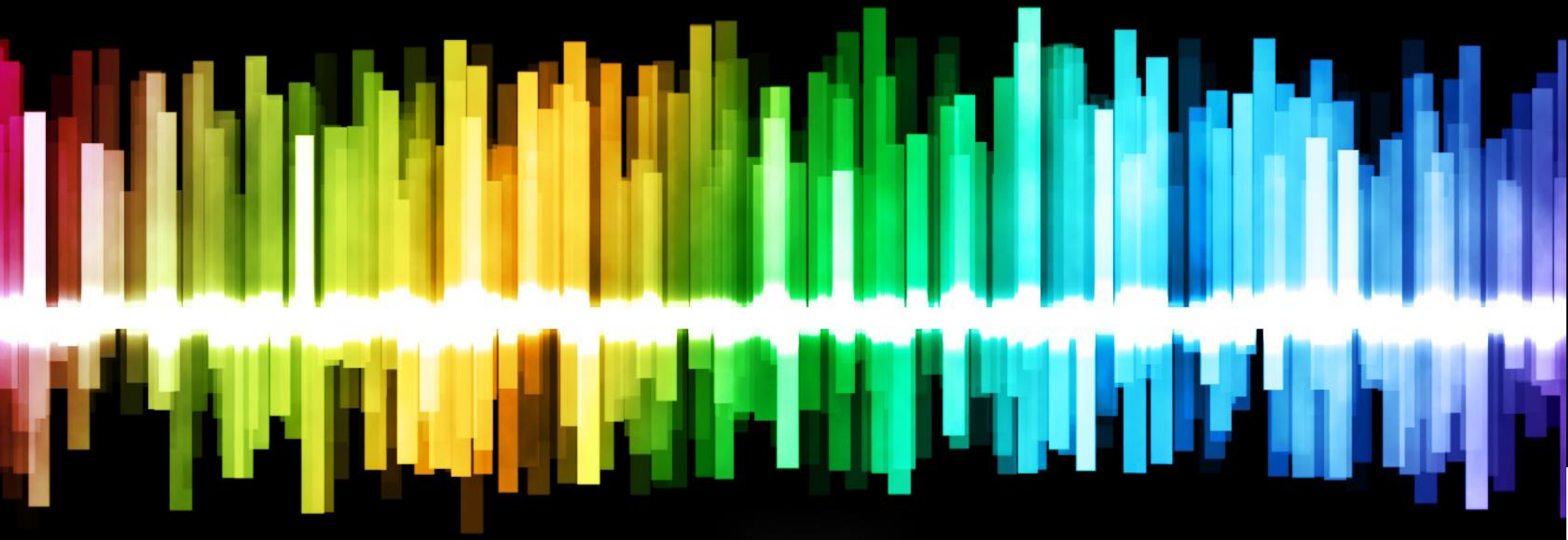




Lecture2 :

CHRONIC OBSTRUCTIVE AIRWAY DISEASE



OBJECTIVES :

1- Understand that this group of disorder is characterized by an increase in resistance to airflow, owing to partial or complete obstruction at any level of the bronchial/bronchiolar.

2- Know that the major obstructive disorder are chronic bronchitis, emphysema , asthma and bronchiectasis.

3- Is aware that the symptom common to all these disorders is “dyspnea” but each have their own clinical and anatomical characteristics .

4- chronic bronchitis and emphysema almost always coexists.

Chronic Obstructive Pulmonary Disease

✓ Bronchial Asthma

Chronic bronchitis

Bronchiectasis

Pulmonary emphysema

Chronic bronchitis

Definition : Persistent productive cough which is last for 3 months to 2 years, most common causes are smoking and air pollution.

Clinical presentation:

- 1) dyspnea
- 2) Hypoxemia
- 3)Hypercapnia
- 4) Cyanosis

- Histological feature:

- 1) **the airway mucosa** is red and edematous
- 2) **bronchus:** there are a lot of mucus in lumen, neutrophil, inflammatory cell
- 3) hypertrophy and hyperplasia in **sub mucosal gland**.
- 4) **In the sputum culture:** there are macrophages full of carbon, and increase of neutrophil

*we **rare** taking biopsy for C.B patient, because we can diagnosed by history.*

Complication:

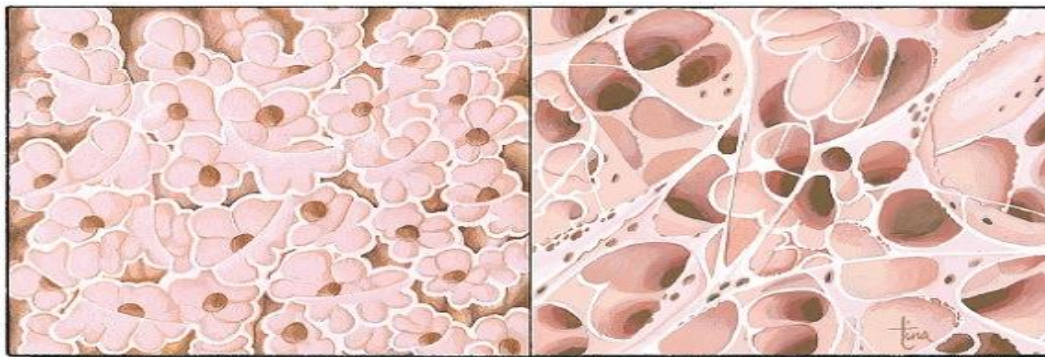
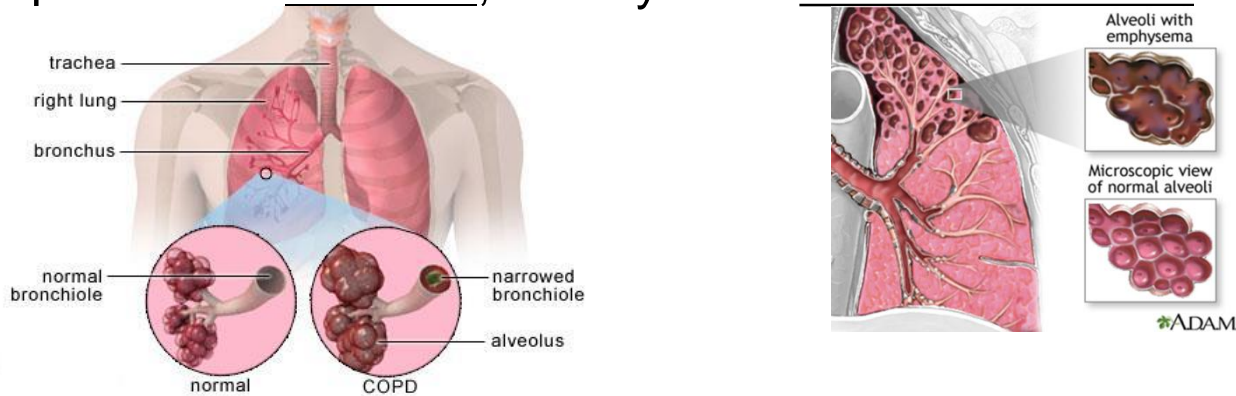
- 1) **Respiratory failure**
- 2) **Cor pulmonary** (heart failure induce by chronic respiratory disorder).

Pulmonary emphysema

Definition : Abnormal dilation of air space distal to terminal bronchiole.

(include: respiratory bronchiole, alveolar duct ,”alveolar sac and alveoli” acinus) with destruction of alveolar wall. Reduced lung elasticity.

* Most patient are smokers, or they have chronic bronchitis.



A

Normal Lung

B

Emphysema

Types of emphysema

Centrilobular

Dilation in central or proximal part of acini (respiratory bronchiole are affected while distal alveoli are spared) most common the upper pulmonary lobes.

occur in smokers.

Panacinar

Dilatation of the entire respiratory acinus (Respiratory bronchiole , alveolar duct, alveolar sac and alveoli)

occur in Alpha-1 antitrypsin deficiency.

Paraseptal

Dilatation of distal part acinus & alveolar duct

But respiratory bronchiole is spare

Striking adjacent pleura and lobular connective tissue septa.

The cause is unknown associated with large subpleural ***bullae** or **blebs** and its rupture leads to ***pneumothorax.**

Irregular

involvement of the acinus with scarring

occur in people who have previous lung infection

* (A big emphysematic area full of air)

***pneumothorax:** accumulation of air in plural cavity lead to (acute medical emergency), it will compress the lung and collapse it.

- **Clinical presentation:**

1) **Dyspnea**

2) **Productive cough and wheezing**

3) **Antero-posterior diameter of thorax is increase (Barrel chest)**

4) **The ratio of FEV1 to FVC is reduced.**

5) **Weight loss**

6) **the patient try to set forward**

(to trying to use his accessory muscle to breath and get rid of air which is interrupt inside mucus).

7) **In classic presentation** the lips and tongue are **pinkish**, because permanent dyspnea and adequate oxygenation of hemoglobin called **“pink buffers”**

8) **In chronic and a history of chronic bronchitis**, the patient may present with **bluish** lips and tongue, because increase CO₂ and decrease O₂ called **“Blue bloaters”**

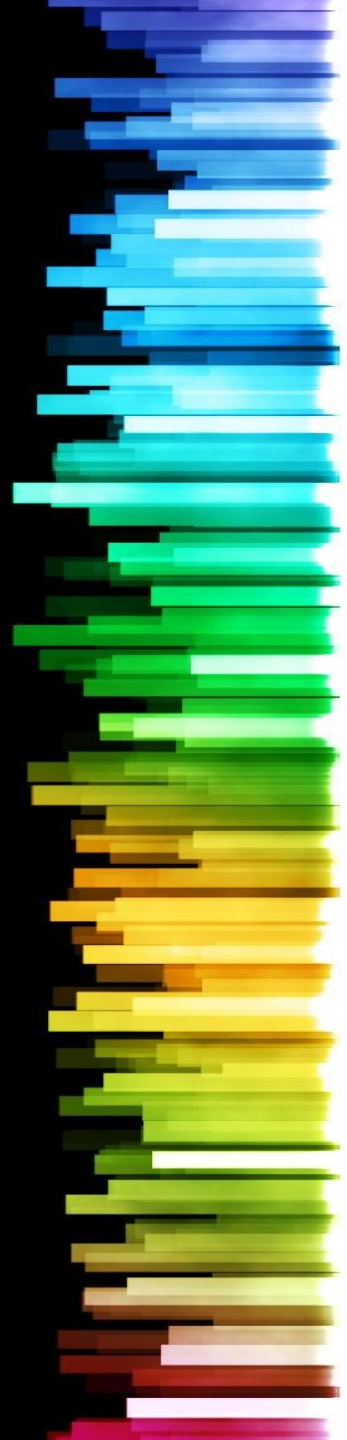
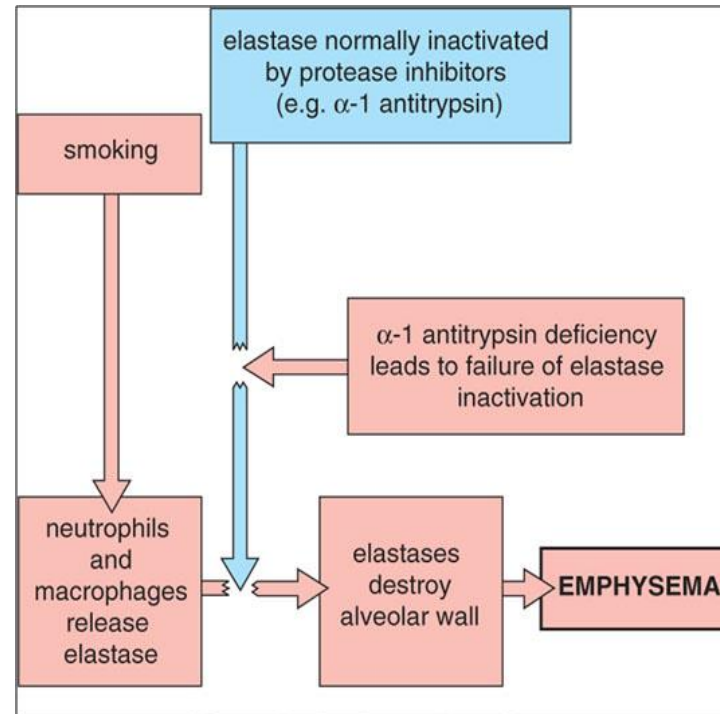
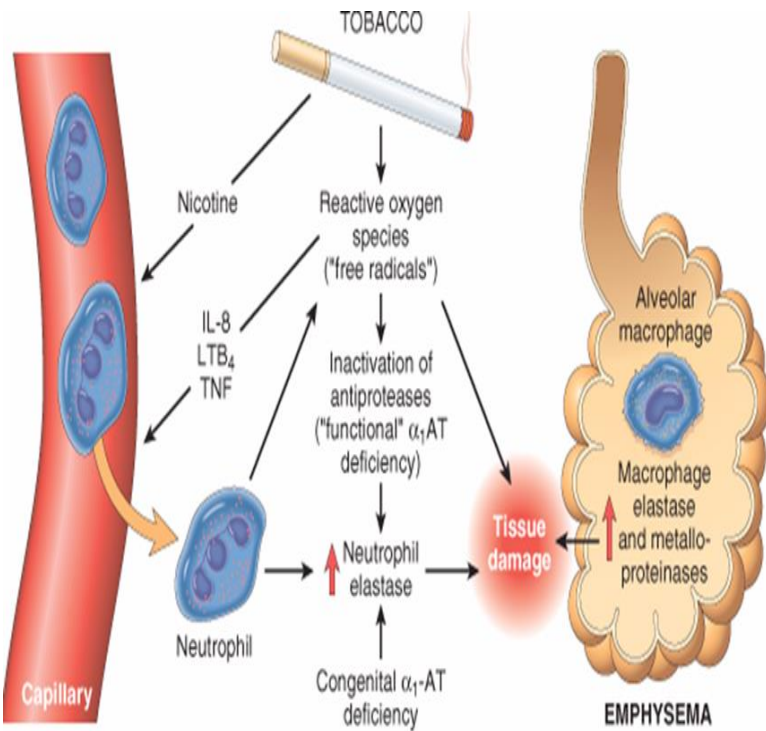
Pathogenesis:

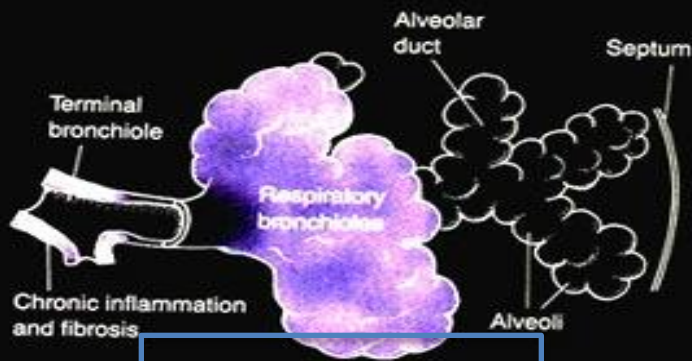
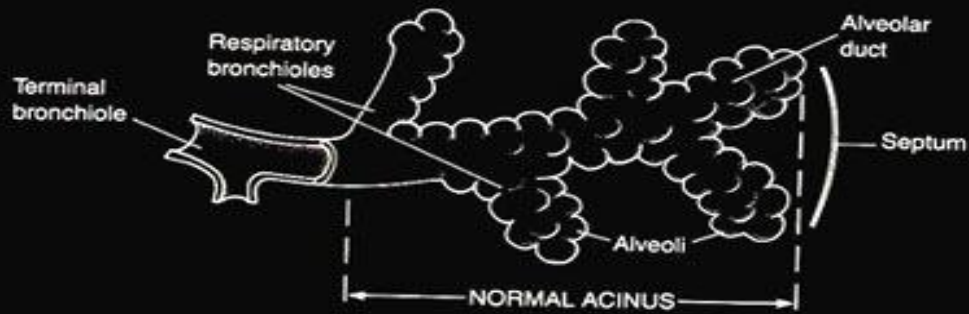
Emphysema may result from **action of Proteinase enzymes** such as **elastase** on the alveolar wall which lead to dilated the alveolar wall.

Elastase can induce **destruction of elastin** unless neutralize by the activities of **alpha1-antitrypsin** (enzyme antagonize action of elastase, and proteases) which can be deficient in cases of emphysema.

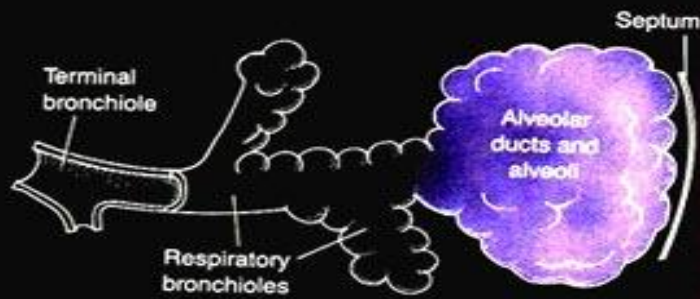
1) **Cigarette smoking** attracts neutrophils and macrophages, which are **sources of elastase** (an enzyme which destroys elastic fibers from the wall of alveoli).

2) **Hereditary alpha 1 antitrypsin deficiency** accounts for a small subgroup of **cases of panacinar emphysema**. It is caused by variants in the *pi* (**proteinase inhibitor**) gene, localized to chromosome 14.

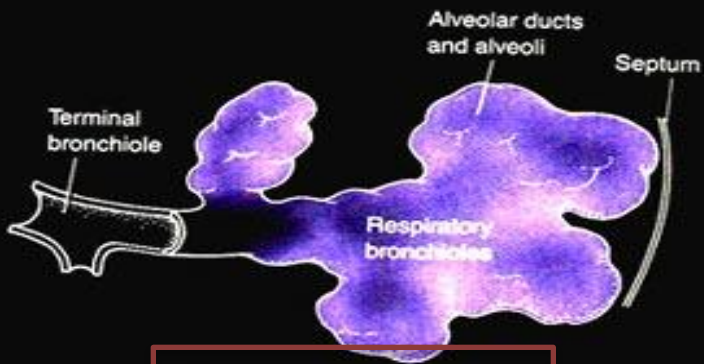




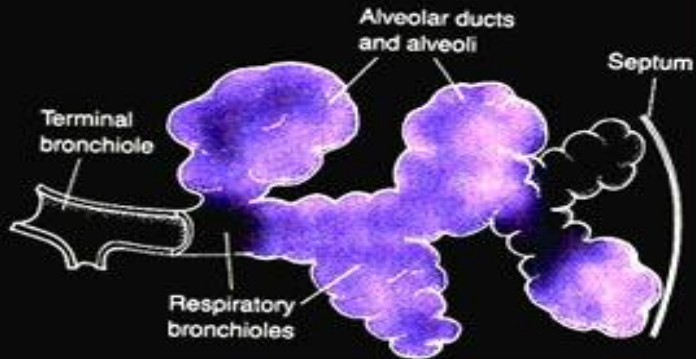
CENTRILOBULAR EMPHYSEMA



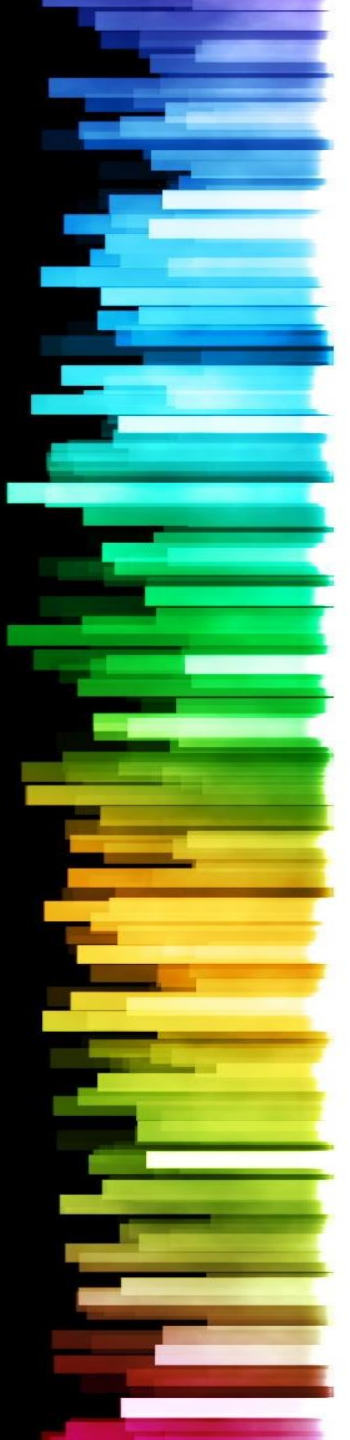
PARASEPTAL EMPHYSEMA



PANACINAR EMPHYSEMA



IRREGULAR EMPHYSEMA



Bronchiectasis

Definition: permanent and abnormal bronchial dilatation which is caused by chronic infection with inflammation and necrosis of the bronchial wall , it likes the lower lobe

It's not primary disease, but rather secondary to:

- 1) **complication** of cystic fibrosis, COPD, tumor, Kartagener-syndrome and foreign body.
- 2) **chronic sinusitis** accompanied by postnasal drip

***Note:** **Cystic fibrosis** is deficiency gene lead to excessive mucus production and sodium, they develop bronchiectasis

Most common condition can lead to bronchiectasis is
Kartagener-syndrome

Also called (**Primary ciliary dyskinesia**)

it's untreatable condition usually effect the boys
characterized by immotile cilia, may lead to infertile and deaf (أصم).

Symptoms: fever, a lot of infection, lack of growth, male infertility,
Situs inversus*

* (congenital condition in which the major visceral organs are reversed or mirrored from their normal positions).

**** uncommon autosomal recessive syndrome. In this condition, there is a structural defect in dynein arms of the cilia**

SUMMARY of chronic obstructive pulmonary diseases (COPD):

<i>Clinical Term</i>	<i>Anatomic Site</i>	<i>Major Pathologic Changes</i>	<i>Etiology</i>	<i>Signs/Symptoms</i>
<i>Chronic Bronchitis</i>	<i>Bronchus</i>	<i>Hyperplasia of Mucus-secreting gland</i>	<i>Tobacco smoke, air pollutants</i>	<i>productive cough</i>
<i>Emphysema</i>	<i>Acinus</i>	<i>Airspace enlargement, wall destruction</i>	<i>Tobacco smoke</i>	<i>Dyspnea, productive cough</i>
<i>Bronchiectasis</i>	<i>Bronchus</i>	<i>Airway dilation and scarring</i>	<i>chronic infections</i>	<i>Cough, purulent sputum, hemoptysis, recurrent pulmonary infection</i>

Questions

Q1:What is the characteristics of COPD?

- 1-airflow obstruction .**
- 2-decreased in the FEV1.**
- 3-reduced in the lung capacity.**

Q2:Name 4 of the COPD disorders ?

- 1- Bronchial asthma**
- 2- Chronic bronchitis**
- 3- Pulmonary emphysema**
- 4- Bronchiectasis**

Q3:What is the worst type of asthma ?

It is status asthmatic that is respond poorly to therapy.

Questions

Q4: What is the type of emphysema ?

- 1- Panacinar emphysema**
- 2- Centrilobular emphysema**
- 3- Paraseptal emphysema**
- 4- Irregular emphysema**

Q5: What are the characteristic of bronchiectasis ?

- 1- Permenant and abnormal bronchial dilatation .**
- 2- Bronchial obstruction**
- 3- Chronic sinusitis**

Questions

Q6: What does cor pulmonale mean?

A: Heart failure induced by chronic respiratory disorder

Q7: Why do you see bluish lips and tongue in chronic emphysematous patients?

A: Increased CO₂ in the blood

Q8: What are the complications of Bronchiectasis?

- 1. May develop lung abscess, migrate to brain, spleen or any organ.**
- 2. After 15-20 years may develop amyloidosis (Amyloid AL).**

MCQs

1- Chronic bronchitis is clearly linked to:

a/ cigarette smoking. b/dry cough

2- Patient came to the clinic with increased anteroposterior diameter of the chest, increased total vital capacity and hypoxia. What is the diagnosis :

a/emphysema. b/restrictive pulmonary diseases
c/bronchial asthma

3- Which one of emphysema types is tend to localize subjacent to the pleura and inter lobar septa:

a/ irregular emphysema. b/ panacinar emphysema.
c/ paraseptal emphysema. d/ centrilobular emphysema.

4- An enzyme that destroys elastic fibers from the wall of alveoli:

a/Elastase. b/ amylase

MCQs

5- Bronchiectasis most often involves:

a/ lower lobes of both lungs.

b/ lower lobe of one lung

c/ upper lobes of both lungs

d/ upper lobe of one lung

6- Centrilobular emphysema is most often localized to :

a/ upper part of the pulmonary lobes.

b/ lower part of the pulmonary lobes

c/whole the pulmonary lobes

7- Which of the following is source of elastase and attracts by cigarette smoking :

a/neutrophils.

b/ macrophages

c/lymphocyte

d/ both a and b

MCQs

8- Which of the following is anatomical site for emphysema?

- A – Acinus
- B- Bronchus
- C- Trachea

9- Where is the Panacinar occurring?

- A. smokers
- B. Alpha-1 antitrypsin deficiency
- C. Chronic infection

10- Which enzyme is inactivated by alpha-1antitrypsin?

- A. ACE 2
- B. Elastase
- C. Proteases
- D. Both B,C
- E. Both A,B

MCQs

11- Which of the following is most common type of emphysema?

- A. Panacinar
- B. Paraseptal
- C. Irregular
- D. Centrilobular
- E. Both A,D
- F. Both A,B

12- Which of the following is acute medical emergency?

- A. kartagener syndrome
- B. status asthmatic
- C. Pneumothorax
- D. Both A,b
- E. Both B,C

MCQs

Q13: Which of the following is complication to chronic bronchitis?

- A. Cystic fibrosis
- B. Cor pulmonary
- C. Lung cancer
- D. Pneumothorax

Q14: Which of the following is associated with formation of bullae?

- A. Panacinar
- B. Paraseptal
- C. Irregular
- D. Centrilobular

MCQs

Q15: Ahmad 21 years old came to hospital, because he had productive cough for last 8 months, also he is smoker. We did sputum culture, we found macrophages full of carbon, and a lot of neutrophil. What is the diagnosis?

- A. Chronic bronchitis
- B. Emphysema
- C. Chronic asthma
- D. Bronchiectasis

Q16: Which of the following is causing infertility?

- A. Bronchiectasis
- B. Emphysema
- C. Kartagener syndrome
- D. Pneumothorax

Answers : 1- A
2- A
3- C
4- A
5- A
6- A
7- D
8- A
9- B
10- D
11- C
12- E
13- B
14- B
15- A
16- C

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