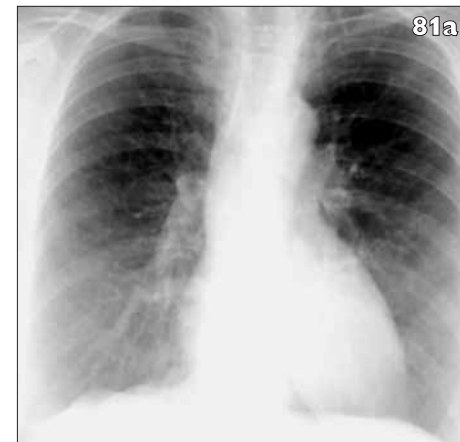
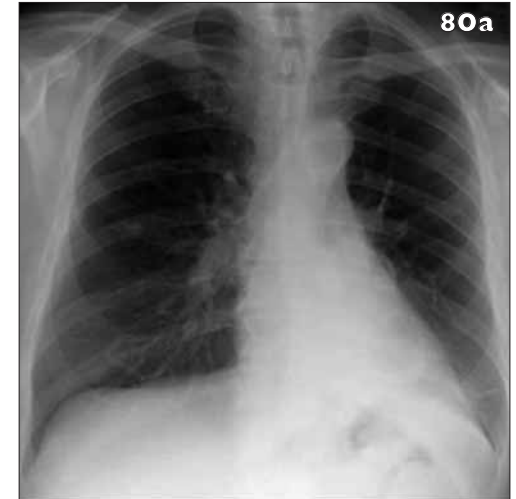
Diffuse pleural thickening results from thickening and fibrosis of the visceral pleura, with fusion to the parietal pleura, often over a wide area. Many studies have confirmed that diffuse pleural thickening is preceded by a benign asbestos pleural effusion. The exposure–response relationship for diffuse pleural thickening is considered to be similar to that of pleural plaques in that it is related to time since first exposure. The latent period is approximately 15 years and the progression of diffuse pleural thickening is slow.

Diffuse pleural thickening has been radiographically defined as a smooth non-interrupted pleural density extending over at least one-quarter of the chest wall, with or without costophrenic angle obliteration. The equivalent CT definition is a continuous sheet of pleural thickening >5 cm wide, >8 cm in craniocaudal extent, and >3 mm in thickness. Diffuse pleural thickening which is <3 mm thick or less extensive may still be functionally significant, however, and a less rigorous definition is probably more appropriate.

Differentiation from pleural plaques can sometimes be difficult. However, plaques generally spare the costophrenic angles and apices. Diffuse pleural thickening is ill-defined and irregular from all angles whereas plaques are often well defined, and plaques rarely extend over more than four rib interspaces unless multiple and confluent. As with discrete pleural plaques, CT is more sensitive and specific for the detection of diffuse pleural thickening than chest radiography, in particular for differentiating extrapleural fat from pleural thickening. On CT, diffuse thickening appears continuous, commonly involving the posterior and lateral surfaces of the lower thorax. Frequently there is an apparent increase in extrapleural fat, partly caused by pleural retraction.

80 A 66-year-old male presented with a persistent cough and weight loss. He also reported right-sided chest pain. He had been a heavy smoker in the past but had given up 2 years previously. On examination, he was not clubbed, but had reduced air entry at the left base. He was tender over the right lower ribs in the mid axillary line. Routine blood tests were normal.

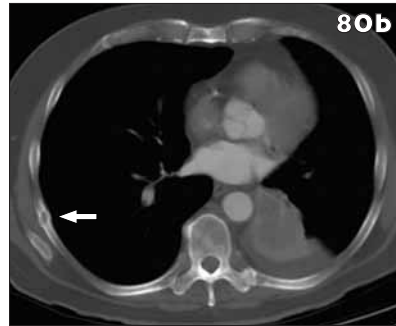
- What does his chest radiograph show (80a)?
- What should be done next?



81 A 55-year-old female had presented with increasing shortness of breath. On examination, she looked well. Lung function showed a FEV₁ of 2.61 l (70% of predicted) and a TL_{CO} 49% of predicted.

- What do the chest radiograph (81a) and HRCT (81b, c) show?
- What is the likely diagnosis?

80 i. The radiograph shows a left lower lobe collapse with increased retrocardiac density, obscuration of the left hemidiaphragm, volume loss in the left hemithorax (note the left-sided rib crowding), and depression of the left hilum (80a). There is also a subtle soft-tissue swelling related to the lateral aspect of the right 8th rib.



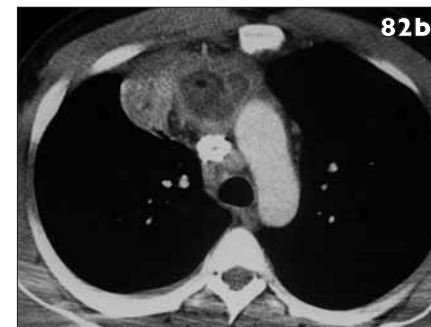
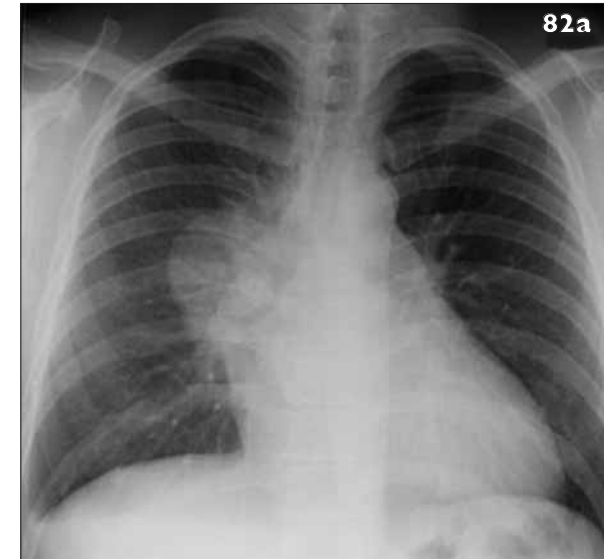
ii. The next investigations of choice would be CT and/or bronchoscopy to exclude an endobronchial lesion resulting in lobar collapse. A bronchoscopy was performed and a lesion demonstrated, which was obstructing the left lower lobe bronchus and was biopsied. Histopathology of the biopsy showed a squamous cell carcinoma.

A CT of the same case is shown imaged on bone windows (80b). The collapsed lower lobe is demonstrated as a roughly triangular-shaped density which lies posteriorly against the thoracic spine. No air bronchograms are seen within the collapsed lobe, which is suggestive of an obstructing endobronchial lesion. The collapsed lobe is also noted to have a convex outer border which is the CT equivalent of a 'Golden's S sign' on radiography and suggests an underlying mass. There is also a small pleural effusion. The arrow shows a subtle, lucent, expansile lesion involving one of the ribs on the right which corresponds with the abnormality on the chest radiograph. These appearances are suggestive of a bony metastasis.

81 i. The chest radiograph shows hyperinflation of both lungs (81a). The HRCT demonstrates numerous thin-walled cystic airspaces uniformly distributed throughout the lungs, ranging in size from a few millimetres to 3 cm (81b, c). No other abnormality is seen in the lung parenchyma or airways.

ii. The appearances are those of lymphangioleiomyomatosis (LAM). LAM is a condition which presents in women of child-bearing age, characterized by proliferation of smooth muscle in pulmonary lymphatic vessels, blood vessels, and airways as well as the mediastinum and retroperitoneum. Patients may present with recurrent pneumothoraces, haemoptysis, and chylous pleural effusions. In this case, the history, lung function, and radiological signs are typical. Extra-pulmonary manifestations of LAM are mediastinal and abdominal angiomyolipomas.

The chest radiograph may be normal, but a nodular, reticular, or reticulonodular pattern may also be demonstrated. The lung volumes tend to increase over time, and visible cysts, bullae, or honeycomb change may develop. The HRCT appearances are of multiple thin-walled cysts which have a uniform distribution in otherwise normal lung. The cysts are often rounded with a thin wall, but may coalesce to form more bizarre shapes. The cysts are distributed throughout the lungs including the costophrenic regions, unlike the cysts in Langerhan's cell histiocytosis, which typically spare these areas, allowing radiological differentiation between the two entities.



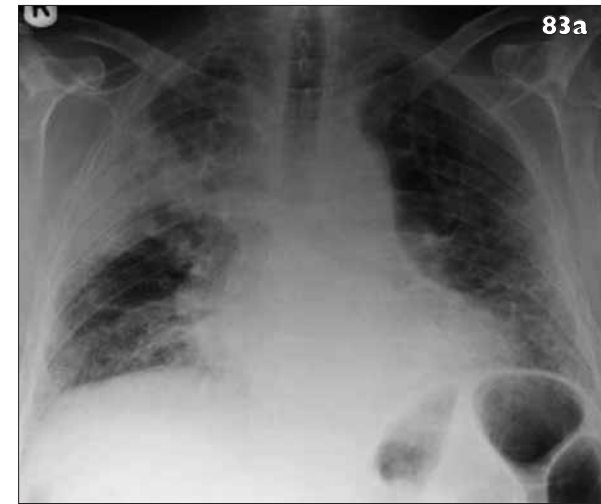
82 A 31-year-old male presented with a cough and pleuritic chest pain. He was normally fit and well and worked as an accountant. Blood tests and spirometry were normal. His chest radiograph (82a) and intravenous contrast-enhanced CT scan images (82b, c) are shown.

What is the diagnosis?



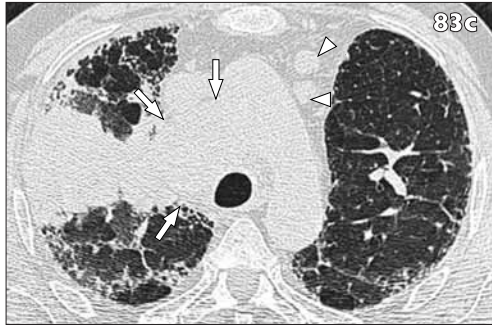
82 The chest radiograph shows abnormality of the mediastinal contour on the right with no obscuration of the right heart border or right hilum, consistent with an anterior mediastinal mass (82a). There is also a small right-sided pleural effusion. The contrast-enhanced CT images show the anterior mediastinal mass to be comprised of areas of differing attenuation with an area of fat (82d, arrow), fluid, soft tissue density, and calcification. There is some atelectasis of the adjacent anterior segment of the right upper lobe (82d, arrowhead). A small, right pleural effusion is confirmed on the CT. A small pretracheal lymph node is also seen at the upper limit of normal for size. The diagnosis is a benign cystic teratoma, which was confirmed by surgical resection and histopathological evaluation. The cause of the pleural effusion was presumed to be rupture into the adjacent pleural space.

Teratomas and germ cell tumours commonly arise in the mediastinum. They can be divided into benign cystic teratoma (also known as dermoid cyst) and malignant germ cell tumours such as seminomas and teratocarcinomas. Benign cystic teratomas consist primarily of ectodermal elements such as skin, hair, smooth muscle, sebaceous material, and calcification. Chest radiographic appearances are typically of a smooth well-defined or lobulated mass arising from the anterior mediastinum, often projecting to one side of the midline. Occasionally, calcification or even teeth can be visible radiographically. CT is superior to chest radiography for demonstrating areas of differing density, particularly a fatty component; demonstration of unequivocal fat or a fat–fluid level is virtually pathognomonic. Cystic components with calcified walls (as in the current case) are also common features. Rupture may occur into the adjacent lung, pleural space, or pericardium.



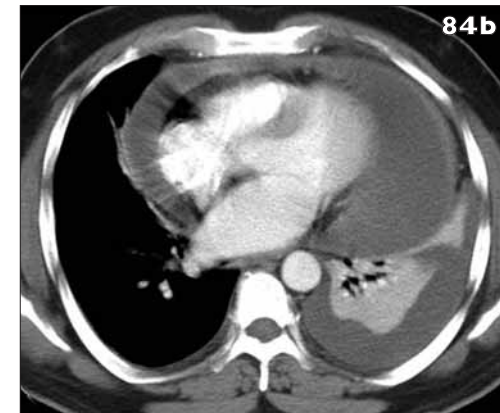
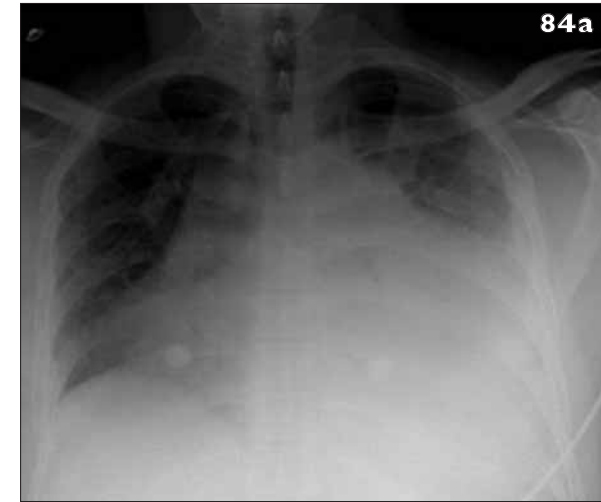
83 A 64-year-old man with known idiopathic pulmonary fibrosis (IPF) presented with weight loss and deterioration in his exercise tolerance. He had been a smoker in the past. On examination, he was afebrile but clubbed with crackles on auscultation at both bases. His inflammatory markers were slightly raised. His pulmonary function tests showed a restrictive defect with reduction in lung volumes and transfer factor (DL_{CO}), but no recent deterioration by comparison with the last year. His chest radiograph and HRCT are shown (83a, b).

What is the likely diagnosis?



83 The chest radiograph shows features of a fibrosing lung disease with a bilateral reticular pattern and reduction in lung volume (83a). In addition, there is increased density in the right upper zone. The CT shows a bilateral reticular pattern which is most apparent in the subpleural regions, and confluent opacity in the right upper zone without air bronchograms. Despite the fact that the images are windowed for the lung, there is abnormal soft tissue visible in the right paratracheal region (83c, arrows) and a few prevascular anterior mediastinal lymph nodes to the right of the aortic arch (83c, arrowheads). While enlarged mediastinal lymph nodes (due to reactive hyperplasia) are not uncommon in IPF, the markedly enlarged right paratracheal lymphadenopathy seems disproportionate. A bronchoscopy was performed and mucosal brushings showed a squamous cell carcinoma.

Bronchogenic carcinoma is ten to twenty times more common in patients with IPF than in the general population. Most patients with IPF have been smokers but there does seem to be a synergistic relationship between the fibrosis itself and the development of malignancy. Some series suggest that the commonest cell type is squamous cell carcinoma, followed by bronchioloalveolar cell carcinoma and adenocarcinoma. Multiple metachronous carcinomas are reported in 15% of cases. Most cancers develop in the periphery in patients with fibrosis. The radiological differential in this case would also include infection (such as tuberculosis); interestingly, community acquired pneumonias are relatively uncommon in patients with IPF.



84 A 56-year-old male presented with shortness of breath and fever. He had been feeling generally unwell for a few weeks. He had been an insulin-dependent diabetic for many years, with poor attendance at the diabetic clinic. He also had a history of hypertension. He was a current smoker. He had had recent contact with his brother who had just been diagnosed with pulmonary TB and commenced on treatment. On examination he was unwell, tachycardic, and tachypnoeic. His heart sounds were quiet and the left lung base was dull to percussion. His blood glucose was slightly raised. He had an increased white cell count, and raised ESR and CRP.

What do the chest radiograph and CT show (84a, b)?