



INTERSTITIAL  
LUNG DISEASES



ERS

EUROPEAN  
RESPIRATORY  
SOCIETY

# Continuing Professional Development

## Interstitial Lung Diseases

### Module 1. Immunology and defence mechanisms

1. Anatomical barriers
2. Reflex mechanisms (sneezing, cough and dyspnoea)
3. Mucociliary clearance and fluid homeostasis
4. Innate defence molecules
5. Professional phagocytes/antigen-presenting cells
6. Adaptive immunity and cytokine/chemokine production
7. Granuloma formation
8. Basics of fibrogenesis

### Module 2. Control of breathing

1. Control systems
2. Peripheral chemoreceptors
3. Central chemoreceptors
4. Testing the control system
5. Ventilatory responses to CO<sub>2</sub>
6. The hypoxic ventilatory response
7. Interaction between hypoxic and hypercapnic responses
8. Disturbances in the control of breathing
9. Control of breathing in pulmonary diseases
10. Type 1 and type 2 respiratory failure
11. Respiratory stimulants

### Module 3. Control of ventilation

1. Ventilatory response to inhaled carbon dioxide
2. Estimation of the ventilatory response to hypoxia
3. Respiratory muscles

### Module 4. Respiratory mechanics

1. Airway resistance
2. Body plethysmography
3. Interrupter technique
4. Forced oscillation technique
5. Lung compliance
6. Measurement of respiratory mechanics (total lung capacity with He (TLC He), total lung capacity with plethysmography (TLC pleth) and total lung capacity with N<sub>2</sub> (TLC N<sub>2</sub>)) and the usefulness of the alveolar volume (AV)/total lung capacity (TLC) ratio
7. Respiratory muscle strength: maximum inspiratory power, maximum expiratory power and sniff nasal inspiratory power

### Module 5. Gas exchange

1. Transfer factor of the lung for carbon monoxide (TLCO)
2. Definition
3. Technique
4. Calculation of TLCO and measurement of the carbon monoxide transfer coefficient (KCO)
5. Transfer factor of the lung for nitric oxide (TLNO) and TLCO/TLNO measurement

### Module 6. Arterial blood gas (ABG) and acid-base status assessment

1. Step 1: evaluation of the utility of ABG and capillary blood gas
2. Step 2: diagnosis of A-B disorders: Henderson-Hasselbalch equation and the relationship between partial pressure of oxygen (PO<sub>2</sub>), partial pressure of carbon dioxide (PCO<sub>2</sub>) and pH



3. Step 3: more on A-B disorders: importance of the D(A-a) difference, fraction of inspired oxygen ( $\text{FiO}_2$ ) the alveolar gas equation and measuring oxygen shunts

#### **Module 7. Exercise testing**

1. Exercise protocols
2. Maximal incremental test
3. Constant work rate tests
4. Walking tests
5. Indications for and basic interpretation of cardiopulmonary exercise testing
6. Exercise variables and indexes

#### **Module 8. Lung function tests**

1. Interpreting lung volume
2. Grading the severity of airflow obstruction or restriction after adoption of Z scores

#### **Module 9. Symptoms**

1. General symptoms of interstitial lung disease (ILD) and extrapulmonary involvement in some ILDs such as sarcoidosis and connective tissue disease (CTD)-associated ILD (CTD-ILD)
2. Vasculitides, extrapulmonary involvement and ILDs
3. CTD
4. Rare lung diseases such as lymphangioleiomyomatosis (LAM)

#### **Module 10. Signs**

1. Velcro and extrapulmonary signs/symptoms
2. Signs of right heart failure and pulmonary hypertension

#### **Module 11. Syndrome-based approach**

1. Diagnosis and differential diagnosis (*i.e.* Hepato-pulmonary syndrome, telomeropathies, sarcoidosis aspects, Hermansky-Pudlak syndrome, Niemann-Pick disease and Gaucher disease)
2. CTD features
3. Haematological diseases
4. Occupational disease
5. Pulmo-renal syndromes
6. Genetic testing in ILDs

#### **Module 12. Endoscopic technique items**

1. Bronchoalveolar lavage/bronchial biopsy and forceps transbronchial lung biopsy
2. Indication and contraindication for cryobiopsy technique including complications of transbronchial cryobiopsy

#### **Module 13. Endobronchial ultrasound (EBUS) and endoscopic ultrasound (EUS)**

1. Indications and contraindications for EBUS and EUS
2. Theory of sample processing and rapid on-site evaluation

#### **Module 14. Surgical lung biopsy**

1. Indications
2. Contraindications
3. Complications

#### **Module 15. Chest X-ray**

1. Limitations and indications of chest X-rays
2. Basic interpretation of chest radiographs
3. Radiological correlates of chest organs and bony chest structures
4. Describing radiological findings of a chest radiograph
5. Recognition of abnormal results and formulation of a diagnosis

#### **Module 16. Thoracic ultrasound**

1. Early detection
2. Ultrasound appearance

#### **Module 17. Computed tomography (CT) scan**

<ol style="list-style-type: none"> <li>1. Technique of multi-slice thickness CT (high resolution CT “HRCT”) for ILD diagnostics</li> <li>2. Patterns and differential diagnosis</li> <li>3. Computer-based quantification options and limitations</li> </ol>
<p><b>Module 18. Systemic pharmacotherapy</b></p> <ol style="list-style-type: none"> <li>1. Steroids and immunomodulators used to treat ILD</li> <li>2. Antifibrotic drugs for pulmonary fibrosis</li> </ol>
<p><b>Module 19. Respiratory physiotherapy</b></p> <ol style="list-style-type: none"> <li>1. Indications, limitations and role of respiratory physiotherapy in ILD</li> </ol>
<p><b>Module 20. Pulmonary rehabilitation</b></p> <ol style="list-style-type: none"> <li>1. Indications, limitations and role of pulmonary rehabilitation in ILD</li> </ol>
<p><b>Module 21. Palliative care</b></p> <ol style="list-style-type: none"> <li>1. Principles of palliative care</li> <li>2. Early integration of palliative care, multidisciplinary care and communication</li> </ol>
<p><b>Module 22. Oxygen therapy</b></p> <ol style="list-style-type: none"> <li>1. Prescription according to current statements and guidelines</li> <li>2. Criteria for long-term oxygen therapy (LTOT) in patients with ILD</li> <li>3. Ambulatory oxygen</li> </ol>
<p><b>Module 23. Preventative measures</b></p> <ol style="list-style-type: none"> <li>1. General aspects of preventative measures (vaccination, sports, <i>etc.</i>)</li> <li>2. Dietary measures</li> <li>3. Exercise</li> <li>4. Influenza vaccination</li> <li>5. Pneumococcal vaccination</li> <li>6. SarsCoV2 vaccination</li> <li>7. Specific preventative management</li> <li>8. Smoking cessation</li> </ol>
<p><b>Module 24. Assisted ventilation</b></p> <ol style="list-style-type: none"> <li>1. Limitations of assisted ventilation in advanced cases</li> <li>2. High-flow oxygen</li> <li>3. Extracorporeal membrane oxygenation</li> <li>4. High-frequency oscillatory ventilation</li> <li>5. CPAP in OSA/ILD overlap</li> </ol>
<p><b>Module 25. Lung transplantation</b></p> <ol style="list-style-type: none"> <li>1. Indications and contraindications for lung transplantation</li> <li>2. Indications for early referral</li> <li>3. Indications for lung transplantation in patients with systemic diseases</li> <li>4. Challenges around pharmacotherapy in ILD and transplant</li> </ol>
<p><b>Module 26. Differential diagnosis</b></p> <ol style="list-style-type: none"> <li>1. Differential diagnosis of respiratory emergencies</li> <li>2. Acute exacerbation of fibrosing ILDs</li> </ol>
<p><b>Module 28. Immediate management steps of respiratory emergencies</b></p> <ol style="list-style-type: none"> <li>1. Early referral to a specialist ILD centre</li> <li>2. Multidisciplinary diagnosis for ILD</li> </ol>
<p><b>Module 27. Diffuse parenchymal lung disorders manifesting with acute lung injury</b></p>
<p><b>Module 28. Idiopathic pulmonary fibrosis (IPF)</b></p> <ol style="list-style-type: none"> <li>1. Clinical aspects</li> <li>2. Diagnostic aspects</li> <li>3. Treatment of IPF</li> <li>4. Acute exacerbation of IPF in patients already known to be affected by IPF</li> </ol>

5. Identification of patients with IPF and significant emphysema
  - 5.1. CT scan features
  - 5.2. Pulmonary function tests focusing on the discrepancy between volume preservation and significant reduction of carbon monoxide diffusing capacity (DLCO)

#### **Module 29. Lung cancer**

1. General aspects of lung cancer
2. Lung cancer in the context of ILD
3. Immunotherapy and ILD

#### **Module 30. Acute respiratory failure**

1. ILD appearing with acute respiratory failure
2. Differential diagnosis
3. Diagnostic approaches
4. Treatment

#### **Module 31. Sarcoidosis**

1. Clinical aspects
2. Diagnostic modality
3. Treatment of different subtypes, including life-threatening organ involvement (heart, central nervous system, hypercalcemia and others)

#### **Module 32. Idiopathic interstitial pneumonias beyond IPF**

1. Idiopathic interstitial pneumonias including cryptogenic organising pneumonia of unknown aetiology/bronchiolitis obliterans organising pneumonia
2. Smoking-related idiopathic interstitial pneumonia and Combined Pulmonary Fibrosis and Emphysema (CPFE)
3. Pleuro-parenchymal fibroelastosis
4. Non-specific interstitial pneumonia
5. Progressive fibrosing ILD
  - 5.1. Diseases with PF-ILD
  - 5.2. Treatment of PF-ILD

#### **Module 33. Bronchiolitis**

1. Of known causes
2. Of unknown causes
3. High-resolution computed tomography (HRCT) scan features
4. Pulmonary function tests
5. Diagnostic work-out
6. Treatment

#### **Module 34. CTD-ILD**

1. CTD-ILD: a clinical overview
2. Treatments of CTD-ILD

#### **Module 35. Langerhans cell histiocytosis**

1. General clinical overview
2. Pathogenesis
3. Treatment

#### **Module 36. LAM**

1. General clinical overview
2. Pathogenesis
3. Treatment

#### **Module 37. Pulmonary alveolar proteinosis**

1. General clinical overview
2. Pathogenesis
3. Treatment



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**Module 38. Amyloidosis**

1. General clinical aspects
2. Pathogenesis
3. Treatment

**Module 39. Drug-induced disease**

1. General aspects of drug-induced disease
2. Pathogenesis
3. Treatment

**Module 40=. Radiation-induced disease**

1. Radiation-induced disease

**Module 41. Acute and chronic eosinophilic interstitial lung disease**

1. Clinical aspects
2. Pathogenesis
3. Treatment

**Module 42. Pulmonary hypertension**

1. Pathophysiology of pulmonary hypertension
2. Pharmacological treatment of pulmonary hypertension according to the underlying disease
3. Diagnosis of pulmonary hypertension
4. Translating national and international management guidelines to an individual patient
5. Appropriate decisions for referral and transfer to specialised referral centres

**Module 43. Vasculitis and diffuse pulmonary haemorrhage**

1. Definition of the main entities
2. Granulomatosis with polyangiitis (GPA)
3. Eosinophilic granulomatosis with polyangiitis (EGPA)
4. Microscopic polyangiitis

**Module 44. Pleural effusion**

1. Pleural disease in ILD

**Module 45. Primary immunodeficiency syndromes**

1. Aspects of primary immunodeficiency syndromes
2. Differential diagnosis

**Module 46. Secondary immunodeficiency syndromes/immunosuppression**

1. Secondary immunodeficiency syndromes/immunosuppression

**Module 47. Cardiac disease**

1. General aspects of cardiac disease
2. Differentiation between cardiac and pulmonary diseases as a cause of acute respiratory failure
3. Differential diagnosis of the cardiac causes of acute respiratory failure
4. Invasive cardiovascular monitoring (e.g. Swan-Ganz catheterisation)
5. Cardiovascular effect of positive pressure ventilation

**Module 48. Gastrointestinal and liver diseases and renal failure**

1. General aspects of lung damage related to gastrointestinal and liver diseases and renal failure in the context of ILD

**Module 49. Haematological disease**

1. General aspects of haematological disease

**Module 50. Birt-Hogg-Dubé syndrome**

1. General aspects of Birt-Hogg-Dubé syndrome
2. Clinical, radiological and histopathological features
3. Genetic background and biology
4. Detection of tumours during follow-up
5. Treatment modality, including participation in clinical trials, and genetic counselling

**Module 51. Environmental and occupational risk factors, to be considered in:**



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6. Clinical evaluation of patient
7. Differential diagnosis
8. Treatment, intervention, mitigation
9. Disability, vocational considerations, Workers' Compensation considerations
10. Public health approach

**Module 52. Acute inhalation injuries and their possible sequelae**

1. General aspects of acute inhalation injuries and their possible sequelae
2. Identification of smoke inhalation and burns as causes of respiratory failure
3. Assessment of the degree of severity of pulmonary involvement
4. Optimal treatment of inhalation injury, including systemic effects

**Module 53. ILD caused by dusts of biologic origin (including extrinsic allergic alveolitis)**

1. General aspects of ILD caused by dusts of biologic origin

**Module 54. Asbestos-related conditions**

1. General aspects of asbestos-related conditions other than bronchopulmonary cancer (but including mesothelioma)

**Module 55. Epidemiological and statistical methods**

1. General aspects of epidemiological and statistical methods for critical appraisal