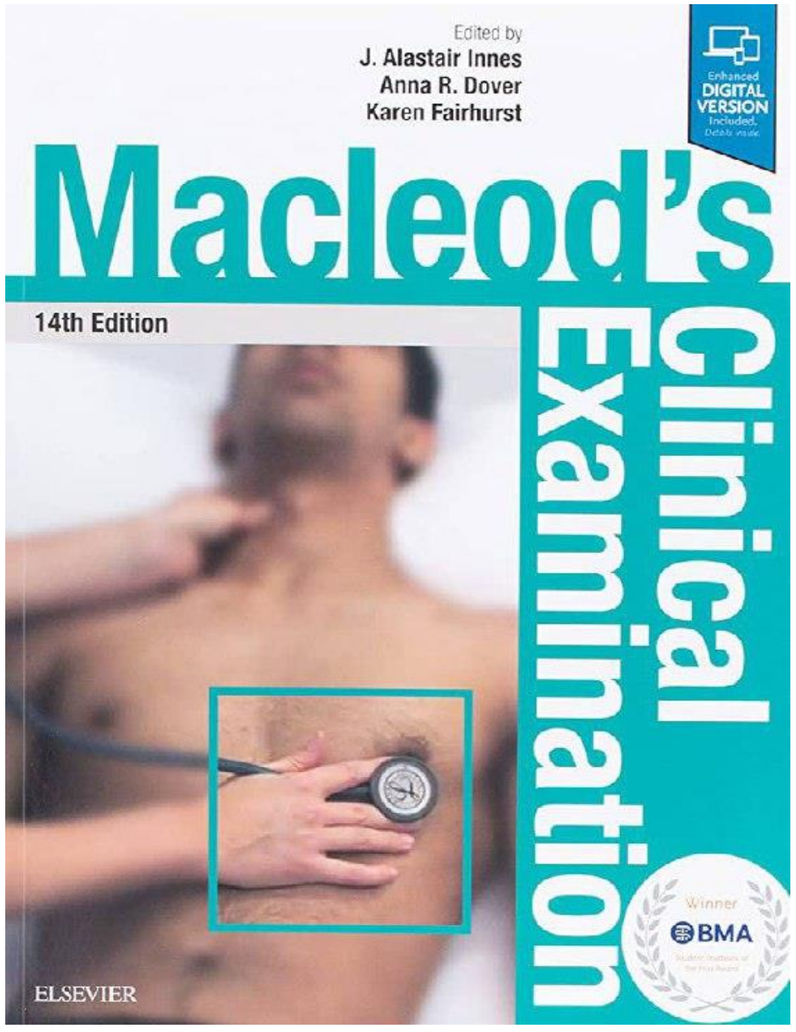

Outlines:

- Anatomy & Physiology.
- Common symptoms history.

Done By: M. ALALI, MD, PH.
Introductory: Section 2, CH.5: RS History taking.
Note: This summary contains all Macleod's important notes.

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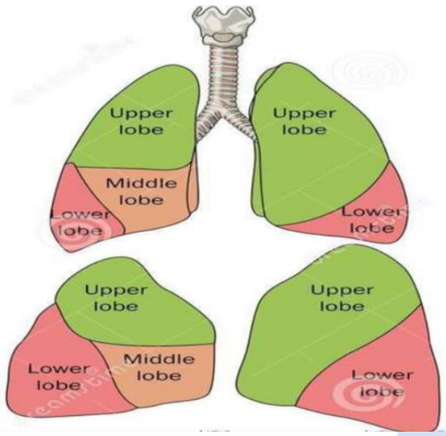
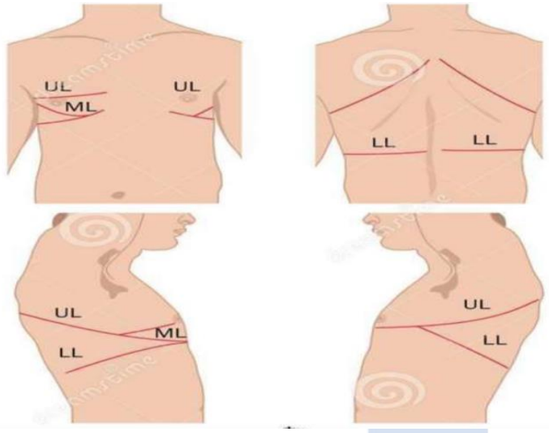
Anatomy & Physiology





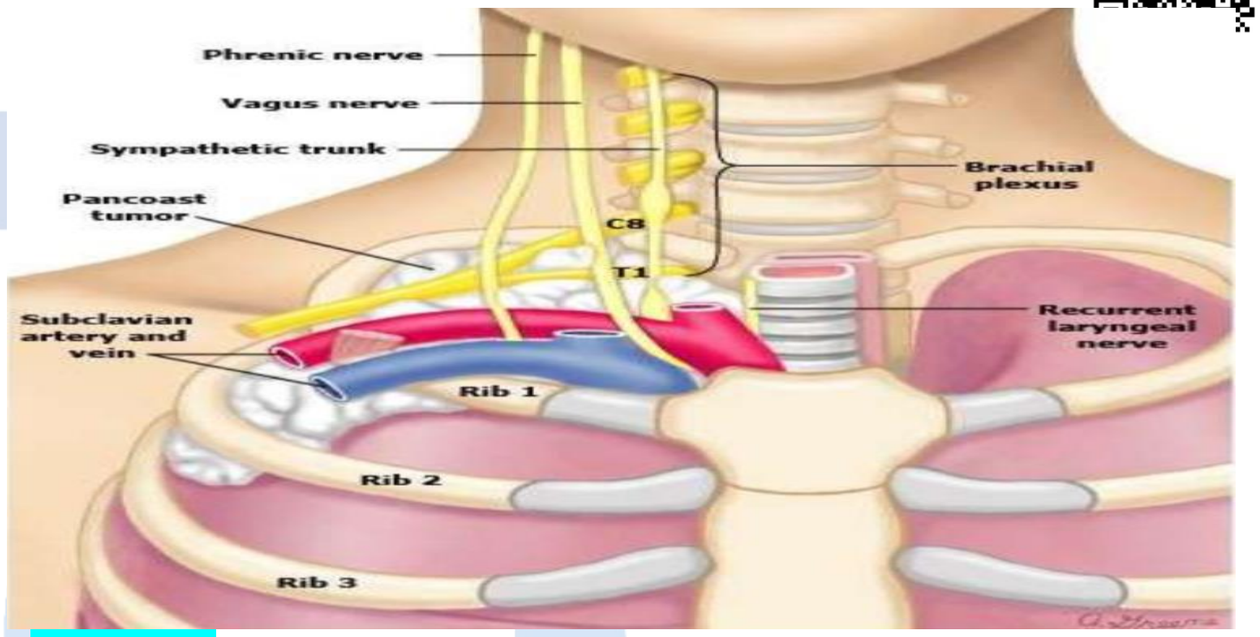
1. At the **end of tidal expiration** the **dome** of the diaphragm **extends high into the thorax to around the level of the anterior end of the fifth rib,** slightly lower on the left.
2. The **lower anterior ribs therefore overlie the liver on the right and the stomach and spleen on the left**, with the parietal pleura extending lower than the lungs on the lateral chest wall.
3. **Posteriorly**, the lungs extend much lower, **approaching the 12th rib on full inspiration**.
4. In healthy, the **lungs optimize gas exchange** by close matching of regional **ventilation and perfusion**.
5. Airway and parenchymal lung diseases **disrupt this matching**, causing **hypoxia and cyanosis**, and commonly **stimulate breathing through lung afferent nerves**, leading to a history of **breathlessness**, and **tachypnea** on examination.

Apical lung tumors:

- **Disrupt T1 root fibers:** causing **pain and numbness in the inner aspect of the upper arm and wasting of the small hand muscles**.
- **Compromise upper thoracic sympathetic outflow to the eye**: leading to a **constricted pupil and ptosis**.

Mid-lower mediastinal tumors:

- Invade and compromise the **pericardium, atria and esophagus**.



The History

Common presenting symptoms:

- Breathlessness
- Wheeze
- Cough
- Sputum/ haemoptysis
- Stridor
- Chest pain
- Fever/rigors/night sweats
- Weight loss
- sleepiness

5.1 Respiratory history taking/documentation framework

History of presenting symptoms

Specific respiratory symptoms

- Breathlessness
- Wheeze
- Cough
- Sputum/haemoptysis
- Chest pain
- Fever/rigors/night sweats
- Weight loss
- Sleepiness

Past medical history

- Respiratory disease
- Other illness/hospital encounters

Drug and allergy history

- Drugs causing or relieving respiratory symptoms
- Allergies to pollens/pets/dust; anaphylaxis

Social and family history

- Family history of respiratory disease
- Home circumstances/effect of and on disease
- Smoking
- Occupational history

Systematic review

- Systemic diseases involving the lung
- Risk factors for lung disease

Breathlessness

- Feeling of **uncomfortable need to breath**.
- **Most common reported** respiratory symptom.

Respiratory diseases can cause breathlessness by different mechanisms:

- **Stimulation of intrapulmonary afferent nerves** by interstitial inflammation or thromboembolism.
- **Mechanical loading of respiratory muscles** by airflow obstruction or reduced lung compliance in fibrosis.
- **Hypoxia due to V/Q mismatch**, **stimulating chemoreceptors**.

Causes of breathlessness

- **Respiratory causes: Any pathology.**
- **Cardiac causes: LVF, Mitral diseases, Cardiomyopathies, Pleural effusion.**
- **Non-cardiorespiratory: Anemia, psychogenic, obesity, metabolic acidosis.**

7.9 Acute breathlessness: commonly associated symptoms

No chest pain	
• Pulmonary embolism • Pneumothorax • Metabolic acidosis	• Hypovolaemia/shock • Acute left ventricular failure/pulmonary oedema
Pleuritic chest pain	
• Pneumonia • Pneumothorax	• Pulmonary embolism • Rib fracture
Central chest pain	
• Myocardial infarction with left ventricular failure	• Massive pulmonary embolism/infarction
Wheeze and cough	
• Asthma	• COPD

Medical research council (MRC) breathlessness scale

Grade	Degree of breathlessness related to activities
1	Not troubled by breathlessness except on strenuous exercise
2	Shortness of breath when hurrying on the level or walking up a slight hill
3	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
4	Stops for breath after walking about 100 yds or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when undressing

Specific questions to distinguish the causes of breathlessness

How did the breathlessness come on? (Table 7.1)

How is your breathing at rest and overnight? Asthma, COPD, HF.

Is your breathing normal some days? Asthma

Tell me something you do that would make you breathless? MRC
How far can you walk on a good day? MRC

When does the breathlessness come on? Asthma (Sympathetic).

7.6 Breathlessness: modes of onset, duration and progression	
Minutes	
• Pulmonary thromboembolism • Pneumothorax	• Asthma • Inhaled foreign body • Acute left ventricular failure
Hours to days	
• Pneumonia • Asthma	• Exacerbation of COPD
Weeks to months	
• Anaemia • Pleural effusion	• Respiratory neuromuscular disorders
Months to years	
• COPD • Pulmonary fibrosis	• Pulmonary tuberculosis

Wheeze

❖ **High-pitched musical sounds** produced by **turbulent air flow** through **narrowed small airways**.

❖ It is most **commonly heard during expiration**, when airway caliber is reduced.

❖ Wheeze must be distinguished from the **rattling inspiratory and expiratory sounds** caused by loose, mobile secretions in the **upper airways**, and from the louder, dramatic **croak of stridor caused by obstruction in the trachea or large airways**.

❖ It is **commonly associated with asthma, exacerbation of COPD, but also with acute respiratory tract infection or with exacerbations of bronchiectasis**.

Specific questions to distinguish the causes of wheezes:

- Is the wheeze worse during or after exercise?(COPD VS. ASTHMA)
- Do you wake with wheeze during the night? (ASTHMA)
- Is it worse on waking in the morning and relieved by clearing sputum? COPD
- History of smoking? COPD
- History of allergies (Atopy)? ASTHMA
- Are there daily volumes of yellow or green sputum, sometimes with blood? BRONCHIAECTASIS

Cough

❖ The cough **reflex has evolved to dislodge foreign material** and **secretions from the central airways**, and may be triggered by **pathology at any level of the bronchial tree**.

❖ Inspiration that is followed by an **expiratory effort against a closed glottis. Then sudden opening of the glottis** with rapid expiratory flow produces the characteristic sound.

❖ **Bovine cough** (**Hoarse forced expiration**) is an important symptom warning of **possible hilar malignancy, due to damage to the left recurrent laryngeal nerve may paralyze the left vocal cord, making it impossible for the patient to close the glottis and generate a normal explosive cough.**

Specific questions to distinguish the causes of cough:

- Duration of the cough?
- Whether it is present every day?
- Is it associated with sputum production?
- Is there any triggers? (swallowing, in cold air, exercise)

If it is intrusive/irresistible or whether the patient coughs to clear a perceived obstruction.

Associated symptoms (wheeze, heartburn, altered voice or swallowing).

History of smoking?)Chronic bronchitis or lung cancer).

Drug history?

	Normal chest X-ray	Abnormal chest X-ray
Acute cough (<3 weeks)	Viral respiratory tract infection Bacterial infection (acute bronchitis) Inhaled foreign body Inhalation of irritant dusts/fumes	Pneumonia Inhaled foreign body Acute hypersensitivity pneumonitis
Chronic cough (>8 weeks)	Gastro-oesophageal reflux disease Asthma Postviral bronchial hyperreactivity Rhinitis/sinusitis Cigarette smoking Drugs, especially angiotensin-converting enzyme inhibitors Irritant dusts/fumes	Lung tumour Tuberculosis Interstitial lung disease Bronchiectasis

Most common cause

Especially in smokers

5.3 Causes of chronic cough and accompanying clues in the history	
Pathophysiology	**Suggestive features in history/examination**
Airways inflammation: **- Asthma – 'cough-variant asthma**	**- ' Affects children and some adults Often present at night Associated wheeze, atopy.**
- Chronic obstructive pulmonary disease	**- History of smoking and intermittent sputum.**
- Persisting airway reactivity	**- following acute bronchitis Recent acute-onset cough and sputum.**
- Bronchiectasis	**- Daily purulent sputum for long periods Pneumonia or whooping cough in childhood Recurrent haemoptysis.**
Lung cancer	**- Persistent cough, especially in smokers Any haemoptysis - Pneumonia that fails to clear in 4–6 weeks**
Rhinitis with postnasal drip	**- Chronic sneezing, nasal blockage/ discharge**
Oesophageal reflux	**- Heartburn or regurgitation of acid after eating, bending or lying - Nocturnal as well as daytime cough**
Drug effects	**- Patient on angiotensin-converting enzyme inhibitors**
Interstitial lung diseases	**- Persistent dry cough Fine inspiratory crackles at bases**
Idiopathic cough	**- Long history with no signs and negative investigations - diagnosis of exclusion**

Sputum

❖ In health, the airway lining fluid coating the transbronchial tree ascends the **mucociliary escalator to the larynx**, where it mixes with URT secretions and saliva and then swallowed.

❖ In **acute or chronic infection**, accumulation of **neutrophils, mucus and proteinaceous secretions in the airways** result in cough with sputum production.

❖ Ask about the **characteristics of sputum to clarify the pathology**.

❖ A **change in color or consistency, or an increase in volume may indicate a new infection in chronic disease**.

Specific questions to distinguish the causes of sputum production:

What is the consistency of sputum?

Amount of sputum? (Bronchiectasis)

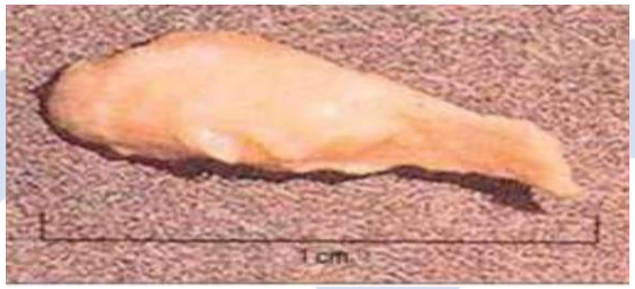
What is the color of sputum?

Consistency

• An **increase** in **stickiness (viscosity)** may <u>indicate exacerbation in bronchiectasis</u>.

• **Large volumes of frothy secretions over weeks/months** are a feature of the uncommon bronchoalveolar cell carcinoma.

• Occasionally, **sputum is produced as firm 'plugs'** by patients with asthma (Fig. 5.3C), sometimes indicating underlying allergic bronchopulmonary aspergillosis.



Volume

• Establish the **volume produced over 24 hours**: small amounts into a tissue or enough to **fill a spoon(s), eggcup(s) or cup(s).**

• **Compare** the **current volume** with the **patient's baseline or minimal volume.**

Color

• **Clear (mucoid):** COPD/bronchiectasis without current infection/rhinitis.

• **Yellow (mucopurulent):** acute lower respiratory tract infection/asthma.

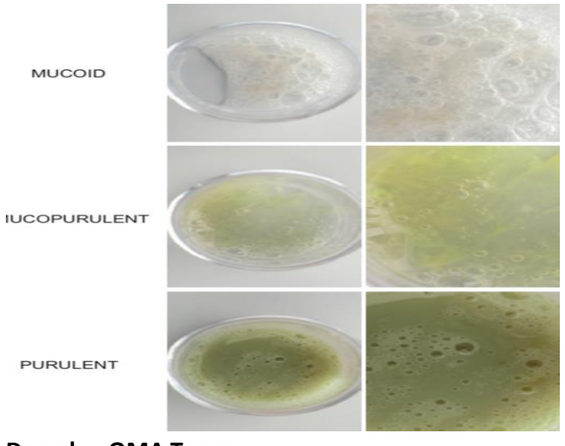
• **Green (purulent):** current infection – acute disease or exacerbation of chronic disease, such as COPD.

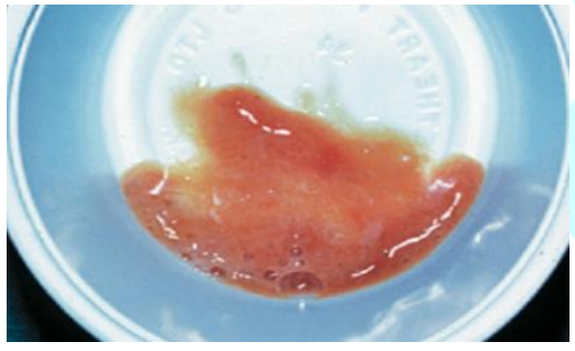
• **Red/brown (rusty):** pneumococcal pneumonia (Fig. 5.3B).

- Try to distinguish between rusty and frank red blood.

• **Pink (serous/frothy):** acute pulmonary edema.

In bronchiectasis, the color of sputum may be used to guide the need for antibiotic treatment.





Hemoptysis

❖Was the blood **definitely** coughed up from the chest?

❖**Amount** of blood?

❖is it **pure blood** or **mixed** with sputum?

❖**Duration** and **frequency**?

1. It can complicate any severe forceful cough but is most commonly associated with acute or chronic respiratory tract infections.
2. Hemoptysis may also indicate pulmonary embolism and lung cancer.
3. Never assume hemoptysis has a benign cause until serious pathology has been considered and excluded.

7.4 Causes of haemoptysis

Tumour	
Malignant • Lung cancer • Endobronchial metastases	**Benign** • Bronchial carcinoid
Infection	
• Bronchiectasis • Tuberculosis • Lung abscess	• Mycetoma • Cystic fibrosis
Vascular	
• Pulmonary infarction • Vasculitis • Polyangiitis • Trauma • Inhaled foreign body • Chest trauma • Cardiac • Mitral valve disease • Haematological • Blood dyscrasias	• Arteriovenous malformation • Goodpasture's syndrome • Iatrogenic • Bronchoscopic biopsy • Transthoracic lung biopsy • Bronchoscopic diathermy • Acute left ventricular failure • Anticoagulation

• A short history of streaks of blood with purulent sputum suggests **acute bronchitis.**

• A sudden episode of a small volume of blood with pleuritic pain and breathlessness suggests **pulmonary embolism**.

• Recurrent streaks of blood in clear sputum should prompt a search for **lung cancer**.

• Recurrent blood streaks in purulent sputum over weeks suggest possible **tuberculosis or cancer with infection**; over years, they suggest **bronchiectasis**.

Massive Hemoptysis:

More than 20ml/one time, or more than 200ml/24hrs.

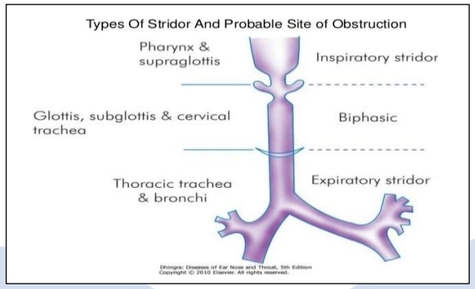
Larger volumes of hemoptysis suggest:

• **Lung cancer** eroding a pulmonary vessel.

• **Bronchiectasis** (such as in cystic fibrosis).

• **Cavitatory disease** (such as bleeding into an aspergilloma/TB).

- **Pulmonary vasculitis**.
- **Pulmonary arteriovenous malformation**.



Stridor

Harsh high-pitched respiratory sound **caused by vibration of the walls of the trachea or major bronchi** when the lumen is critically **narrowed** by compression, tumor, or inhaled foreign body.

Timing with respiration:

1. **Inspiration** lowers the pressure inside the **extra thoracic trachea**, so critical narrowing here leads to **inspiratory stridor**.
2. In contrast, the **intrathoracic large airways** are compressed during **expiration** by positive pressure in the surrounding lung, leading to fixed **expiratory wheeze or stridor**.
3. Large airway narrowing at the **thoracic inlet** (for example, tracheal compression by a large goiter) may cause **both inspiratory and expiratory stridor.**

Rapid investigation and treatment are vital when this sign is present.

Chest pain

➢ Chest pain can originate from the **musculoskeletal, respiratory, cardiovascular and gastro- esophageal disease**.

A. Ischemic chest pain: **Massive pulmonary thromboembolism** acutely increasing right ventricular pressure alongside with **hypoxia and hypotension that may produce central chest pain similar to myocardial ischemia.**

N.B: Besides myocardial ischemia, chest pain can **arise** from the **chest wall, parietal pleura, mediastinal structures, tracheobronchial tree, pericardium, esophagus and subdiaphragmatic organs** (liver and gallbladder). Pain does not originate in the lung parenchyma or visceral pleura, as they have only an autonomic nerve supply.

B. Pleural pain:

- **Sharp, stabbing and intensified by inspiration or coughing**.
- Site and radiation vary.
- Common causes of pleuritic chest pain are **pulmonary embolism, pneumonia, pneumothorax and fractured ribs**.
- Disease causes parietal pleural pain in several ways:

• **Pneumonia and pulmonary infarcts**: either direct pleural inflammation or adhesions with pleural traction on respiratory movement.

• **Pneumothorax:** mechanical distortion of pleura with lung collapse.

• **Lung cancer:** pleural distortion by infiltration, although constant pain is more typical.

C. Musculoskeletal chest pain: is common and may occur with chest **trauma, forceful coughing or connective tissue disease**.

The chest is characteristically **tender to local palpation**, and the pain can be **reproduced by respiratory movements and/ or movement of the spine or shoulder muscles**.

1. Sudden and localized after coughing or direct trauma is characteristic of **rib fractures or intercostal muscle injury**.
2. **Herpes zoster infection (shingles)** may start with superficial itch or burning pain in a thoracic dermatome, followed by the appearance of a vesicular rash. Pain and altered sensation may persist long after the rash has resolved, often with scarring in the dermatomal distribution.
3. Chest wall pain due to **direct invasion by lung cancer, mesothelioma or rib metastasis** is typically dull, unrelated to respiration, progressively worsens and disrupts sleep.
4. **Bornholm disease** is an infection with an enterovirus (**Coxsackie B**), which causes acute but self-limiting inflammation of intercostal muscles. Episodes of unilateral severe, stabbing myalgia develop over an intercostal space and settle after a few days.

5. Costochondritis (called **Tietze's syndrome** when **costochondral swelling is present**) is idiopathic inflammation of the costochondral cartilages adjoining the sternum and can cause acute localized pain and tenderness. The pain settles with simple analgesia and the passage of time in both of these conditions.

D. Esophageal pain:

Burning retrosternal pain may indicate esophagitis but **also occurs with myocardial ischemia**. Alteration of **discomfort after eating or antacids helps to distinguish esophageal pain.**

E. Malignancy pain:

1. Central, constant, progressive, non-pleuritic chest pain may represent **mediastinal disease, particularly malignancy**.

2. Similarly, **chest wall pain** (without trauma) that is **constant**, **progressive** and **non- pleuritic suggests chest wall invasion by malignancy**. **Pain-induced sleep disturbance** is a feature of such **malignant pains**.

Non-central	
Pleural • Infection: pneumonia, bronchiectasis, tuberculosis • Malignancy: lung cancer, mesothelioma, metastatic • Pneumothorax • Pulmonary infarction • Connective tissue disease: rheumatoid arthritis, SLE	**Chest wall** • Malignancy: lung cancer, mesothelioma, bony metastases • Persistent cough/ breathlessness • Muscle sprains/tears • Bornholm's disease (Coxsackie B infection) • Tietze's syndrome (costochondritis) • Rib fracture • Intercostal nerve compression • Thoracic shingles (herpes zoster)
Central	
Tracheal • Infection • Irritant dusts **Cardiac** • Massive pulmonary thromboembolism • Acute myocardial infarction/ ischaemia **Oesophageal** • Oesophagitis • Rupture	**Great vessels** • Aortic dissection **Mediastinal** • Lung cancer • Thymoma • Lymphadenopathy • Metastases • Mediastinitis

Fevers/rigors/chills/night sweats

❖ **Infection** is the usual cause but other etiologies should be considered such as **lung cancer, lymphoma and vasculitis**.

❖ Patients use a range of terms to describe fever (such as **shivers, chills, being 'hot and bothered', shakes**), so ask for a detailed account of their symptoms using common terms.

❖ **Rigors: generalized, uncontrollable episodes of body shaking lasting a few minutes.**

Rigors usually **indicate bacterial sepsis; lobar pneumonia and acute pyelonephritis** are the most common causes. They can be **misinterpreted as seizures** but the retention of consciousness and associated pyrexia suggest rigors.

❖ **Night sweats** are closely associated with **chronic infection (Ex: TB) and malignancy** rather than acute infection.

Weight loss

Weight loss is a common feature of several important respiratory diseases:

- **Lung cancers.**
- **Chronic infective diseases (such as tuberculosis and bronchiectasis).**
- **Diseases causing chronic breathlessness (such as COPD and interstitial lung diseases)**.

The **pathophysiology is complex**; however, breathlessness is associated with **diminished appetite**, and the **systemic inflammatory response is also thought to contribute to weight loss**.

Small amounts of weight loss also occur in acute infection with **consequent loss of appetite, particularly during hospitalization.**

Ask the patient to estimate the **extent and duration of weight loss, and enquire about appetite and dietary intake**.

Being underweight is a poor prognostic indicator in any chronic respiratory disease.

Sleepiness

Ask about:

• Normal **sleeping habit**: does the patient keep hours that allow reasonable rest?

• **Shift or night work**: this can disrupt and prevent healthy sleep patterns.

• **Does the person wake refreshed or exhausted?** Sleep apnea patients are exhausted in the morning.

• **Have they struggled to stay awake in the day: for example, at work or when driving?** It is vital to advise cessation of driving pending investigation if OSA is suspected.

Ideally, **seek a description of any night-time breathing disturbance from a bed partner.**

In **OSA**, the partner may **observe periodic cessation of breathing**, accompanied by **increasing respiratory efforts, followed by a sudden and loud resumption of breathing**, often with **postural repositioning**, then repetition of this cycle.

Past medical history

Previous illness related to respiratory
Eczema, hay fever
Childhood asthma
Pneumonia, pleurisy
Whooping cough, measles, inhaled foreign body
Tuberculosis
Connective tissue disorders
Cancer, recent travel, surgery or immobility
Recent surgery, loss of consciousness
Previous malignancy
Neuromuscular disorders

Family history and social history

❖ Family history of respiratory disease: **Cystic fibrosis**?

❖ Social history: - **Home circumstances** /effect of and on disease.

- **Smoking**. - **Occupational history**.

Occupational History: Heavy industry factory

Asbestos	Silica dust	Coal dust
Asbestosis, mesothelioma, lung cancer	Silicosis, massive fibrosis	Pneumoconiosis, massive fibrosis

Animal contact

Paint sprayer	Isocynates	Asthma
Baker	Flour	Asthma
Joiner	Wood dust	Asthma
Distiller	Aspergillus in malt	Hypersensitivity pneumonitis
Pigeon fancier/ pet bird owner	Antigens in dust from, feathers/ excerta	Hypersensitivity pneumonitis
Veterinarian/ cat, dog or rodent owner	Antigens in skin, flakes or urine	Asthma
Laboratory worker	Antigen in skin, flakes or urine	Asthma

Systematic enquiry

• **Ask specifically about any risk factors, such as** malignancy for thromboembolism.

• **The remaining history may reveal previously unsuspected pathologies presenting with respiratory symptoms or complicating respiratory illness, such as ovarian malignancy presenting with pleural effusion.**