



NADE ANNUAL CONFERENCE 2025

Respiratory Listings: Pitfalls and Update

Denver, CO

August 12th

Michael Canham, MD

Pulmonary, Critical Care Specialist

Retired, Professor of Medicine

National Jewish Health, University of Colorado School of Medicine



Lung is Like a Slinky



Case Presentation CT Video

42-year-old male construction worker from Texas comes to Denver for second opinion at National Jewish. Prior testing shows moderate obstructive defect on spirometry and modest reduction in DLCO. Can't work and can't get approved for SSA disability.

SSA guidelines for Exercise ABG study confirms allowance under preamble 3.00.G3bi-ii {TABLE IV-B}

LightSpeed16

A

Anonymous Hospital

Ex: 23275

PATIENT8534

Recon 2: THORAX (INSPIRATION)

1960 Nov 10 M MR8534

Se: 3/8

Acc: ACC18196

Im: 1/74

2007 Feb 27

Ax: S16.0

Acq Tm: 07:52:20

Mag: 1.5x

512 x 512

LUNG



120.0 kV

439.0 mA

5.0 mm

Tilt: 0.0

ET: 0.7 s

GP: 0.6 s

TS: 17.50 mm/s

SPR:

Lin: DCM / Lin: DCM / Id: D

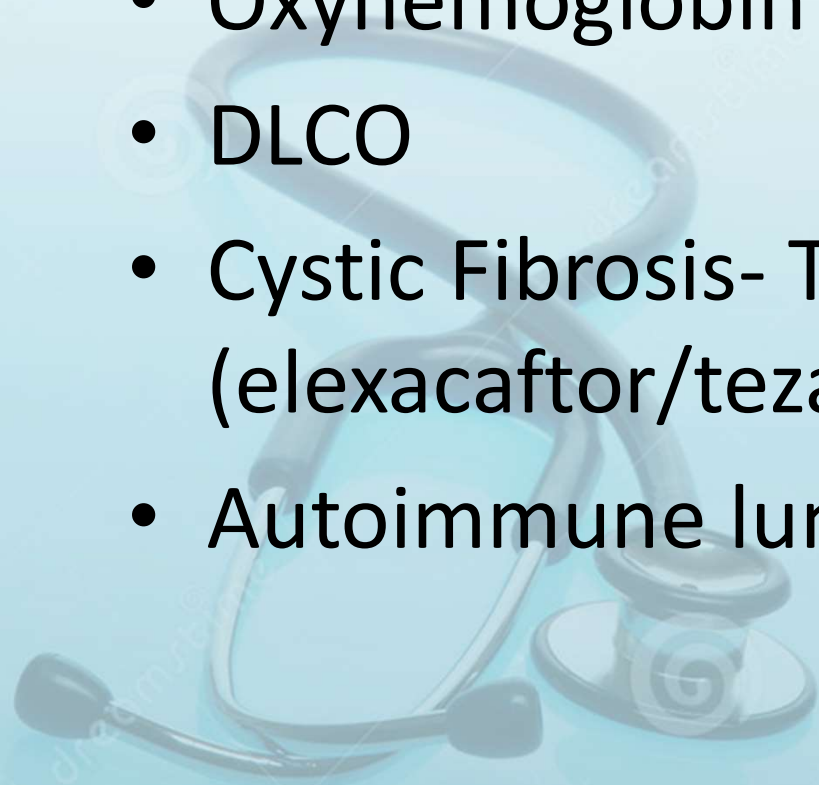
W: 1500 L: 600

P

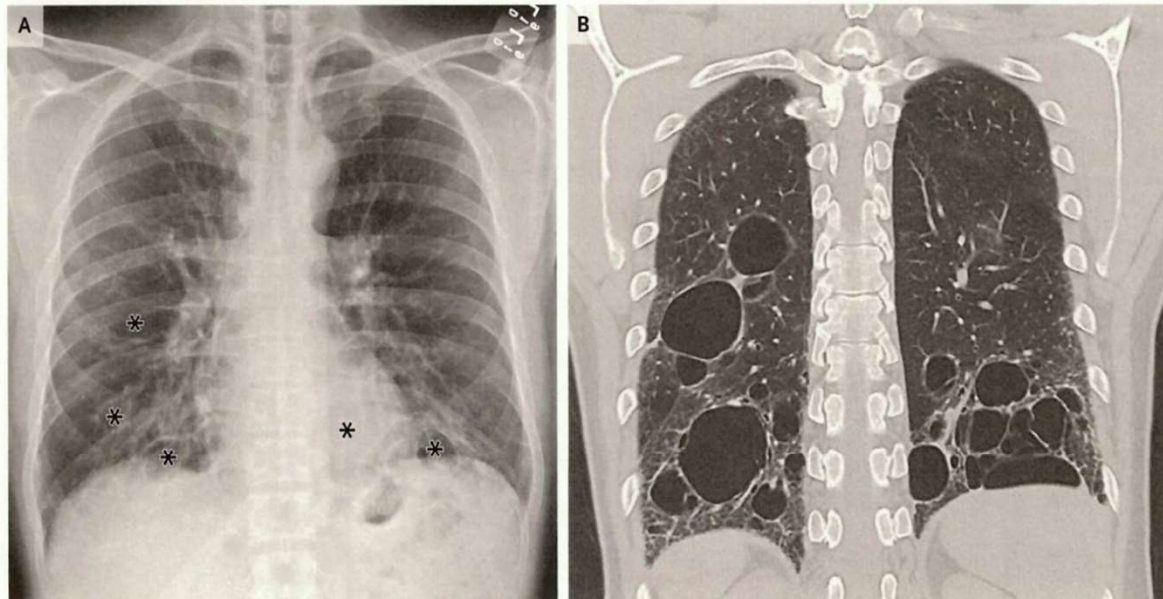
DFOV: 36.6 x 36.6 cm

Pitfalls & Update Areas

- Spirometry Problems: Effort Dependent
- Pulse Oximetry and Pulse Waveform
- Oxyhemoglobin Dissociation Curve
- DLCO
- Cystic Fibrosis- Trikafta (brand name) (elexacaftor/tezacaftor/vacaftor)*
- Autoimmune lung disease - 14.00 listings



Lymphoid Interstitial Pneumonia



Furkan Ufuk, M.D.¹

¹University of Chicago Medicine, Chicago.

Dr. Ufuk can be contacted at furkan.ufuk@hotmail.com.

This article was published on February 15, 2025, at [NEJM.org](https://www.nejm.org).

A PREVIOUSLY HEALTHY 37-YEAR-OLD MAN PRESENTED TO THE PULMONARY clinic with a 10-month history of dry cough, fatigue, and dry mouth. He was a lifelong nonsmoker. On physical examination, crackles were heard at both lung bases. The oral mucosa and conjunctivae were dry, and dental caries were present. A chest radiograph showed reticular opacities at the lung bases and cystic lucencies in both lungs (Panel A, asterisks). Laboratory testing was negative for human immunodeficiency virus infection. Results were otherwise notable for normal immunoglobulin levels and an autoantibody profile consistent with Sjögren's syndrome, which was confirmed with a minor salivary gland biopsy. Computed tomography of the chest showed well-demarcated, thin-walled peribronchovascular cysts, predominantly in the lower lungs, as well as mild ground-glass opacities and subpleural reticulation (Panel B). A surgical lung biopsy showed dense interstitial lymphocytic infiltration with marked alveolar septal thickening. Immunohistochemical analysis was negative for CD1a-positive Langerhans' cells. A diagnosis of lymphoid interstitial pneumonia with Sjögren's syndrome was made. Treatment with prednisone was started. Three months later, mycophenolate mofetil was started, and the dose of prednisone was slowly tapered and then stopped after 6 months. At the 1-year follow-up, the patient's symptoms and radiographic findings were stable.

DOI: 10.1056/NEJMicm2411756

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Spirometry Pitfalls

Effort dependent. Spirometry is only useful if good quality and normal. If an allowance is considered always look at tracings.

Lack of Certified PFT technicians to assure good quality. Hospital based PFT labs are certified.

Malingering (or poor coaching) in British study may be as high as 40%.

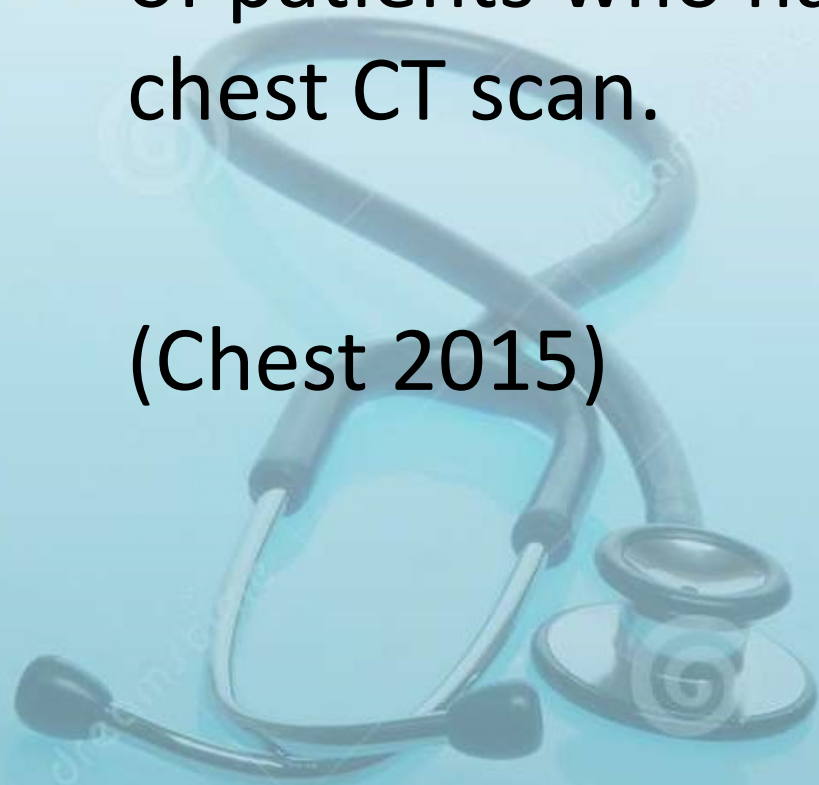
State disability offices have difficulty in judging efforts by looking at tracings alone.

Over reliance on spirometry for decisions.

How Common is Airflow Limitations in Patients With Emphysema on CT Scan of the Chest

Spirometry was normal or near normal, in 10.4% of patients who has significant emphysema on chest CT scan.

(Chest 2015)



Spirometry Pitfalls

If spirometry alone not allowance, consider gas exchange impairment (listing 3.02C-1).

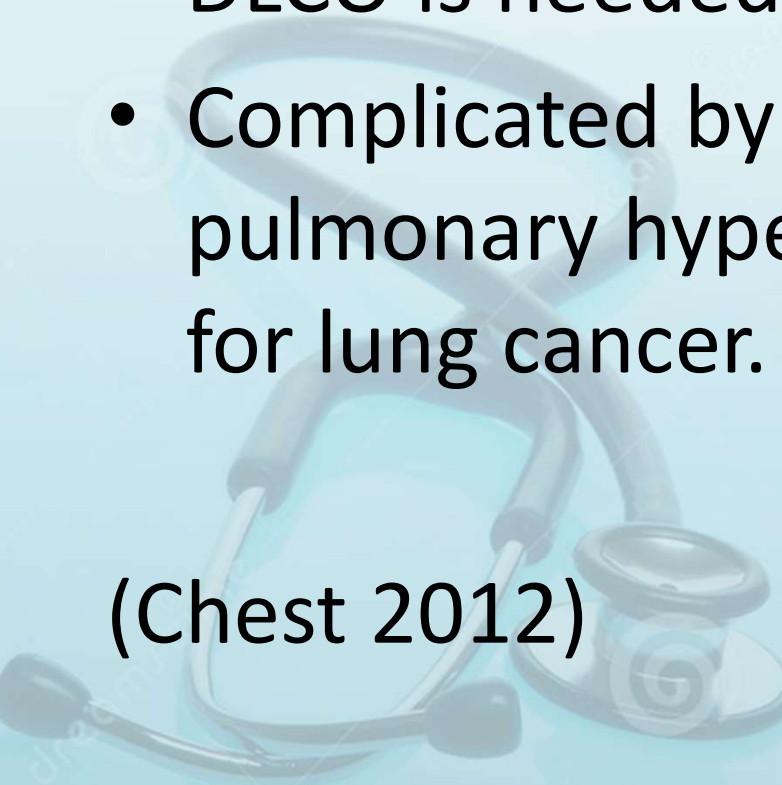
LOOK FOR CLUES: Chest CT scan report diagnoses.

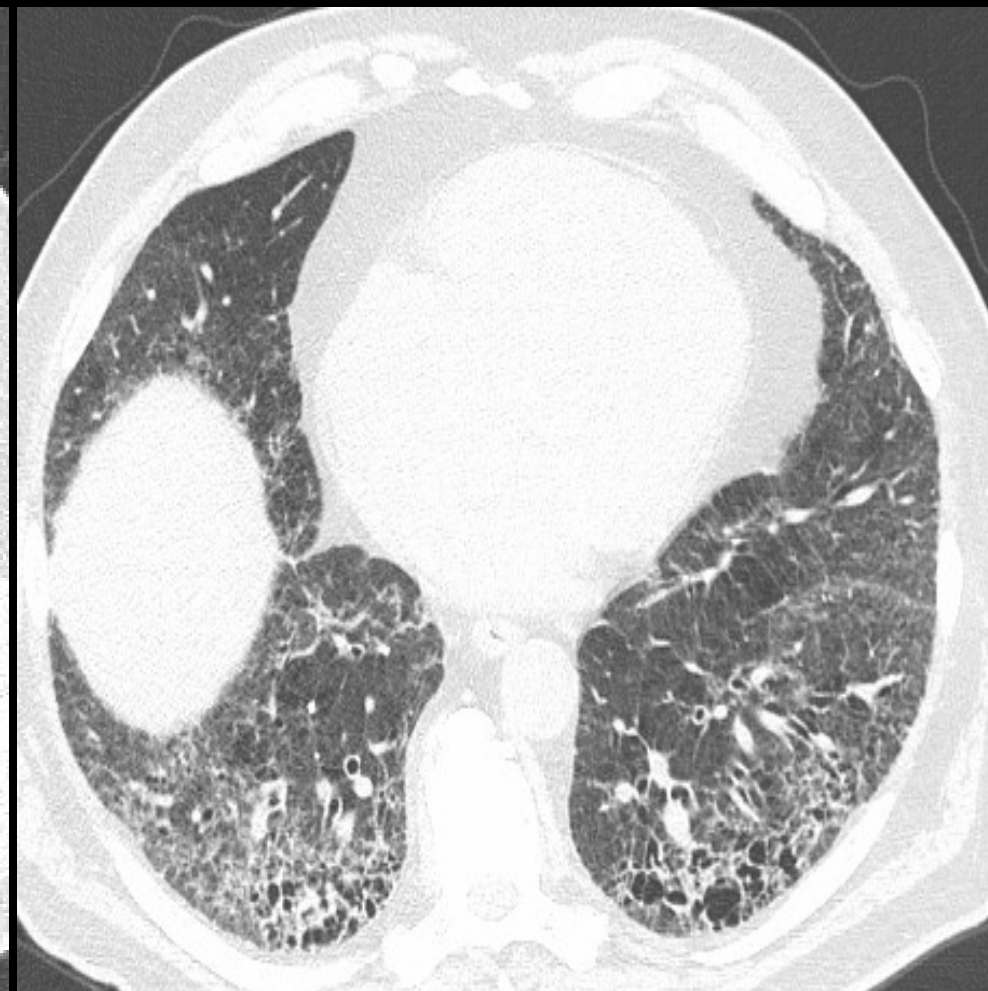
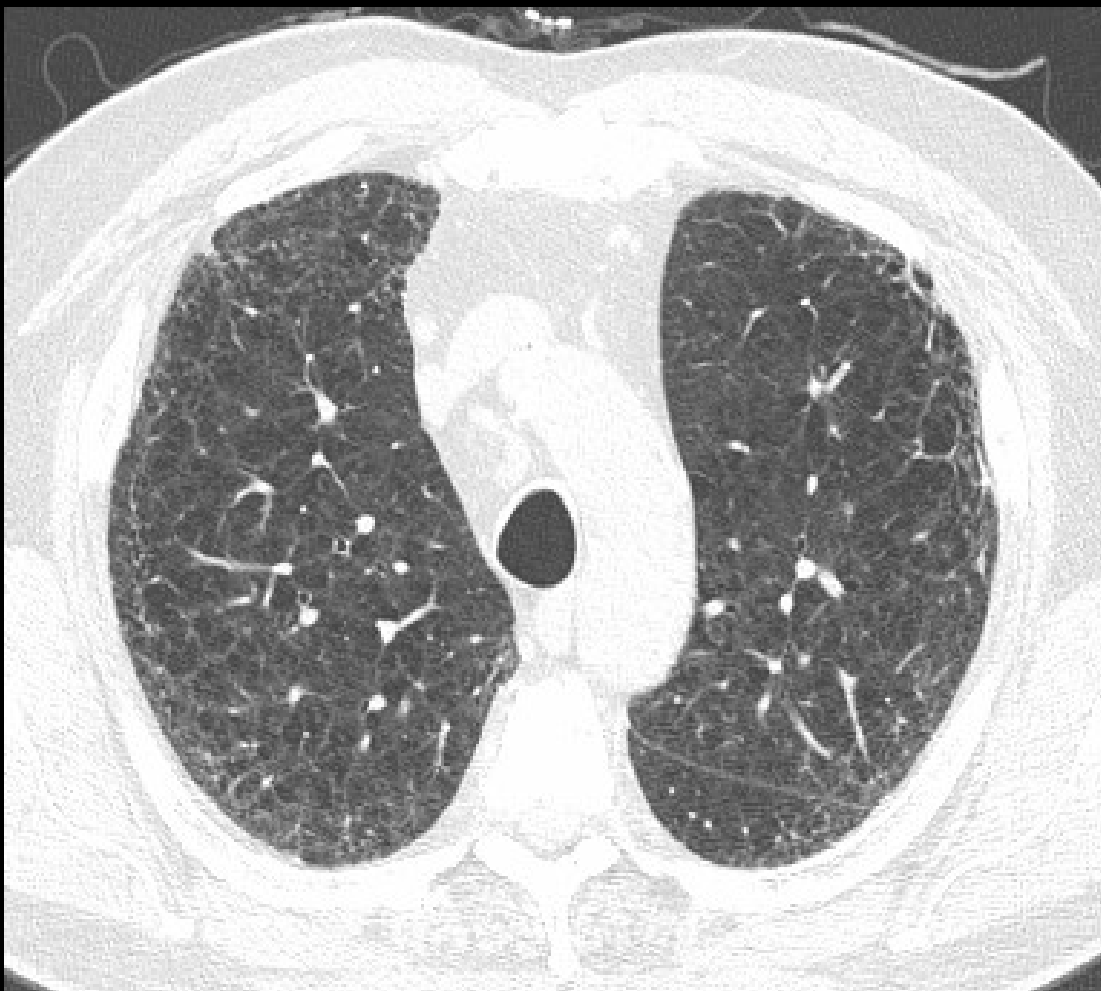
Paraseptal versus centrilobular emphysema.
Combined pulmonary fibrosis emphysema.
Interstitial lung disease (ILD) especially
Idiopathic Pulmonary Fibrosis (IPF or UIP).

Combined Pulmonary Fibrosis & Emphysema

- Spirometry can be normal
- DLCO is needed
- Complicated by refractory hypoxemia, pulmonary hypertension, and increased risk for lung cancer.

(Chest 2012)



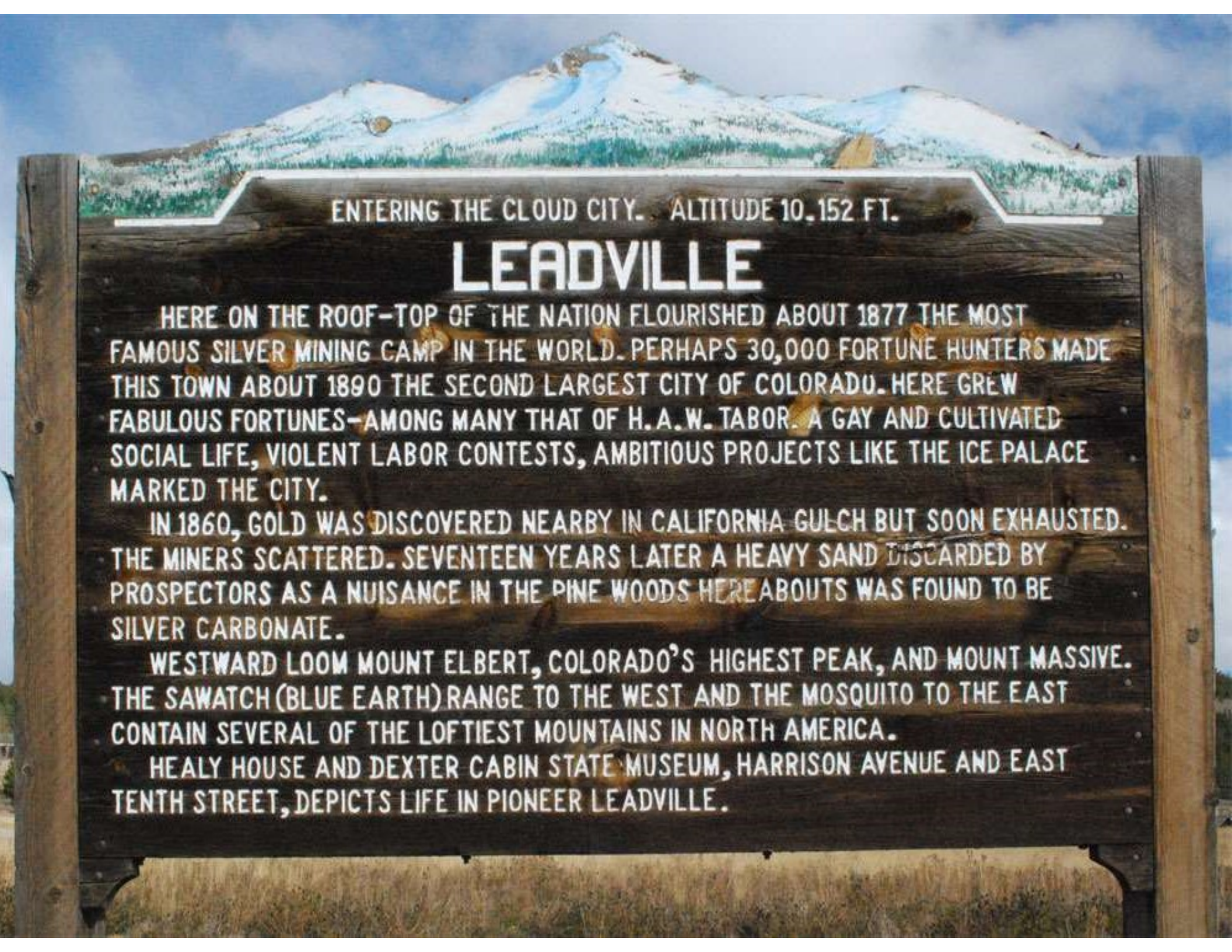


Combined Pulmonary Fibrosis Emphysema



Combined Pulmonary Fibrosis Emphysema





ENTERING THE CLOUD CITY. ALTITUDE 10,152 FT.

LEADVILLE

HERE ON THE ROOF-TOP OF THE NATION FLOURISHED ABOUT 1877 THE MOST FAMOUS SILVER MINING CAMP IN THE WORLD. PERHAPS 30,000 FORTUNE HUNTERS MADE THIS TOWN ABOUT 1890 THE SECOND LARGEST CITY OF COLORADO. HERE GREW FABULOUS FORTUNES—AMONG MANY THAT OF H.A.W. TABOR. A GAY AND CULTIVATED SOCIAL LIFE, VIOLENT LABOR CONTESTS, AMBITIOUS PROJECTS LIKE THE ICE PALACE MARKED THE CITY.

IN 1860, GOLD WAS DISCOVERED NEARBY IN CALIFORNIA GULCH BUT SOON EXHAUSTED. THE MINERS SCATTERED. SEVENTEEN YEARS LATER A HEAVY SAND DISCARDED BY PROSPECTORS AS A NUISANCE IN THE PINE WOODS HERABOUTS WAS FOUND TO BE SILVER CARBONATE.

WESTWARD LOOM MOUNT ELBERT, COLORADO'S HIGHEST PEAK, AND MOUNT MASSIVE. THE SAWATCH (BLUE EARTH) RANGE TO THE WEST AND THE MOSQUITO TO THE EAST CONTAIN SEVERAL OF THE LOFTIEST MOUNTAINS IN NORTH AMERICA.

HEALY HOUSE AND DEXTER CABIN STATE MUSEUM, HARRISON AVENUE AND EAST TENTH STREET, DEPICTS LIFE IN PIONEER LEADVILLE.

DLCO - diffusion of lung for Carbon Monoxide (CO)

Blood Vessels

Hemoglobin (Hgb)

Carboxy Hgb
(CO - Hgb)

Pitfalls

- 1) Anemia
- 2) ↑CO-Hgb in blood already (smokers)
- 3) Too small a breath (VI, IVC, IV)

Air Sac

Oxygen (O₂)

CO greater than O₂

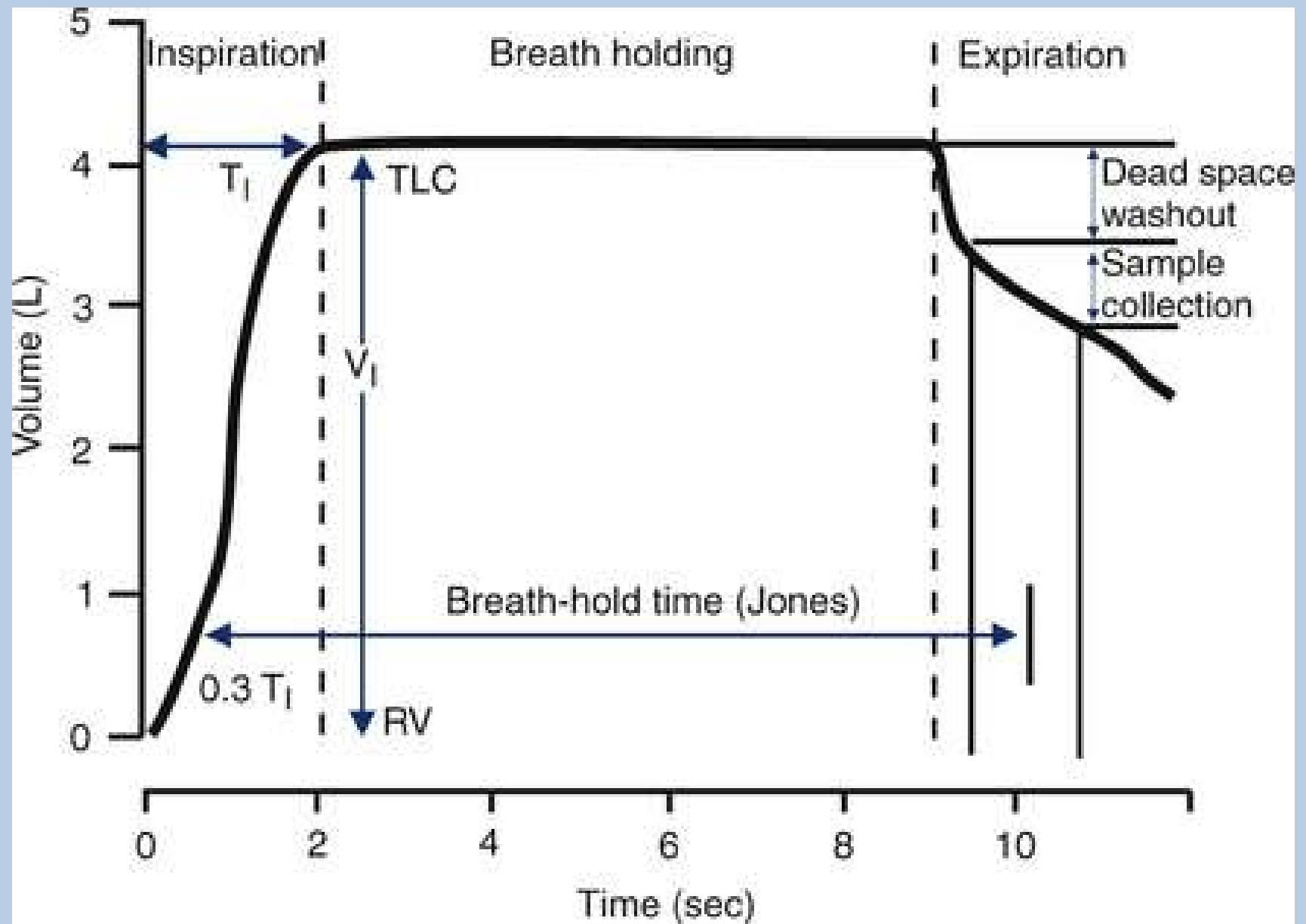
250x

$\frac{DL}{VA}$ - correction for alveolar volume

Often supranormal in Lung Restriction from obesity.

Lung Membrane

DLCO



DLCO Pitfall

Remember the size of the breath influences the result.

SSA requires that the Inspiration Volume (abbreviated as: IVC, IV, or VI) must be $>85\%$ of the FVC pre-BD. Measure yourself!

MAKE THE IVC/FVC CALCULATION TO ASSURE THE DLCO RESULT IS VALID!

Gas Exchange Evaluations

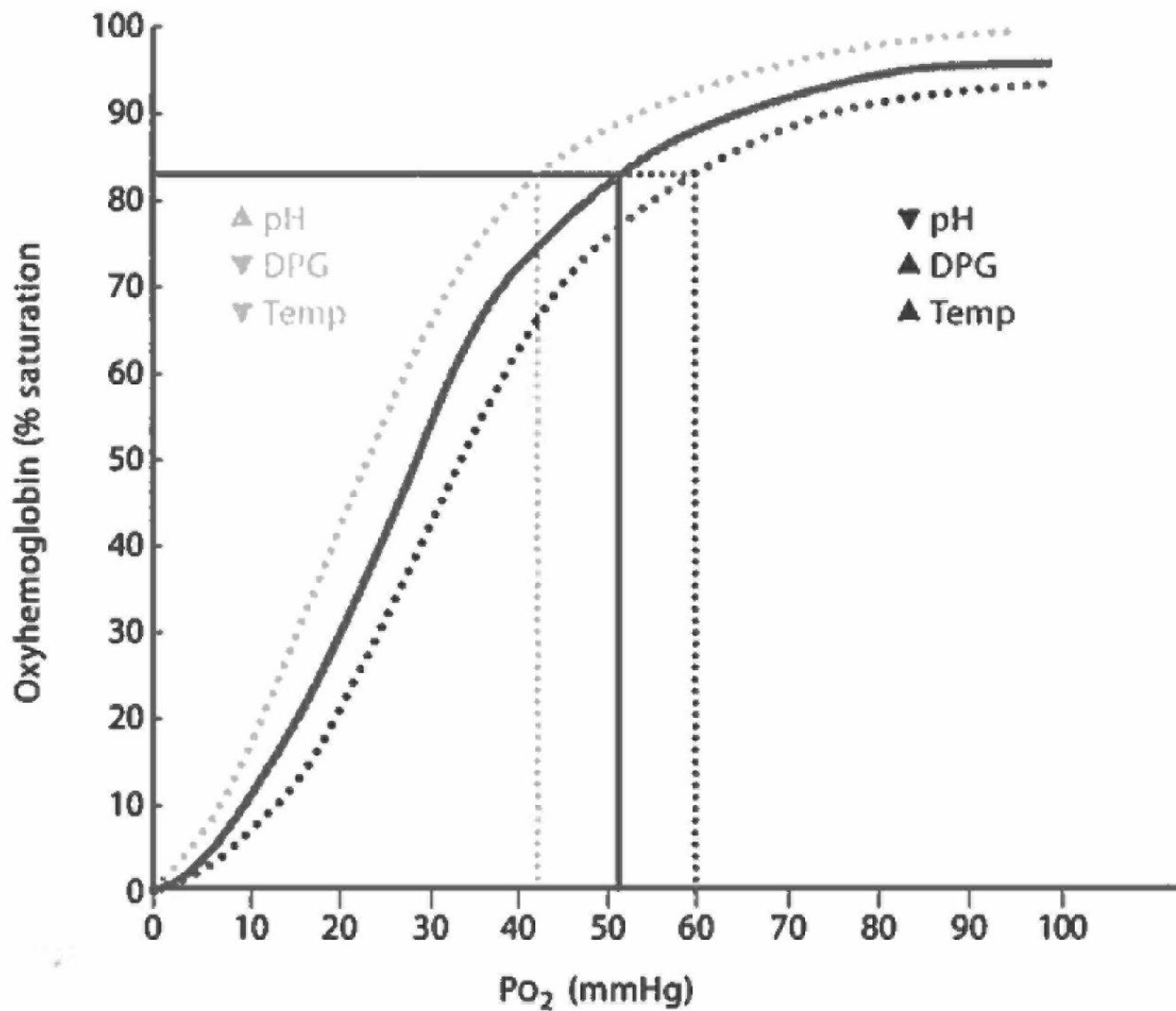
Arterial Blood Gas:

More discomfort and inconvenient.

Measures $p\text{CO}_2$, $p\text{O}_2$, and pH. If combined with Co-oximetry (usually included in ABG equipment) will obtain Carbon monoxide level.

ABG measures dissolved O_2 , not bound to hemoglobin. O_2 enters blood – driven by the barometric pressure.

Oxyhemoglobin Dissociation Curve



Oximetry vs ABG Pitfall

Normal Oximetry may be accompanied by pO₂ values that meet TABLE IV-A, B, C.

Reduced Oximetry O₂ sats may be accompanied by ABG values that do not meet TABLE IV.

CONSIDER ABG TESTING IF ANY QUESTIONS,
CONCERNS, OR CHANGE IN DECISION

Pulse Oximeter Results Unreliable, Still

A 2020 study analyzed more than 48,000 patients, finding that the rate of hypoxemia not detected by pulse oximetry was nearly three times as high in Black patients as in White patients.

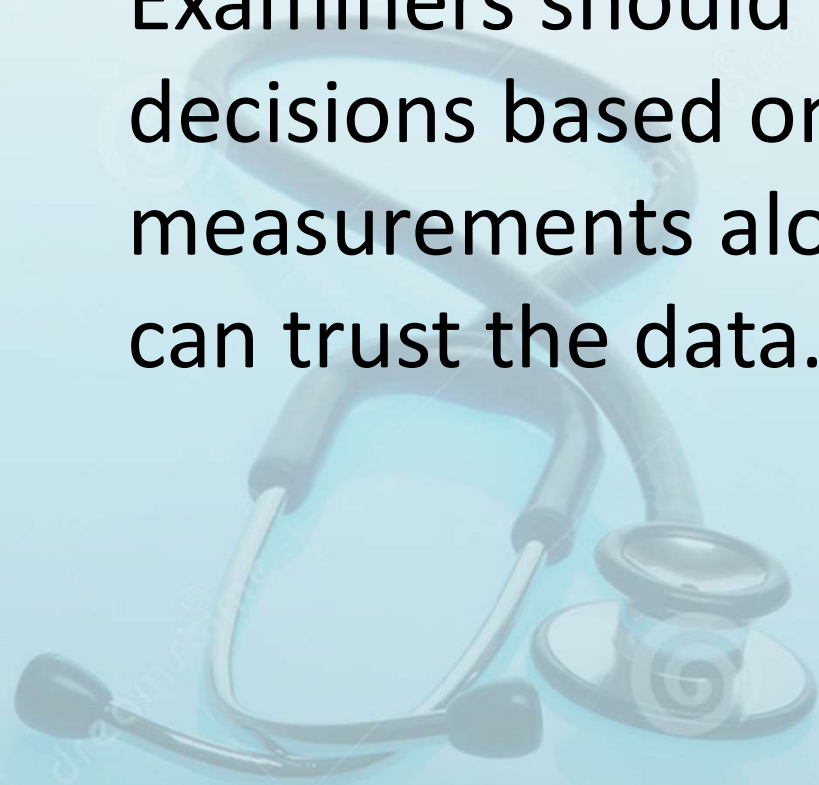
Pulse oximetry overall tended to underestimate blood oxygen levels. However, it did so less for patients with dark skin.

Additionally, other comorbidities such as smoking also increased the chance that the pulse oximetry would overestimate blood oxygen levels.

Equiox study March 30, 2025

Oximetry continued...

Examiners should “pause” when making decisions based on pulse oximetry measurements alone and consider whether they can trust the data.



Oximetry continued...

Falsely elevated O2 sats:

Increased carbon monoxide (CO)

Darker skin color

Hyperventilation

Elevated pH

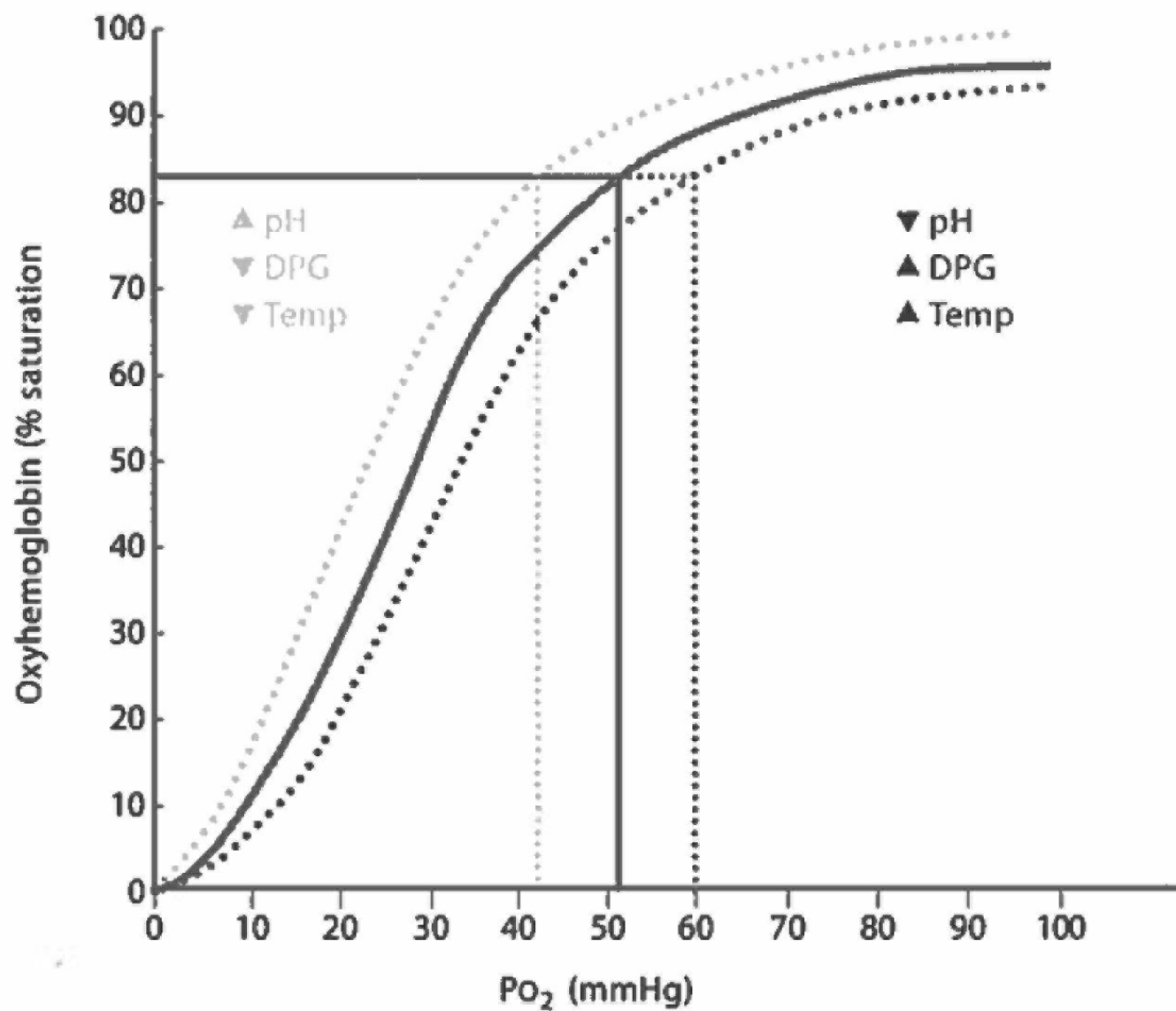
Falsely reduced O2 sats:

Severe anemia (pernicious)

Low pH acidemia

Poor signal- SSA requires pulse waveform

Cold hands



COPD Update

Lung Volume Reduction Procedures:

Surgical removal of severe emphysematous areas to allow normal lung to expand and reduce “dynamic hyperinflation”.

Bronchoscopic placement of coils, valves, and stents to reduce size of emphysematous areas.

Bronchial valve



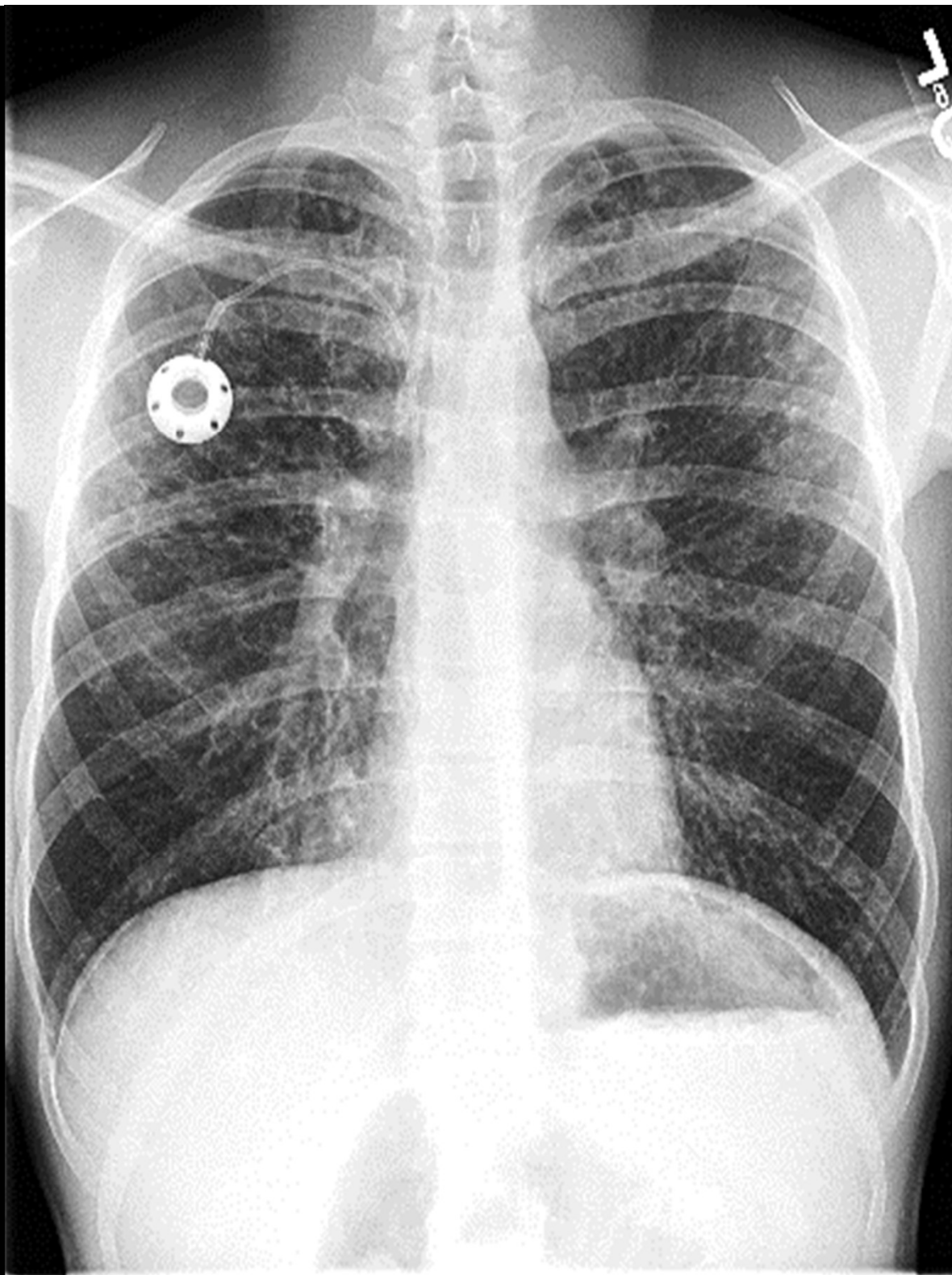
Cystic Fibrosis (CF) - Update

Discovery of gene responsible for CF in 1989.

~ 2000 mutations discovered. 50% have most severe mutation – “Delta F508”

CF transmembrane receptor (CFTR) regulates salt/water balance in bronchial tubes.

Targeted therapy is here! Trikafta.



Cystic Fibrosis



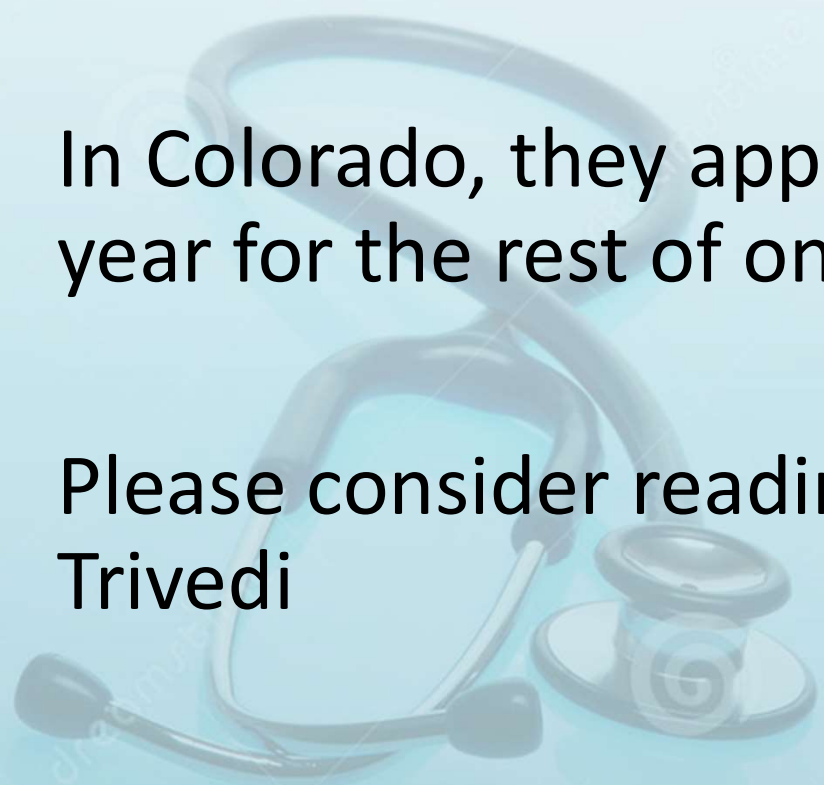
Cystic Fibrosis

Cystic Fibrosis Therapy

Cystic Fibrosis- Trikafta (brand name)
(elexacaftor/tezacaftor/vacaftor)

In Colorado, they approved cost of \$250,000 per
year for the rest of one's life

Please consider reading, “Breath from Salt” –Bijal P.
Trivedi

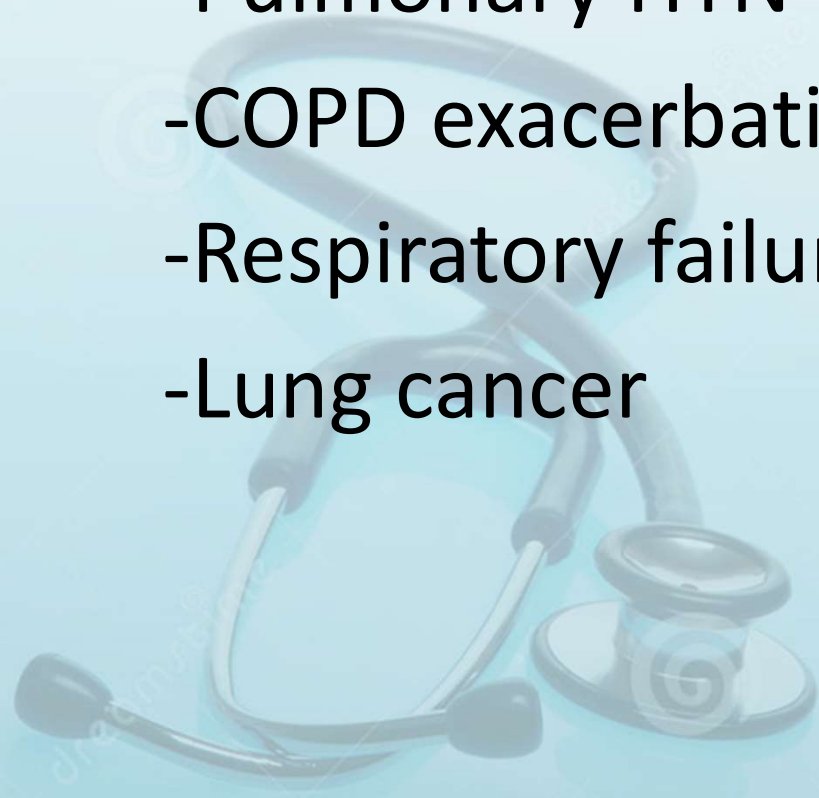


Questions???



Questions to Ponder...

- Black Lung program
- Pulmonary HTN
- COPD exacerbations
- Respiratory failure DX
- Lung cancer



Pulmonary Vascular Resistance (PVR) in Pulmonary Arterial Hypertension (PAH)



$$R = \frac{\Delta \text{Pressure}}{\text{Flow}}$$

or

$$\text{PVR} = \frac{\text{Mean PA press}}{\text{C.O.}}$$

mean pulmonary artery pressure
($\overline{\text{PAP}}$)

Pitfall of 3.09A

1) Mean $\overline{PAP}$ $>$ 40mmHg - meets listing

2) If C.O. is too low due to failing heart and the PVR is stable and high, the mean $\overline{PAP}$ may drop $<$ 40mmHg.

PVR often measured in Wood Units (WU)

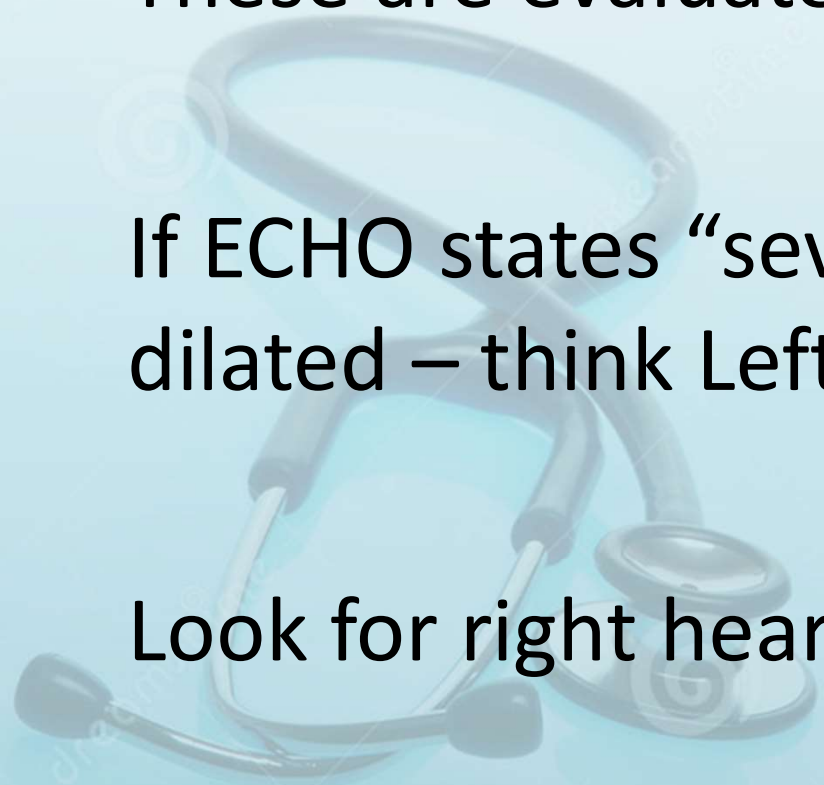
If $>$ 6 WU. Severe and equals listing severity.

Pulmonary Hypertension (PH) Pitfalls

The most common cause of Pulmonary Hypertension is Left Heart Failure. WHO-Class II. These are evaluated under 4.02A1-2.

If ECHO states “severe PH” if left atrium is dilated – think Left Ventricle.

Look for right heart cath data.



Homework

For “Easy Spirometry Interpretation Guide” and
Sample “Spirometry Tracings” —

GO TO: jonesmedical.com and click on those
headings.

Internet Search:

Oxyhemoglobin dissociation curve.

Eosinophilic Lung Disease/Asthma.

LUNG CANCER

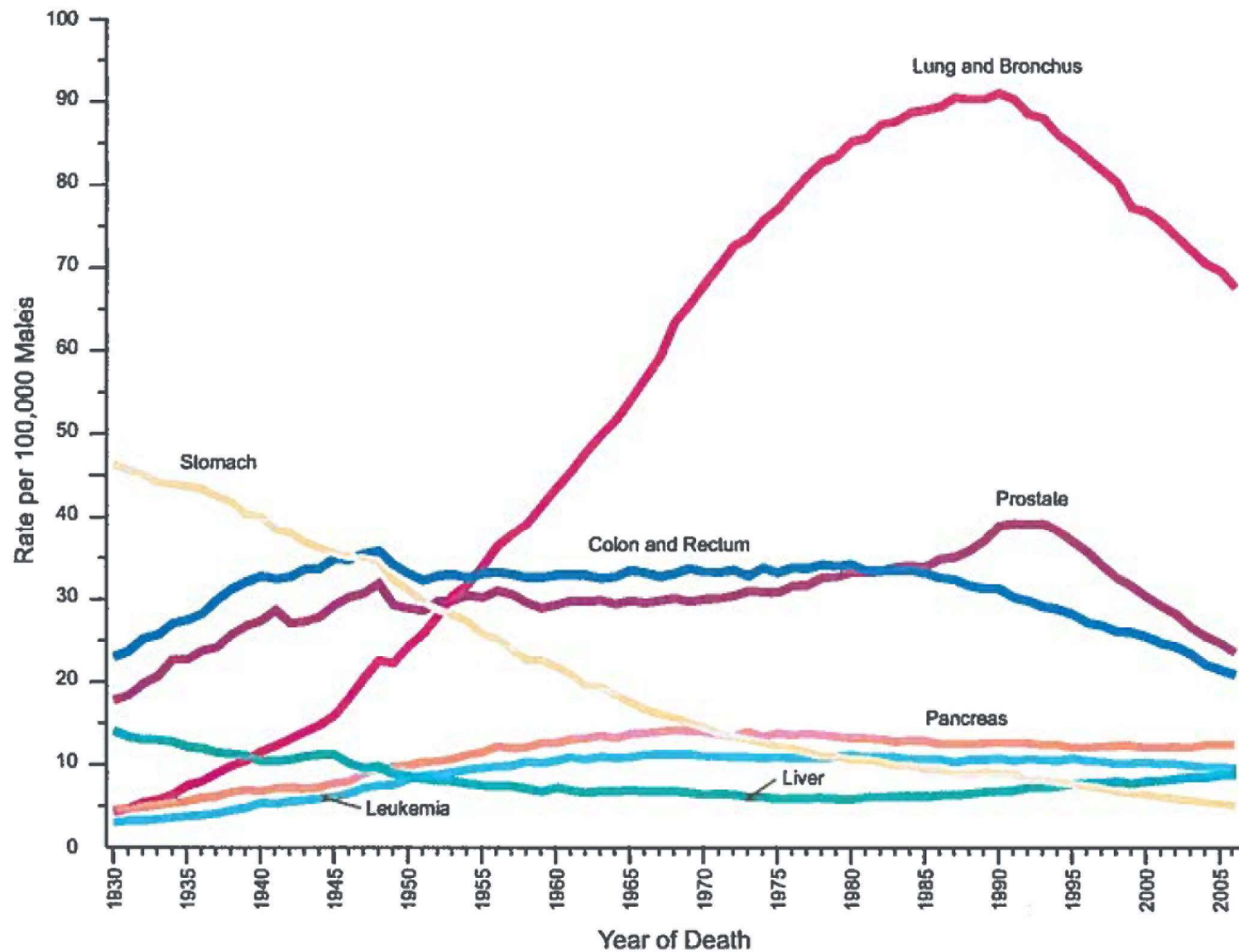


FIGURE 4. Annual Age-Adjusted Cancer Death Rates* Among Males for Selected Cancers, United States, 1930 to 2006.

*Rates are age adjusted to the 2000 US standard population. Due to changes in International Classification of Diseases (ICD) coding, numerator information has changed over time. Rates for cancers of the lung and bronchus, colon and rectum, and liver are affected by these changes. Source: US Mortality Data, 1960 to 2006, US Mortality Vol. 1930 to 1959. National Center for Health Statistics, Centers for Disease Control and Prevention.

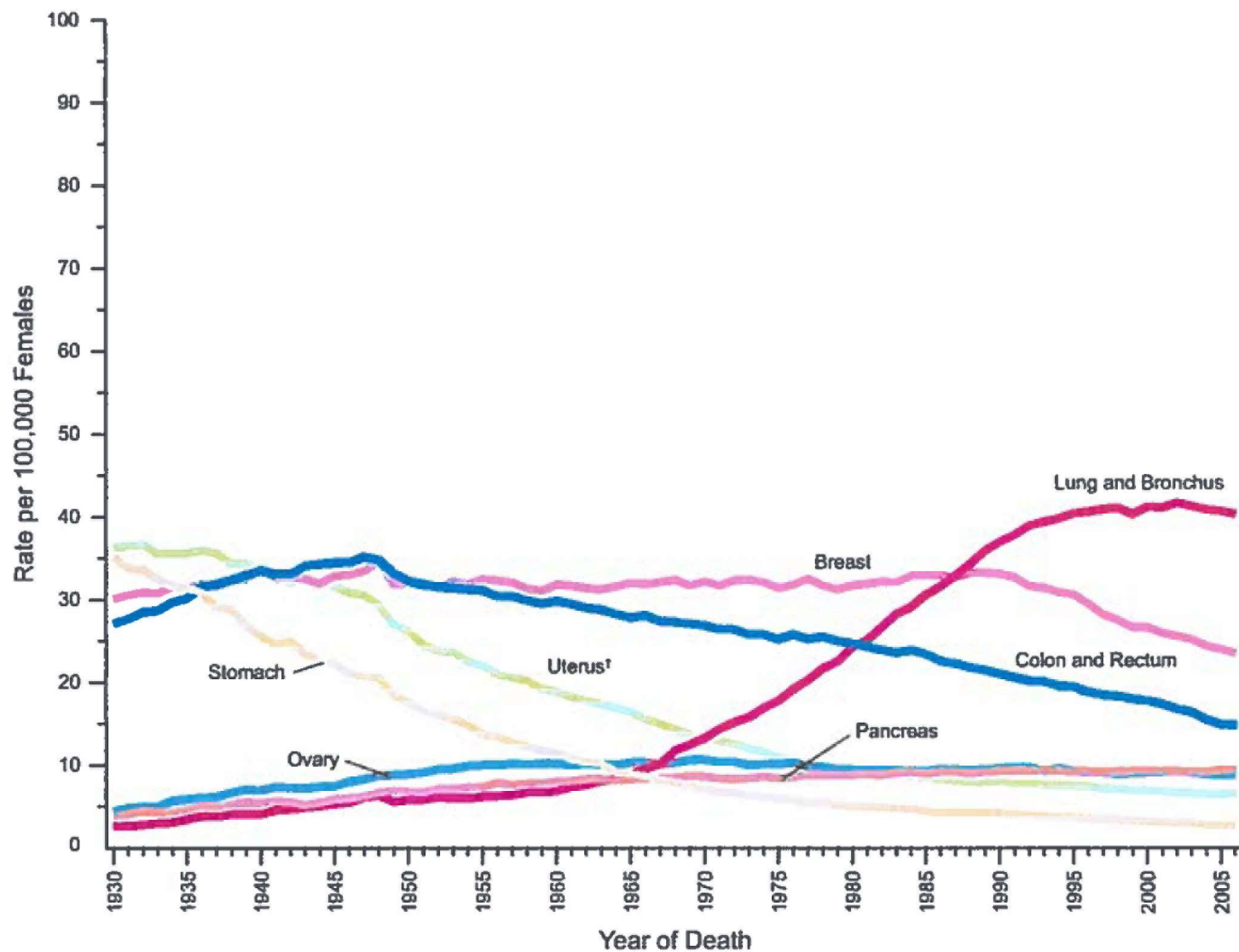


FIGURE 5. Annual Age-Adjusted Cancer Death Rates* Among Females for Selected Cancers, United States, 1930 to 2006.

*Rates are age adjusted to the 2000 US standard population.

†Uterus includes uterine cervix and uterine corpus. Due to changes in International Classification of Diseases (ICD) coding, numerator information has changed over time. Rates for cancers of the uterus, ovary, lung and bronchus, and colon and rectum are affected by these changes. Source: US Mortality Data, 1960 to 2006, US Mortality Volumes 1930 to 1959. National Center for Health Statistics, Centers for Disease Control and Prevention.

Lung Cancer Update

Biomarkers and Gene Expression Assays – high risk mutations found early.

Low dose Chest CT scan for screening – reduces mortality by 20%!

Molecular profiling → Targeted Therapy (FDA approved – 8 new agents)

Immunotherapy trials under way.

EOSINOPHILS (Eos) IN ASTHMA

Failure to use “eos” as a biomarker for management.

Eosinophils are unique inflammatory WBC, seen in allergies and other irritants.

Can be measured in blood (CBC), sputum, or by exhaled Nitric Oxide (eNO).

****Look at lab in asthma cases for EOSINOPHILS.**

Eos. in Asthma – continued.

Increased eosinophils in blood, called eosinophilia.

Look for eos percentage, but more importantly the absolute eos count.

Lab report: $> .4$ thousand cells/ml
or > 400 cells/ml.

If elevated consider asthma: undertreated, not treated, or non-compliant.

Eos. in Asthma - continued

Look for CBC results and increased eos in claimants with frequent ED or hospital admissions.

Eos disappear from blood tests after a single dose of prednisone (or other corticosteroids).

So positive test helps!

IMPORTANCE: Eosinophilic asthma is readily treatable and controllable!! And NEW therapies: EOS targeted.

Update on Exhaled Nitric Oxide in Clinical Practice



Srinivas R. Mummadi, MD, FCCP; and Peter Y. Hahn, MD, FCCP

Asthma is characterized by chronic airway inflammation. Fractional exhaled nitric oxide (FENO) has emerged as a marker of T-helper cell type 2-mediated allergic airway inflammation. Recent studies suggest a role for FENO testing as a point-of-care tool in the management of patients with asthma. This Topics in Practice Management article reviews current coverage and reimbursement issues related to FENO testing and provides an overview of pertinent recent studies.

CHEST 2016; 149(5):1340-1344

KEY WORDS: asthma; nitric oxide

Asthma is a heterogeneous disease characterized by chronic airway inflammation, variable airflow limitation, and airway hyperresponsiveness. It is increasingly recognized that asthma is a complex syndrome composed of recognizable demographic, clinical, and pathophysiologic clusters often referred to as asthma phenotypes.¹ In the era of personalized medicine, better recognition of these various phenotypes may help guide therapy for individual patients. Although the type of airway inflammation can differ between patients with asthma, T-helper cell type 2 (Th2)-driven allergic inflammation occurs in up to 80% of children and 50% of adults.² Allergic airway inflammation has been shown to increase with allergen exposure and is associated with worsened asthma control and increased rate of exacerbations. Allergic airway inflammation has also been shown to be very sensitive to inhaled corticosteroids (ICS). Measurement

of fractional exhaled nitric oxide (FENO) is a noninvasive point-of-care test that accurately reflects allergic airway inflammation and may be helpful in identifying patients with corticosteroid-responsive airway inflammation and in the management of patients with asthma.³

Background

FENO levels increase during Th2 allergic inflammation and often correlate with eosinophilic inflammation in the airways.³ Elevated FENO levels can help identify patients with allergic airway inflammation likely to respond to therapy with ICS (Table 1).⁴ In allergic airway inflammation, mast cells and antigen-specific Th2 cells are activated, resulting in the production of cytokines, including IL-4, IL-5, and IL-13. IL-4 and IL-13 result in the upregulation of inducible nitric oxide synthase (iNOS) via the signal transducer and activator of transcription 6. The upregulation of iNOS results in the increased

FOR EDITORIAL COMMENT SEE PAGE 1123

ABBREVIATIONS: FENO = fractional exhaled nitric oxide; ICS = inhaled corticosteroids; iNOS = inducible nitric oxide synthase; ppb = parts per billion; Th2 = T-helper cell type 2

AFFILIATIONS: From the Department of Pulmonary, Critical Care, and Sleep Medicine, Tuality Healthcare, Hillsboro, OR.

CORRESPONDENCE TO: Peter Y. Hahn, MD, FCCP, Tuality Healthcare, 364 SE 8th Ave, Ste 301, Hillsboro, OR 97123; e-mail: hahnpy@gmail.com

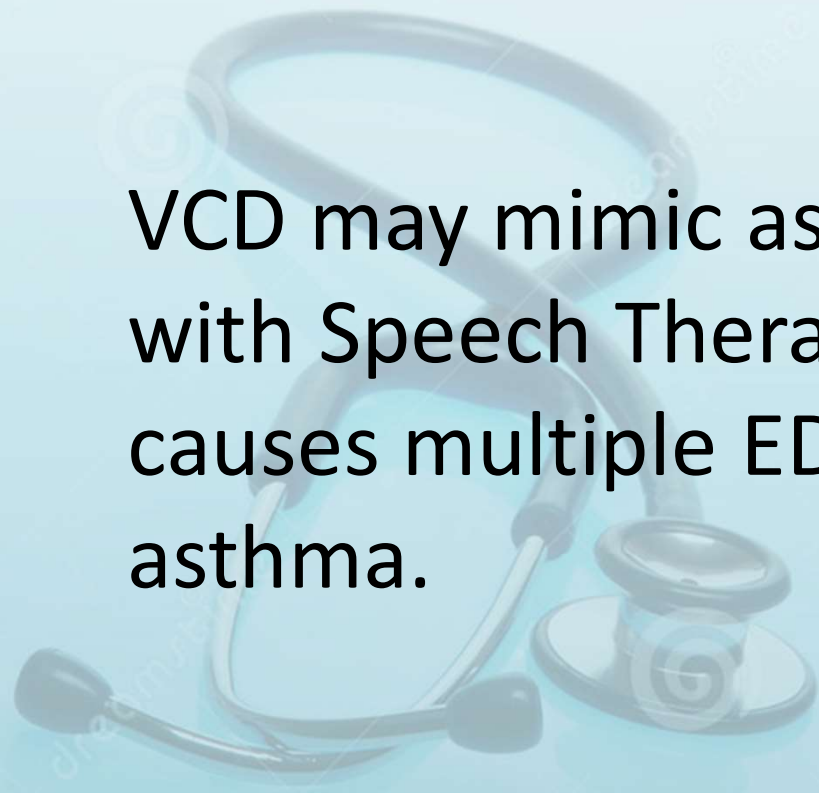
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DOI: <http://dx.doi.org/10.1016/j.chest.2015.11.020>

Paradoxical BD response and Vocal Cord Dysfunction (VCD)

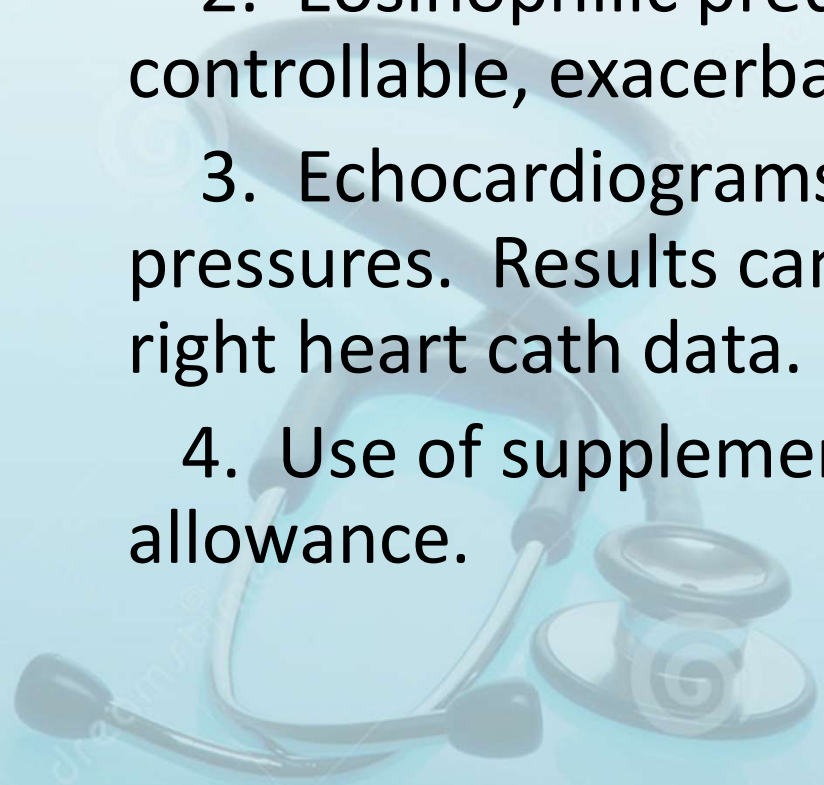
Some people have a paradoxical response to BD and drop FEV1 post BD. Due to mutation in the BD receptor. Perhaps in 5% of population.

VCD may mimic asthma and is readily treatable with Speech Therapy. This sometimes also causes multiple ED visits and misdiagnosed as asthma.



Summary

1. Not severe spirometry does not mean not severe lung disease. {Types of emphysema, ILD, PE, PH may have normal spirometry}. Think gas exchange!
2. Eosinophilic predominant asthma is treatable and controllable, exacerbations can be avoided in most.
3. Echocardiograms do NOT measure mean PA pressures. Results can't be used to meet/= PH. Look for right heart cath data.
4. Use of supplemental O2 is not an automatic allowance.



Case A

Interpreted as poor effort on part of the claimant.

But also consider poor coaching.

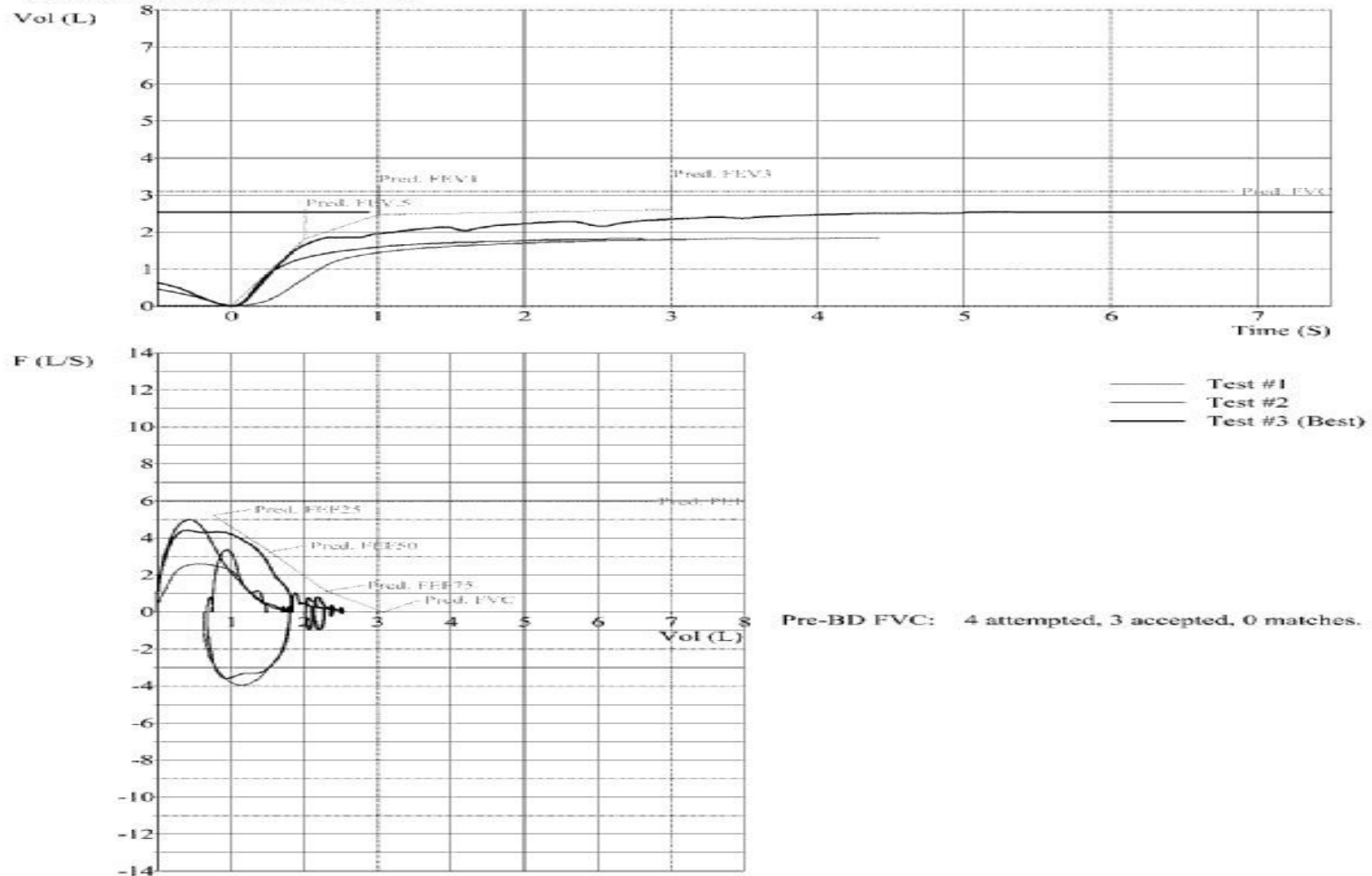
Single best effort not repeated.

Pre BD no consistent efforts.

Post BD – inhalation > exhalation. Poor initial breath.

Name:
ID:
Test Date: 09/03/16 17:33:07
Test Date Post: 09/03/16 17:32:01

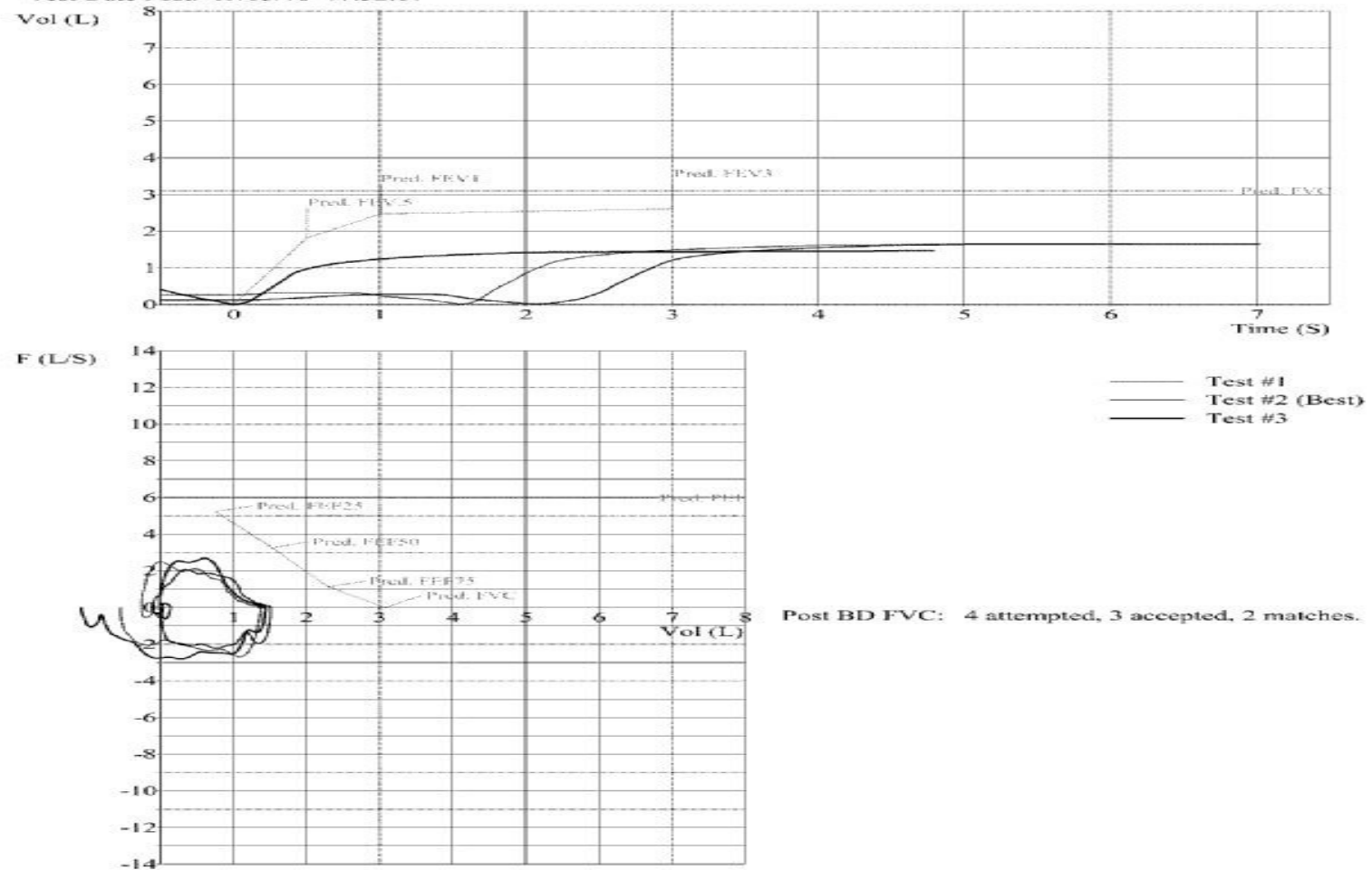
Best 3 Pre-Bronchodilator FVC Tests



Case A

Name:
ID:
Test Date: 09/03/16 17:33:07
Test Date Post: 09/03/16 17:32:01

Best 3 Post Bronchodilator FVC Tests



Case A

Case B

01/17/17: Poor Efforts. Pre BD with
"Matches" but invalid efforts. Best
FEV1-0.82.

Repeat at Hosp PFT lab Performed
2/8/17: FEV1-2.4

Spirometry Report

DES
PO Box 271388 Ste #
Littleton, CO 80127

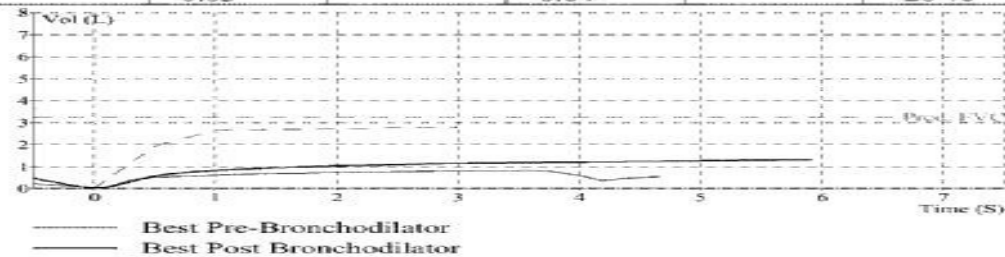
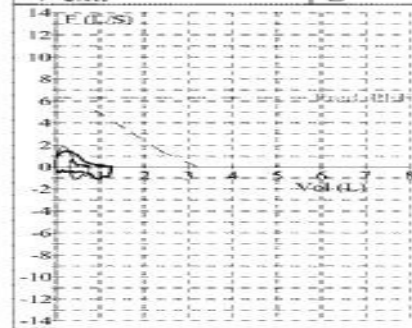
Name: _____
ID: _____
Sex: Female
Smoker: Yes. 20 cigs./day for 29 years.
COPD Risk: _____

Age: 44 years
Height: 61 inches
Race: Hispanic
Weight: 250 lbs.
Indication: Emphysema/COPD
Medications: _____
Lung Age: _____

Requested By: _____
Test Date: 01/17/17 08:11:01
Test Date Post: 01/17/17 08:10:00
Press./Temp.: 760 mmHg/64 degrees F
Bronchodilator: Albuterol

Performed By: BMJ
Sensor S/N: 540895
Sensor Calibrated: 01/17/17 07:47:29
Spiro Control Ver: 8.6.0
Normals/Interp.: NHANES III/

Measurement	Units	Predicted	Pre-Bronchodilator		Post-Bronchodilator		% Change
			Actual	% Pred.	Actual	% Pred.	
FVC	L	3.22	0.79	24 %	1.25	39 %	59 %
FEV1	L	2.63	0.58	22 %	0.82	31 %	41 %
FEV1/FVC	%	82 %	74 %	90 %	66 %	80 %	-8 %
FEF25%	L/S	5.43	1.86	34 %	1.41	26 %	-24 %
FEF50%	L/S	3.48	0.96	27 %	0.63	18 %	-34 %
FEF75%	L/S	1.40	0.19	13 %	0.19	13 %	0 %
FEF25-75%	L/S	2.96	0.44	15 %	0.50	17 %	14 %
PEF	L/S	6.31	1.85	29 %	1.45	23 %	-22 %
Exp. Time	Sec.		3.52		5.80		65 %
V ext.	L		0.03		0.04		26 %



Pre-BD FVC: 3 attempted, 3 accepted, 3 matches.
Post BD FVC: 3 attempted, 3 accepted, 2 matches.

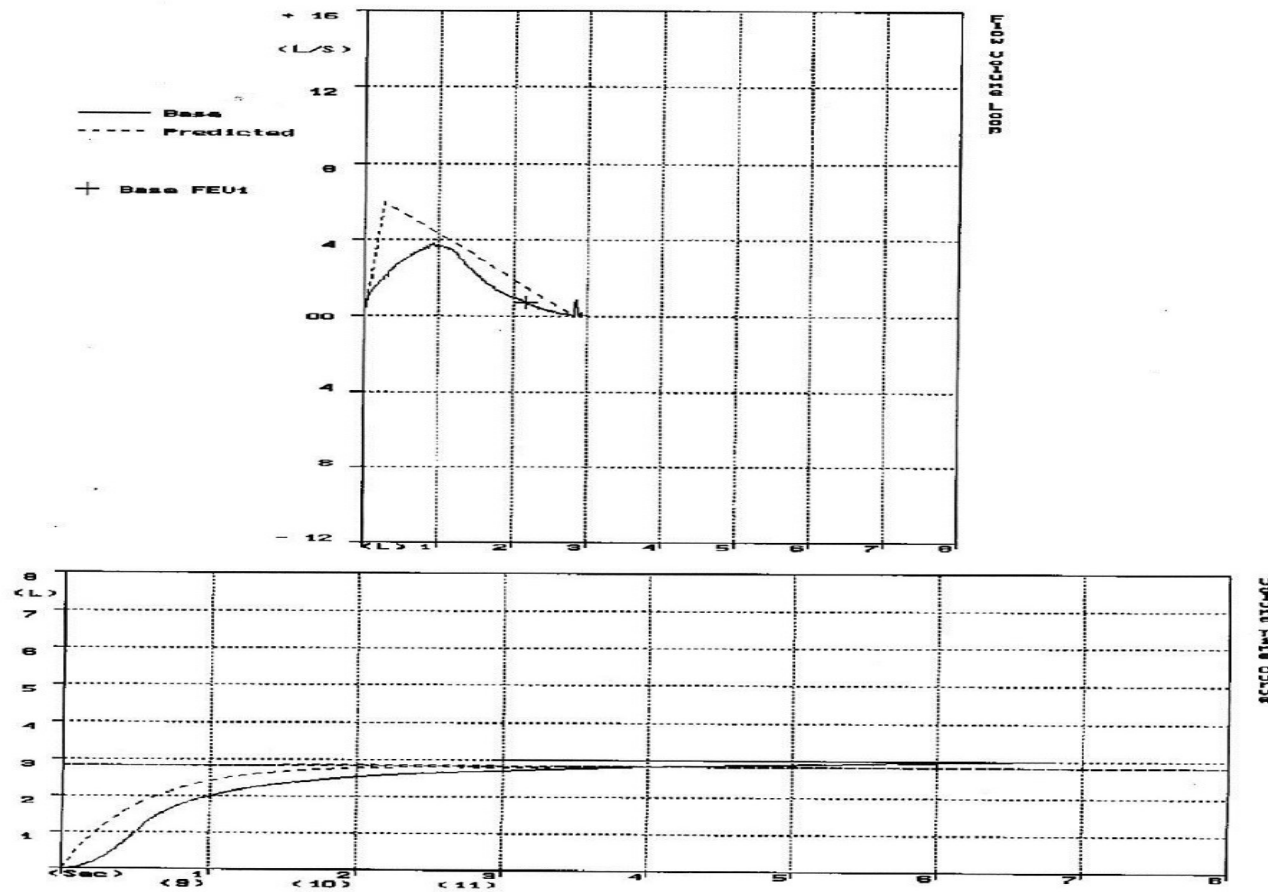
Interpretation: Pt understood but did not follow instructions. poor effort. BMJ

Observations:

Reviewed By: Q _____ 01/17/17

Case B

Repeat - Valid



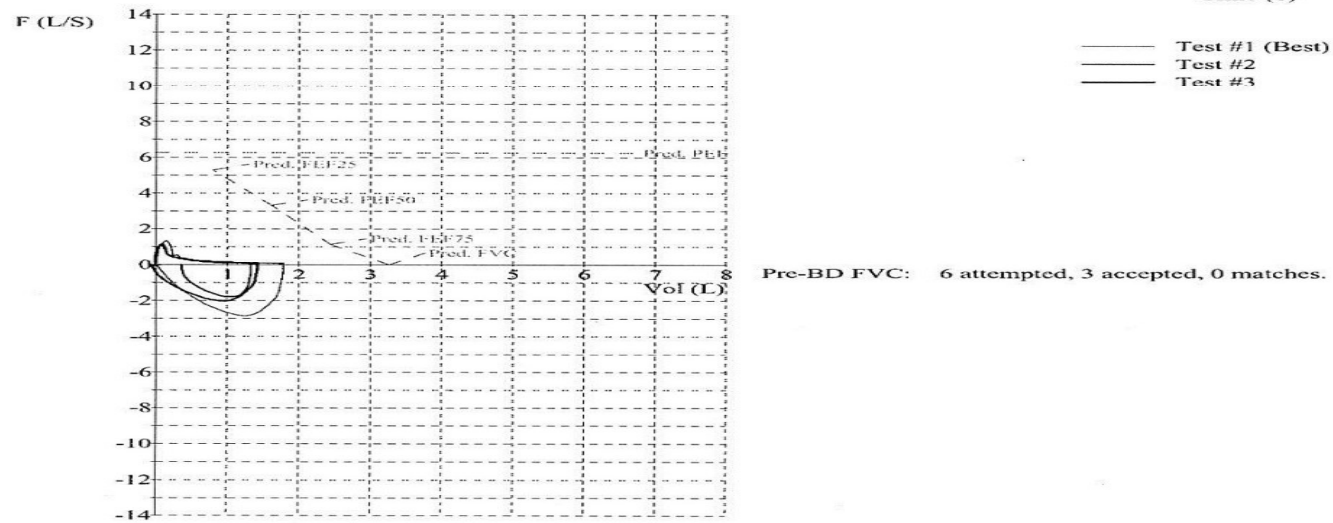
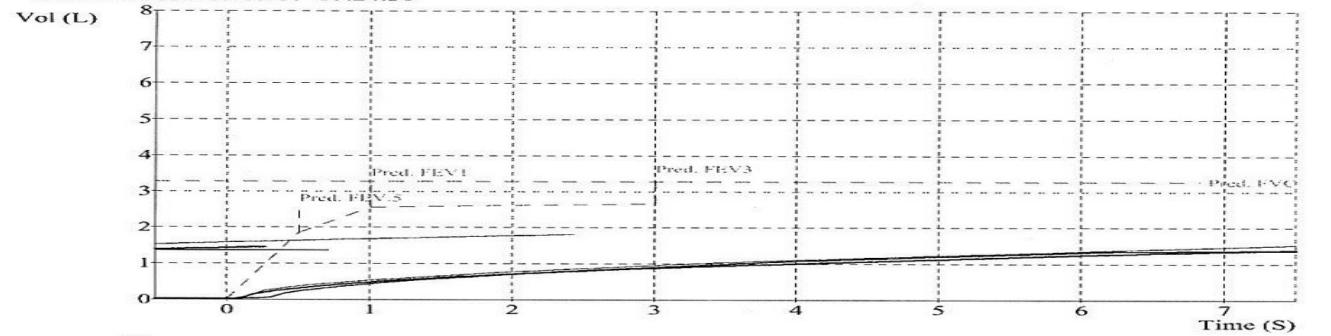
Case B

Case C

- Post BD was “faked” by the performing office. It was impossible for claimant to have performed the post BD study.
- Claimant had two prior spirometry by treating physician that were similar to pre BD study.
- The Interpreting doc did not notice this.

Name:
ID:
Test Date: 09/09/17 09:24:46
Test Date Post: 09/09/17 09:24:30

Best 3 Pre-Bronchodilator FVC Tests



Case C

Spirometry Report

DES Exams
PO Box 271388
Littleton, CO 80127

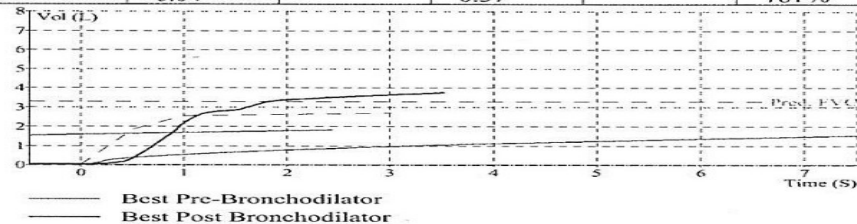
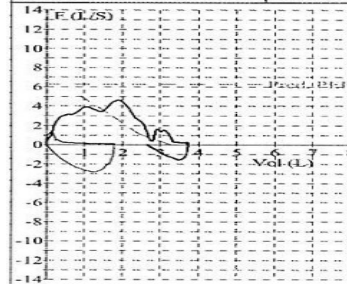
Name:
ID:
Sex: Female
Smoker: No.
COPD Risk:

Age: 57 years
Height: 63 inches
Indication: Emphysema/COPD
Medications:
Lung Age:
Race: Caucasian
Weight: 114 lbs.

Requested By:
Test Date: 09/09/17 09:24:46
Test Date Post: 09/09/17 09:24:30
Press./Temp.: 760 mmHg./73 degrees F
Bronchodilator:

Performed By: JE
Sensor S/N: 524052 2006
Sensor Calibrated: 09/09/17 07:45:18
Spiro Control Ver: 8.4.0
Normals/Interp.: NHANES III/

Measurement	Units	Predicted	Pre-Bronchodilator		Post-Bronchodilator		% Change
			Actual	% Pred.	Actual	% Pred.	
FVC	L	3.26	1.78	54 %	3.72	114 %	109 %
FEV1	L	2.54	0.53	21 %	2.83	111 %	434 %
FEV1/FVC	%	79 %	30 %	38 %	76 %	97 %	46 %
FEF25%	L/S	5.32	0.31	6 %	3.53	66 %	1043 %
FEF50%	L/S	3.33	0.18	5 %	4.41	132 %	2318 %
FEF75%	L/S	1.15	0.11	10 %	0.41	36 %	268 %
FEF25-75%	L/S	2.42	0.17	7 %	2.60	107 %	1414 %
PEF	L/S	6.30	1.35	21 %	4.63	74 %	242 %
Exp. Time	Sec.		10.42		3.02		-71 %
V ext.	L		0.04		0.37		781 %

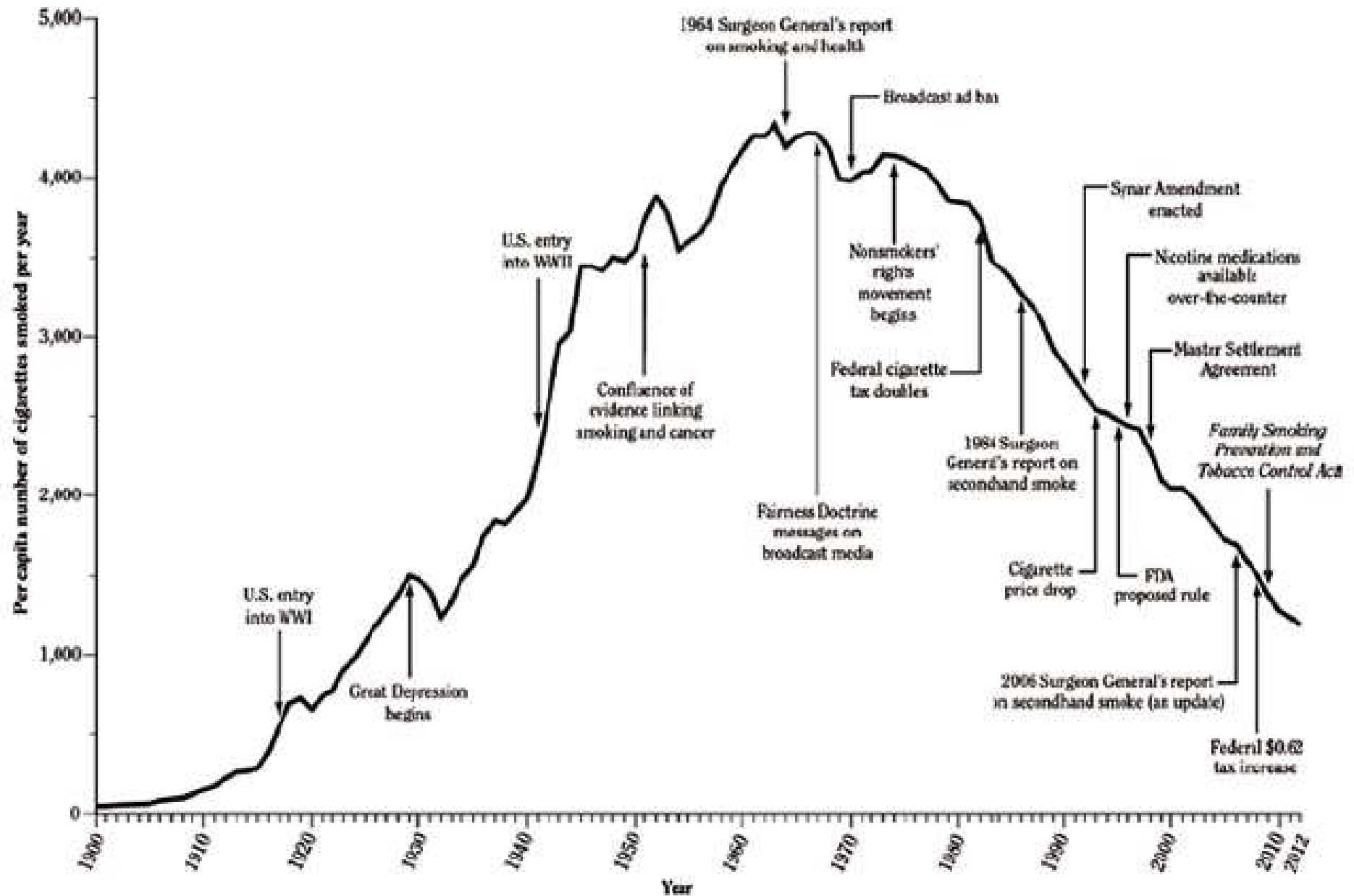


Interpretation: PT understood concept of test, pt did appear to give all strength in test.

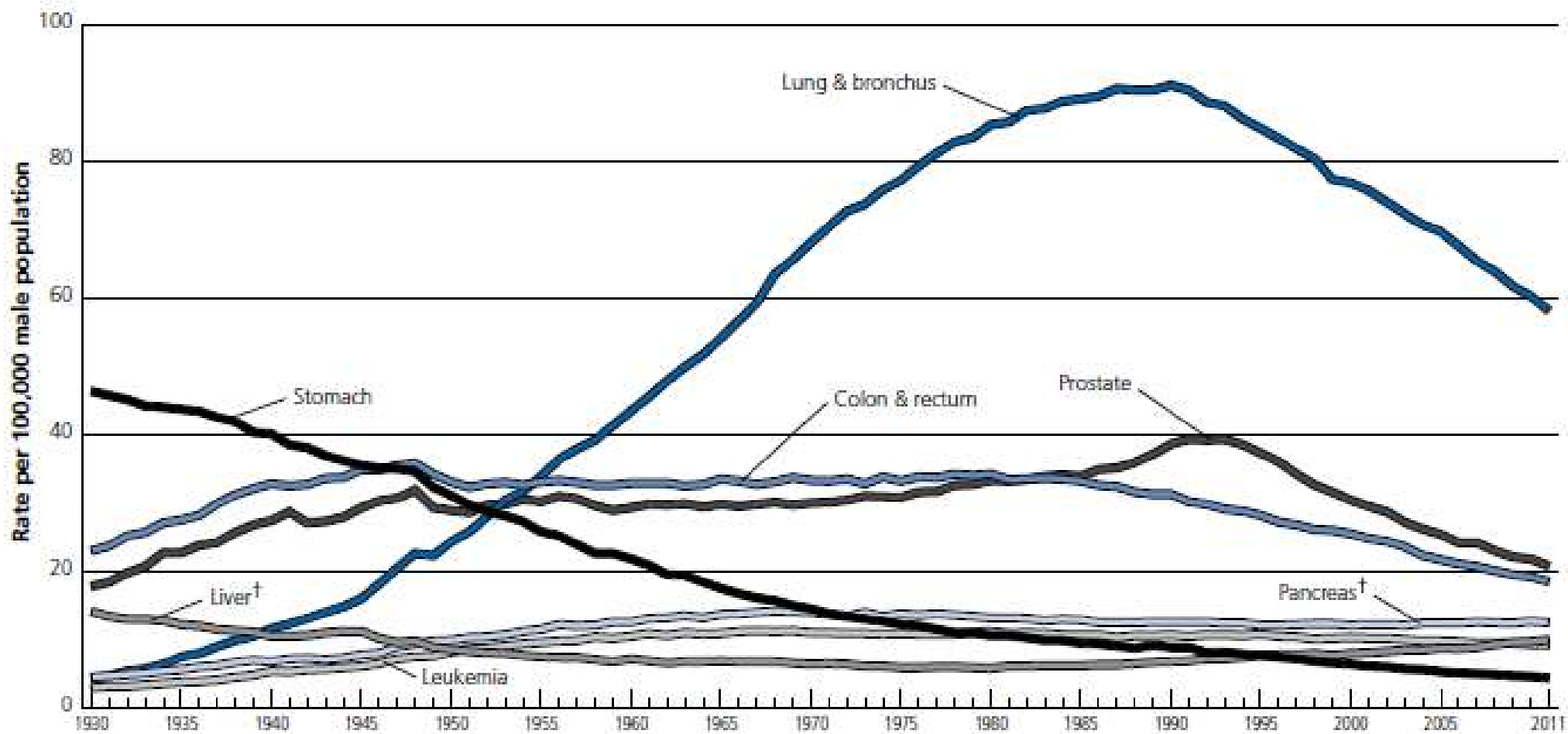
Reviewed By: Dr Bhattacharya 09/09/17

Case C

Adult per Capita Cigarette Consumption and Major Antismoking Events



Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2011



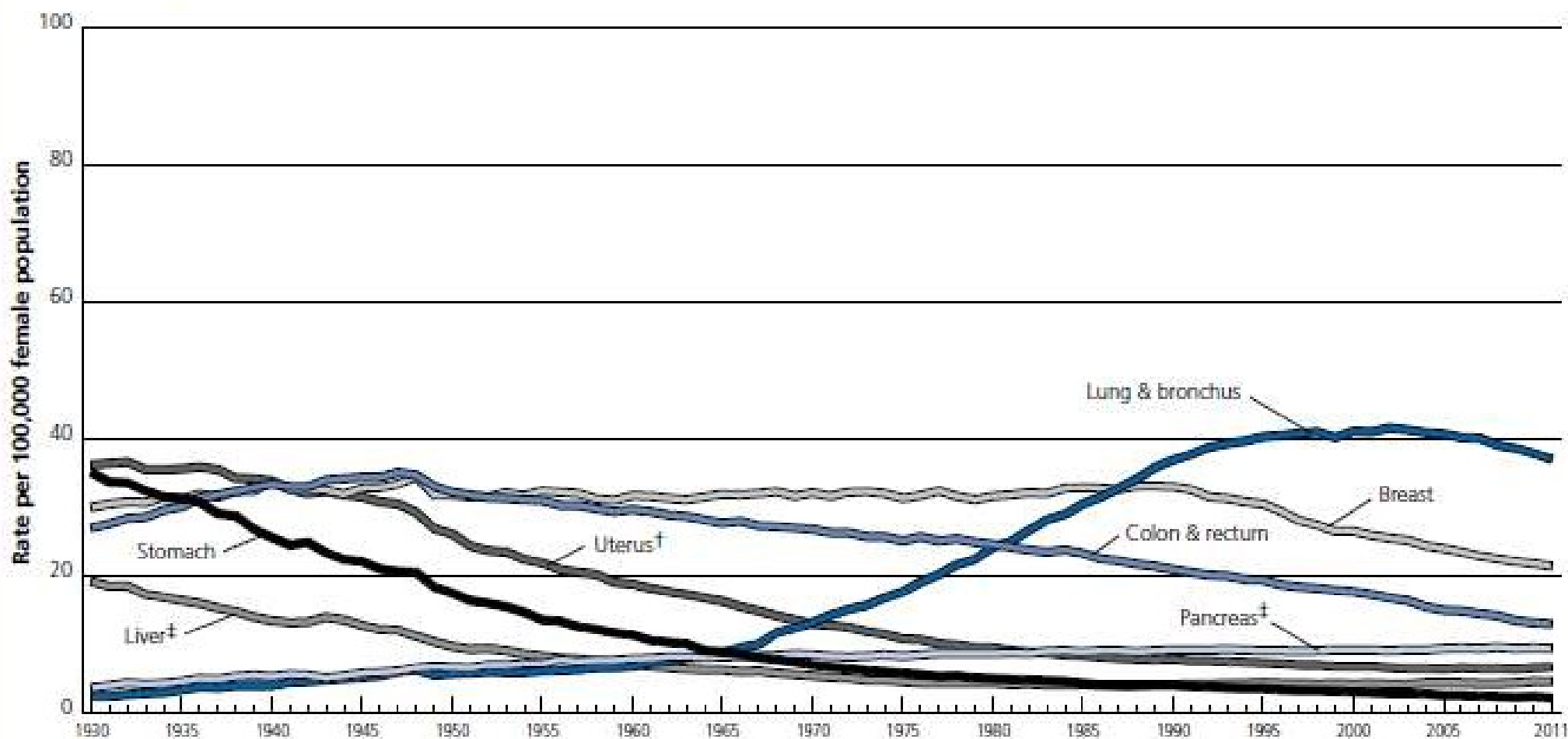
*Per 100,000, age adjusted to the 2000 US standard population. †Mortality rates for pancreatic and liver cancers are increasing.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancer of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959 and US Mortality Data 1960 to 2011, National Center for Health Statistics, Centers for Disease Control and Prevention.

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Trends in Age-adjusted Cancer Death Rates* by Site, Females, US, 1930-2011



*Per 100,000, age adjusted to the 2000 US standard population. †Uterus refers to uterine cervix and uterine corpus combined. ‡Mortality rates for pancreatic and liver cancers are increasing.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancer of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959 and US Mortality Data 1960 to 2011, National Center for Health Statistics, Centers for Disease Control and Prevention.

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