

Tough Problems in Inpatient Pulmonary Disease



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10/17/2019

MANAGEMENT OF THE HOSPITALIZED PATIENT

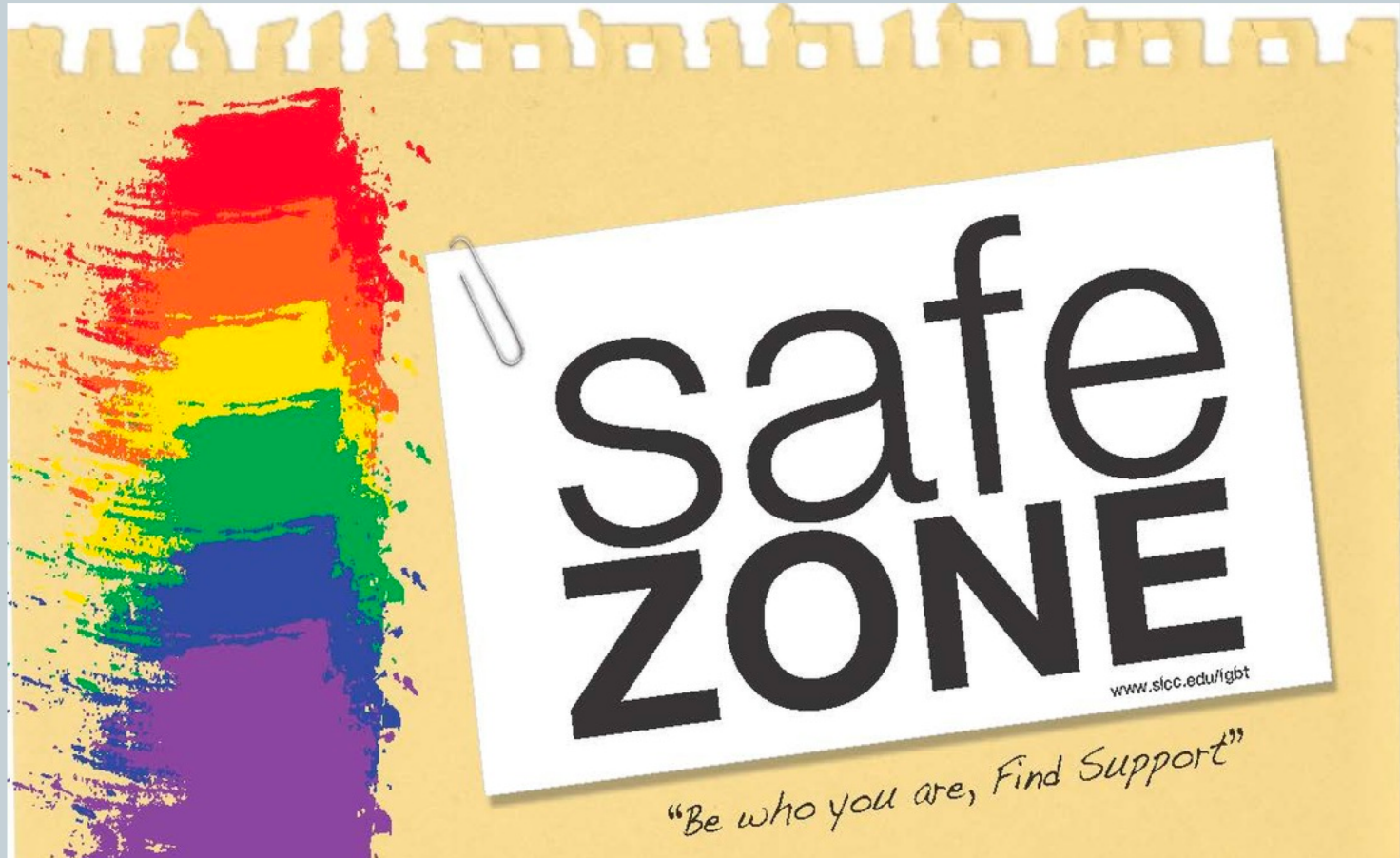
SMALL GROUPS

Disclosures



None.

Introductions & Ground Rules



Choose Your Own Adventure! Top 6 Cases



**Hot Off the
Presses:
Could this
be VAPI?**

**It's Not Easy
Being
Wheezy**

**Effusion
Confusion**

**A Tickle In
the Throat**

**An
Internation
al Enigma**

**Potatoes,
Pot-ah-toes**

The Case



- CC: Shortness of breath, diarrhea

HPI



- 32 year old man with no real PMHx comes to ED for 1 week of diarrhea, abdominal pain, cough and shortness of breath
- PMHx & PSHx: None
- SHx: Never-smoker, rare alcohol, +MJ *
- FHx: None

Physical Exam



VS: T 37, HR 110, BP 100/63, RR 28, O₂ 83% RA

General: Ill-appearing, diaphoretic, tachypneic

HEENT: Mucus membranes moist, OP clear

CV: RRR, no murmurs/rubs/gallops

Lungs: Bilateral coarse crackles, tachypnea

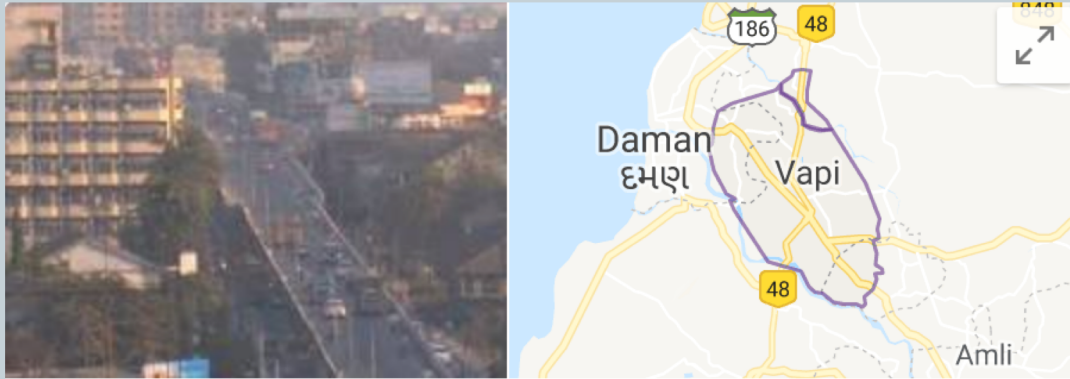
Abdomen: Benign, +BS, no rebound/guarding

Ext: No clubbing, cyanosis

Imaging



Could this be VAPI?



Vapi

City in India

Vapi, is a city and municipality in Valsad District in the state of Gujarat. It is situated near the banks of the Damanganga River, around 28 km south of the district headquarters in the city of Valsad, it is surrounded by the Union Territories of Daman to the west and Dadra and Nagar Haveli to the east. [Wikipedia](#)

Weather: 89°F (32°C), Wind N at 5 mph (8 km/h), 67% Humidity

Could this be VAPI?



American Thoracic Society

PUBLIC HEALTH | *INFORMATION SERIES*

Vaping Associated Pulmonary Illness (VAPI)

As of September 2019, the Centers for Disease Control (CDC) has reported over 350 cases of vaping-associated pulmonary illness (VAPI) across 36 states. The observed patterns of disease are variable but all have been associated with recent electronic cigarette use or “vaping.” Vaping is a word used to describe the use of an electronic system to deliver inhaled drugs, most commonly nicotine and cannabinoids (natural or synthetic forms of marijuana)¹. Juuling is another term that is used to describe the use of a specific vape device.



Your Differential Diagnosis? BESIDES VAPI?



Your Differential Diagnosis? BESIDES VAPI?



Rapidly Progressive Respiratory Failure

- ARDS (Acute Respiratory Distress Syndrome)
- Acute infection – viral +/- bacterial pneumonia
- Massive aspiration
- Acute eosinophilic pneumonia
- Lipoid pneumonia
- (Pulmonary embolism)

Clinical Course



- His hypoxemia worsens and he develops worsened hypoxemic respiratory failure requiring intubation
- Now how do you manage him?

Management Pearls for VAPI



- Supportive care
- Limited role for steroids
- Bronchoscopy to rule-out infection
- Lung-protective ventilation strategy
- Fluid-conservative strategy
- Report to CDC, SFDPH, and local research teams

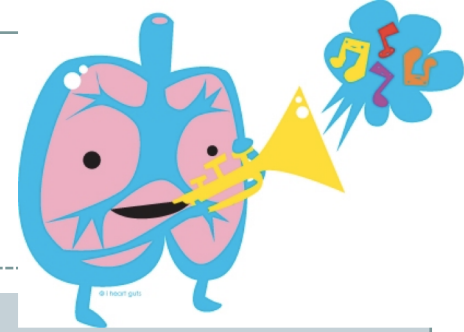
Pulmonary Advocacy re: VAPI



Rx *Action Steps*

- ✓ Report all suspected cases to CDC.
- ✓ Screen all patients for the use of tobacco and vaping devices.
- ✓ Offer smoking and vaping cessation counseling to all patients who report use.
- ✓ Support legislation to prevent the sale of vaping and tobacco products to anyone under the age of 21.
- ✓ Support stronger penalties for retailers who illegally sell tobacco, nicotine, and vaping devices to minors.
- ✓ Encourage the FDA and Congress to ban flavors in tobacco products.
- ✓ Support research on prevention and cessation strategies for smoking and vaping.

Summary: Key Learning Points



1. Think of VAPI in people who have vaped within 90 ds who have respiratory failure
2. GI sx are common & often people don't disclose immediately
3. Treat with supportive care & report to CDC and SFDPH & local research teams

Choose Your Own Adventure! Top 6 Cases



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It's Not Easy Being Wheezy



- A 55 year old man who has a history of COPD, OSA, CAD, CKD, jaundice, & childhood asthma admitted for dyspnea. He is still wheezing & hypoxemic despite 5 d steroids & antibiotics.

What is your differential diagnosis for his wheezing?

ACOS (Asthma-COPD Overlap Syndrome)

Risks

- Genetic patterns
- Maternal smoking
- Childhood diseases
- Allergy
- IgE
- Eosinophilia
- Exhaled nitric oxide
- Th2-related inflammation
- Rhinitis

INFLUENCE OF ENVIRONMENT AND AGING ON SEVERITY AND CHRONICITY OF DISEASE

- Genetic patterns
- Aging
- Smoking
- Maternal smoking
- Exposure to smoke from biomass fuels
- Occupational hazards
- Poor nutrition
- BHR
- Emphysema
- BPD

Outcomes

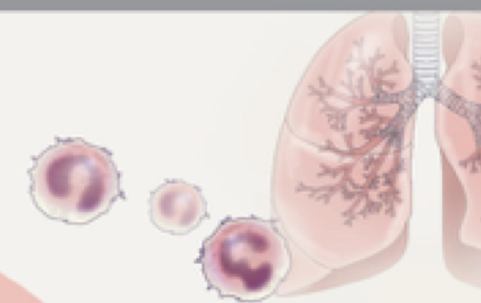
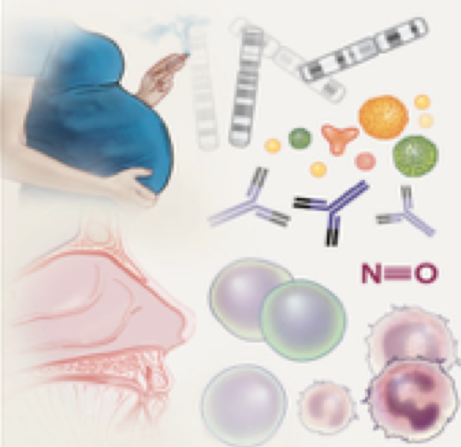
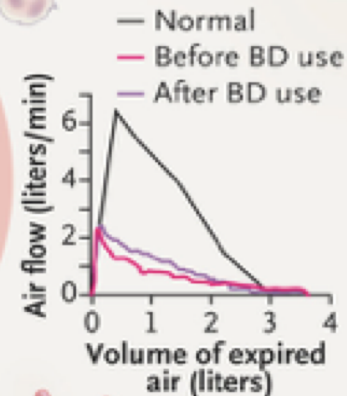
Asthma

- Low lung function
- Episodic wheezing
- Nocturnal symptoms
- BHR
- Eosinophilia
- GERD

ACOS

- Limited reversibility of airway obstruction
- Hyperinflation
- Abnormal body composition
- Coexisting cardiac conditions
- Infections
- Dyspnea

COPD



All that Wheezes is not Asthma or COPD



- ❑ Vocal cord dysfunction
- ❑ Allergic bronchopulmonary aspergillosis
- ❑ Vasculitides such as Eosinophilic Granulomatosis with Polyangiitis
- ❑ Infections such as Strongyloides
- ❑ Malignancy (lung or mets)
- ❑ Pulmonary embolism
- ❑ Decompensated CHF
- ❑ Obesity
- ❑ Bronchiectasis
- ❑ Occupational lung diseases
- ❑ Interstitial lung diseases

What About Reactive Airways Disease?



Pulmonary Perspective

“Reactive Airways Disease”

A Lazy Term of Uncertain Meaning That Should Be Abandoned

JOHN V. FAHY and PAUL M. O'BYRNE

Department of Medicine and the Cardiovascular Research Institute, University of California, San Francisco, California; and the Department of Medicine, McMaster University, Hamilton, Ontario, Canada

- Different from Reactive Airways Dysfunction Syndrome -
- Acute wheezing in response to inhaled irritant

Diagnostically, When to C/S Pulm?



- Basic diagnostics are not helpful (PFTs, Chest CT)
- You need advanced testing (e.g. methacholine/bronchoprovocation testing, exercise testing, bronchoscopy, etc.)
- You suspect an asthma/COPD mimic
- You just need extra diagnostic help!

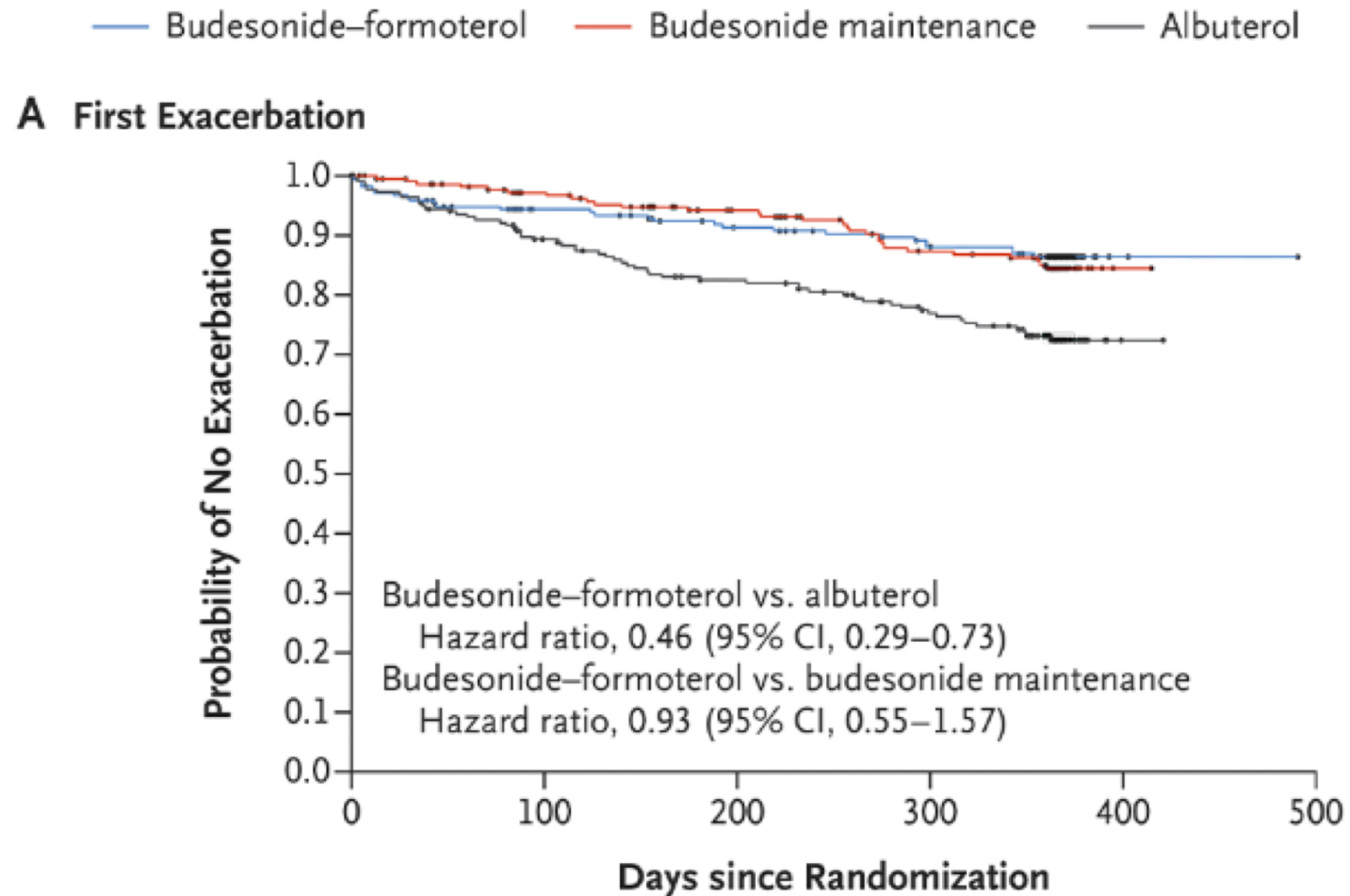
Therapeutically, When to C/S Pulm?



- Severe asthma requiring ICU stay - ICU Admission for asthma and intubation are strong predictors for fatal or near-fatal asthma!
- Uncontrolled asthma despite step-up therapy
- You are considering omalizumab or other IgE-mediated tx

New Data from 2019: START Trial

PRN Symbicort is superior to PRN Albuterol for Prevention of Asthma Exacerbations!



New Data from 2019: SYGMA Trials



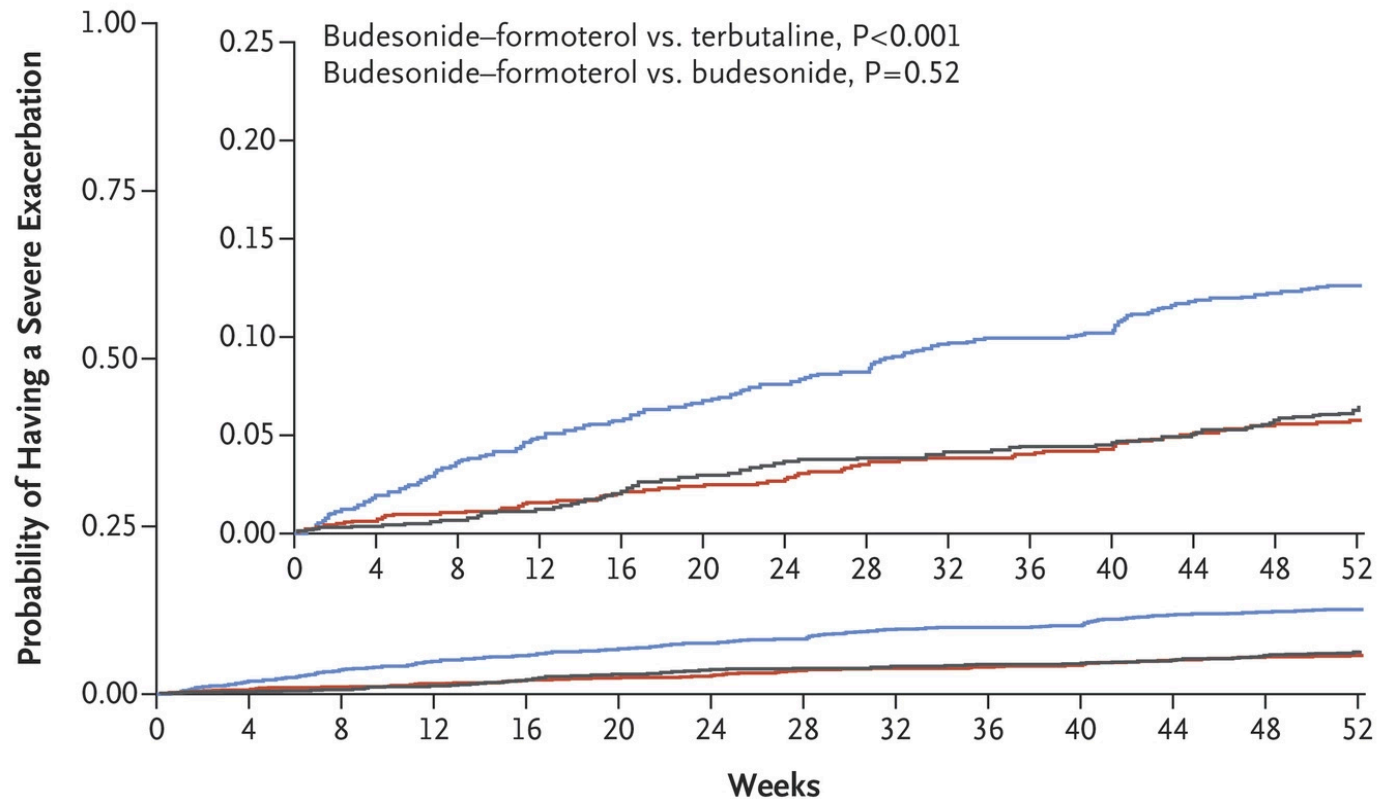
PRN Symbicort prolonged time to first severe exacerbation

— Terbutaline as needed
(N=1277)

— Budesonide–formoterol as needed
(N=1277)

— Budesonide maintenance
(N=1282)

A Severe Exacerbation



BIG Change in 2019 GINA Guidelines



“The 2019 GINA strategy report represents **the most important change in asthma management in 30 years.”**

For safety, GINA no longer recommends treatment with SABA alone...

GINA now recommends that all adults with asthma should receive either symptom-driven or daily low-dose ICS-containing controller treatment.”

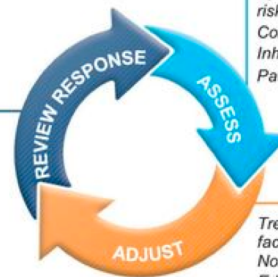
The Changes in Asthma Management

Personalised asthma management

Adults & adolescents 12+ years

Personalized asthma management:
Assess, Adjust, Review response

Symptoms
Exacerbations
Side-effects
Lung function
Patient satisfaction



Confirmation of diagnosis if necessary
Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient goals

Treatment of modifiable risk factors & comorbidities
Non-pharmacological strategies
Education & skills training
Asthma medications

Asthma medication options:
Adjust treatment up and down for individual patient needs

PREFERRED CONTROLLER
to prevent exacerbations and control symptoms

PREFERRED RELIEVER

STEP 1

As-needed low dose ICS-formoterol*
Low dose ICS taken whenever SABA is taken†
Other controller options

STEP 2

Daily low dose inhaled corticosteroid (ICS), or as-needed low dose ICS-formoterol*
Leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA is taken†

As-needed low dose ICS-formoterol*

STEP 3

Low dose ICS-LABA
Medium dose ICS, or low dose ICS+LTRA#

As-needed low dose ICS-formoterol for patients prescribed maintenance and reliever therapy‡

STEP 4

Medium dose ICS-LABA
High dose ICS, add-on tiotropium, or add-on LTRA#

STEP 5

High dose ICS-LABA
Refer for phenotypic assessment ± add-on therapy, e.g. tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R
Add low dose OCS, but consider side-effects

As-needed short-acting β_2 -agonist (SABA)

* Off-label; data only with budesonide-formoterol (bud-form)
† Off-label; separate or combination ICS and SABA inhalers

‡ Low-dose ICS-form is the reliever for patients prescribed bud-form or BDP-form maintenance and reliever therapy
Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV₁ >70% predicted

See 2019 GINA Severe Asthma Pocket Guide for more details about Steps 4-5

Maintenance OCS is not a preferred option at Step 5 because of serious side-effects

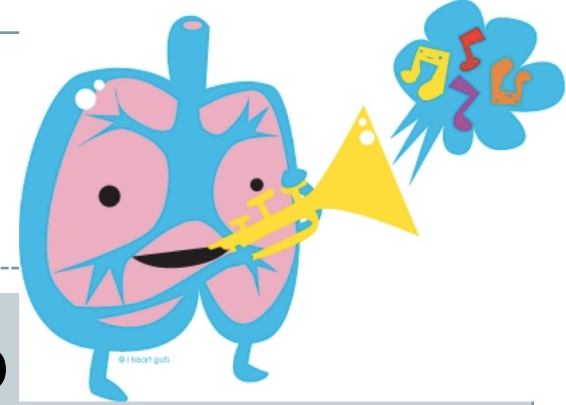
A holistic approach – not just symptom control

ICS-containing controller is recommended across all severities to reduce exacerbation risk

"Preferred" and "other" options are provided at each step, based on evidence

SABA is not a preferred reliever because of the risks of SABA-only treatment, including if adherence is poor

Summary: Key Learning Points



1. All that wheezes is not asthma/COPD
2. Remember ICU admission for asthma is a predictor for fatal asthma in future
3. BIG change in guidelines this year – no more Albuterol PRN only – consider Symbicort PRN
4. Remember non-pharmacologic management & when to consult Pulmonary

Choose Your Own Adventure! Top 6 Cases



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Effusion Confusion

A 65 year old woman is readmitted for pleural effusion of unknown etiology. Last thoracentesis had negative cytology & cx. You:

- a. Repeat the thoracentesis
- b. Refer for pleurodesis
- c. Refer for pleural biopsy
- d. Place a PleurX catheter



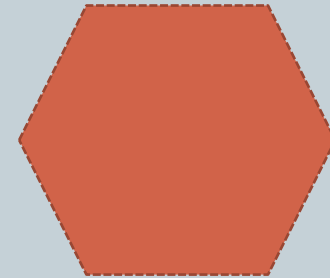
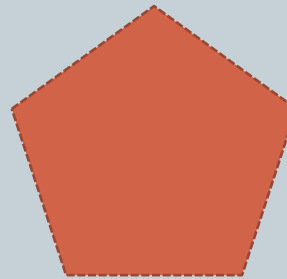
Never Forget Your Light's



1. Fluid/serum **protein** ≥ 0.5
[pentagon]

2. Fluid/serum **LDH** ≥ 0.6
[hexagon]

3. **LDH** $\geq 2/3$ normal serum
LDH



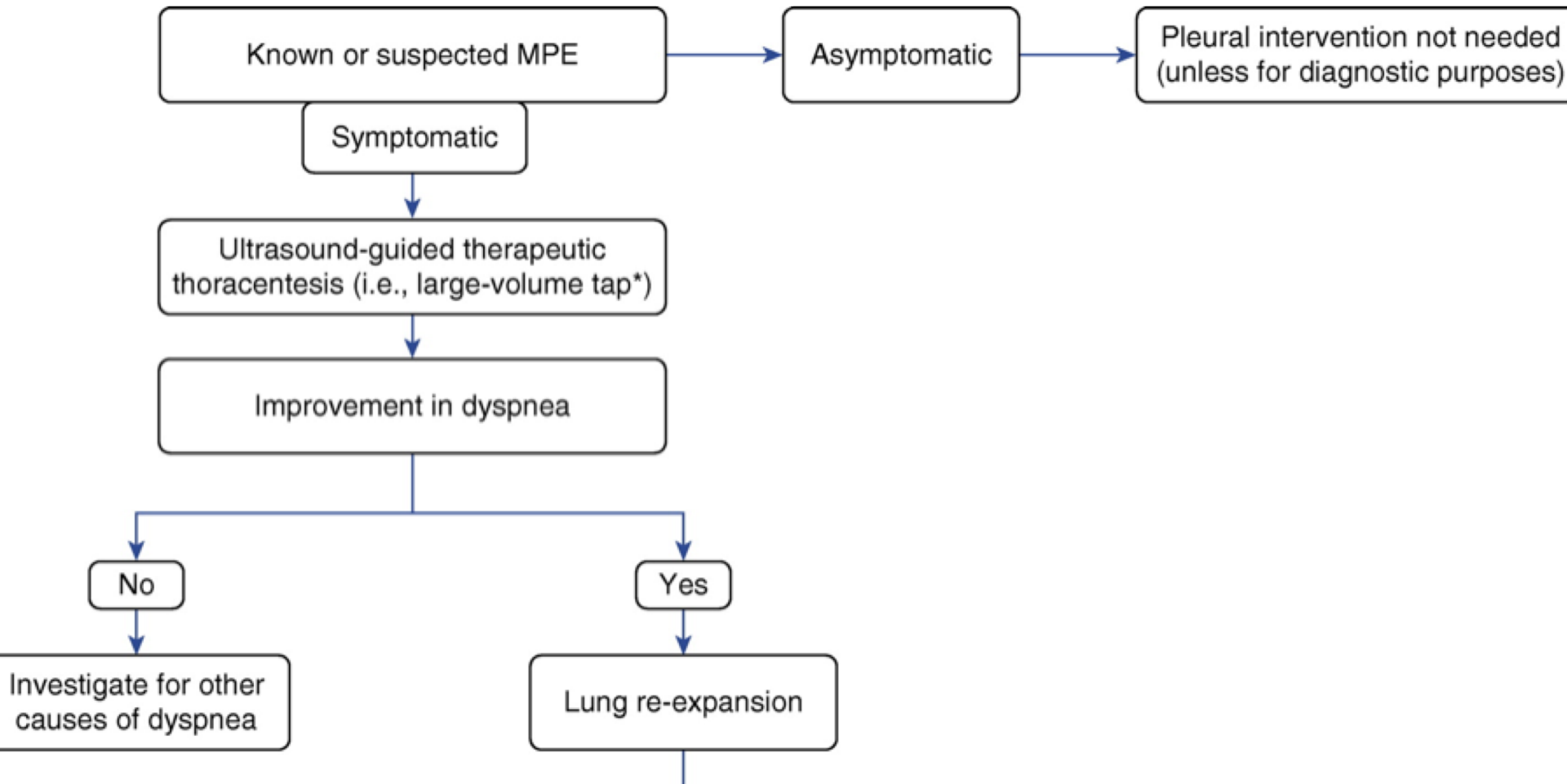
Chest Tube/Effusion Troubleshooting

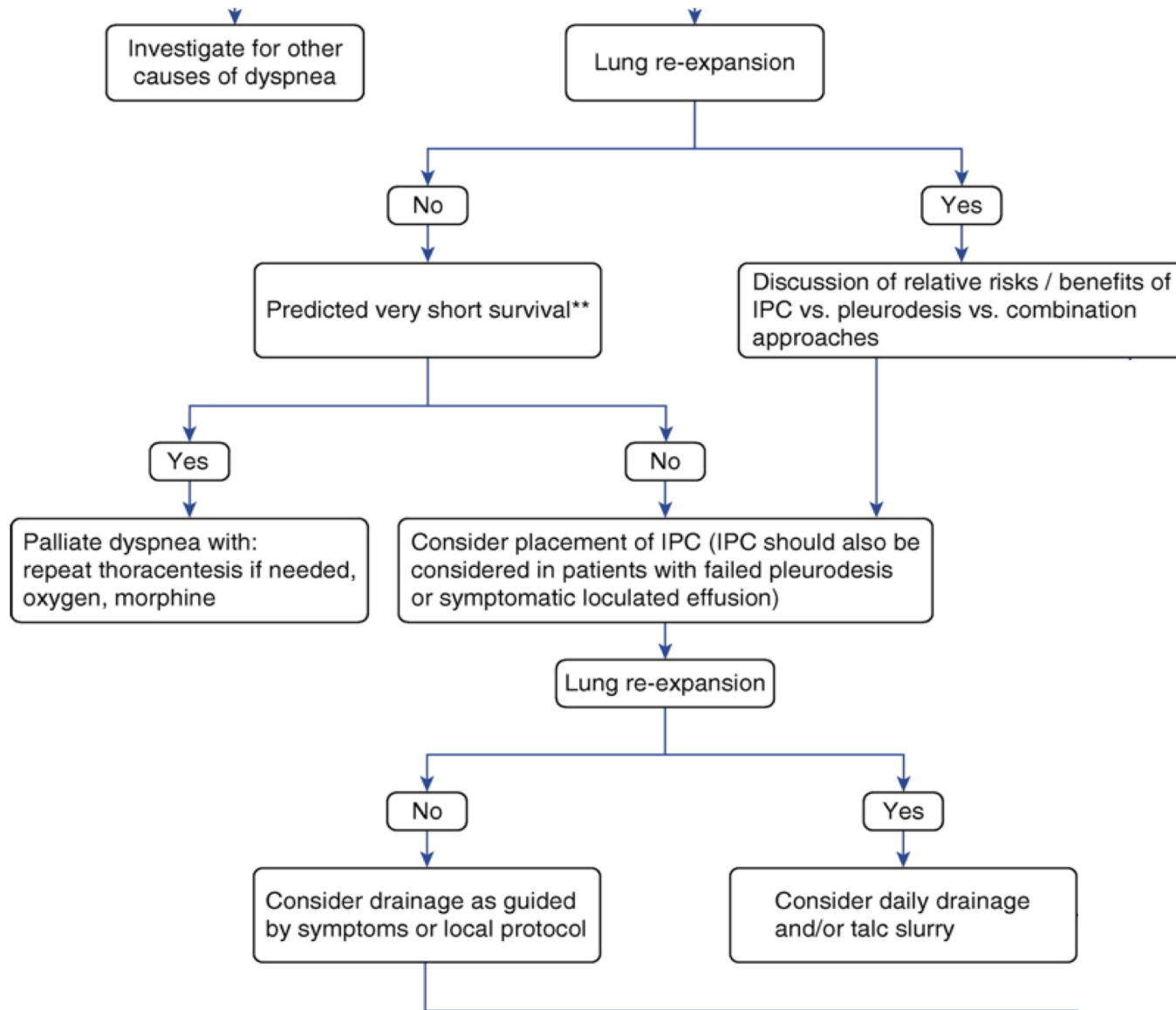


- **Never** place a chest tube to drain hepatohydrothorax.
- Consider serial drainage + diuretics for recurrent **transudates**
- If drainage **slows** but effusion persists:
 - Consider reimaging: loculation? tube position?
 - Consider TPA and DNAase
- If chest **pain** with chest tube beyond expected:
 - Consider: tube dysfunction/malpositioning?
 - Consider complications like infxn, lung lac, diaphragm injury, reexpansion pulm edema

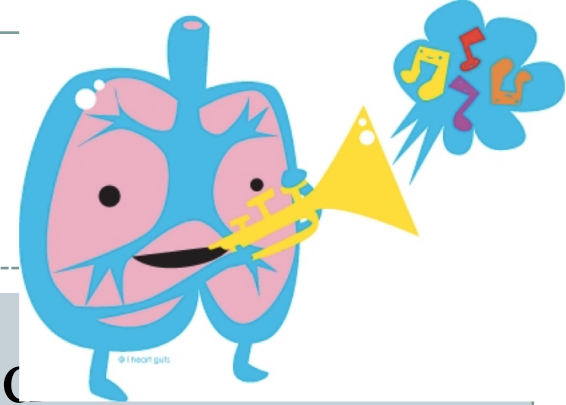
Effusion Size	Bacteriology	Chemistry	Treatment
Minimal, free-flowing (<10mm)	Neg cx/Gram stain		Antibiotics
Small-to-moderate free-flowing (>10 mm, but < ½ hemithorax)	Neg cx/Gram stain	pH \geq 7.2	Antibiotics
Large, free-flowing, >1/2 hemithorax, loculated, effusion w/ thickened parietal pleura	Pos cx/Gram stain or frank pus	pH < 7.2	Chest tube drainage

2018 ATS Guidelines on MPEs





Summary: Key Learning Points



1. Tap, tap & **retap** to increase cyto yield
2. Avoid tapping a hepatic **hydrothorax**
3. For MPE, let **prognosis** be your guide for next step in management
4. Remember your chest tube **troubleshooting** tips

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A Tickle in the Throat



The Consult Question



**New C/S: Bronch
to r/o PCP.Thx.**



History of Present Illness



- 55yoM w/ HIV on and off HAART w/ dyspnea
- Dyspnea began on July 4th while walking around
- Presented to ED & given albuterol nebs → sx resolved → D/Ced from ED w/ albuterol inhaler
- Had been using inhaler once/day → q5 minutes
- +Wheezing & sensation of tickle in throat

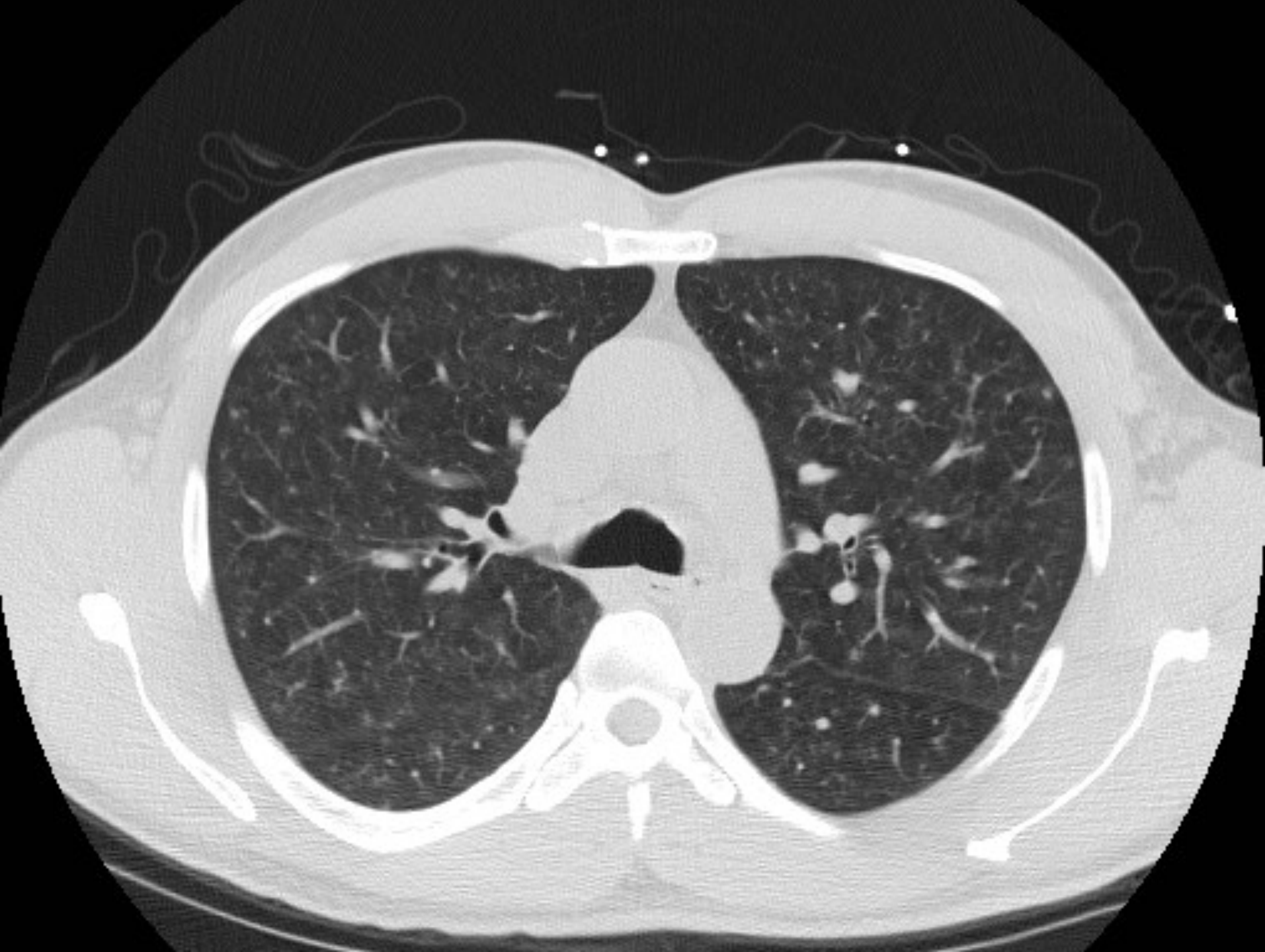
History of Present Illness

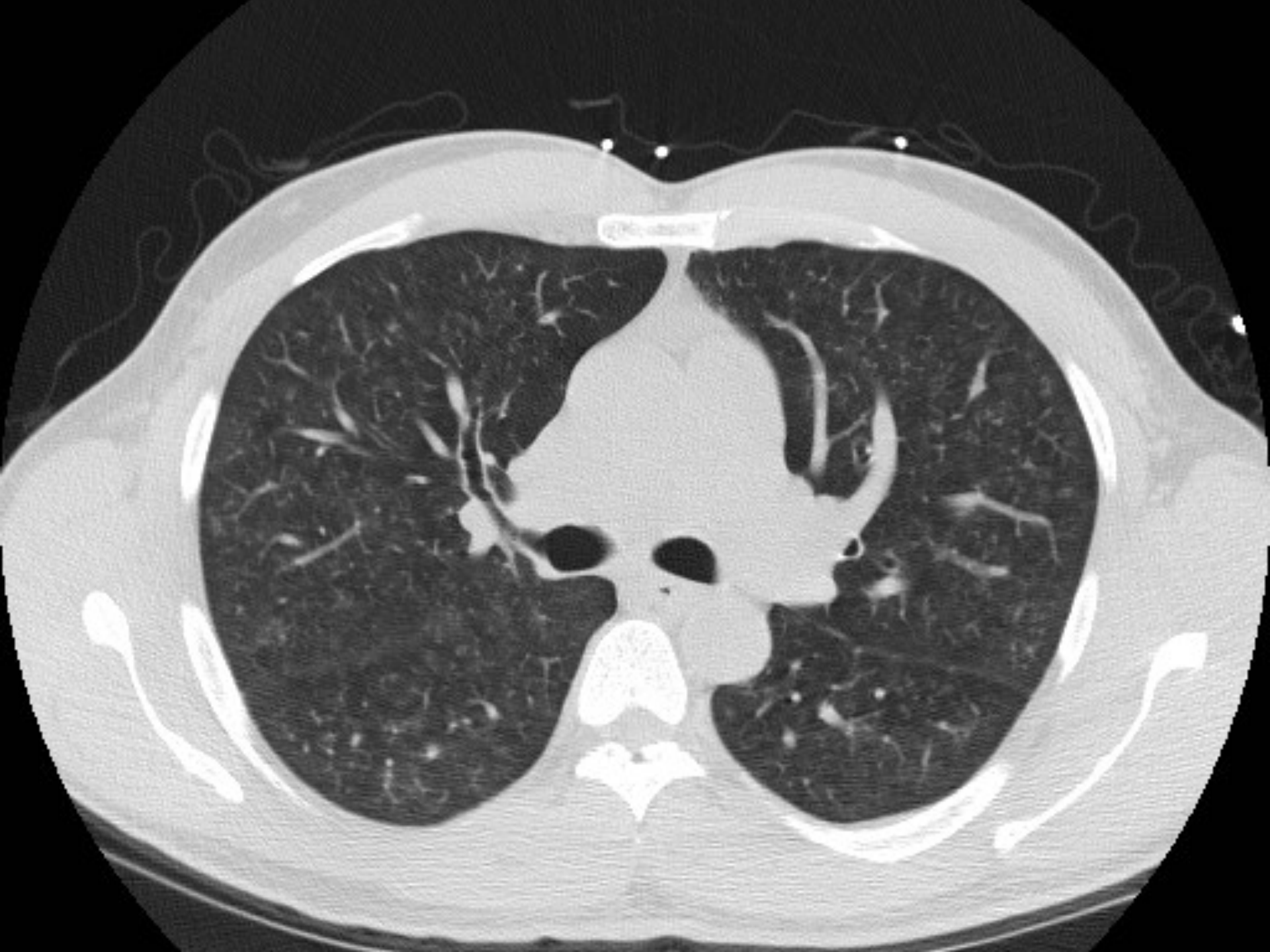


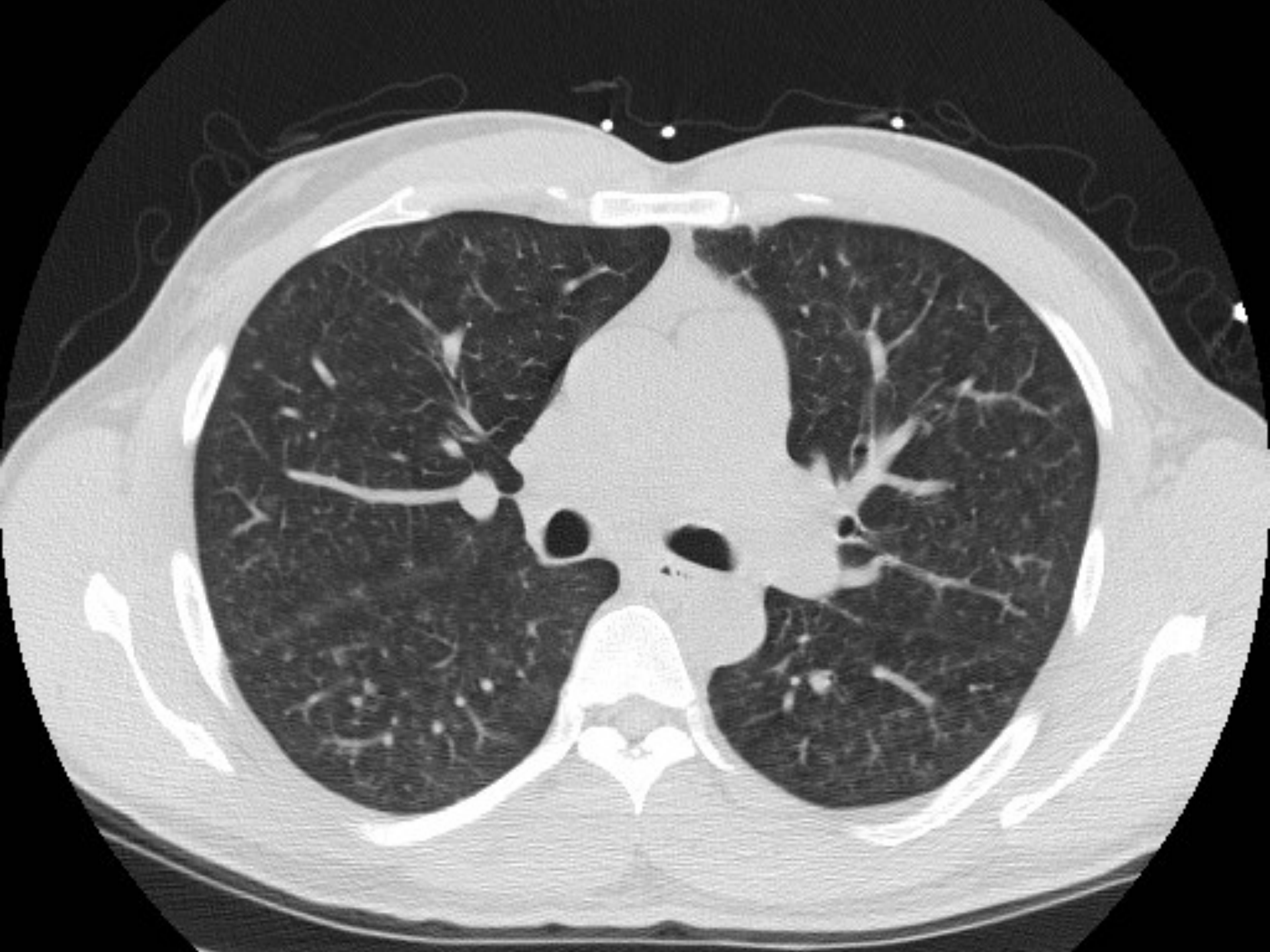
- Reports no cough, hemoptysis, fevers/chills/sweats
- No myalgias and no sick contacts
- No chest pain/palpitations/PND/orthopnea/lower extremity edema
- No recent travel
- ...Except to his home country of Fiji 2 months ago

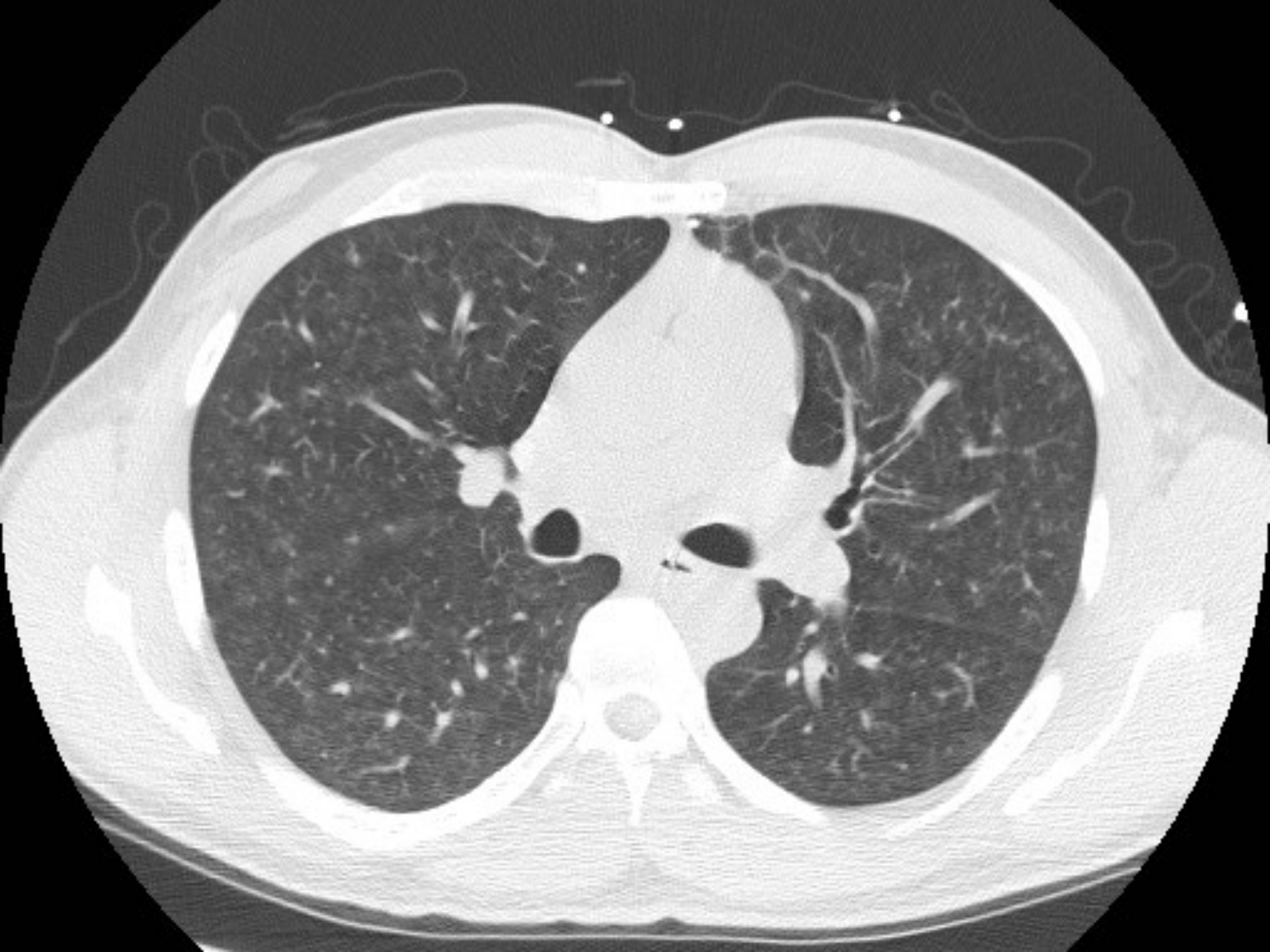


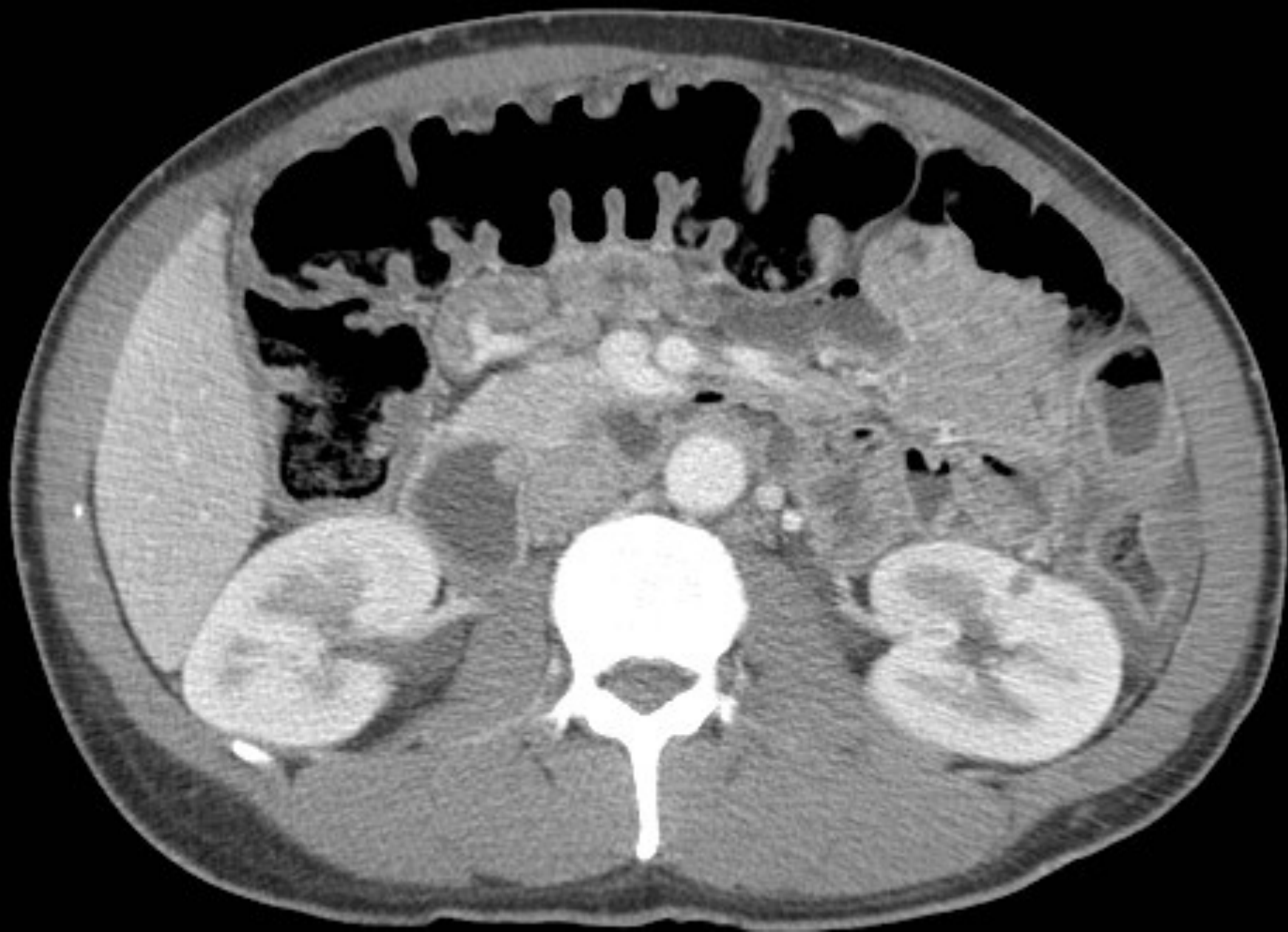
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DAL



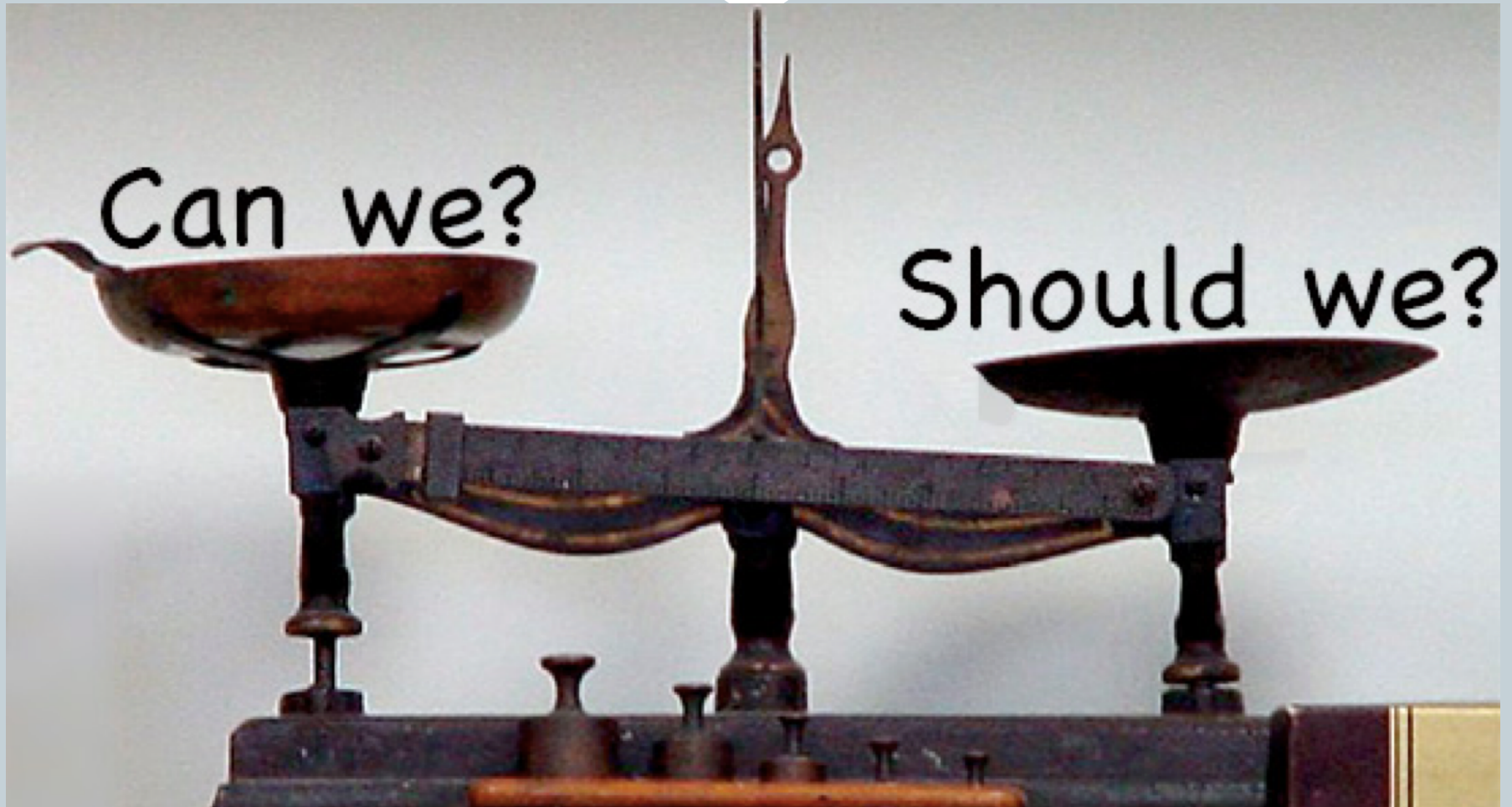








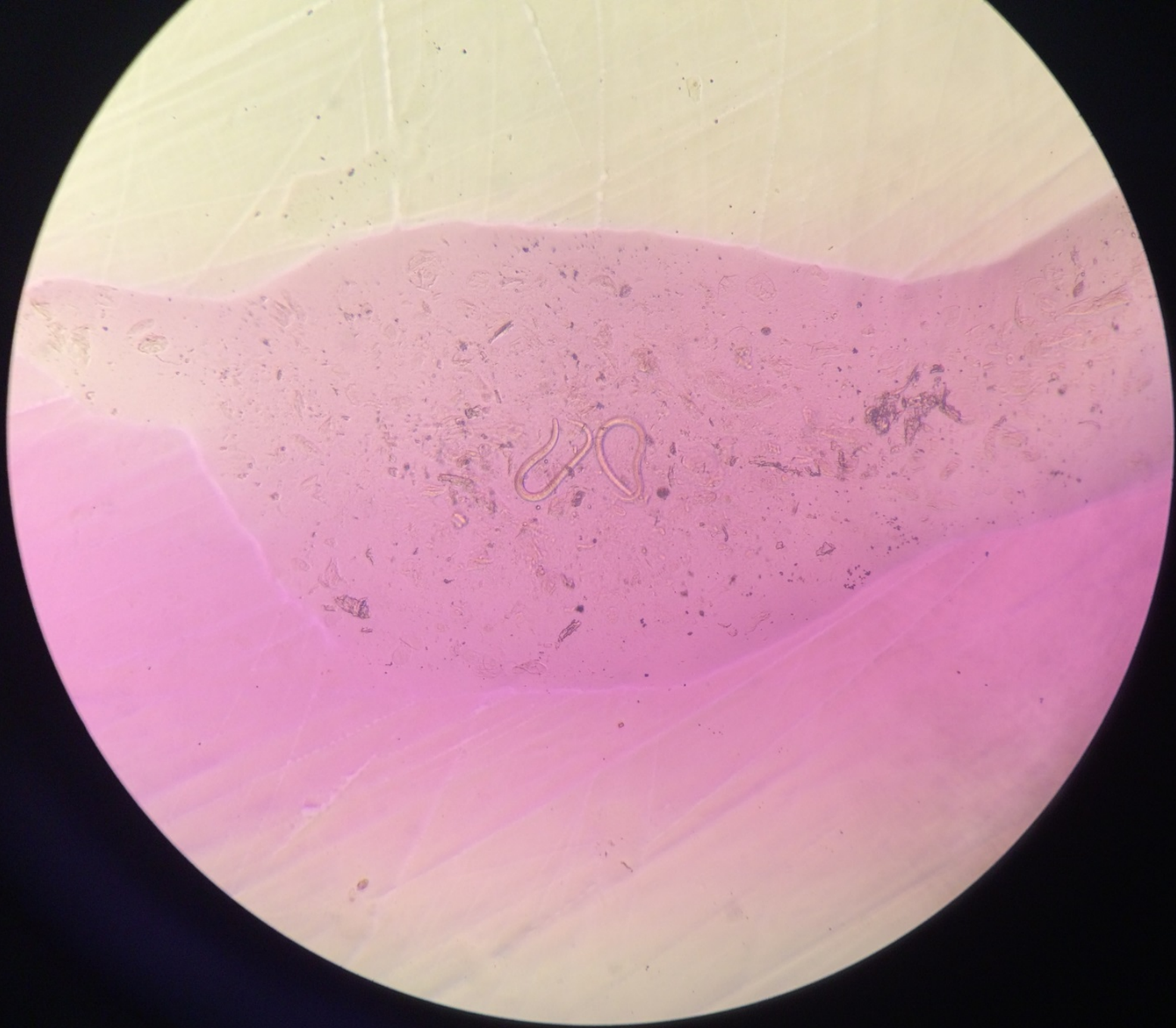
To Branch or Not to Branch?

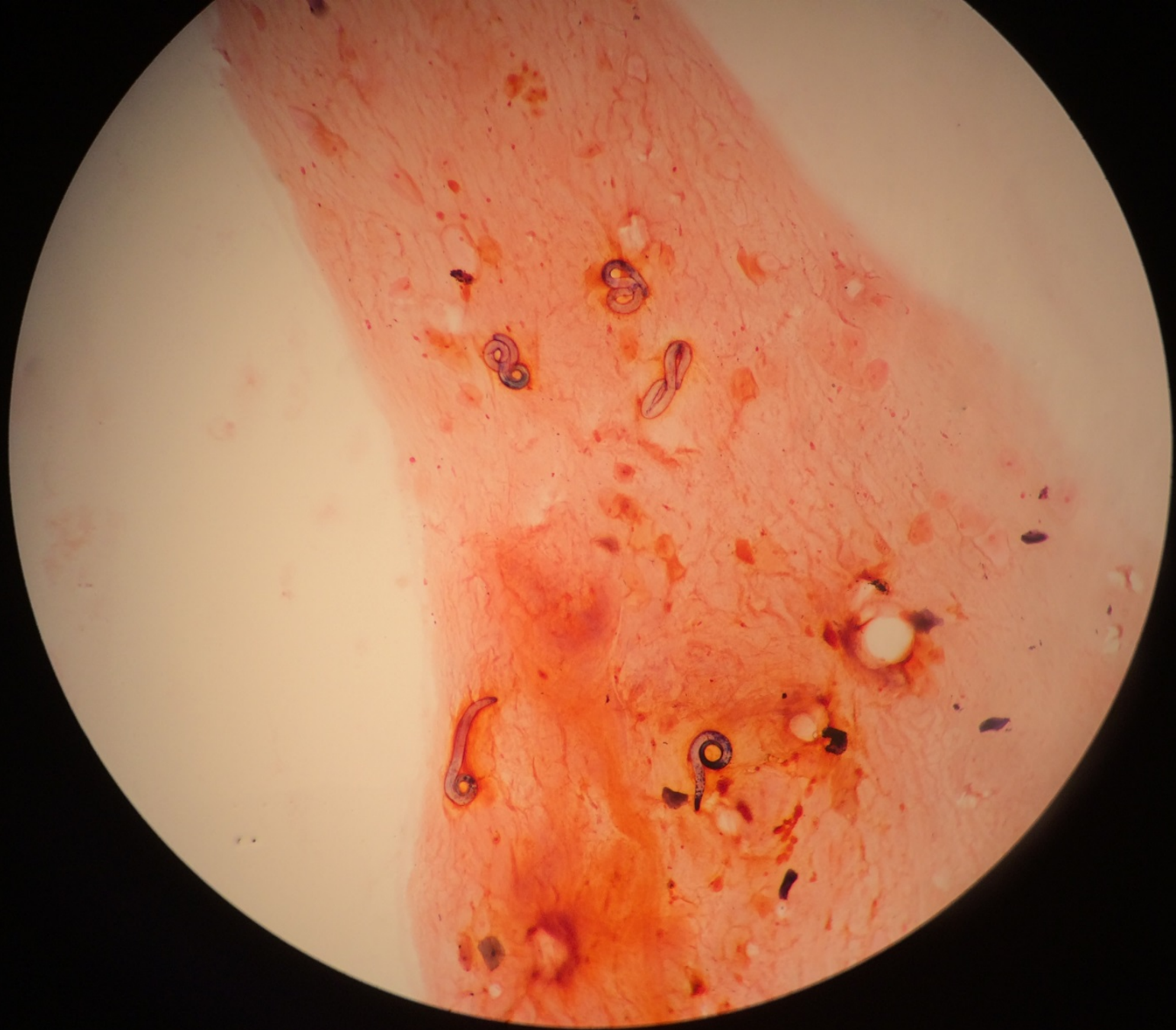


A Diagnostic Test Returns....









i = Infective Stage
d = Diagnostic Stage

6 Infective filariform larvae penetrate the intact skin initiating the infection.

7 The filariform migrate by various pathways to the small intestine where they become adults.

5 The rhabditiform larvae develop into infective filariform.

Development into filariform larvae

AUTOINFECTION

8 Adult female worm in the intestine.

4 Rhabditiform larvae hatch from embryonated eggs.

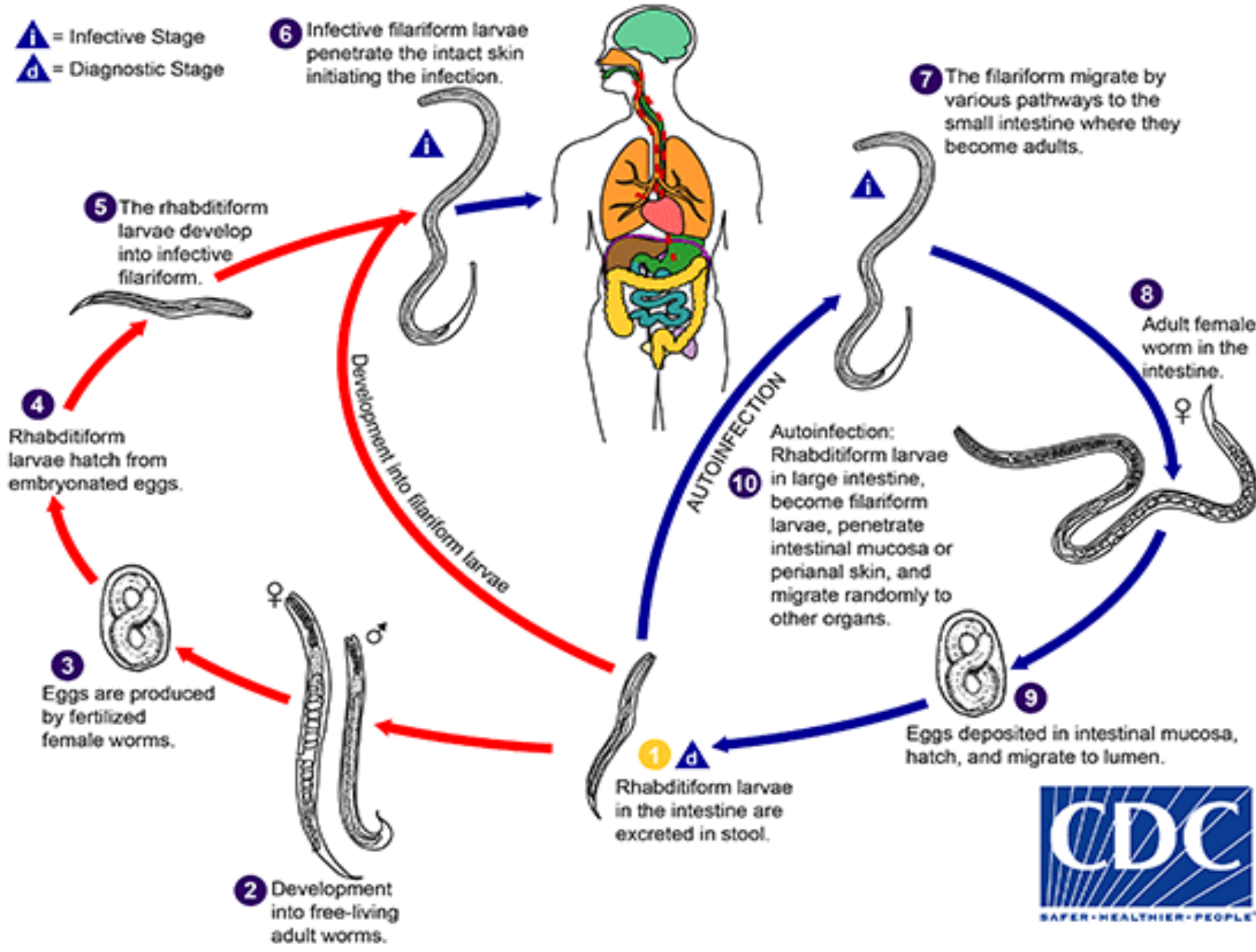
10 Autoinfection: Rhabditiform larvae in large intestine, become filariform larvae, penetrate intestinal mucosa or perianal skin, and migrate randomly to other organs.

3 Eggs are produced by fertilized female worms.

9 Eggs deposited in intestinal mucosa, hatch, and migrate to lumen.

2 Development into free-living adult worms.

1 Rhabditiform larvae in the intestine are excreted in stool.



Viewpoints

Is Human Immunodeficiency Virus Infection a Risk Factor for *Strongyloides stercoralis* Hyperinfection and Dissemination?

Marc O. Siegel, Gary L. Simon*

Division of Infectious Diseases, George Washington University Medical Center, Washington, DC, United States of America

- NOT a traditional risk factor
- Biggest risk factors are corticosteroid use & HTLV-1
- Only 40 cases of disseminated Strongy in HIV pts – many were also receiving steroids

Diagnosis



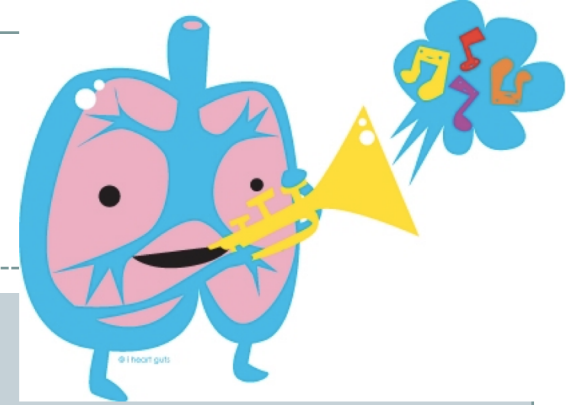
- Classic sx: GI symptoms (diarrhea), respiratory symptoms (dry cough, throat irritation), skin (itchy red rash when worm enters skin and can get recurrent red rash along thighs & buttocks)
- Diagnosis usually depends on visualization of the larvae in stool or respiratory culture
- Stool specimens are very insensitive (<50%)
- Serology (ELISA) is 83-89% sensitive, 97% specific

Management



- Treatment is usually ivermectin (200mcg/kg) as first-line treatment, use up to 14 days in case of disseminated strongyloides
- Can combine with albendazole therapy
- Monitor w/ repeat stool studies, CBC w/ diff, anti-Strongyloides antibodies
- Prognosis is good unless you develop bacteremia/sepsis

Summary: Key Learning Points



1. In HIV patients, travel history is key
2. Bronchoscopy is the gold standard for diagnosis of PCP ~ 99% yield!
3. Think of Strongyloides with the triad of eosinophilia, respiratory sx & GI sx
4. Absence of GGOs on HRCT makes PCP unlikely

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An International Enigma



Chief Complaint



- Abdominal Pain

History of Present Illness



- 42yo woman visiting SF from Canada
- H/o unilateral lung transplant 16 months ago
- For the last 10 days, has been going to multiple OSH ERs with nausea, vomiting, crampy abdominal pain
- Numerous negative CT Scans

Past Medical History



- s/p single lung transplant for NSIP
- GERD
- Obesity

Medications



- CellCept
- Tacrolimus (Prograf)
- PPI
- Septra ppx
- Calcium/Vitamin D



- VS: 37.2, HR 79, 132/86, RR 18, 93% RA
- General: Cushingoid appearing woman lying down, appearing fatigued, no acute distress
- Lungs: Fine crackles throughout R lung field, L lung with basilar crackles, no wheezes
- Abdomen: Hypoactive bowel sounds, tender to palpation in mid-epigastrium and RUQ but no rebound/guarding/peritoneal signs, no CVA tenderness, no suprapubic tenderness, no Murphy's signs

OSH Results



- Normal CBC
- Normal CHEM
- Normal LFTs
- Normal CT Abdomen/Pelvis

A Diagnostic Test Returned...



A Diagnostic Test Returned...



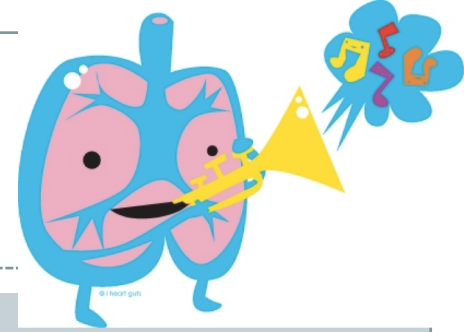
- Tacrolimus level of 21.2!

Tacrolimus Toxicity



- Common sx: fatigue, anorexia, malaise, abdominal pain
- Labs: AKI, hyperkalemia, metabolic acidosis
- Beware of interactions with other drugs!
- Chronic >> acute, especially in renal patients

Summary: Key Learning Points



1. When in doubt, call Transplant team!

1. In any transplant patient, think of:
 - a. Infection
 - b. Rejection
 - c. Recurrence of underlying disease
 - d. Medication effect
 - e. Post-transplant lymphoproliferative dz

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Chief Complaint



- Shortness of breath

History of Present Illness



- 73yoM with multiple myeloma s/p chemo (cyclophosphamide, bortezomib, dexamethasone)
- Was admitted with pneumonia a week ago but since discharge still feeling poorly and requiring 6 L NC on readmission
- +Dry cough, no fevers/chills/LEE/orthopnea/PND

Past Medical History



- Multiple myeloma s/p chemo & radiation to ribs
- Meds: Amlodipine, Lexapro, PPI
- Never-smoker, no alcohol, drugs
- No family history

Physical Exam



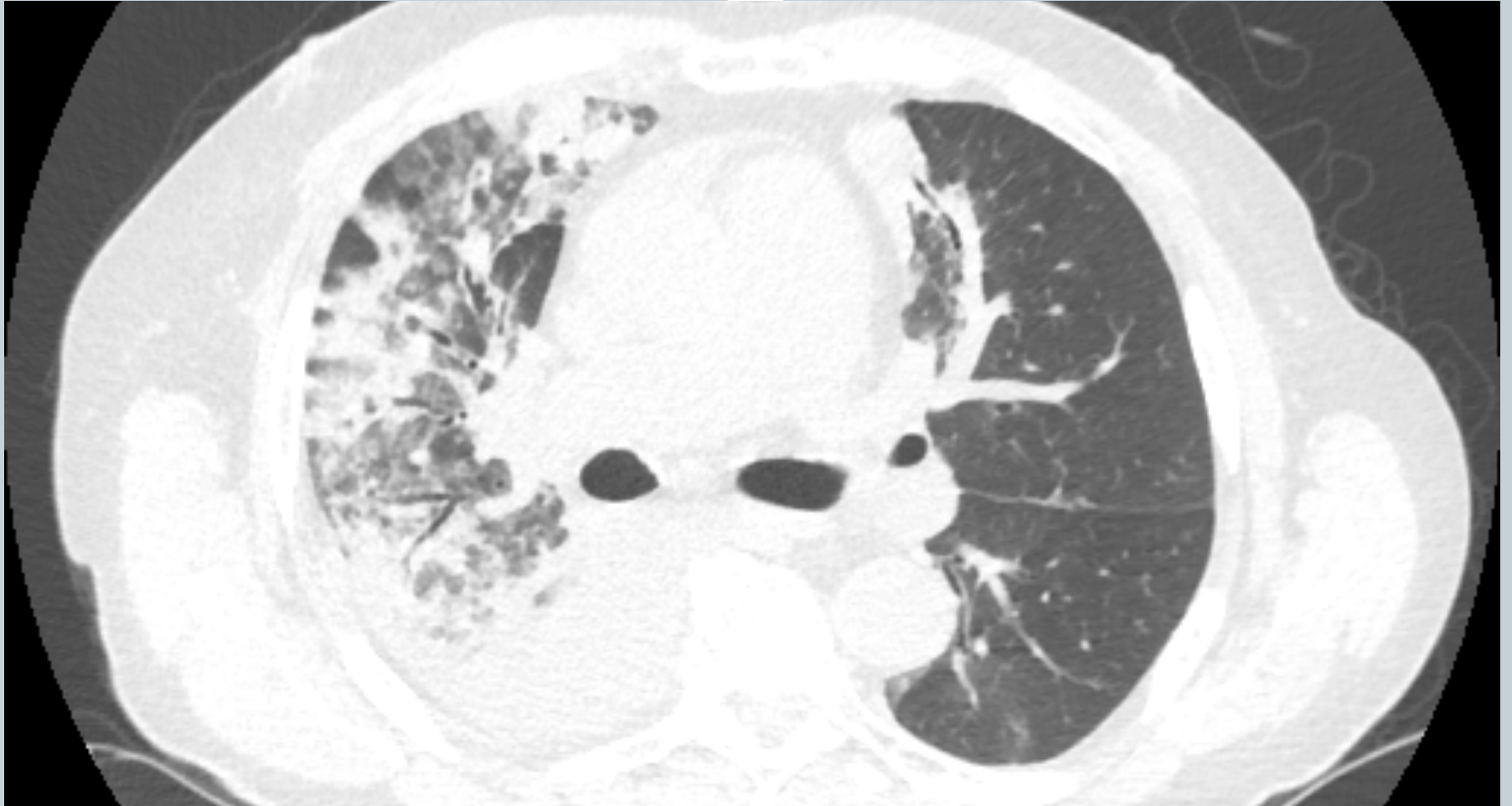
- VS 37, HR 83, BP 119/69, RR 20, 93% 6 L NC
- Gen: Lying in bed in NAD
- Lungs: RLL and RML crackles, no wheezes, no increased work of breathing
- CV: RRR no murmurs, no JVD
- Ext: No edema

Labs

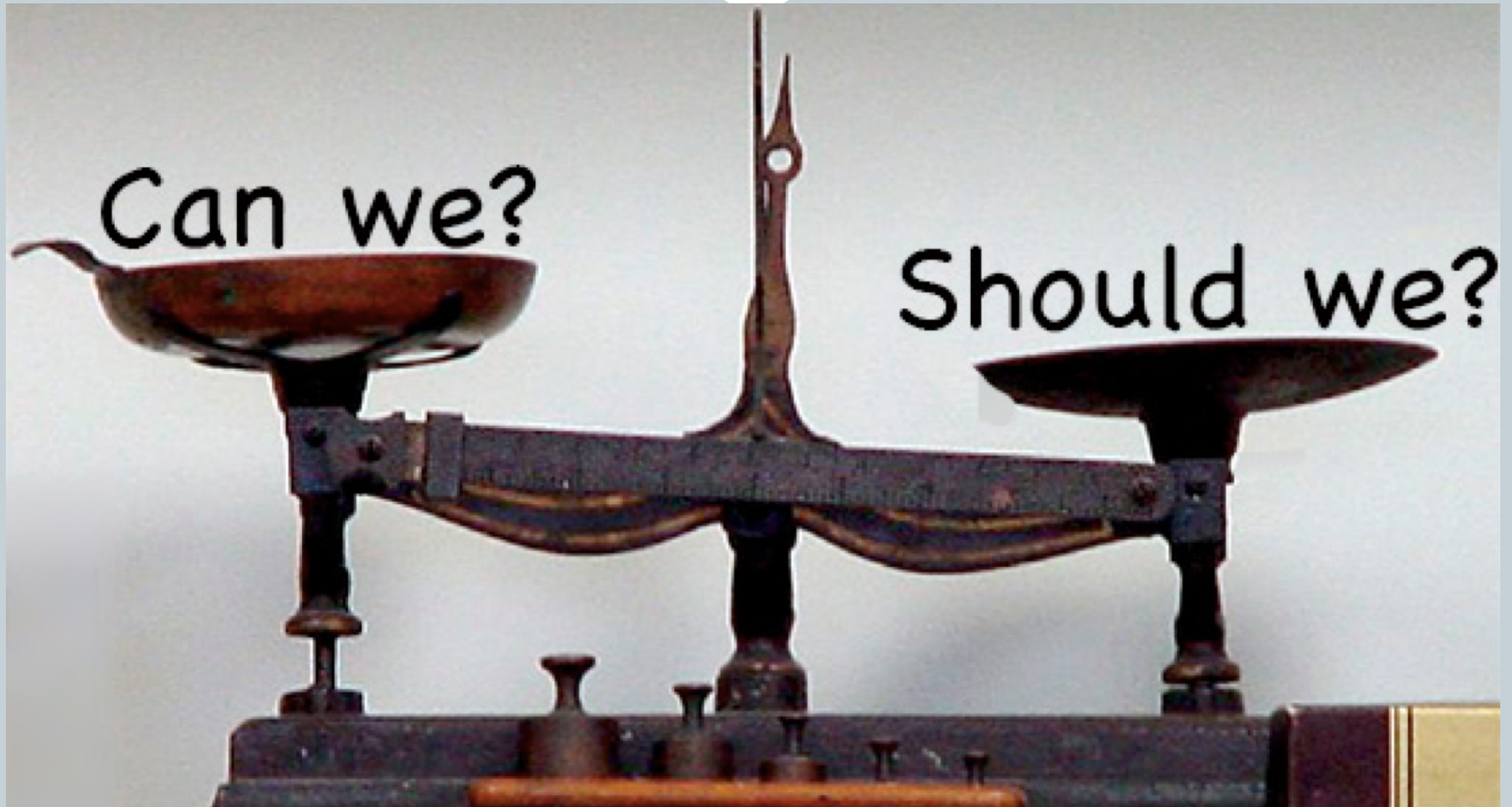


- Normal CBC & CHEM
- Lower Extremity DVT U/S: No DVT
- Blood cultures negative, Rapid flu negative
- Sputum culture negative

Chest CT Scan



To Branch or Not to Branch?

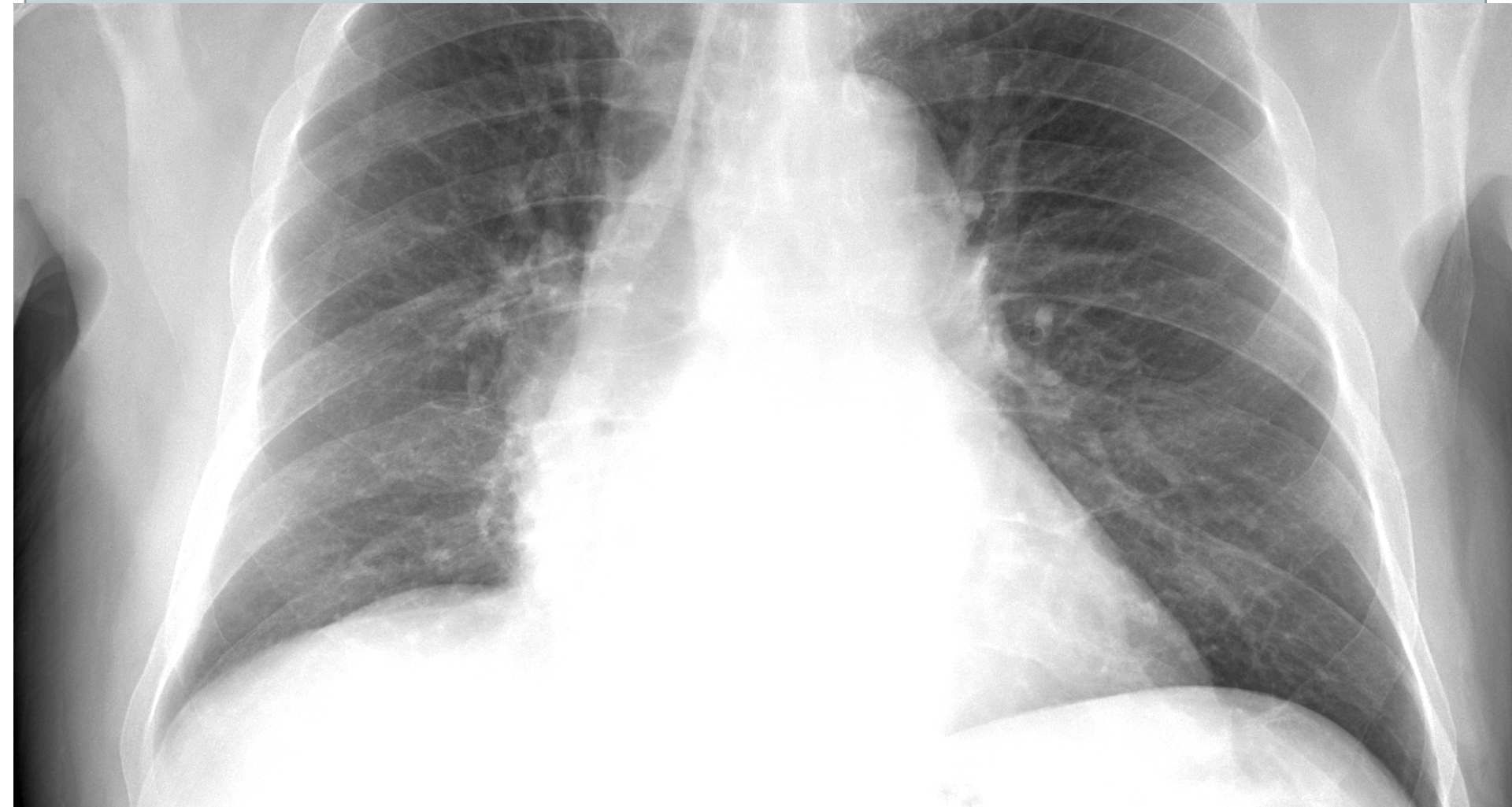


Bronchoscopy



- Bronchoscopy showed no e/o bacterial, fungal, viral infection and cytology showed no PCP
- So we decided to treat and this happened ...

Latest CXR – Cured!



What was the Diagnosis?



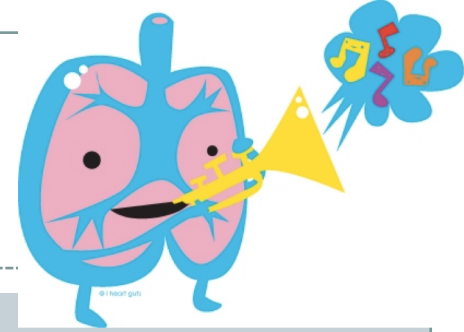
Radiation Pneumonitis!

Radiation Pneumonitis/OP 2/2 XRT



- Acute phase usually 4-12 weeks after XRT
- Sx: cough, dyspnea, low-grade fever, chest pain
- Immune-mediated change in capillary permeability
- Classically you see well-demarcated imaging findings
- Treatment is high-dose steroids (1mg/kg) for loooong

Summary: Key Learning Points



1. Always ask re: timing of XRT
2. Check drugs on www.pneumotox.com – ESPECIALLY PD1-inhibitors
3. Have to r/o infection before high-dose steroids (& don't forget PJP prophylaxis!)

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Thank You!



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