

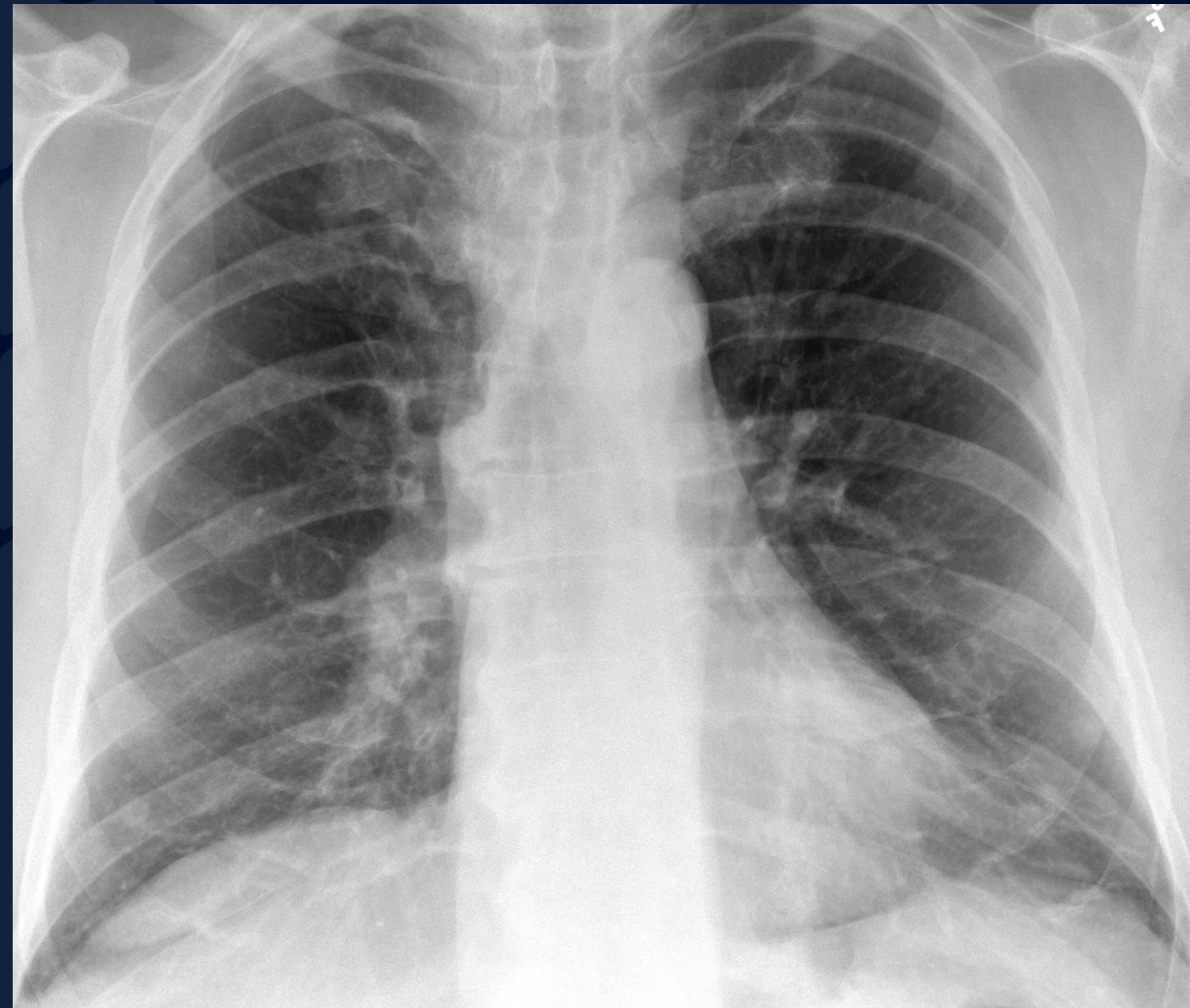
69 year-old male presents with  
right posterolateral pleuritic chest  
pain.

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**UConn**  
**HEALTH**

RADIOLOGY



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# Pulmonary embolus (Westermark and Palla Signs)



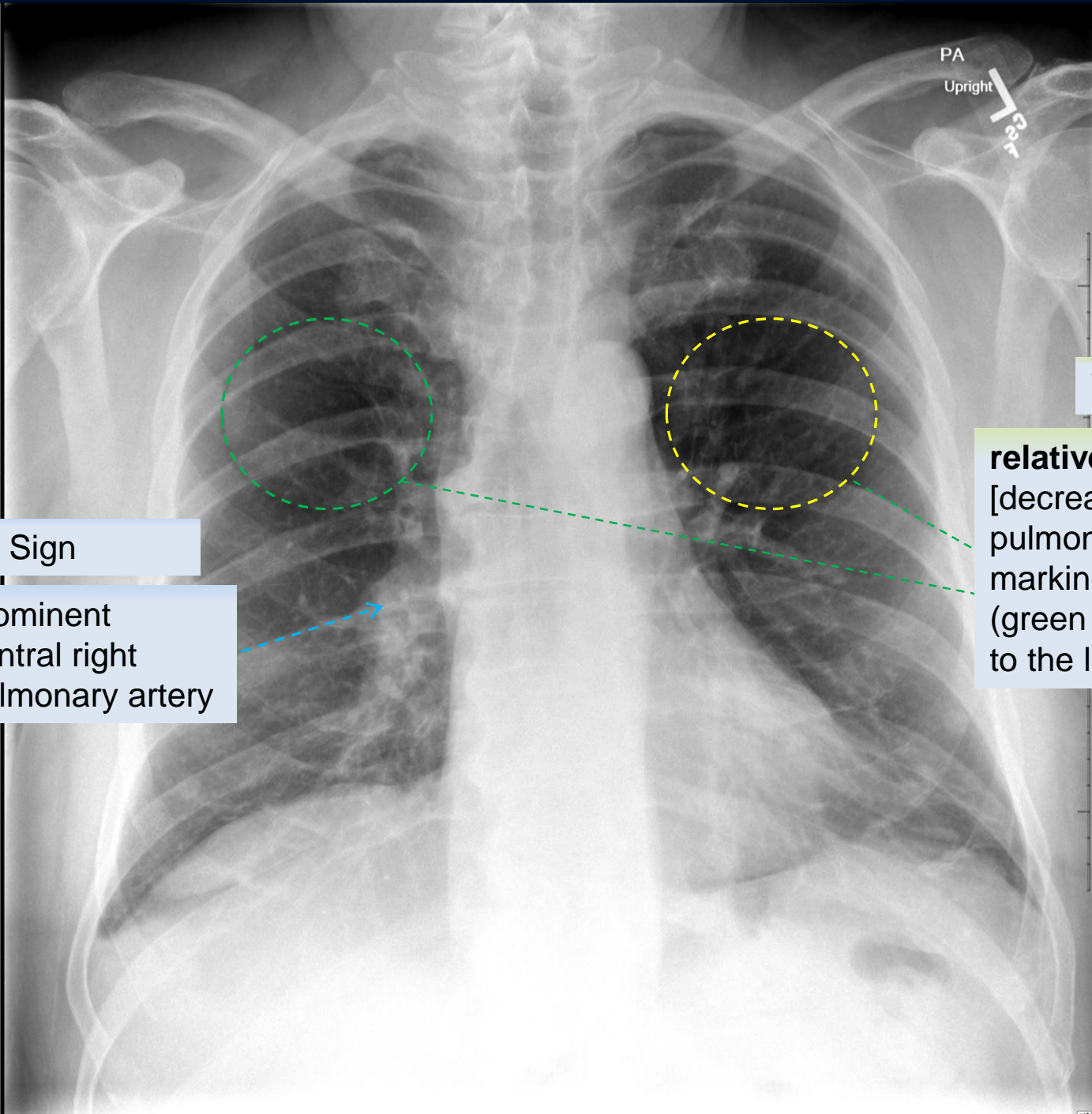
PA  
Upright  
123

**Westermark Sign**

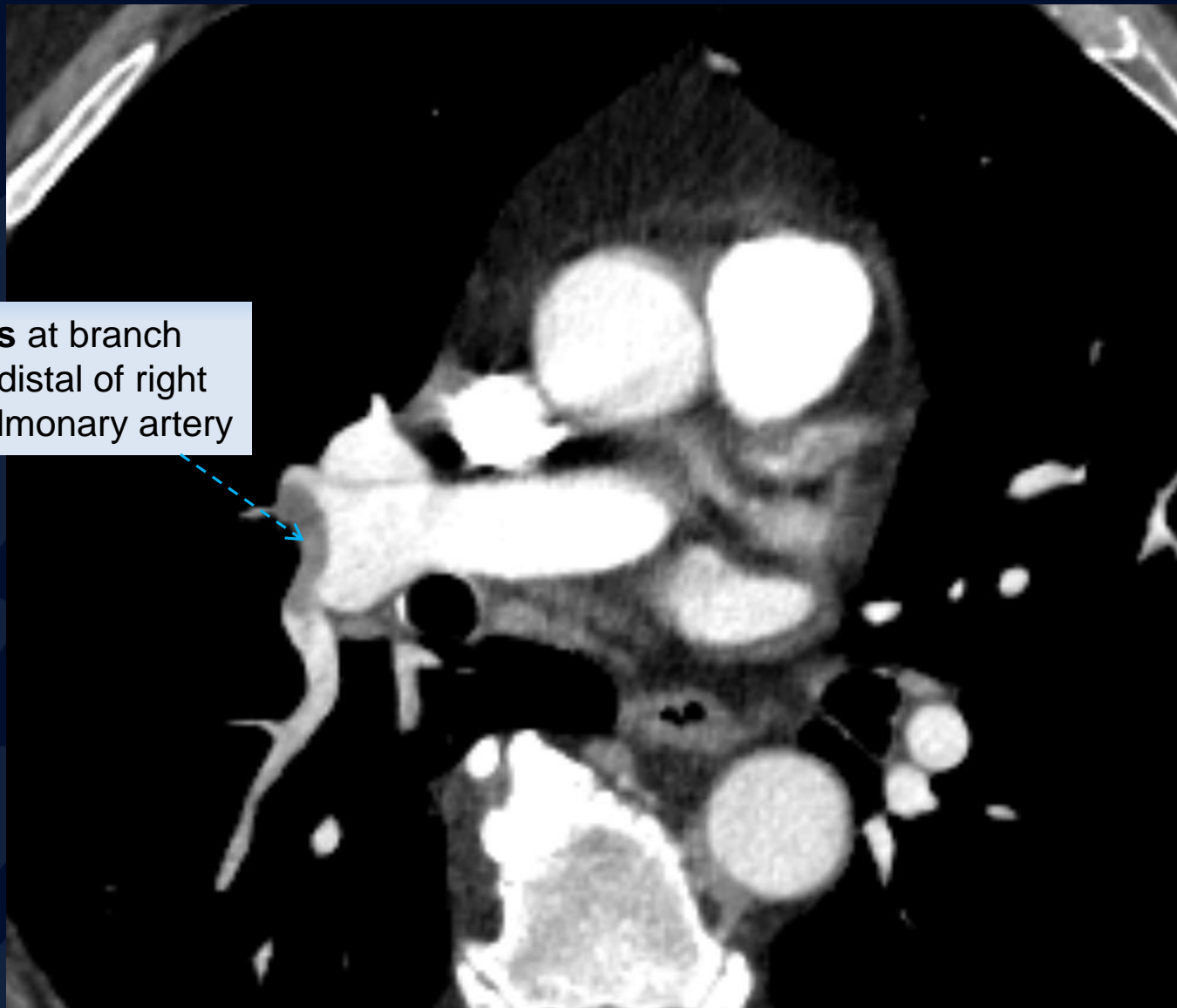
**relative oligemia**  
[decreased caliber of pulmonary arterial markings on the right (green circle) compared to the left (yellow circle)].

**Palla Sign**

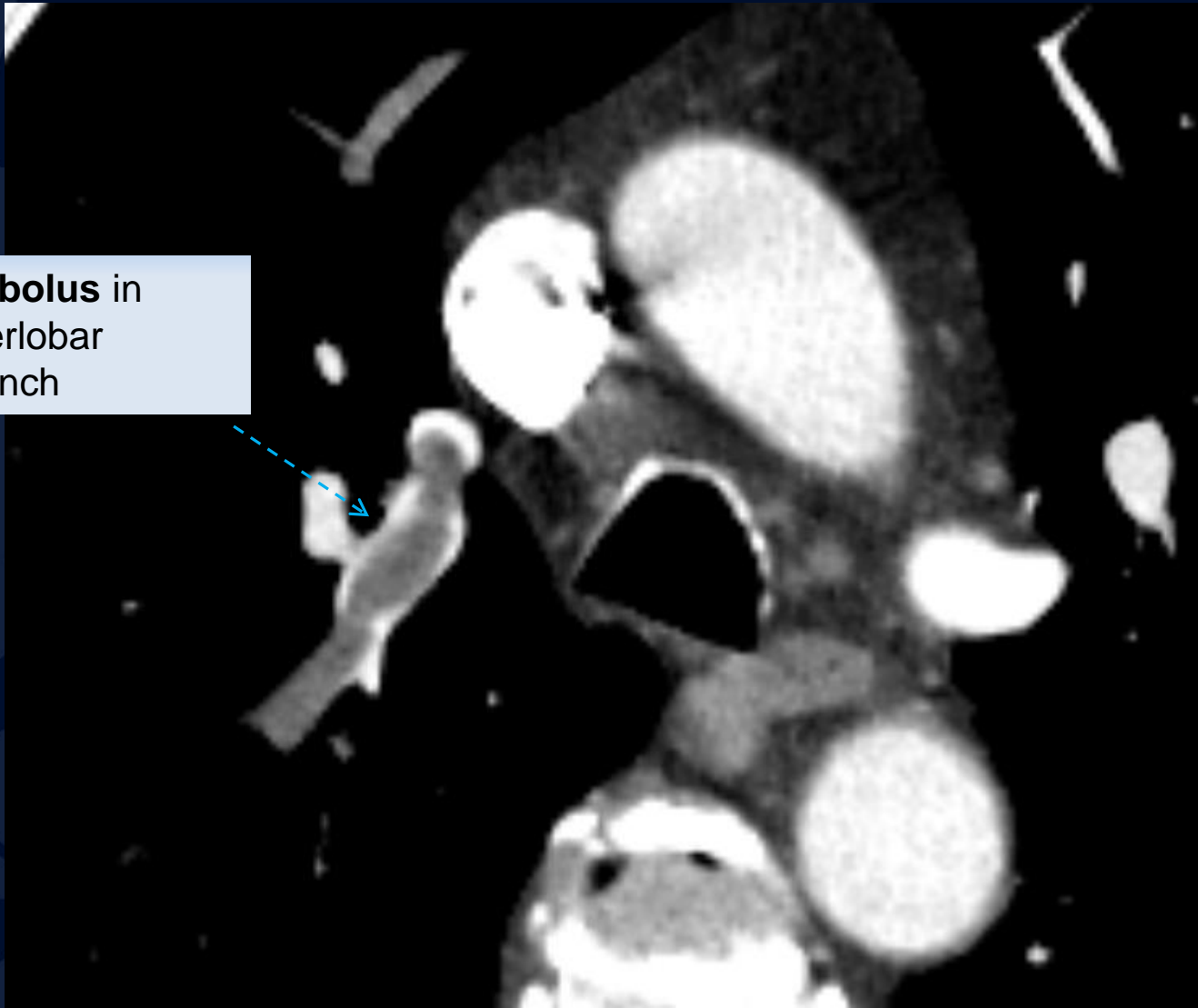
prominent central right pulmonary artery



**embolus** at branch  
point of distal of right  
main pulmonary artery



**embolus** in  
interlobar  
branch

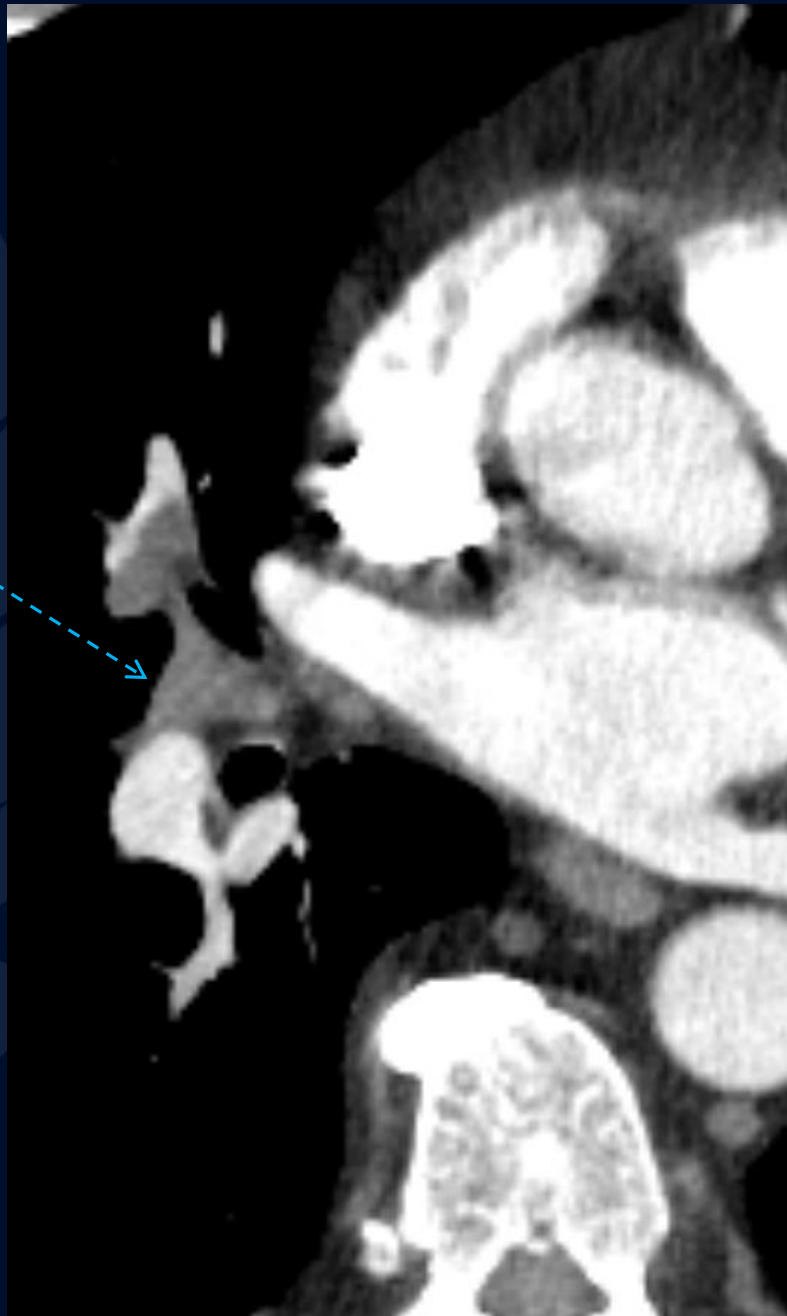






**embolus** in  
segmental branch to  
RML

**embolus** in sub-segmental branch of right pulmonary artery



**embolus** in sub-segmental branch of right pulmonary artery



pleural thickening,  
likely representing  
reactive or  
ischemic pleuritis

# Pulmonary Embolus (Westermark and Palla signs)

- Westermark Sign – areas of relative oligemia secondary to decreased caliber of regional pulmonary arteries.
  - The relative oligemia occurs as a result of proximal occlusion of the involved pulmonary arteries.
- As seen in this case, the more central pulmonary artery may be dilated (Palla sign).
- Westermark sign has the highest positive predictive value (~38%) and specificity (~92%) for pulmonary embolism relative to other plain radiographic findings.
- Note that generally, plain radiographs are used to exclude alternative diagnoses on the differential, i.e. pneumonia, CHF, or pneumothorax.
- Most plain chest radiographs in the setting of PE are NORMAL.

# Pulmonary Embolus (other signs)

- Fleischner sign – enlarged main pulmonary artery.
- Hampton hump – peripheral wedge-shaped region of opacity suggesting lung infarction distal to embolus.
- Palla sign – enlarged right pulmonary artery.
  - When seen with Westermark sign suggests emboli in segmental or smaller sub-segmental pulmonary arteries
- Chang & Knuckle signs – dilated and abruptly cut off right pulmonary artery
- Note that the absence of any of these signs does not exclude a pulmonary embolism

# References

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- Brenes-Salazar, J. A. (2014). Westermarck’s and Palla’s signs in acute and chronic pulmonary embolism: Still valid in the current computed tomography era. *Journal of Emergencies, Trauma, and Shock*, 7(1), 57–8. <https://doi.org/10.4103/0974-2700.125645>
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