SO1 : COPD Pathology

Chronic Disease (Pulmonary)
= Divided into 2 types
→ Obstructive
→ Restrictive

Obstructive Lung Disease

Struggle to exhale
Associated → Cigarette Smoking
progressive loss in lung function
↑ Dyspnoea
Hypoxia
Resp failure
Cor pulmonale — NB
Lung Fx → ↓ FEV_1

Conditions
Chronic Bronchitis
Emphysema
Asthma
} NB.
Small airway disease (Bronchiolitis)

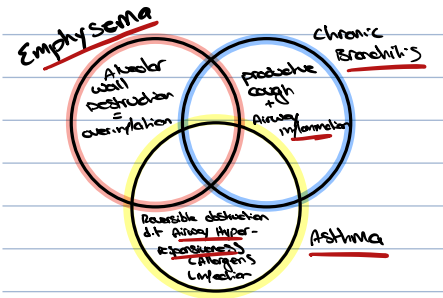
Restrictive Lung Disease:

↓ Expansion of parenchyma
↓ TLC
FEV_1 = ↑ / normal
→ Chest wall disorders
- neuromuscular / obesity / pleural / kyphoscoliosis
→ Chronic interstitial & infiltrative disease
- pneumoconiosis / Interstitial fibrosis

COPD

Mainly
- Chronic bronchitis
- Emphysema

=> Many have overlapping features of damage
↳ Emphysema : Damage at alveoli lvl = over inflation
↳ Chronic Bronchitis : Damage at Bronchi = productive cough
↳ Asthma : Reversible Bronchospasm
: Bronchial inflammation
: Can have an irreversible component

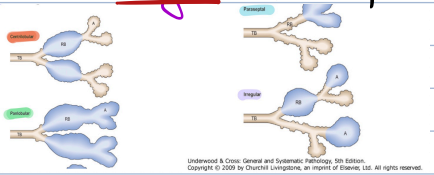


Emphysema

Irreversible
↑ Size distal terminal bronchiole
(Destruction Alveolar walls)
(without obv fibrosis)
= Massive Alveoli
= ↓ Surface area for gas xchange
Long term Heavy Smoking
(also pollution)

Pathological Classification:

according to location within lobule
1) Centriacinar : Middle (Resp Bronchiole)
2) Panacinar : Entire
3) Paraseptal : Peripheral Alveoli
4) Irregular : combo of All 3



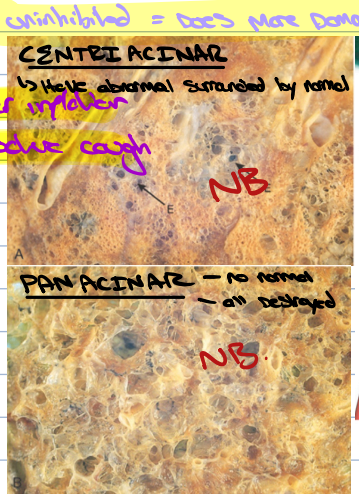
Lung lobule?
Terminal Bronchiole → Pulmonary → AA. / Vv.
→ All its Branches

Centriacinar

Proximal part of lobule (R. Bronchiole)
Distal Alveoli = spared (relatively)
usually upper lobes
Heavy smokers

Panacinar

Lower zones of lung
α_1 - Antitrypsin Deficiency
↳ Enzyme that stops Elastase Action
↳ uninhibited = does more damage that should



Irregular Emphysema

Acinus irregularly marked
Scarring
Scar tissue → pulls adj alveoli →
Dilating of some alveoli → Larger

Emphysema Pathogenesis

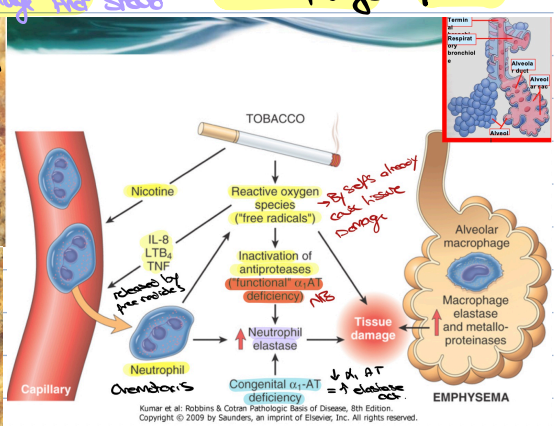
Result of destructive properties of High protease lvls
Disturbance of protease : Anti-protease Ratio

Any insult that ↑ no. neutrophils & macrophages in lung = more protease production (↓, ↑)
Smoking attracts neutrophils (foreign matter)
↳ Smoking also disrupt oxidant : Antioxidant Ratio (smoking = lots of free Radicals)
= Depletes lung Anti-oxidants
→ Additional O's :
Goblet cell Metaplasia = mucus plugging
Inflammatory infiltration ⇐ Neutro, Macro, Lympho
Thickening of Bronchiolar walls
↳ Smooth muscle hypertrophy & peribronchiolar fibrosis.

Fx: 1) Voluminous lungs = overinflated
2) Mostly upper 2/3 affected
= Barrel chest
3) Apical Blebs / Bullae
4) Abnormally large Alveoli
(Loss of Alveolar septae)
5) ↓ capillary Bed → ↑ pulmonary pressure → Cor pulmonale.

CXR:
↳ ↓ ♡ shadow
↳ Bottom of lungs = flatter

↓ Alveoli = ↓ Gas xchange



Distal (paraseptal)

Proximal = normal
Distal = alveoli affected
↳ closest parts to pleura mostly
- Esp upper parts of lung
- occurs adj to areas of Fibrosis / Scarring / Atelectasis

multiple enlarged spaces

Emphysema Presentation:

Dyspnoea cough wheezing
Prolonged Expiration
↓ RR (Deep Breathing
} more elastic work.

Death d.t: (↑ pCO_2)
- Resp Acidosis & coma
- Cor Pulmonale
Bullae rupture
- Pneumothorax

Chronic Bronchitis

NB Definition
Persistent cough
sputum production
3 Months
2 consecutive years
Absence of ID cause

NB ⇌ know Def. Future Boards!

common in: smokers
: urban smog Areas

Complications:
progress to COPD
Cor pulmonale
Metaplasia -> Dysplasia -> Malignancy
↳ Mostly Smoking induced
RE -> Squamous
(↓ mucociliary?)

Pathogenesis
- Irritant
- Hypersecretion of mucous in Large Airways
= Hypertrophy of submucosal Glands in Trachea & Bronchi
Chronic Bronchitis (with inflammation) Develops
overall = Airway obstruction (small bronchioles)
= Basis of Acute Bronchitis (superinfection)
=> Airway obstruction / mucus oversecretion / chronic inflammation & fibrosis

Clinical
Initially Asymptomatic
Chronic cough
Dyspnea of exertion
Dyspnea at Mild exercise
COPD features: Hypercapnia (↑ CO2)
Hypoxia (cyanosis) (↓ O2)
Cor pulmonale with RH failure
Superimposed infections / pneumonia
Death

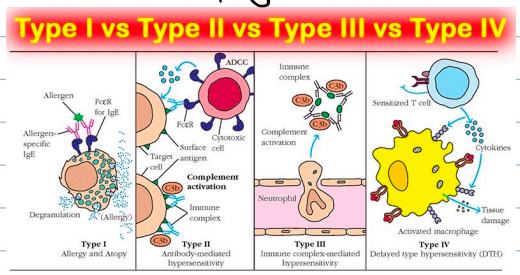
Asthma

Reversible small airway obstruction
- Bronchospasm
- Inflammation
- oedema
Paroxysmal attacks
over Distended lungs
Enlarged Bronchial mucous glands with
mucous plugs in Bronchi
(Hyperplasia/Trophy)
Hypersensitivity induced:
Chronic inflammation with variable
Bronchoconstriction & mucous secretion
Night / Early morning (circadian Rhythm)

Bronchoconstriction
mucous secretion
Inflammation

Clinical Categories of Asthma

1) Atopic (T1 Hypersensitivity)
2) non-Atopic (Resp infections)
3) Aspirin-induced
4) occupational Asthma — T1 / TIII
5) Allergic Bronchopulmonary Aspergillosis
↳ Aspergillus spores inhalation
= mucus plugs with Hyphae



Asthma -> Early (Histamine)
-> Late (Eosinophils & Lymphocytes)

Asthma Pathology

over Distended lungs
Bronchi + Bronchioles = occluded mucus
Airway walls = thick — inflammation, oedema (Smooth muscle Hypertrophy)
↳ BM thickened
↳ Submucosal Gland Hypertrophy

Obstructive airway Disease Summary

- ↑ Difficulty to exhale
- Partial / complete obstruction at any level
- ↓ FEV1 / FVC Ratio
↳ Chronic Bronchitis
↳ Asthma
↳ Emphysema
↳ Bronchiectasis
↳ Small airway Disease: Bronchiolitis