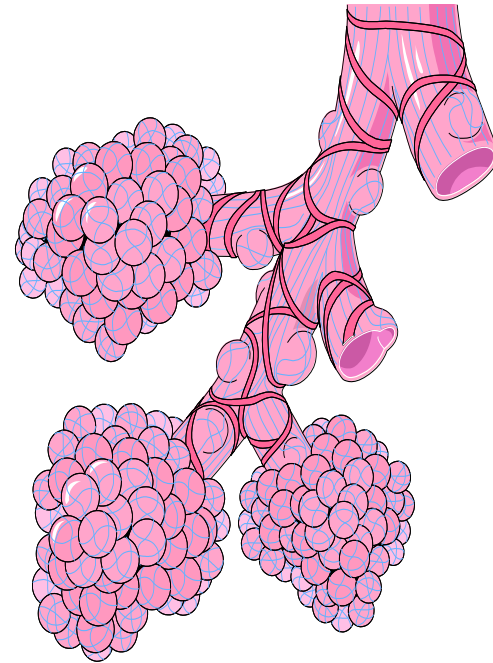
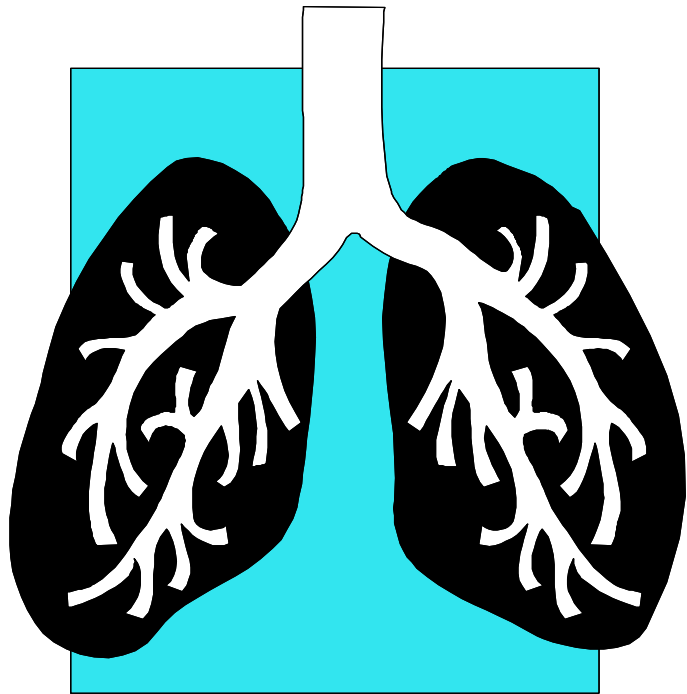
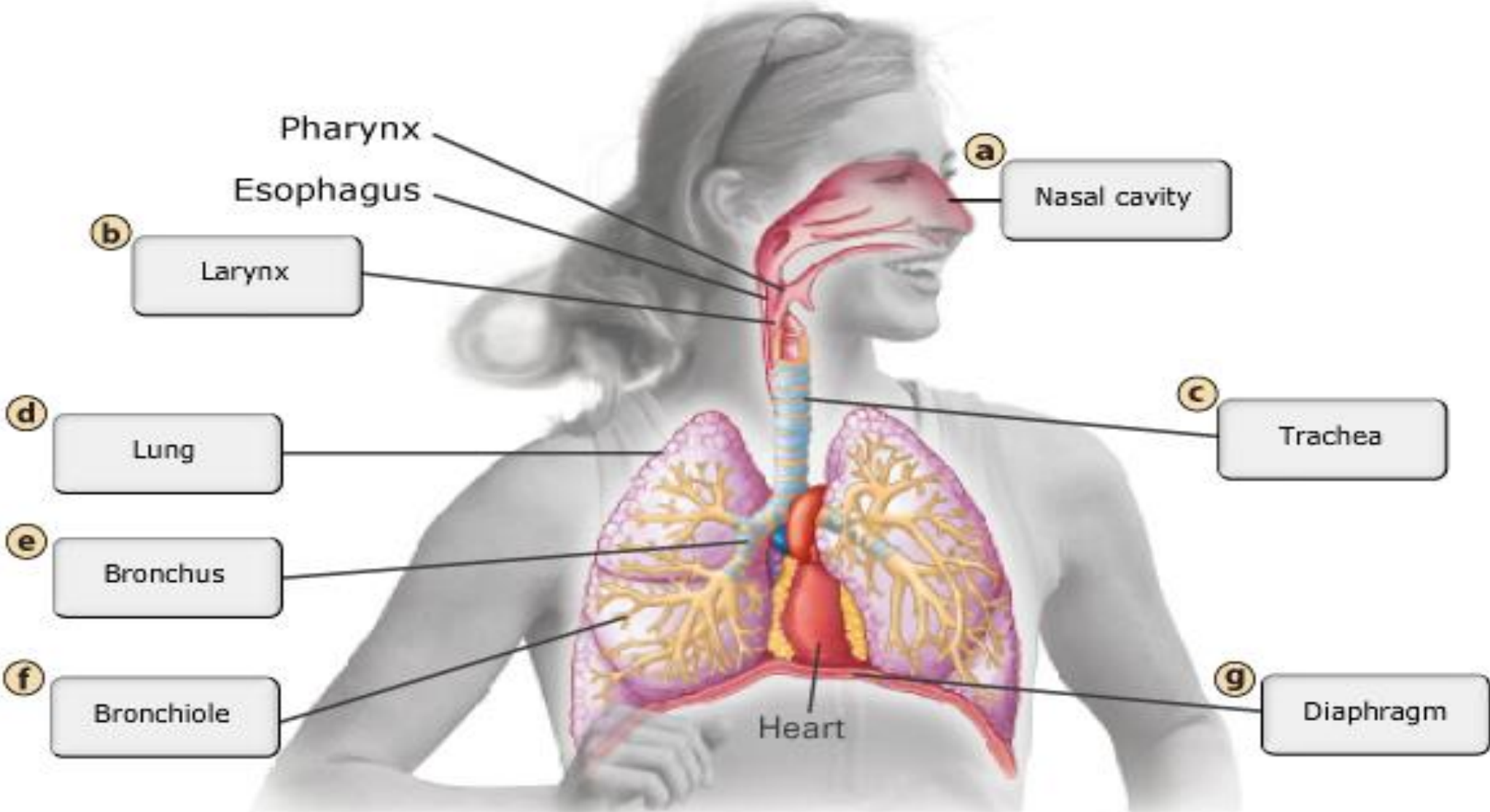


Sign and symptoms of respiratory system



Anatomy of Respiratory system



Lungs & Pleura

The lungs occupy the upper 2/3 of the thorax

– right lung = 3 lobes

– left lung = 2 lobes

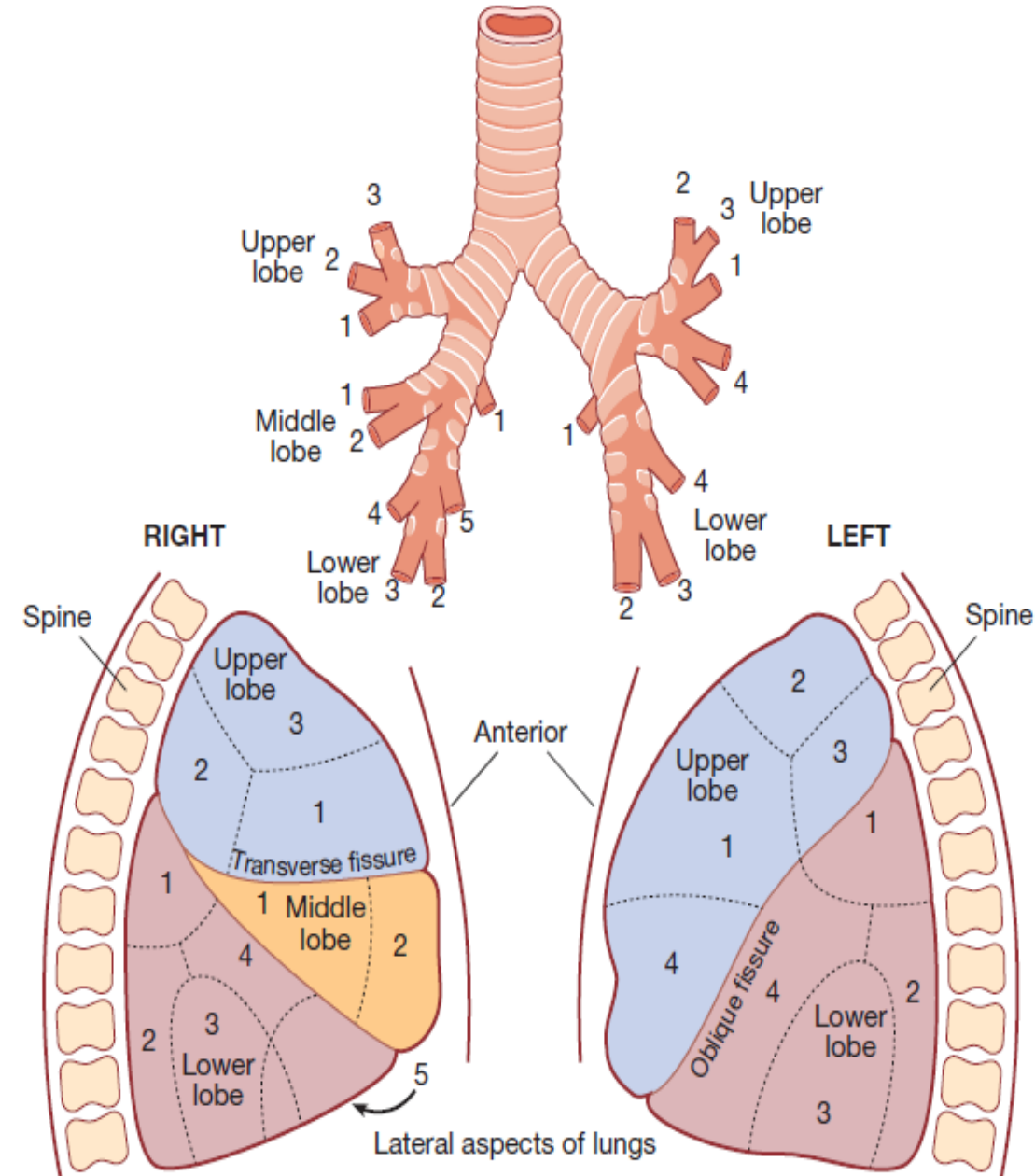
– lower part of lung resting on diaphragm =

Base of lung

– upper part of lung under clavicle = Apex of lung

– pleura = serous membrane (i.e. secretes some fluid)

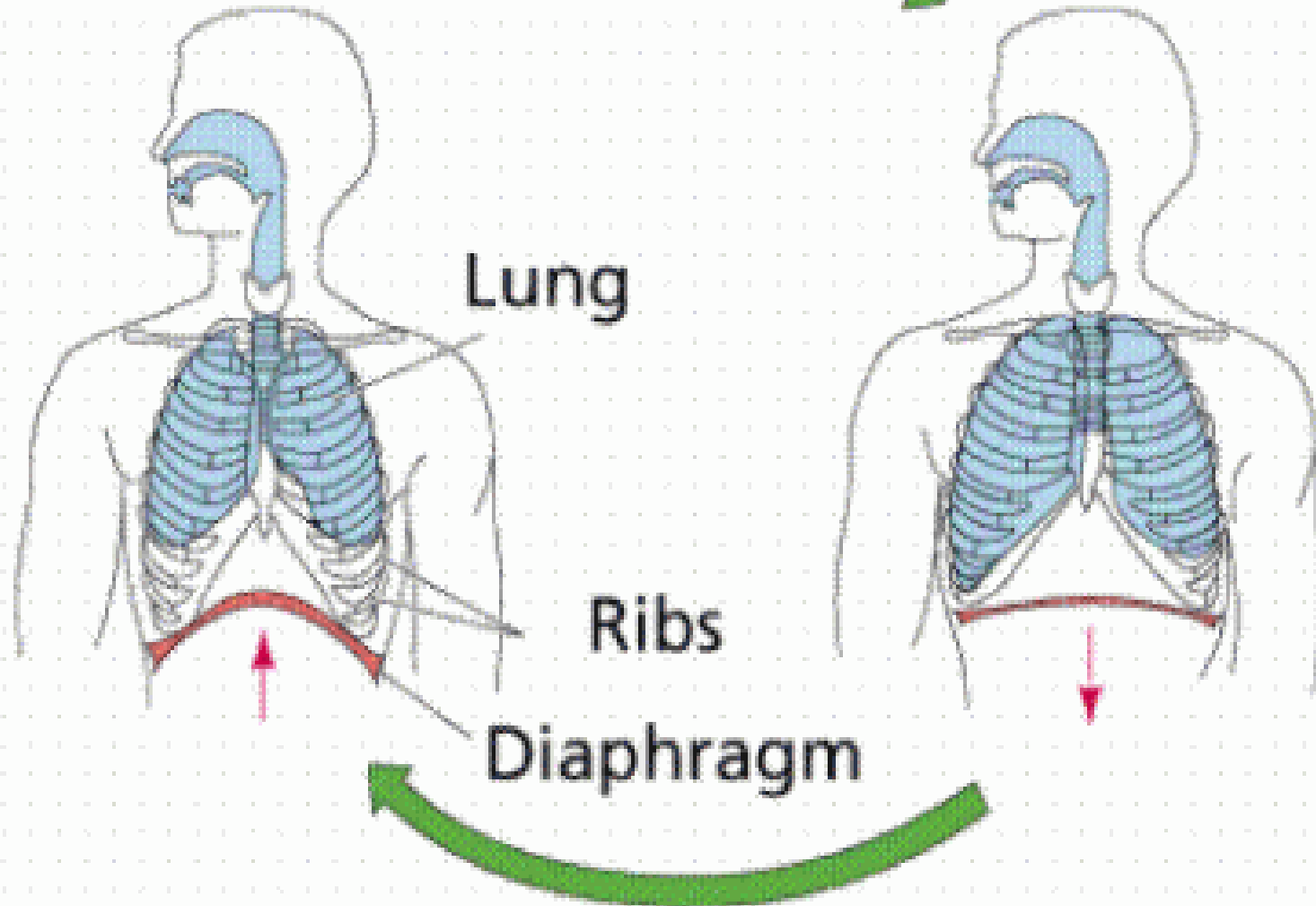
- parietal pleura lines thoracic cavity
- visceral pleura lines organs (viscera)



How do we breath??

Exhalation

Inhalation



Mechanics of Breathing

– air moves by differences in air pressure

– Inspiration

- » active process; get contraction of diaphragm & external intercostal muscles
- » results in increase in size of chest cavity
- » air sucked in

– Expiration

- » passive process with normal expiration driven by elastic recoil of the lungs
- » active process with forced expiration; get contraction of abdominal & internal intercostal muscles
- » results in decrease in size of chest cavity which increases pressure & forces air out

Signs and Symptoms of Respiratory Diseases

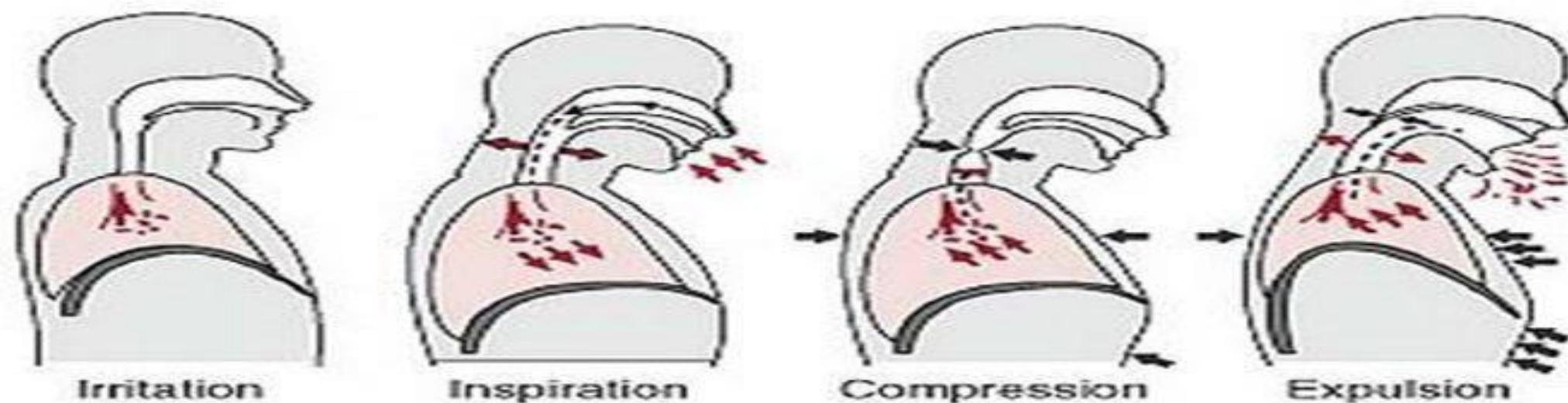
Common Symptoms

- Sneezing
- Cough
- Sputum
- Hemoptysis
- Dyspnea
- Wheezes
- Chest pain

• Coughing

- is a protective reflex caused by stimulation of sensory nerves in the mucosa of the pharynx, larynx, trachea and bronchi
- It is typically induced by changes in air temperature or exposure to irritants, such as cigarette smoke or perfumes

Cough Mechanism



Deep Inspiration \Rightarrow Closure of Glottis
 \Rightarrow Abdominal Contraction \Rightarrow Glottis Opens
 \Rightarrow Forceful Abdominal Contraction \Rightarrow Expulsion
of Air / Mucus

Components of cough reflex

- Cough receptors: Rapidly adapting receptors at pharynx, trachea(carina) ,bronchi and bronchioles
- Afferent nerves : Vagus and glossopharyngeal nerves
- Cough centre : Medulla (nucleus tractus solitarius)
- Efferent nerves : Vagus,phrenic and spinal motor nerves
- Effector muscles : Glottis, external intercostal, diaphragm, major inspiratory and expiratory muscles

Cough

| Origin | Common causes | Clinical features |
|------------------|---|---|
| Pharynx | Post-nasal drip | History of chronic rhinitis |
| Larynx | Laryngitis, tumour, whooping cough, croup | Voice or swallowing altered, harsh or painful cough Paroxysms of cough, often associated with stridor |
| Trachea | Tracheitis | Raw retrosternal pain with cough |
| Bronchi | Bronchitis (acute) and chronic obstructive pulmonary disease (COPD) Asthma Eosinophilic bronchitis Lung cancer | Dry or productive, worse in mornings Usually dry, worse at night Features similar to asthma but airway hyper-reactivity absent Persistent (often with haemoptysis) |
| Lung parenchyma | Tuberculosis Pneumonia Bronchiectasis Pulmonary oedema Interstitial fibrosis | Productive (often with haemoptysis) Dry initially, productive later Productive, changes in posture induce sputum production Often at night (may be productive of pink, frothy sputum) Dry and distressing |
| Drug side-effect | Angiotensin-converting enzyme (ACE) inhibitors | Dry cough |
| Aspiration | Gastro-oesophageal reflux disease (GORD) | History of acid reflux, heartburn, hiatus hernia Obesity |

Cause of cough

- 1) Infections : common cold, acute bronchitis, pneumonia, pertussis, or tuberculosis
- 2) Reactive airway disease: Asthma
- 3) Gastroesophageal reflux
- 4) Air pollution including tobacco smoke
- 5) Foreign body
- 6) Angiotensin-converting enzyme inhibitor
- 7) Psychogenic cough
- 8) Neurogenic cough
- 9) Other

- acute (of sudden onset) if it is present < 3 weeks
- subacute if it is present between $3-8$ weeks
- chronic when last in > 8 weeks.

- A cough can be non-productive (**dry**)
- productive (**when sputum is coughed up**)
- It may occur only at night (**then called nocturnal cough**)
- during both night and day, or just during the day

Complications of coughing can be classified as either acute or chronic

Acute

- cough syncope (fainting spells due to decreased blood flow to the brain when coughs are prolonged and forceful)
- cough-induced vomiting
- rupture of blebs causing spontaneous pneumothorax
- subconjunctival haemorrhage or "red eye"
- coughing defecation or cough urination
- in women with a prolapsed uterus

Chronic

- abdominal or pelvic hernias,
- fatigue
- fractures of lower ribs
- costochondritis.
- Chronic or violent coughing can contribute to damage to the pelvic floor and a possible cystocele

Treatment of cough

- should target the cause; for example, smoking cessation or discontinuing ACE inhibitors
- Cough suppressants such as codeine or dextromethorphan are frequently prescribed, but have been demonstrated to have little effect
- Other treatment options may target airway inflammation or may promote mucus expectoration

Breathlessness or dyspnoea

Is defined as the feeling of an uncomfortable need to breathe

➤ **Respiratory diseases can stimulate breathing and dyspnoea by:**

1. stimulating intrapulmonary sensory nerves (e.g. pneumothorax, interstitial inflammation and pulmonary embolus)
2. increasing the mechanical load on the respiratory muscles (e.g. airflow obstruction or pulmonary fibrosis)
3. by causing hypoxia, hypercapnia or acidosis, which stimulate chemoreceptors.

Causes of breathlessness

| System | Acute dyspnea | Chronic exertional dyspnea |
|--------------------|--|--|
| CVS | Acute pulmonary oedema | Chronic heart failure Myocardial ischemia (angina equivalent) |
| Respiratory | *Acute severe asthma *Acute exacerbation of COPD *Pneumothorax *Pneumonia *Pulmonary embolus Inhaled foreign body (especially in children) Lobar collapse Laryngeal oedema (e.g. anaphylaxis) | *COPD *Chronic asthma Lung cancer & Lymphangitis carcinomatosa Interstitial lung disease (sarcoidosis, fibrosing alveolitis, extrinsic allergic alveolitis, pneumoconiosis) Chronic pulmonary thromboembolism Large pleural effusion(s) |
| Others | Metabolic acidosis (e.g. diabetic ketoacidosis, lactic acidosis, uraemia, overdose of salicylates, ethylene glycol poisoning) Psychogenic hyperventilation (anxiety- or panic-related) | Severe anaemia Obesity Deconditioning |

- **Orthopnoea** is a type of dyspnoea that occur when the patient lying supine common in Chronic obstructive air way disease COPD, as well as in heart disease,
- because airflow obstruction is made worse by upward displacement of the diaphragm by the abdominal contents on lying flat, so many patients choose to sleep propped up

Modified Medical Research Council (MRC) dyspnoea scale

| Grade | Degree of breathlessness related to activities |
|-------|---|
| 1 | No breathlessness, except with strenuous exercise |
| 2 | Breathlessness when hurrying on the level or walking up a slight hill |
| 3 | Walks slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own pace |
| 4 | Stops for breath after walking about 100 m or after a few minutes on level ground |
| 5 | Too breathless to leave the house, or breathless when dressing or undressing |

Cyanosis

- Is the bluish or purplish discolouration of the skin or mucous membranes due low oxygen saturation occurring when 5.0 g/dL of deoxyhemoglobin or greater is present



- the presence of cyanosis is dependent upon there being an absolute quantity of deoxyhemoglobin, the bluish color is more readily apparent in those with high hemoglobin counts (polycythemia) than it is with those with anemia

- Central cyanosis is often due to a circulatory or ventilatory problem that leads to poor blood oxygenation in the lungs
- It develops when arterial oxygen saturation drops below 85% or 75%
- Acute cyanosis can be as a result of asphyxiation or choking, and is one of the definite signs that respiration is being blocked

Causes of Central cyanosis :

1. CNS causes

Intracranial hemorrhage, Drug overdose (e.g. heroin), grand mal seizure

2. Respiratory system:

Pneumonia, Bronchiolitis, asthma, Pulmonary hypertension, Pulmonary embolism, Hypoventilation, Chronic obstructive pulmonary disease

3. Cardiovascular diseases:

Congenital heart disease (e.g. Tetralogy of Fallot, right to left shunts in heart or great vessels), Heart failure, Myocardial infarction

4. Blood:

- Methemoglobinemia * Note this causes "spurious" cyanosis, in that, since methemoglobin appears blue, the patient can appear cyanosed even in the presence of a normal arterial oxygen level.
- Polycythaemia

5. Others:

High altitude, cyanosis may develop in ascents to altitudes >2400 m,

Hypothermia, Obstructive sleep apnea

Peripheral cyanosis

- Peripheral cyanosis is the blue tint in fingers or extremities, due to an inadequate or obstructed circulation
- All factors contributing to central cyanosis can also cause peripheral symptoms to appear but peripheral cyanosis can be observed in the absence of heart or lung failures
- Small blood vessels may be restricted and can be treated by increasing the normal oxygenation level of the blood

Causes of Peripheral cyanosis :

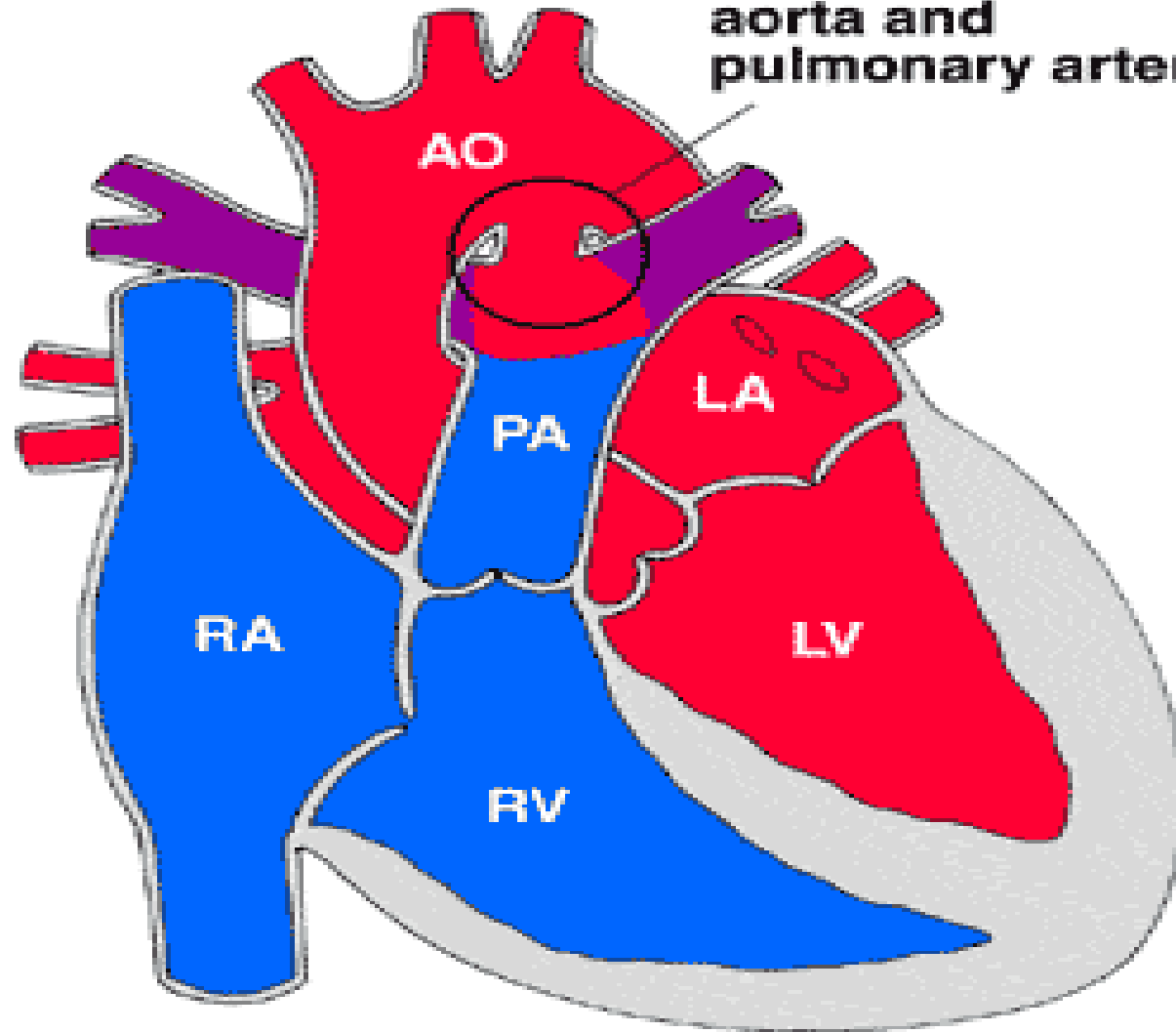
1. All common causes of central cyanosis
2. Reduced cardiac output (e.g. heart failure or hypovolaemia)
3. Cold exposure
4. Chronic obstructive pulmonary disease (COPD)
5. Arterial obstruction (e.g. peripheral vascular disease, Raynaud phenomenon)
6. Venous obstruction (e.g. deep vein thrombosis)




Differential cyanosis

- is the bluish coloration of the lower but not the upper extremity and the head
- This is seen in patients with a patent ductus arteriosus
- Patients may develop progressive pulmonary vascular disease, and pressure overload of the right ventricle occurs
- As soon as pulmonary pressure exceeds aortic pressure, shunt reversal (right-to-left shunt) occurs.
- The upper extremity remains pink because the brachiocephalic trunk, left common carotid trunk and the left subclavian trunk is given off proximal to the PDA

Patent Ductus Arteriosus PDA

Vessel connecting
aorta and
pulmonary artery



-  Oxygen-rich blood
-  Oxygen poor blood
-  Mixed blood

AO = aorta
PA = pulmonary artery
LA = left atrium
RA = right atrium
LV = left ventricle
RV = right ventricle

