Dyspnea in the oncology patient: a pulmonologist's approach

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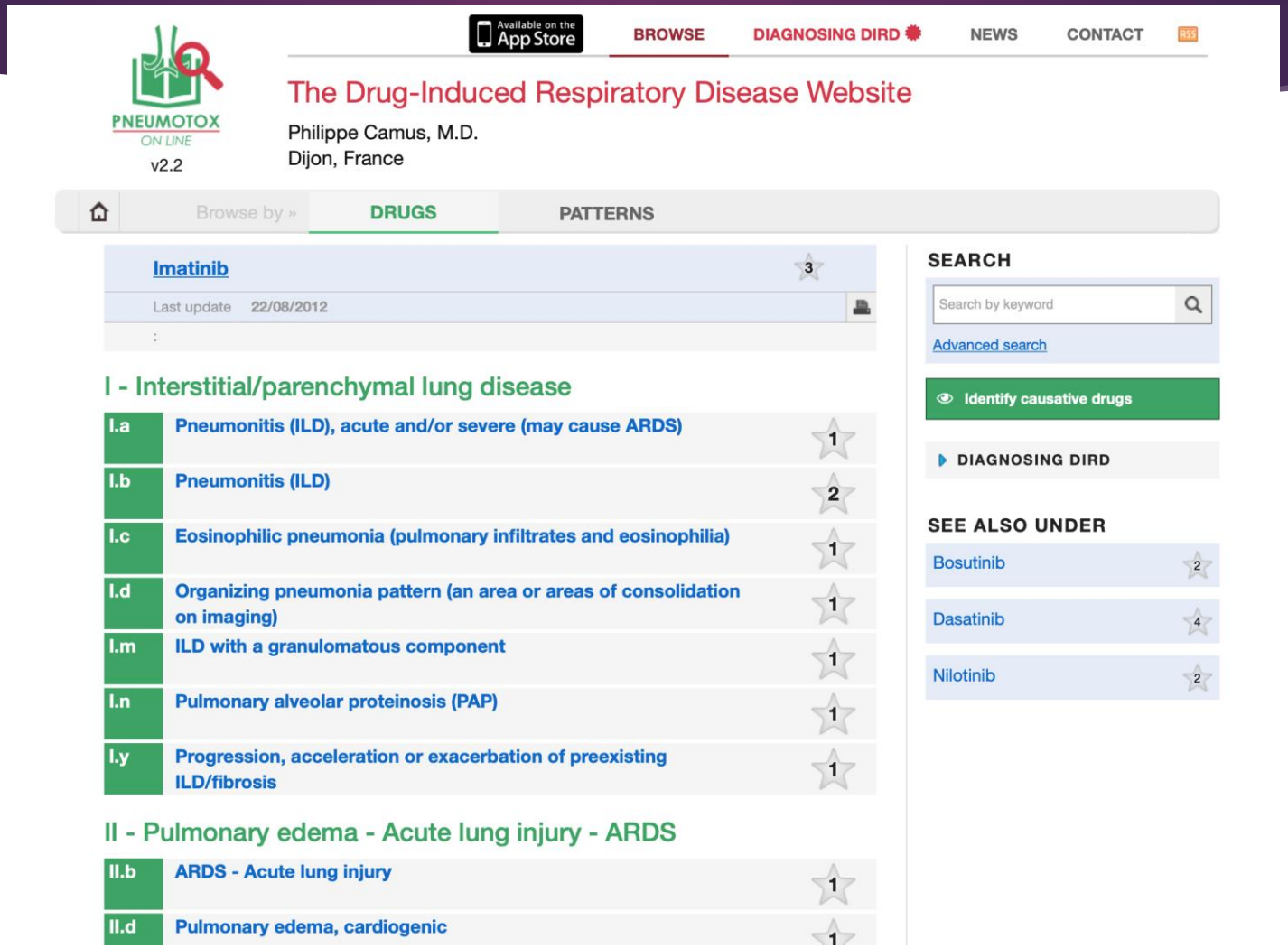
PULMONARY AND CRITICAL CARE MEDICINE

LAKELAND REGIONAL HEALTH

History – High yield

- Severity and Urgency
- Acute versus chronic complaint
- Associated complaints
  - Wheezing
  - Cough
  - Bleeding
  - jaundice
  - Swelling and weight gain
  - Palpitations
  - Aspiration
  - Ascites
  - Orthopnea (CHF, diaphragm failure, effusion)
  - Platypnea (AVMS, liver disease)
- Other medical history
  - Prior VTE
  - Port
  - Smoking
  - CTD
  - Cardiac history
  - Recent BMT
  - Recent procedures
- Medications
- Radiation

Medications



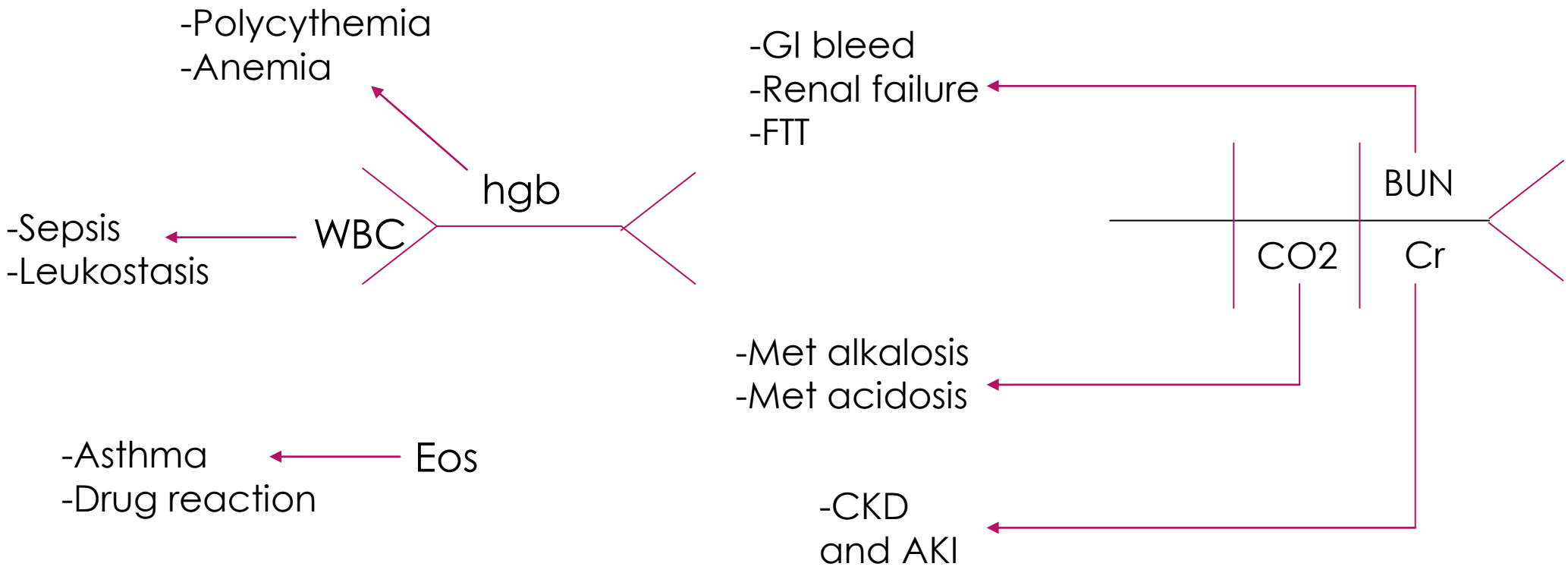
Physical exam

- Vitals
  - Fever or hypothermia
  - BP
    - Hypertension
      - Multi-kinase inhibitors
      - VEGF agents, Proteasome inhibitors
    - Hypotension
      - Sepsis
      - PE
      - Heart failure or tamponade
      - Dehydration from diarrhea, vomiting, FTT
      - Adrenal insufficiency
- Tachypnea
  - Compensation for metabolic acidosis
  - Hypermetabolic state
  - Diaphragm failure
- SpO2%
  - Up to 10% differences in saturation estimates in darker-skinned patients and worse at lower saturations (Feiner 2007)
  - Methemoglobinemia
    - SpO2% usually in the mid 80s
    - Rasburicase (Alessa 2015)
    - Ifosfamide (Hadjiliadis 2000)
    - Cyclophosphamide (Sangera 2015)

Physical Exam
- high yield head to toe

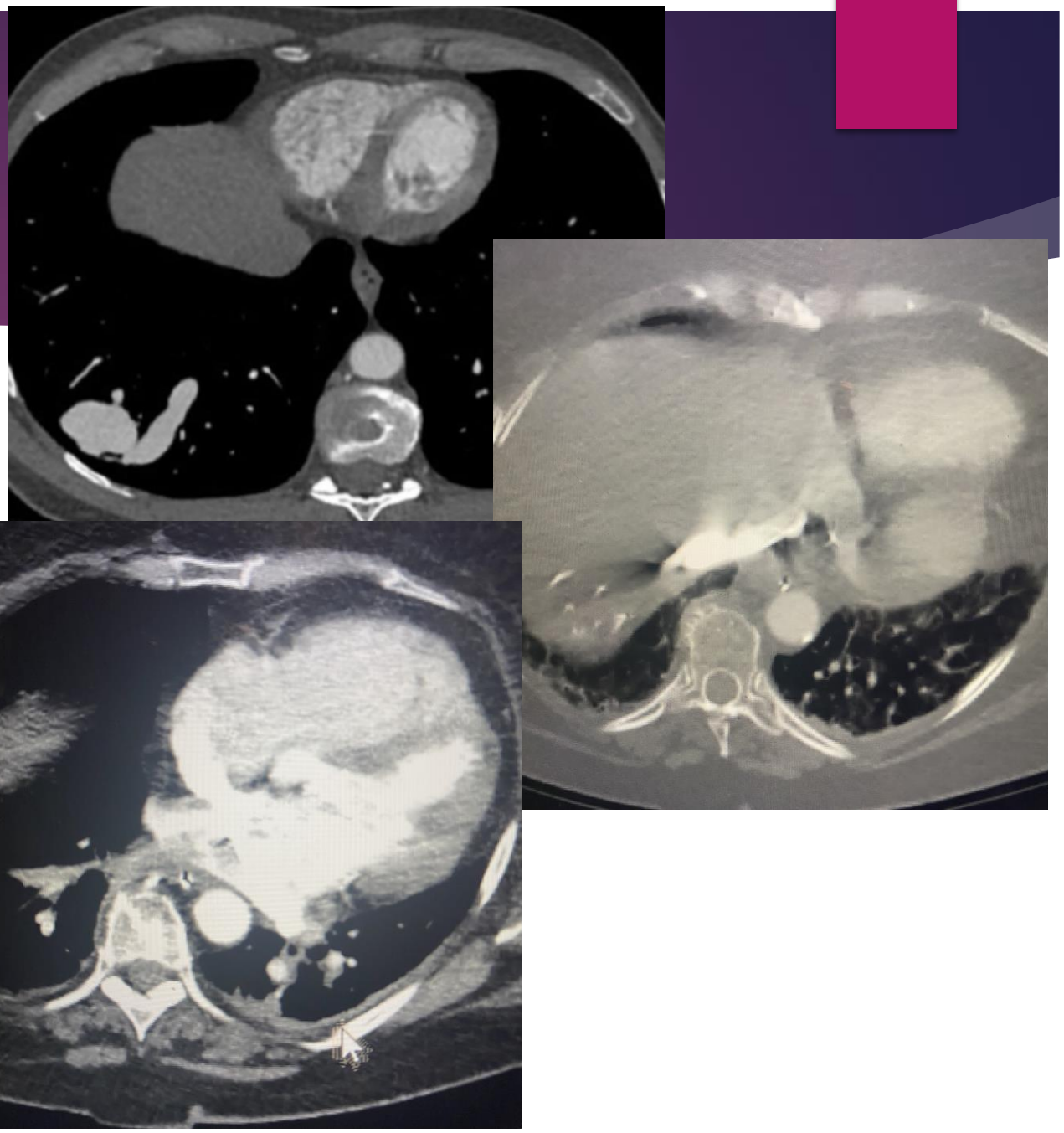
- Icterus
  - PLS after BMT?
  - Biliary obstruction?
- JVD
  - CHF
  - Tamponade
  - Valvulopathy
- Accessory muscle use
- Murmurs
- Wheezing, crackles, percussion
- Abdominal distension
- Extremities
  - Clubbing
  - Edema
  - Temperature
  - Capillary refill

Labs – Basic labs



Imaging – CT chest

- With contrast
  - Creates more ground glass
  - More difficult to asses lung parenchyma
  - CTA timing
    - PA
      - AVM (shunting)
      - PE
      - Clues for RV overload (contrast reflux)
      - Clues for intracardiac shunt (contrast in LA)
    - Aortic/bronchial artery
      - Dissection
      - Hemoptysis (Mass, mycetoma, bronchiectasis)



Bronchial artery

- Bronchial circulation is the source of massive hemoptysis in 90% of cases
  - Goal is to guide IR for bronchial artery embolization
  - → CT angio/aortogram

What about the kidneys?

- Contrast nephropathy from CAT scans is of questionable existence as an independent risk factor for AKI
- Concerns are based on very flawed and outdated data
- If the test will be helpful, get the test
- I routinely follow up abnormal VQ scans with CTAs that are negative
- Make a dot phrase for justification and list references
- Aycock et al 2018, Hinson et al 2019 , Ehrman et al 2017
- McDonald et al 2015
  - Mayo Clin Proc
    - Retrospective propensity score-adjusted analysis
    - A total of 6902 patients (4496 CKD stage III, matched: 1220 contrast and 1220 noncontrast; 2086 CKD stage IV-V, matched: 491 contrast and 491 noncontrast)
    - rates of AKI, emergent dialysis, and mortality were not significantly higher in the contrast group than in the noncontrast group in either CKD subgroup (CKD stage III: OR, 0.65-1.00; P<.001-.99 and CKD stage IV-V: OR, 0.93-2.33; P=.22-.99).

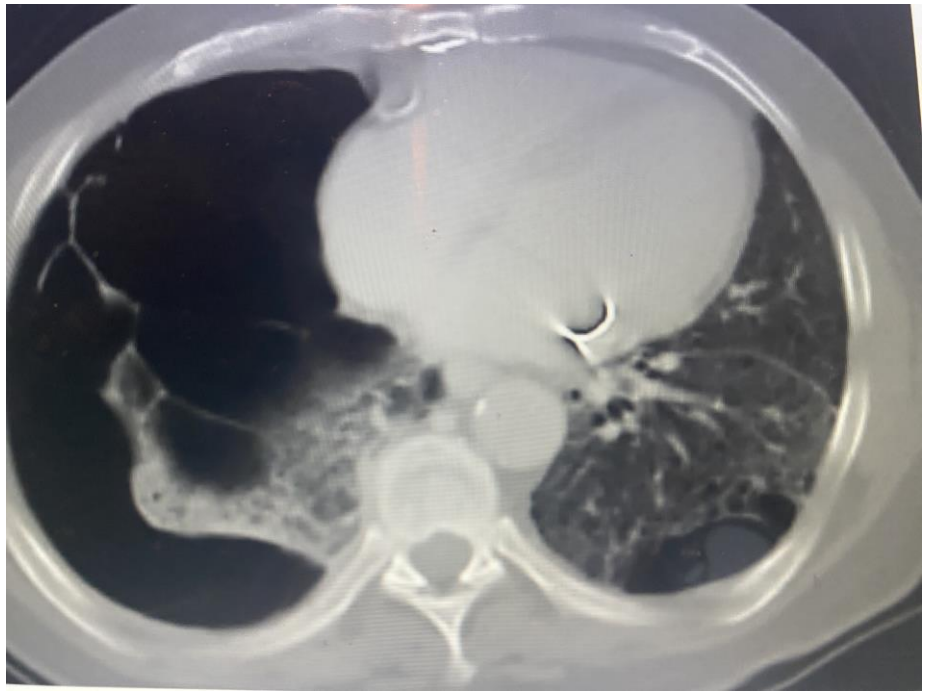
Imaging – CT chest

- Without contrast
  - HRCT chest
    - Can miss or mischaracterize nodules
    - Prone images with inspiration and expiration
    - Best for interstitial lung disease
  - Non con CT chest
    - Best for nodules and masses
    - Prone to artifacts at the bases

Examples

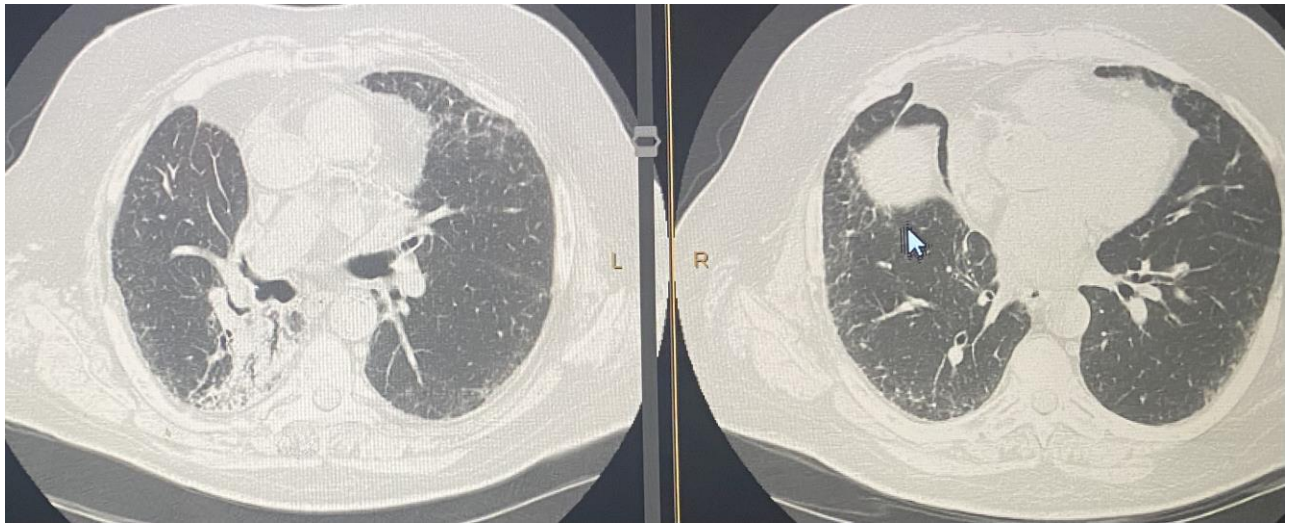
h/o small cell, severe bolus disease and dynamic hyperinflation

Treated with liquid morphine



h/o radiation and now concomitant IPF

Treated with Esbriet and gabapentin

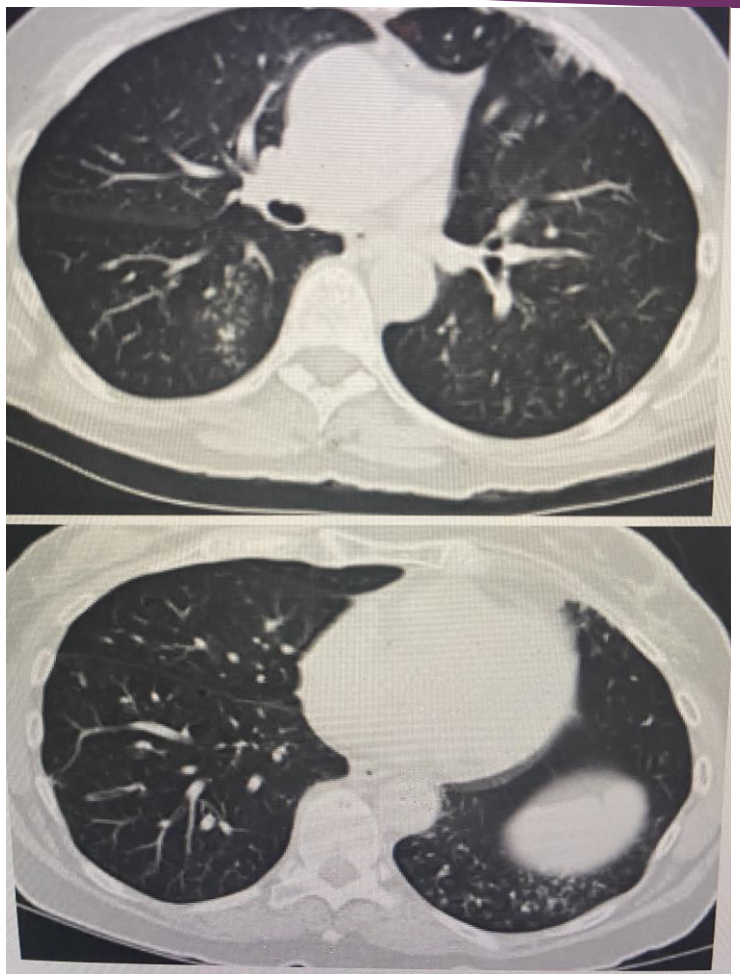


Examples - micronodules

Centrilobular nodules

-MAI, medication induced bronchiolitis, hypersensitivity pneumonitis

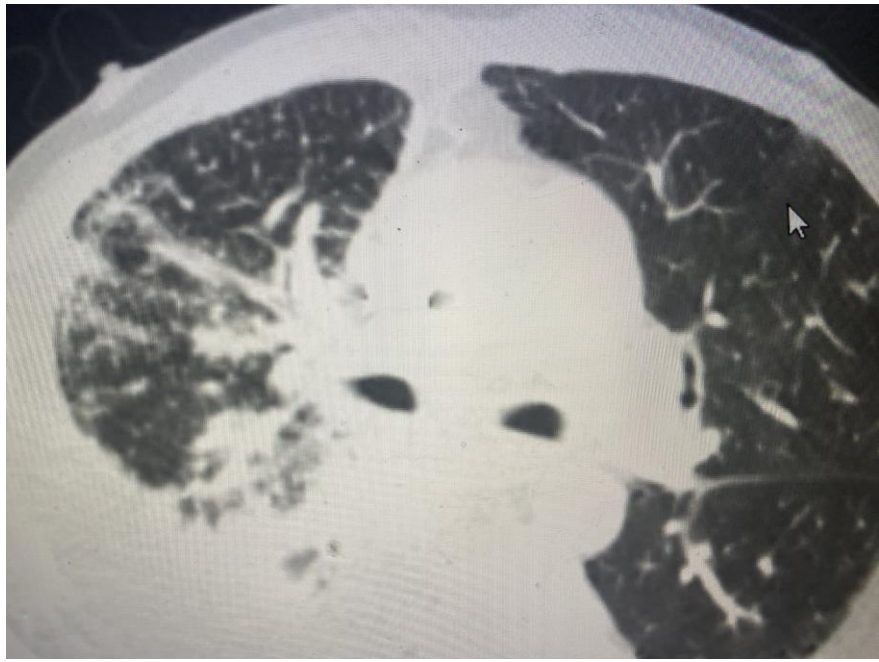
-Spare the periphery

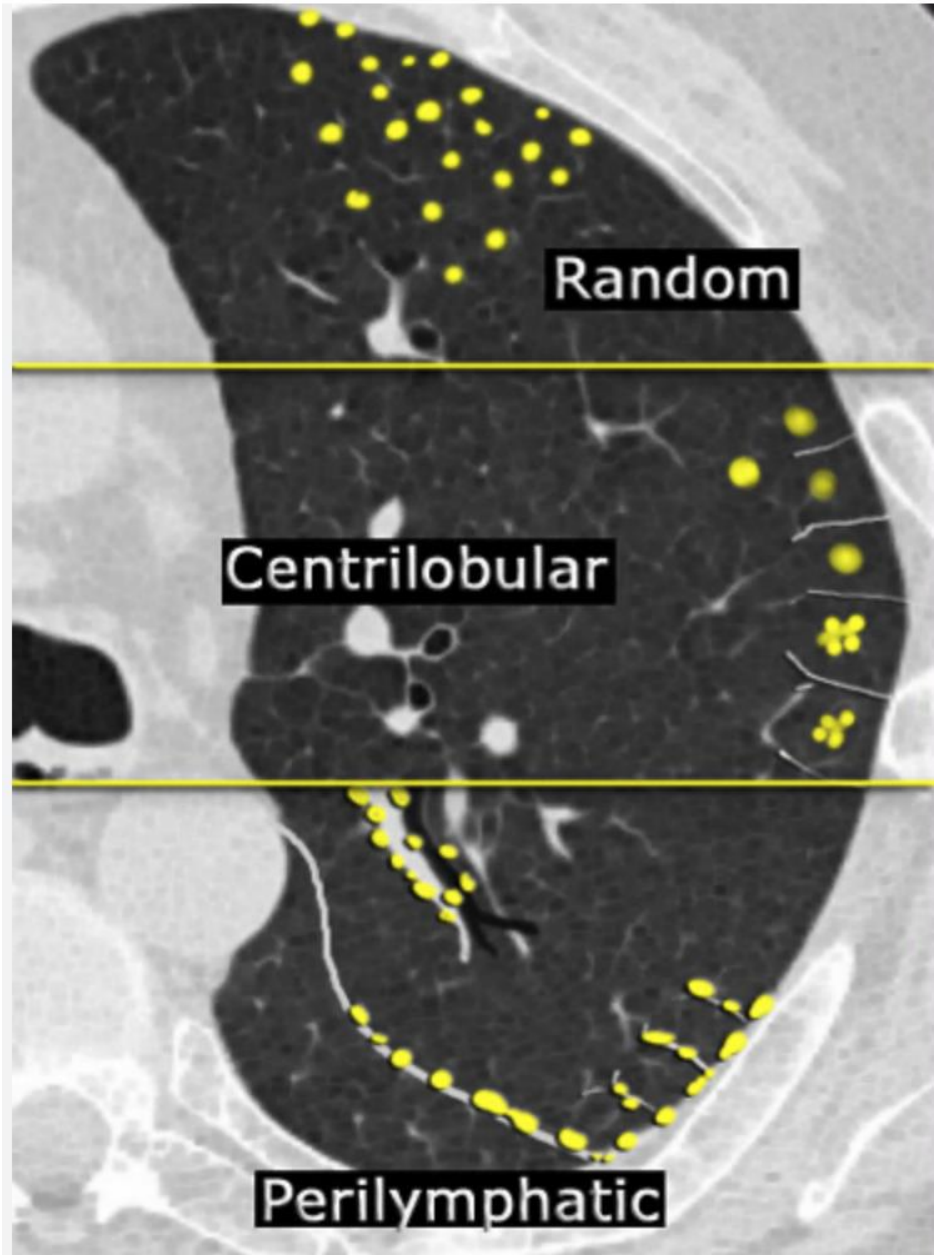


Peri lymphatic

-lymphangitic spread, sarcoidosis

-bronchovascular and subpleural





HRCT - basic interpretation. (n.d.). Radiologyassistant.Nl. Retrieved May 13, 2023, from https://radiologyassistant.nl/chest/hrct/basic-interpretation

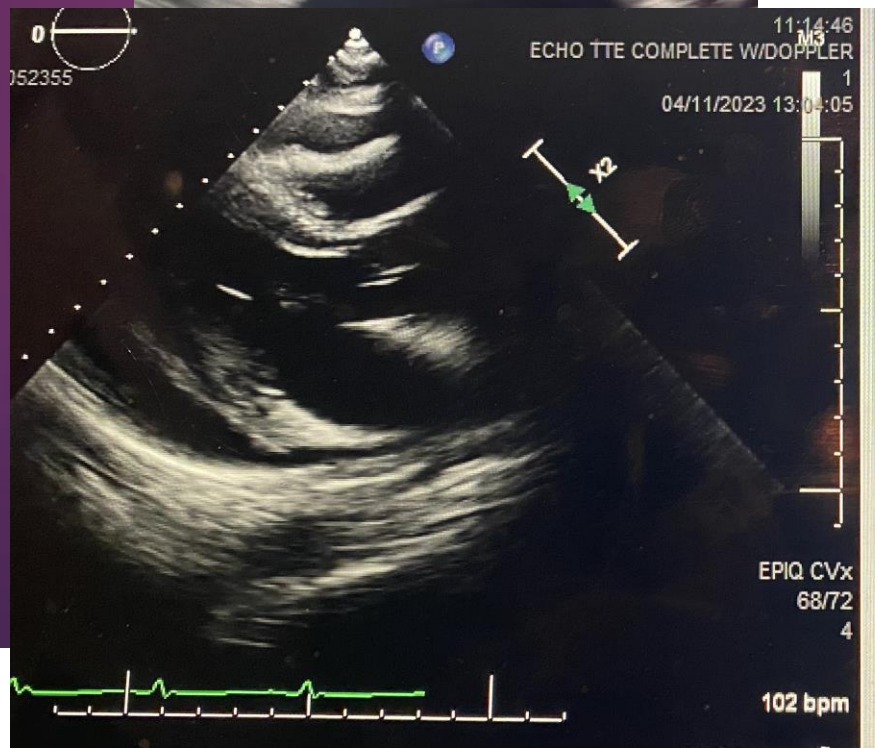
Echo and POCUS

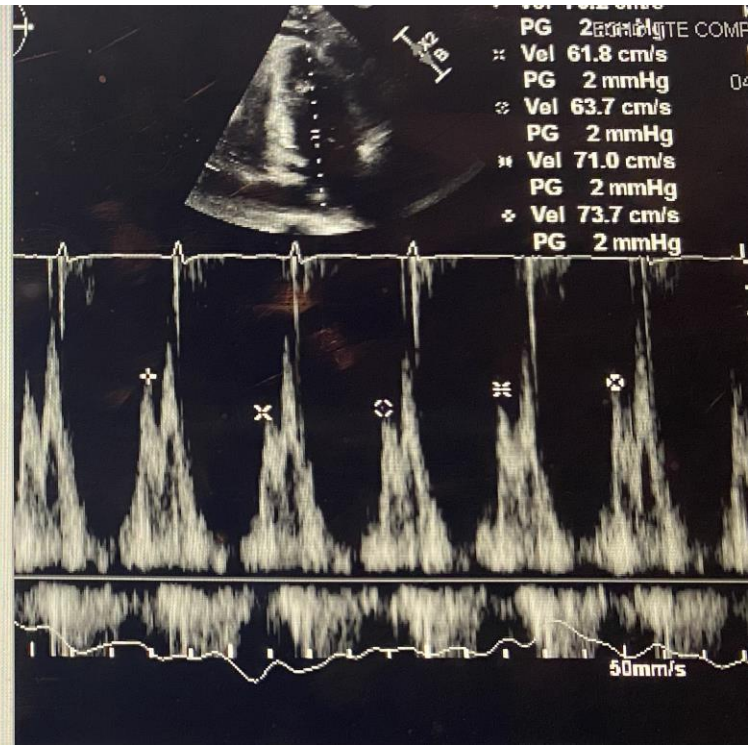
IVC gives clues for RV pressures

-volume status

-tamponade

-RV failure from PE or MI





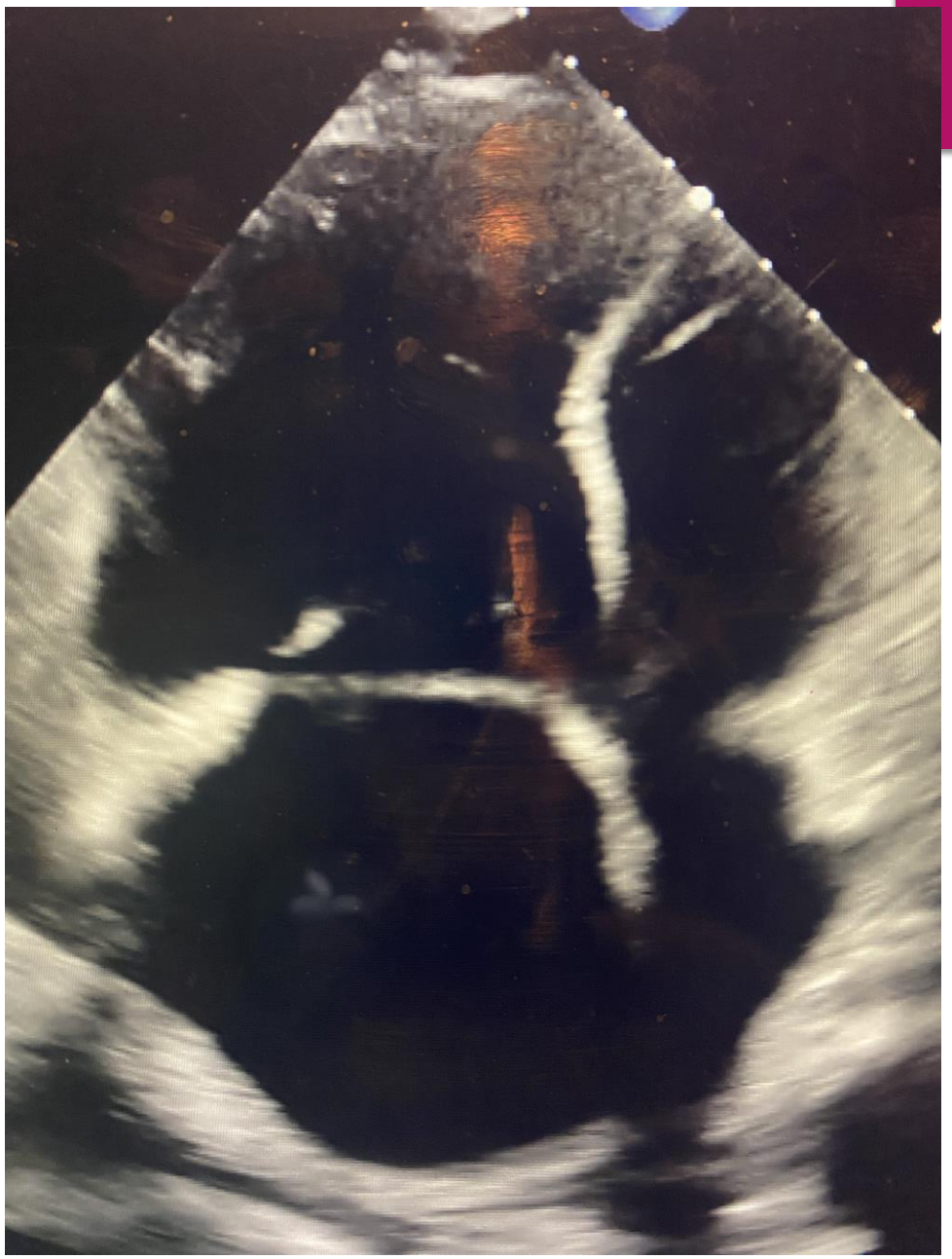
RV failure

-PE?

-Tumor or medication induced pulmonary hypertension?

-Malignancy-induced PVOD? (McHugh 2021)

-CTEPH



Bubble study

R → L shunt

Specific Situations

Anemia
-IV iron, pulmonary rocket rocket fuel

BMC Pulm Med. 2015; 15: 58. Published online 2015 May 8. doi: 10.1186/s12890-015-0050-y

PMCID: PMC4426177 | PMID: 25952923

Anemia and hemoglobin serum levels are associated with exercise capacity and quality of life in chronic obstructive pulmonary disease

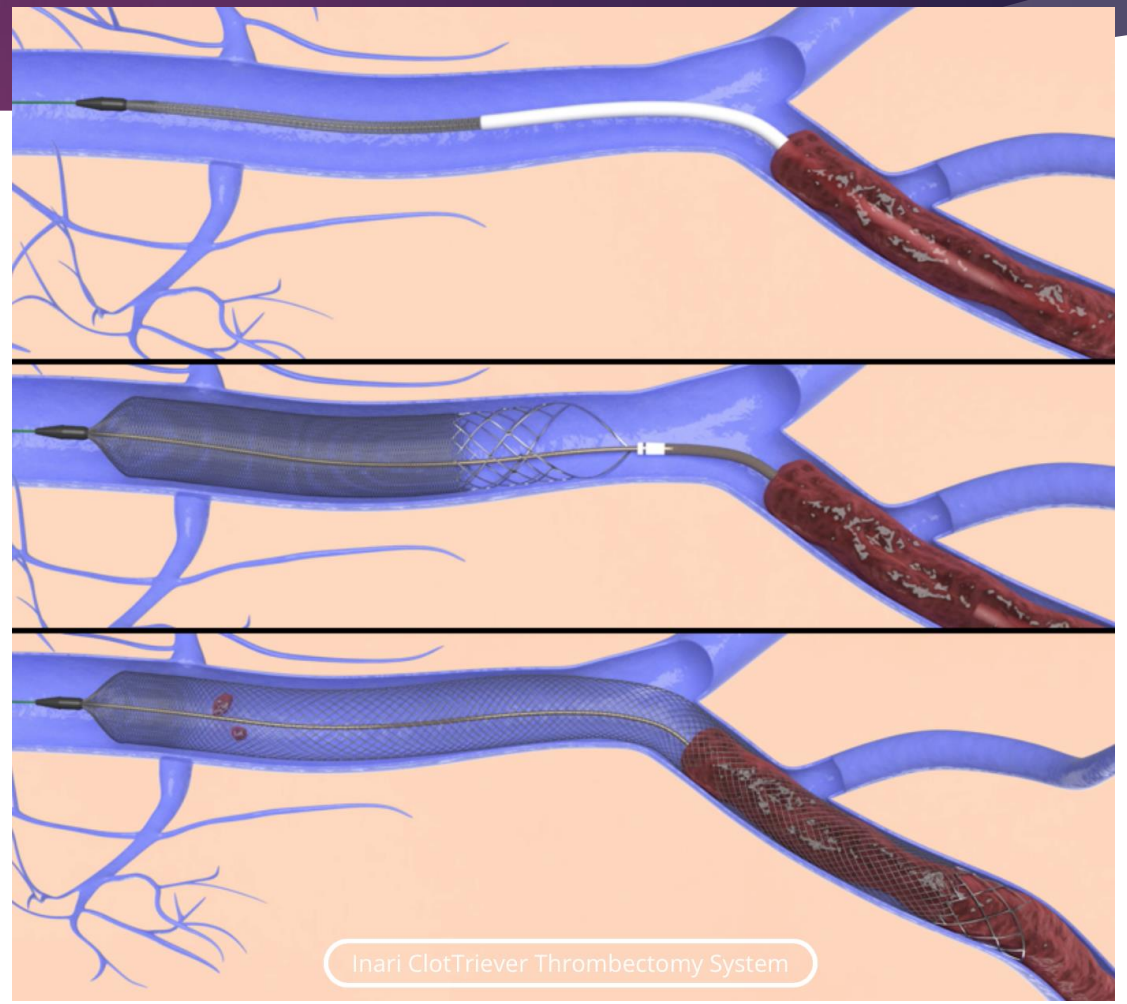
Marcello Ferrari, Lorenzo Manea,✉ Kamel Anton, Paola Bruzzone, Mara Meneghello, Francesco Zamboni, Luigi Purgato, Lucia Cazzoletti, Pietro Ferrari, and Renato Testi

- 105 COPD patients
- Anemic vs non Anemic
- Anemic patients
  - Higher medical research council dyspnea scale (MRCs)
  - Lower 6MWD
  - Lower VO2max
  - Worse quality of life
  - No difference in muscle strength
  - Were not that anemic (hgb 11.5)

Pulmonary Emboli

PEERLESS Trial

- FlowTriever system versus catheter-directed thrombolysis (CDT)
- Enrolling in multicenter RCT
- Patients with intermediate-high risk pulmonary embolism (PE)
- Potential for immediate relief without the risk of lytics
- May be able to offer interventions to higher risk patients in lower risk PEs
- https://clinicaltrials.gov/ct2/show/NCT05111613

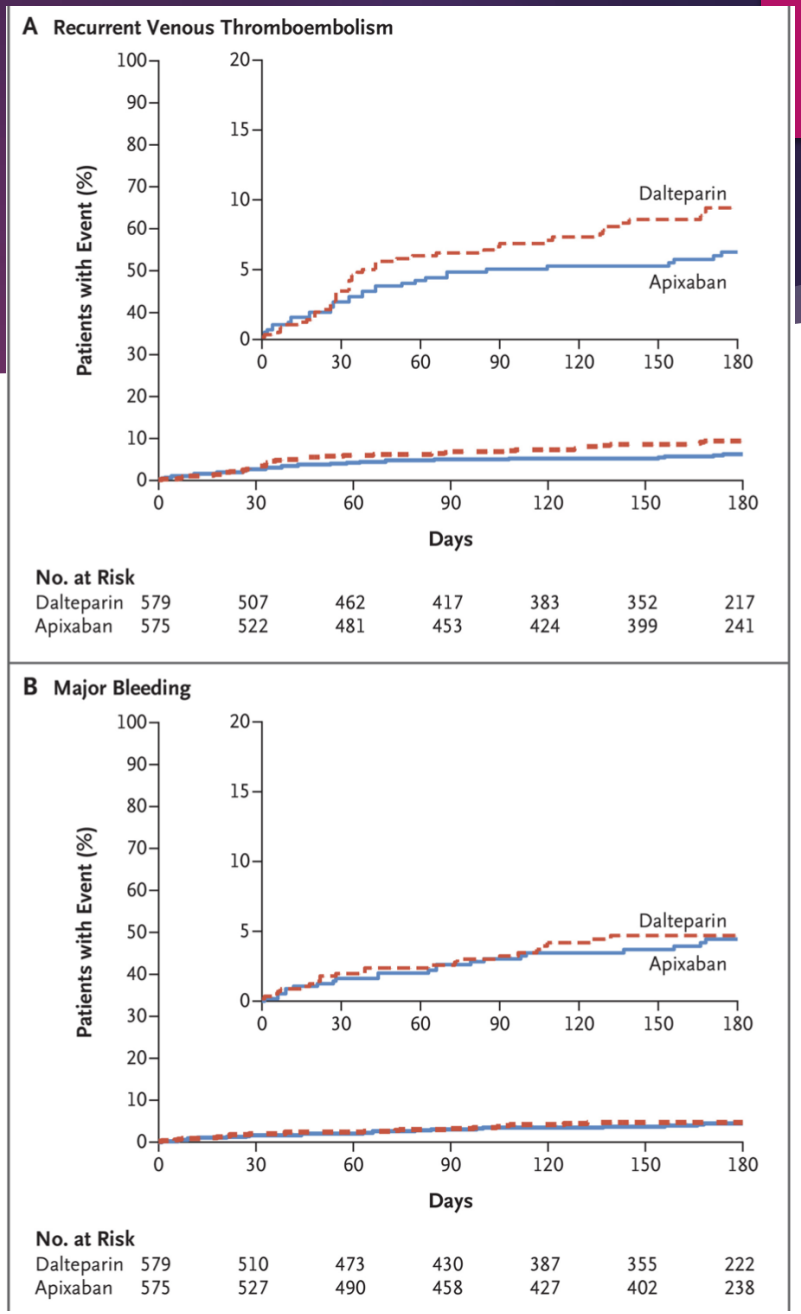


IVC filters

- 8,255 IVC filter lawsuits as of May 2022 (Miller 2023)
- Jury awards as high as $34 million
- Lack of evidence to support the use of IVC filters in any situation other than an absolute contraindication to anticoagulation
- In 2014, the FDA updated recommendations:
  - Risks > benefits between 29 and 54 days
  - Rarely retrieved that soon in real life
- American College of Chest Physicians in 2021 – strong recommendation against the use of IVC filters in addition to anticoagulants
- Society of interventional radiology clinical practice guidelines from 2020 – moderate recommendation stating "In patients with acute VTE who are being treated with therapeutic anticoagulation, we recommend against routine placement of an IVC filter"
- PREPIC2 trial, Randomized, open-label, blinded end point trial: "Among hospitalized patients with severe acute PE, the use of a retrievable inferior vena cava filter plus anticoagulation compared to anticoagulation alone did not reduce the risk of symptomatic recurrent PE at 3 months. Theses findings do not support the use of this type of filter in patients who can be treated with anticoagulation"

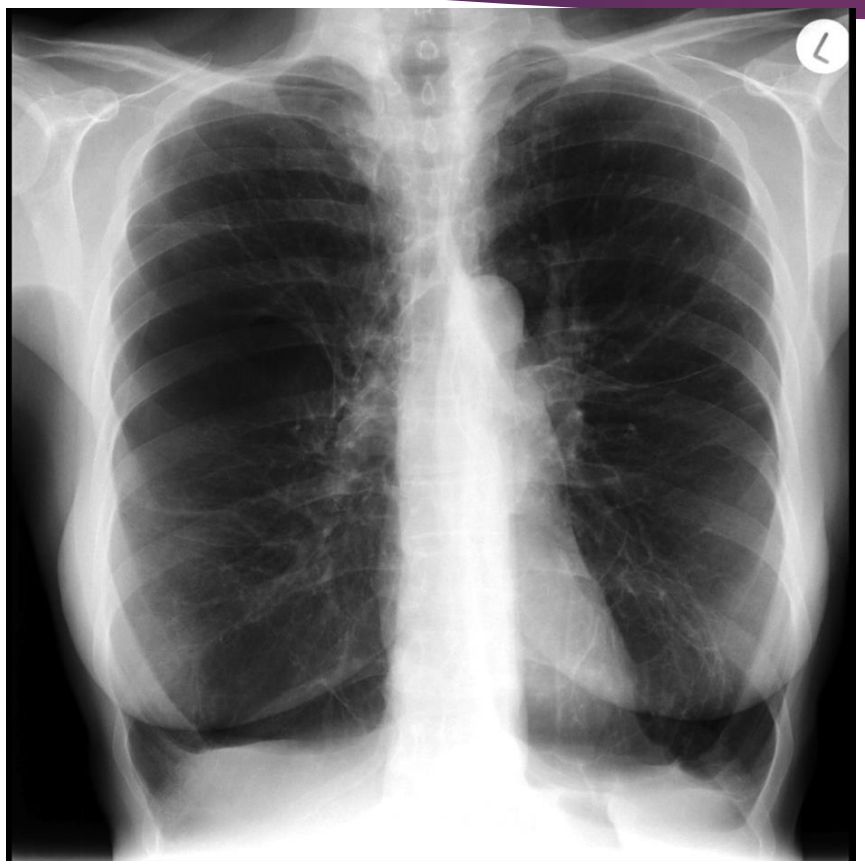
Apixaban and VTE in oncology patients

- Apixaban for the Treatment of Venous Thromboembolism Associated with Cancer. April 23, 2020
  N Engl J Med 2020; 382:1599-1607
  - multinational, randomized, investigator-initiated, open-label, noninferiority trial with blinded central outcome adjudication
  - Patients with cancer and VTE to receive apixaban or dalteparin for 6 months
  - Oral apixaban was noninferior to subcutaneous dalteparin for the treatment of cancer-associated venous thromboembolism without an increased risk of major bleeding



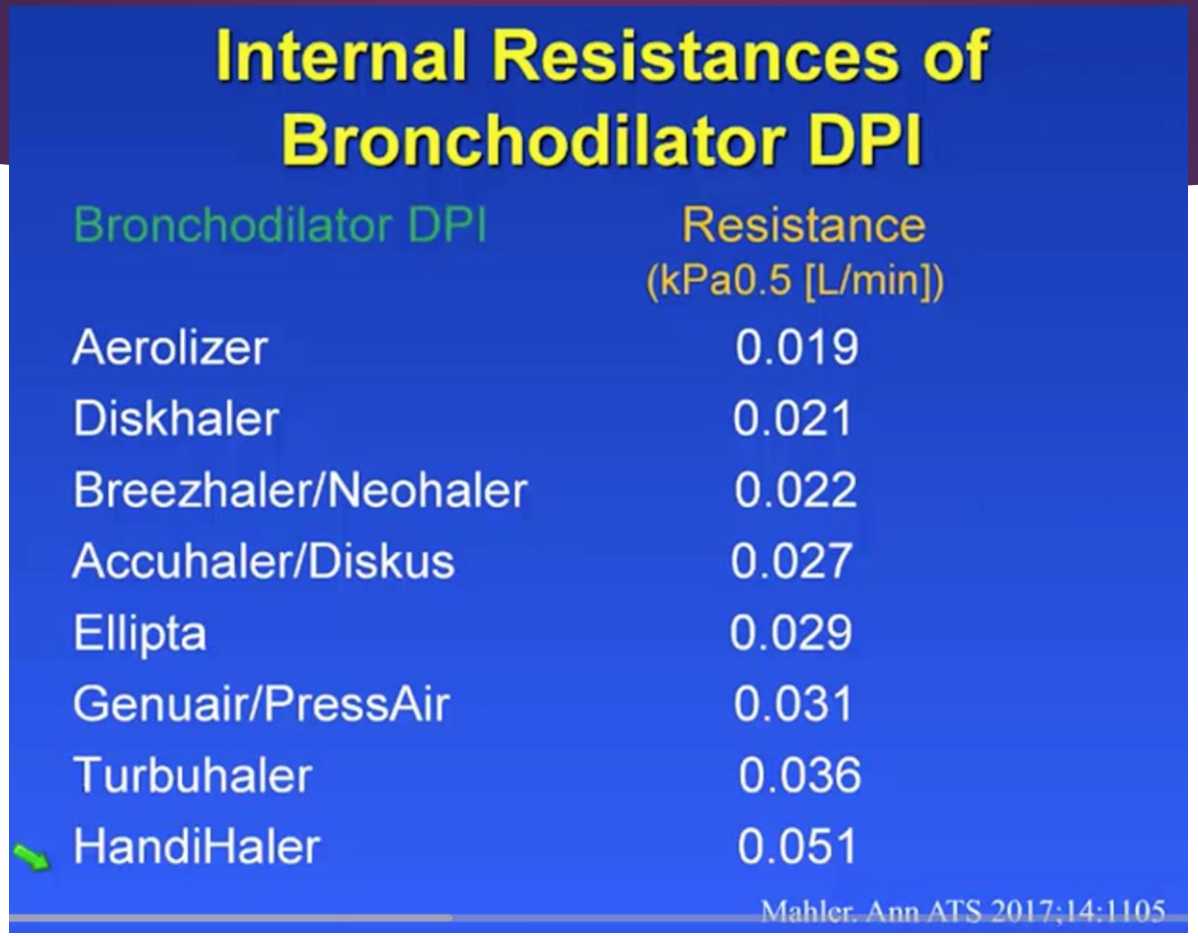
Advanced Emphysema

Advanced emphysema



- More hyperinflation = less PIFR
  - Correlates with age (older = worse PIFR)
  - Lower IC = worse PIFR
  - Being female has been associated with reduced PIFR
  - Hyperinflation (worsened during exacerbation) reduced PIFR
- → bad obstruction and hyperinflation = may not benefit from an inhaler

Advanced emphysema



Pharmacology literature indicates patients must generate 60 L/min to receive optimal dose

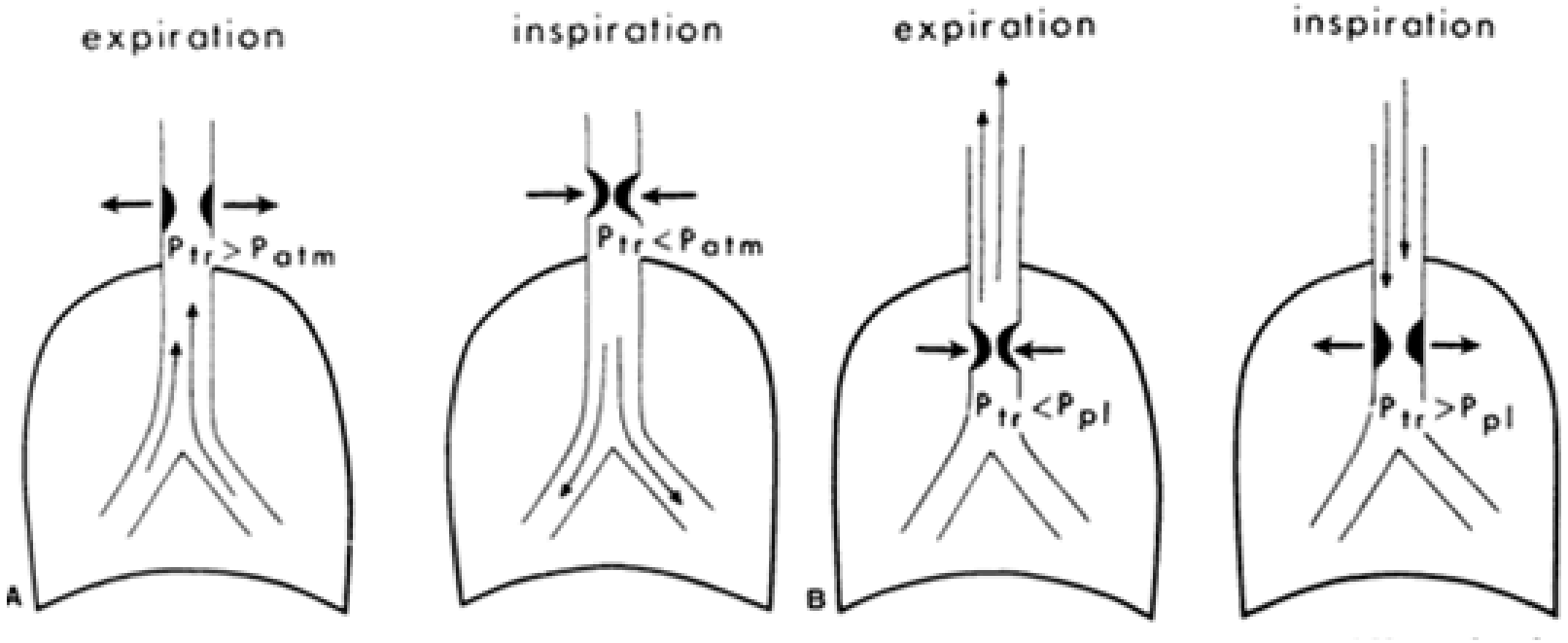
More resistance = more difficult to generate flow

→ DPIs require hard and fast inhalation

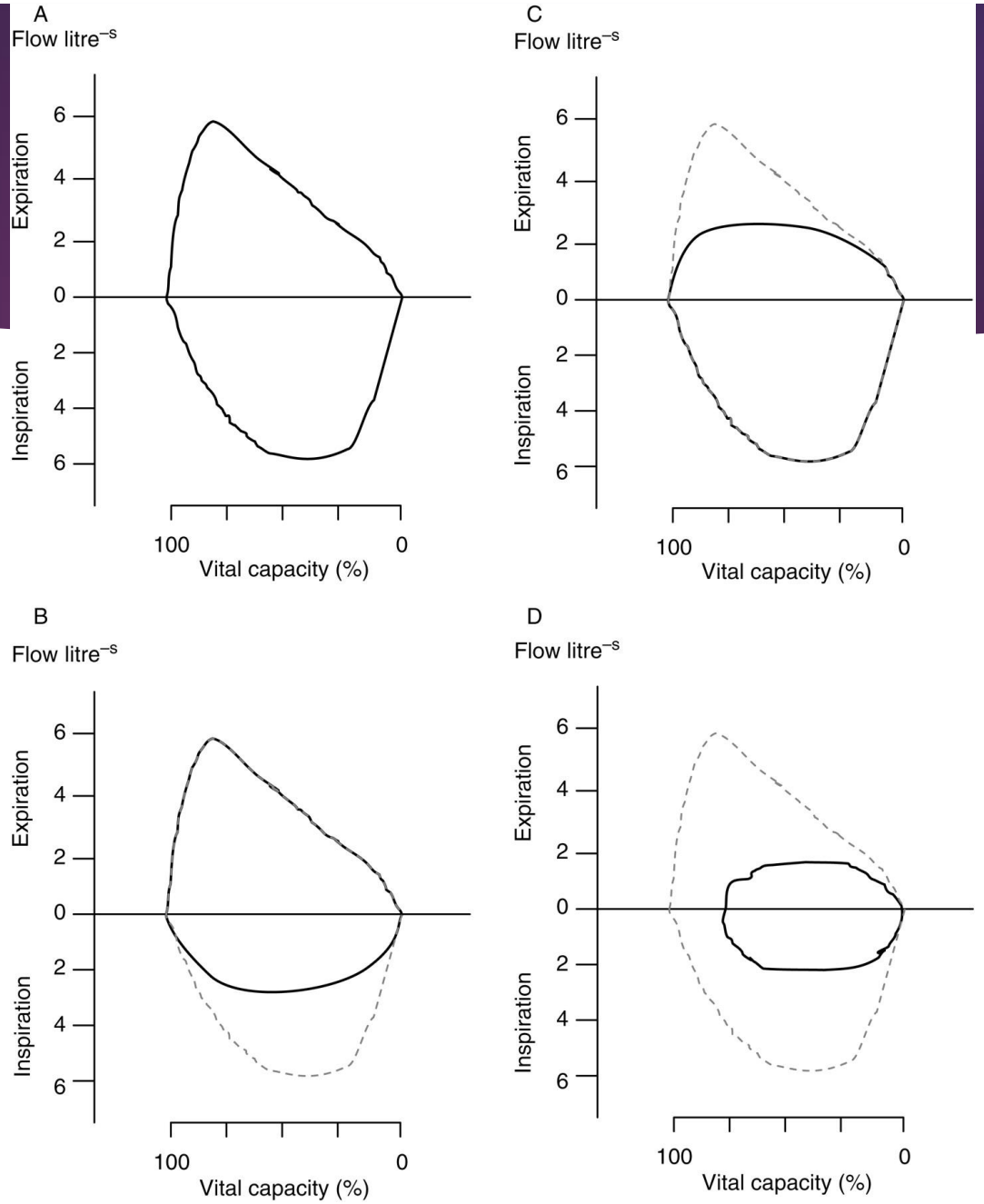
Advanced emphysema
My go-to regimen

- All nebulizer meds
  - Revefenacin
  - Formoterol
  - Budesonide
- Prevent exacerbations
  - Azithromycin TIW
  - Mepolizumab or Tezepelumab
- Hypercapnic → Home non-invasive ventilator
- Severe dynamic hyperinflation → Liquid morphine

Endobronchial tumor



FVLs


A
Flow litre⁻ˢ
Expiration
Inspiration
6
4
2
0
2
4
6
100
0
Vital capacity (%)
C
Flow litre⁻ˢ
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Vital capacity (%)
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Vital capacity (%)
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Flow litre⁻ˢ
Expiration
Inspiration
6
4
2
0
2
4
6
100
0
Vital capacity (%)

Checkpoint inhibitor pneumonitis

- Patient risk factors
  - Lung cancer
  - Renal cell cancer
  - h/o ILD
  - Prior chest radiation
  - Smoking
  - Age > 70
- Usually around 6 months of therapy but range is broad 1.5 to 127 weeks
- Almost always with elevated CRP and ESR

CPI pneumonitis

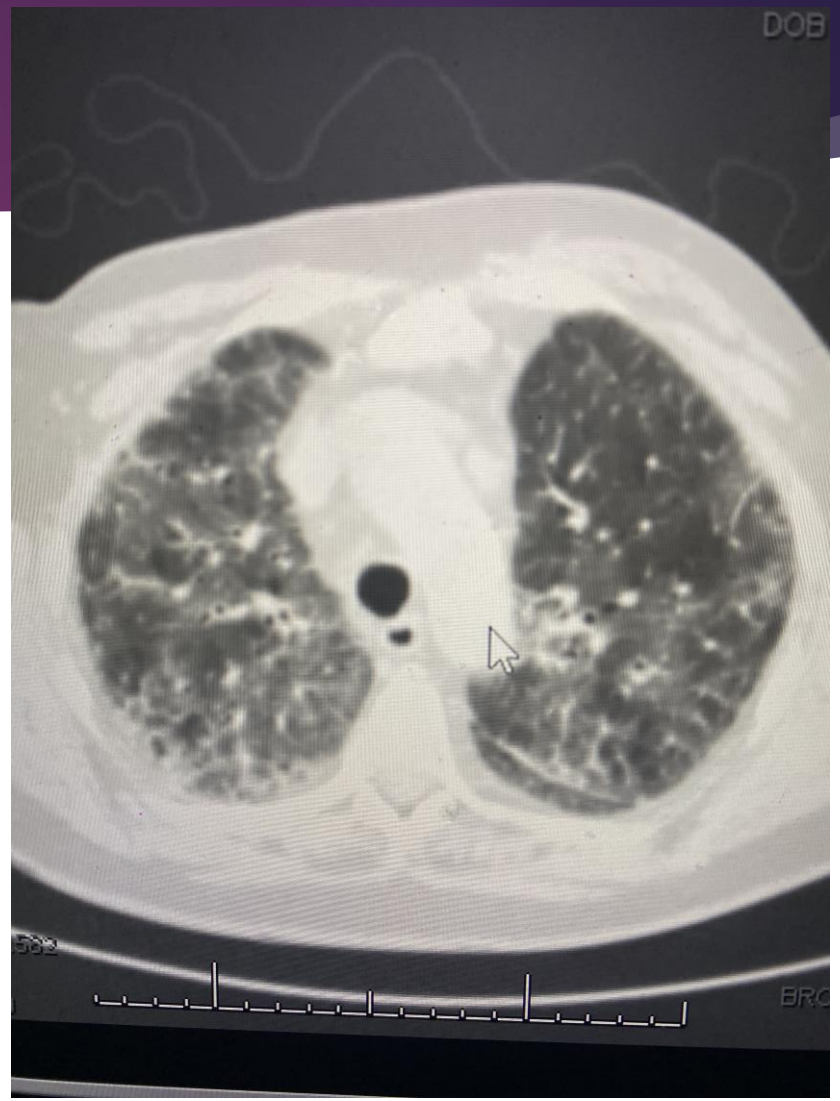
Table 2: National Cancer Institute CTCAE Pneumonitis Grading System

Table 2: National Cancer Institute CTCAE Pneumonitis Grading System

Grade	Symptom
1	Asymptomatic; clinical or diagnostic observations only; intervention not indicated
2	Symptomatic; medical intervention indicated; limiting instrumental ADL
3	Severe symptoms; limiting self-care ADL; oxygen indicated
4	Life-threatening respiratory compromise; urgent intervention indicated (ie, tracheostomy or intubation)
5	Death

Source.—Reference 26.
Note.—ADL = activities of daily living.

-Sarcoid like reaction



Kalisc 2019

Thank You

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