Mosaic attenuation

- Non-specific = patchwork of regions of differing attenuation
- Three major causes
  - pulmonary vascular
  - small airways
  - primary parenchymal disease
- Term best used where the differentiation between mosaic perfusion (or mosaic oliagemia) and ground-glass opacity cannot be confidently made.

Mosaic attenuation (normal finding)

- Posterior aspects of the upper lobe often have higher attenuation than the superior segments of the lower lobes.
- In general, the most dependent portions of the lung are of slightly higher attenuation than the less-dependent lung.
- Increased degree of perfusion centrally than peripherally.
- mild mosaic attenuation at inspiration can be seen in up to 20% of normal patients.
- Can be normal during expiratory CT

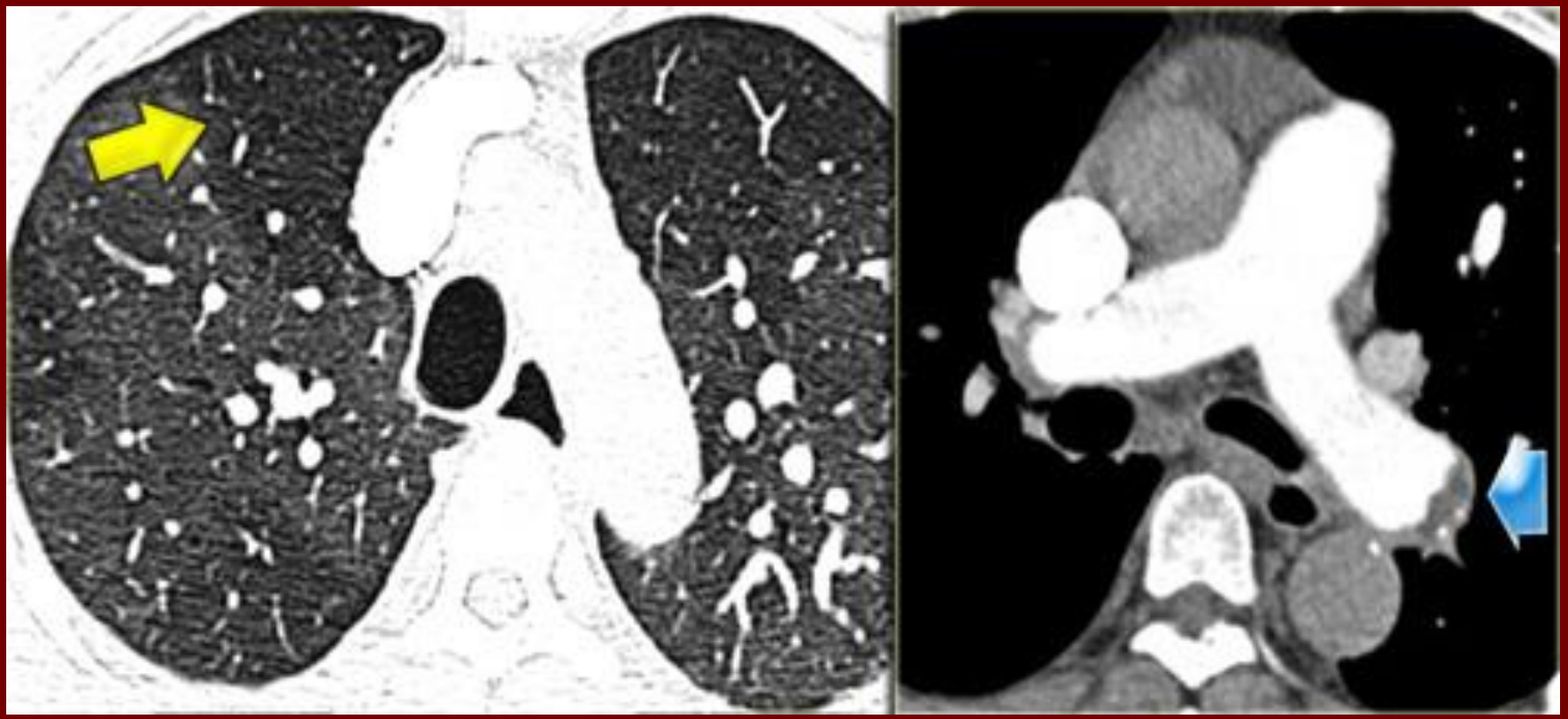
Obliterative Bronchiolitis

Inspiration

Expiration

Mosaic perfusion

Chronic Thromboemboli



Mosaic attenuation

- Role of the radiologist is to determine which part is abnormal: the black or the white lung.
- Look at expiratory scans for air trapping
- Look at the vessels

Two diagnostic hints for further differentiation

- There are two diagnostic hints for further differentiation:k at expiratory scans for air trapping
- Look at the vessels
- If the vessels are difficult to see in the 'black' lung as compared to the 'white' lung, likely that the 'black' lung is abnormal.
- Two possibilities:
  - Obstructive bronchiolitis or chronic pulmonary embolism.
  - Sometimes these can be differentiated with an expiratory scan.
- If the vessels are the same in the 'black' lung and 'white' lung, then you are looking at a patient with infiltrative lung disease.
- Parenchymal disease/ Infiltrative lung disease :
  - high attenuation regions are abnormal and represent ground-glass opacity

Mosaic attenuation

- **obstructive small airways disease:**
  - low attenuation regions are abnormal and reflect decreased perfusion of the poorly ventilated regions, e.g. bronchiectasis, cystic fibrosis, constrictive bronchiolitis
- **Occlusive vascular disease** (can be termed a **mosaic perfusion** pattern.
  - low attenuation regions are abnormal and reflect relative oligaemia, e.g. chronic pulmonary embolism
- **Parenchymal disease:**
  - high attenuation regions are abnormal and represent ground-glass opacity

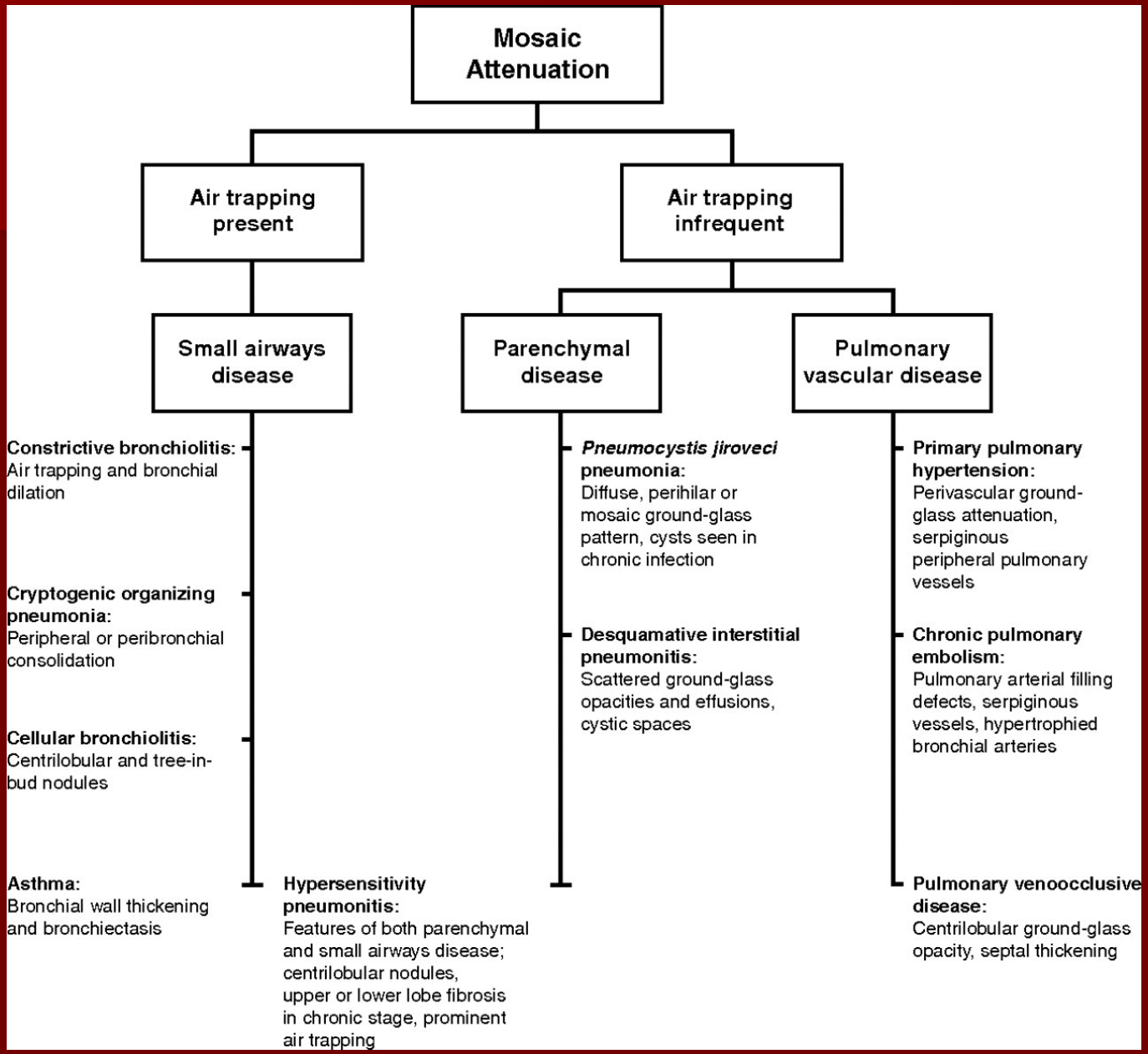
Differentiating Cause

- Evaluate the size of the peripheral pulmonary arteries in the more lucent lung.
- With vascular causes, the peripheral pulmonary vasculature is attenuated in areas of dark lung , corresponding to vascular territories where segmental or subsegmental arteries are narrowed or occluded
- This finding is classically described in but not limited to CTEPH (chronic thromboembolic pulmonary hypertension)

Cont

- Finding can also be seen in cases of small airways disease.
- small airway obstruction or fibrosis leads to hypoxic vasoconstriction in the affected lung, shunting blood away from areas of reduced gas exchange.

3 Causes


Mosaic Attenuation
Air trapping present
Air trapping infrequent
Small airways disease
Parenchymal disease
Pulmonary vascular disease
Constrictive bronchiolitis: Air trapping and bronchial dilation
Cryptogenic organizing pneumonia: Peripheral or peribronchial consolidation
Cellular bronchiolitis: Centrilobular and tree-in-bud nodules
Asthma: Bronchial wall thickening and bronchiectasis
Hypersensitivity pneumonitis: Features of both parenchymal and small airways disease; centrilobular nodules, upper or lower lobe fibrosis in chronic stage, prominent air trapping
Pneumocystis jiroveci pneumonia: Diffuse, perihilar or mosaic ground-glass pattern, cysts seen in chronic infection
Desquamative interstitial pneumonitis: Scattered ground-glass opacities and effusions, cystic spaces
Primary pulmonary hypertension: Perivascular ground-glass attenuation, serpiginous peripheral pulmonary vessels
Chronic pulmonary embolism: Pulmonary arterial filling defects, serpiginous vessels, hypertrophied bronchial arteries
Pulmonary venoocclusive disease: Centrilobular ground-glass opacity, septal thickening