**Question 1**

A patient presents to the ED. This is his 5thpresenrtation since suffering from a bout of pneumonia 3yrs ago. His main clinical findings are cough, purulent sputa and fever. What is the most likely diagnosis?

A Asthma

B Bronchiectasis

C Emphysema

D Chronic bronchitis

Explanation B

**Question 2**

Drug induced asthma can occur following the ingestion of which of the following drugs?

A Paracetamol

B Oxycodone

C Pseudoephedrine

D Ibuprofen

Explanation D

Aspirin and other NSAIDs trigger asthma in patients by inhibiting the cyclooxygenase pathway of the arachidonic acid metabolism, leading to a rapid decrease in prostaglandin E2. PGE2 normally inhibits the enzyme that generate proinflammatory mediators such as leukotrienes B4, C4,D4 and E4, which are believed to have central roles in aspirin induced asthma

**Question 3**

Which of the following is true regarding malignant mesothelioma?

A There is an increased risk of mesothelioma in asbestos workers who smoke

B Mesothelioma arise in the thorax from the visceral pleura only

C The lifetime risk of developing mesothelioma in heavily exposed individuals is as high as 7-10%

D Sarcomatoid is the most common morphological type

Explanation C

 90% of reported mesotheliomas are asbestos related. The lifetime risk of developing mesothelioma in heavily exposed individuals is as high as 7-10%. There is a latent period of 25-45yrs for the development of asbestos related mesothelioma. Mesothelioma arise in the thorax from either the visceral or parietal pleura. There is no increased risk of mesothelioma in asbestos workers who smoke. However there is a markedly increased risk of asbestos related lung cancer in asbestos workers who smoke. Thus for asbestos workers (especially those that smoke), the risk of dying of lung cancer far exceeds that of developing mesothelioma. Morphology types: epitheliod (60%), sarcomatoid (20%) and mixed (20%). Asbestos bodies (and asbestos plaques) are found in increased umbers in the lungs of of patients with mesothelioma

**Question 4**

Regarding lobar pneumonia, which of the following statements is correct?

A Rarely caused by streptococcus

B It is not usually associated with a productive cough

C It is more common in the young and elderly

D A change from red to grey hepatisation occurs

Explanation D

Lobar pneumonia is more prevalent in the elderly and is associated with a productive cough. Streptococcus pneumoniae is the most common organism and there are 4 morphological phases starting with congestion, red hepatisation, grey hepatisation and resolution

**Question 5**

Regarding non-atopic (intrinsic) asthma, which of the following statements is correct?

A A positive family history is common

B Decreases vagal afferent responsiveness

C Is mainly triggered by viral respiratory illnesses rather than bacterial

D Is associated with atopy

Explanation C

Non-atopic asthma is the second largest group of asthmas. It is also called non-reaginic. It is frequently caused by viral respiratory tract infections. A family history is uncommon. Serum IgE levels are normal and there are no other associated allergies. Skin tests are negative. It is thought that the virus induced inflammation of the respiratory mucosa lowers the threshold of the subepithelial vagal receptors to irritants

**Question 6**

Which of the following types of emphysema is most commonly associated with smoking and chronic bronchitis?

A Paraseptal

B Irregular

C Centriacinar

D Panacinar

Explanation C

Centrilobular or centriacinar emphysema is associated with smoking and chronic bronchitis. Panacinar or panlobular emphysema is associated with alpha 1 anti-trypsin deficiency. Irregular emphysema or airspace enlargement is associated with fibrosis, and paraseptal or ductal emphysema is associated with spontaneous pneumothorax

**Question 7**

Which of the following types of emphysema is most commonly associated pneumothorax in young patients?

A Paraseptal

B Irregular

C Centiacinar

D Panacinar

Explanation A

Centrilobular or centriacinar emphysema is associated with smoking and chronic bronchitis. Panacinar or panlobular emphysema is associated with alpha 1 antitrypsin deficiency. Irregular emphysema or airspace enlargement is associated with fibrosis. And paraseptal or ductal emphysema is associated with spontaneous pneumothorax

Paraseptal emphysema or distal acinar emphysema involves alveolar sacs and ducts around septa. The resulting bulla may lead to spontaneous pneumothorax

**Question 8**

All of the following cause compressive atelectasis, with the exception of?

A Pneumothorax

B Ascites

C Asthma

D Pleural effusion

Explanation C

Compressive atelectasis results whenever the pleural cavity is partially or completely filled by fluid exudate, tumour, blood or air. It occurs commonly in patients in cardiac failure who develop pleural fluid, in patients who develop neoplastic effusion and in patients who have intra-abdominal pathology that results in an abnormal elevation of the diaphragm. Other types of atelectasis include resorption and contraction atelectasis.

**Question 9**

Which of the following is the most common form of emphysema in patients with alpha one antitrypsin deficiency?

A Paraseptal

B Irregular

C Centriacinar

D Panacinar

Explanation D

Centrilobular or centriacinar emphysema is associated with smoking and chronic bronchitis. Panacinar or panlobular emphysema is associated with alpha 1 antitrypsin deficiency. Irregular emphysema or airspace enlargement is associated with fibrosis, and paraseptal or ductal emphysema is associated with spontaneous pneumothorax

**Question 10**

Which of the following is the most characteristic change occuring in chronic bronchitis?

A Columnar metaplasia of the bronchial epithelium

B Increase in smooth muscle thickness

C Increase in size of the mucous glands

D Decreased in goblet cell number

Explanation C

In chronic bronchitis, although the number of the globet cells increases slightly, the major increase is in the size of the mucous glands. The bronchial epithelium may exhibit squamous metaplasia and dysplasia. The Reid index (ration of the thickness of the mucous gland layer to the thickness of the wall between the epithelium and the cartilage) is increased in chronic bronchitis (normal is 0.4)

**Question 11**

Which of the following statements is correct regarding squamous cell carcinoma of the lung?

A Is usually peripheral

B Is more common in females

C Has a 5 year survival of 60%

D Is commonly associated with cigarette smoking

Explanation D

Squamous cell carcinoma has a 5 yr survival rate of around 40%. Men who smoke are at the highest risk. The site of the carcinoma commonly occurs around the hilum of the lung

**Question 12**

What happens to most particles 1-5 micrometers in diameter after they are breathed in?

A Lodged in trachea and bronchi

B Deposited in nose

C Exhaled away

D Phagocytosed by pulmonary alveolar macrophages

Explanation D

Note: conflicting evidence relating to a polluted atmosphere. Explanation 1- comes from physiology sources, explanation 2 web sources and explanation 3 comes from pathological sources.

1-When an aerosol is inhaled, its fate depends on the size of particles. Large particles are removed by impaction in the nose and pharynx. This means that the particles are unable to turn the corners rapidly because of their inertia, and they are trapped on the wet mucosa. Medium size particles are deposited in small airways and elsewhere because of their weight. This is called sedimentation. The smallest particles (<0.1 micron in diameter) reach the alveoli, where some deposition occurs through the walls by diffusion. Many small particles are not deposited at all but are exhaled with the next breath. Once deposited in the alveoli, they are engulfed by macrophages that leave the area via the blood stream and the lymphatic system. If deposited on the bronchioles, they are swept up by the bronchiolar cilia and are either swallowed or expectorated.

2-size range and site of lodgement in pulmonary tree:

> 10 microns = upper airway. 5-10 microns = lower trachea or conducting airways. 0.5 - 5 microns = distal lung parenchyma (i.e. size of many bacteria)

One micron (or micrometer) is 0.001mm. A micrometer is one millionth of a meter, 1/1000000m

A nonometer is one billionth of a meter 1/1000000000.

3-The amount of dust retained in the lungs is determined by the dust concentration in ambient air, the duration of exposure, and the effectiveness of clearance mechanisms. Any influence, such as cigarette smoke, that affects the integrity of the mucocillary apparatus significantly predisposes to the collection of dust. The most dangerous particles range form 1-5micrometers in diameter because they reach the terminal small airways and air sacs and settle in the their linings. Under normal conditions there is a small pool of intra-alveolar macrophages that expands when the dust reaches the alveolar spaces. Protection is provided by phagocytosis. However this protection can be overwhelmed by a large dust burden by specific chemical interactions of the particles with cells

Finally: A useful way of rationalising these dimensions is that 1micron is approximately the diameter of a single coccus e.g. Streptococcus - the most common cause of typical pneumonia.

**Question 13**

The pathogenicity of Mycobacterium tuberculosis is caused by which of the following mechanisms?

A Is direct host cell killing by the bacillus

B Is due to caseous necrosis

C Is impaired antibody response/cell mediated

D Is a hypersensitivity response to products of the tuberculosis bacteria

Explanation D

The development of cell mediated (type IV) hypersensitivity response explains the organism’s destructiveness in tissues and the emergence of resistance to the organisms. The T cells are responsible for killing the macrophages that have the bacilli. Lysis of macrophages results in the formation of caseating granulomas. Mycobacterium cannot grow in this acidic, extracellular environment which is lacking in oxygen, and so the infection is controlled.

**Question 14**

In obstructive (resorptive) atelectasis, which of the following statements is correct?

A Due to a partial obstruction of an airway

B It is caused by pleural fluid

C The mediastinum moves away from the lesion

D It involves the reabsorption of air

Explanation D

Obstructive atelectasis is the consequence of complete obstruction of an airway which leads to resorption of the oxygen trapped in the dependant alveoli, without impairment of blood flow through the affected alveolar walls. Since lung volume is diminished, the mediastinum may shift towards the atelectic lung

**Question 15**

Which of the following statements is correct regarding the use of steroids in asthma?

A They are immediately effective

B They should be given nocte because of diurnal variation

C They inhibit cytokines

D Cause bronchodilation

Explanation C

Steroids (in the nebulised form) are useful in the chronic management of asthma. Oral and IV doses, given in acute exacerbation, take a few hours to prevent the inflammatory response. They are given in the morning due to their diurnal variation. They have no effect on bronchodlitation

**Question 16**

Which of the following statements is true regarding lobar pneumonia?

A Is associated with immunosuppression

B Is not usually associated with a productive cough

C Is more common in the young than the elderly

D Involves morphological changes of red to grey hepatisation

Explanation D

Lobar pneumonia is more prevalent in the elderly and is associated with a productive cough. Streptococcus pneumoniae is the most common organism and there are 4 morphological phases starting with congestion, red hepatisation, grey hepatisation and resolution

**Question 17**

Chronic bronchitis is characterised by which of the following?

A Goblet cell hypertrophy

B Mucus gland hypertrophy

C Smooth muscle hypertrophy

D Chronic neutrophilic inflammation

Explanation B

In chronic bronchitis, although the number of the goblet cells increases slightly, the major increase is in the size of the mucous glands. The bronchial epithelium may exhibit squamous metaplasia and dysplasia. The Reid index (ratio of the thickness of the mucous gland layer to the thickness of the wall between the epithelium and the cartilage) is increased in chronic bronchitis (normal is 0.4). Grossly there is swelling, oedema and hyperaemia of the mucous membranes accompanied by mucopurulent secretions. Histologic features are chronic lymphocytic inflammation

Note: There is also bronchial smooth muscle hyperplasia.

**Question 18**

Which of the following is not a cause of compressive atelectasis?

A Pleural effusion

B Congestive cardiac failure (CCF)

C Pneumothorax

D Asthma

Explanation D

Compressive atelectasis results whenever the pleural cavity is partially or completely filled by fluid exudate, tumour, blood or air. It occurs commonly in patients in cardiac failure who develop pleural fluid, in patients who develop neoplastic effusion and in patients who have intra-abdominal pathology that results in an abnormal elevation of the diaphragm. Other types of atelectasis include resorption and contraction atelectasis.

**Question 19**

Which of the following is not correct in relation to bronchogenic cysts?

A They may become dysplastic

B They occasionally cause pneumothorax

C They are often connected to the tracheobronchial tree

D They may contain mucus

Explanation C

Bronchogenic cysts occur anywhere in the lungs as a single or, on occasion, multiple cystic spaces. They are usually found adjacent to bronchioles but are rarely in communication with the tracheobronchial tree. They are lined by bronchiolar-type epithelium and are usually filled with mucinous secretions. Complications include infection, rupture causing haemorrhage, pneumothorax or interstitial emphysema. There is a small risk of malignant deterioration

**Question 20**

The major morphological change in chronic bronchitis is which of the following?

A Increased mucosal gland depth (REID index)

B Smooth muscle hypertrophy

C Leukocyte infiltration

D Decreased goblet cell number

Explanation A

In chronic bronchitis, although the number of the globet cells increases slightly, the major increase is in the size of the mucous glands. The bronchial epithelium may exhibit squamous metaplasia and dysplasia. The Reid index (ratio of the thickness of the mucous gland layer to the thickness of the wall between the epithelium and the cartilage) is increased in chronic bronchitis (normal is 0.4)

**Question 21**

Which of the following statements is true regarding bronchogenic carcinoma?

A Small cell carcinoma is the most common type

B Distant spread occurs solely by lymphatic spread

C Surgical resection is often effective for small cell carcinoma

D It most often arises around the hilum of the lung

Explanation D

Lung cancer is currently the most frequently diagnosed major cancer in the world and is the most common cause of mortality. This is largely due to the carcinogenic effects of cigarette smoke

Lung cancer is a poor term as such tumours should be defined according to their cell lines. Lung cancers arise most often in and about the hilum of the lungs. About 3/4 of the lesions take their origin from bronchi. Only a small percentage of primary lung cancers arise in the peripheral lung substance. Adenocarcinoma is the most common lung cancer (37% of male and 47% of female lung cancers). It typically presents as a peripheral mass. However, these may also arise from the bronchi. Small cell and squamous cell carcinoma make up a smaller proportion of lung cancers each individually, but both present as central or hilar masses, and thus the majority of lung cancers arise around the hilum of the lung. Therefore, the majority of lung carcinomas are derived from the bronchi and are called bronchogenic cancers arising most often in and about the hilum of the lung. Distant spread occurs via the blood stream and lymphatic system.

Surgical resection is ineffective for small cell carcinoma

**Question 22**

Which of the following statements is correct In regard to emphysema?

A Elastase activity is unaffected by oxygen free radicals

B The protease-antiprotease mechanism is the most plausible explanation for the disease

C A deficiency of alpha 1 antitrypsin is protective

D Centriacinar destruction leads to obstructive overinflation

Explanation B

Emphysema is characterised by abnormal enlargement of the airspaces distal to the terminal bronchiole, accompanied by destruction of their walls, and without obvious fibrosis. In contrast, the enlargement of airspaces without destruction is termed overinflation. Alpha 1 antitrypsin is protective against elastases causing emphysema. Oxygen free radicals secreted by neutrophils inhibit alpha 1 antitrypsin and thus decrease the net antielastase activity in smokers

1. Centriacinar emphysema begins in the respiratory bronchioles and spreads peripherally. - It is associated with long-standing cigarette smoking and predominantly involves the upper half of the lungs. 2) Panacinar emphysema destroys the entire alveolus uniformly and is predominant in the lower half of the lungs. Panacinar emphysema generally is observed in patients with homozygous alpha1-antitrypsin (AAT) deficiency. 3) Paraseptal emphysema, also known as distal acinar emphysema, preferentially involves the distal airway structures, alveolar ducts, and alveolar sacs.

**Question 23**

Which of the following options is correct with regard to chronic bronchitis?

A Dysplasia of the epitheleum leads to emphysema

B Cigarette smoke stimulates alveolar leukocytes

C The hallmark is hypersecretion of mucus in the large airways

D Infection is a primary cause

Explanation C

In chronic bronchitis, although the number of the globet cells increases slightly, the major increase is in the size of the mucous glands. The bronchial epithelium may exhibit squamous metaplasia and dysplasia. The Reid index (ratio of the thickness of the mucous gland layer to the thickness of the wall between the epithelium and the cartilage) is increased in chronic bronchitis (normal is 0.4). The role of infection is secondary. It is not important in initiating chronic bronchitis but it is important in maintaining it. Smoking affects the cilliary action of the respiratory mucosa and inhibits the ability of alveolar leukocytes to clear bacteria. Dysplasia leads to the possibility of developing respiratory cancer

**Question 24**

With regard to bronchial asthma, which of the following statements is correct?

A Primary mediators include eosinophilic and neutrophilic chemotactic factors

B Bronchial wall smooth muscle is atrophic

C Sub-epitheleal vagal receptors in respiratory mucosa become desensitised to irritants

D IgG plays a role

Explanation A

(Note A is the wrong response in a similar question in HETI week 20 q2. The correct option was non-atopic asthma is initiated by diverse non-immune mechanisms)

Most asthma is associated with atopy, which represents an increased susceptibility to generate IgE in response to allergens. In addition, direct stimulation of subepithelial vagal receptors provokes bronchoconstriction through both central and peripheral reflexes, making them more sensitive. The bronchial smooth muscle becomes hypertrophic.

**Question 25**

Which of the following statements is correct regarding pulmonary tuberculosis?

A Langhans cells occur in coalescent granulomata

B Liquefactive necrosis precedes the formation of granulomata

C The Ghon focus is a parenchymal peri-hilar lesion

D Bacilli establish themselves in sites of low oxygen tension

Explanation A

The Ghon focus is a parenchymal subpleural lesion found just above or below the interlobar fissure between the upper and lower lungs (distal airspaces of the lower part of the upper lobe or the upper part of the lower lobe). The bacilli thrive on oxygen. Granulomata form during the type IV cell mediated immune response. However, the bacilli may be toxic to the macrophages contributing to the caseous necrotic centre of a granuloma. Histologically, coalescent granulomata are composed of epitheliod cells surrounded by a zone of fibroblasts and lymphocytes that usually contain Langhans giant cells.

A gohn focus with nodal involvement is called a Gohn complex

**Question 26**

Which of the following options is correct in relation to bacterial pneumonias?

A The nasopharynx is inconsequential in defending the lung against infection

B Alveolar clearance of bacteria is achieved by lymphocytes

C Patchy consolidation of the lung is the dominant feature of a bronchopneumonia

D Klebsiella pneumoniae is a common virulent agent

Explanation C

Klebsiella pneumoniae is a common pathogen but it occurs more commonly in the debilitated malnourished patient. Alveolar clearance is achieved mainly by macrophages. The nasopharynx is important in removing particles (droplets) containg the microorganisms by sneezing or blowing, and plays a vital role in defence against infection. Common agents include staphylococcus, streptococcus, pneumococcus, haemophilus, pseudomonas aeruginosa and coliform bacteria

**Question 27**

The most frequent site of a primary tuberculous lesion in lung is?

A Peripherally

B Lower zone of upper lobe

C Apex Your Answer

D Hilum

Explanation B

Primary tuberculosis (TB) implants in the lower part of the upper lobe or the upper part of the lower lobe. Secondary TB occurs near the apical pleura

**Question 28**

Which of the folowing does is NOT an indication for a lung transplant

A Neoplastic terminal lung disease

B Idiopathic pulmonary fibrosis

C End stage emphysema

D Idiopathic/familial pulmonary arterial hypertension

Explanation A

Indications for a lung transplant include almost all-non neoplastic terminal lung disease, provided the patient is able to take lifelong immunosuppressive medications. The most common indications include: end stage emphysema, idiopathic pulmonary fibrosis, cystic fibrosis, idiopathic/familial pulmonary arterial hypertension. Often, only single lungs are transplanted as there is sufficient improvement in the patient from the one transplanted lung (and you can donate to two patients). Patients with chronic bilateral lung infections requiring transplant of both lungs in order to remove the reservoir of infection.