

Occupational Pulmonary Impairment and Disability



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Goals and Objectives



- Review how to evaluate permanent respiratory impairment by quantifying its severity, assess its impact on the ability to perform activities of daily living, and if possible, identify the cause of the abnormality and recommend measures to prevent further impairment
- **Causation: What is it?**
- **Compensability: Is it work related?**
- **Assessing the dose-response**
- **Discuss the principles of toxicology and risk**
- **Develop an Understanding of the Key Components of an Occupational Medical History and Examination**
- **Case presentations**

Principles of Pulmonary Assessment

Impairment



- **An impairment is:** “a loss of use, or derangement of any body part, organ system, or organ function”
- Respiratory impairments that produce a decrement of lung function and affect the ability to perform ADL's, are assigned impairment ratings
- Is a pleural plaque an impairment?
- Although there is an anatomic impairment there is no functional loss.

Principles of Pulmonary Assessment

To establish the specific impairment percentage:

- Consider both the severity and prognosis of the condition **AND**
- How the impairment affects the individual's ability to perform ADL's



Job Classification Description

Sedentary Work	Exerting up to 10 pounds of force occasionally and/or negligible amount to frequently lift, carry push pull or move objects. Involves sitting most of the time but may involve walking, standing for brief periods
Light Work	Exerting up to 20 pounds force occasionally or up to 10 pounds frequently
Medium Work	Exerting up to 50 pounds of force occasionally and or up to 20 pounds frequently and/ or up to 10 pounds constantly
Heavy Work	Exerting up to 100 pounds of force occasionally and or 50 pounds frequently and or in excess of 20 pounds constantly
Very Heavy Work	Exerting in excess of 100 pounds of force occasionally and in excess of 50 pounds frequently and or in excess of 20 pounds constantly

Occasional: activity exists up to 1/3 time 20 minutes/hr or 2 ½ hrs/day, 3-12 repetitions/hr or 21-100 repetitions/day

Frequent: activity exists 1/3-2/3 of the time, 40 minutes/hr or 5 ½ hr/day; 13-30 repetitions/hr or 101-245 repetitions/day

Constant: activity exists 2/3 or more of the time, 41 minutes/hr or more than 5 ½ hr/day, 31-60 repetitions/hr or 246-490 repetitions/day

Impairment Classification of Dyspnea

Severity	Definition and Question
Mild	Do you have to walk more slowly on the level than people of your age because of breathlessness?
Moderate	Do you have to stop for breath when walking at your own pace on the level?
Severe	Do you ever have to stop for breath after walking about 100 yards or for a few minutes on the level?
Very severe	Are you too breathless to leave the house, or breathless on dressing or undressing?

Other things to consider:

- ① Whether or not dyspnea is controlled with treatment
- ② Physical signs of disease with or without treatment

1996 Florida Uniform Permanent Impairment Rating Schedule

PFT	<u>Class 1 -</u> 1-14% Impairment	<u>Class 2 -</u> 15-29% Impairment	<u>Class 3 -</u> 30-54% Impairment	<u>Class 4 -</u> 51-100% Impairment
FVC	80% of predicted and	Between 60-79% or	$\geq 51\%$ and $\leq 59\%$ of predicted	$\leq 50\%$ of predicted or
FEV1	80% of predicted and	Between 60-79% or	$\geq 41\%$ and $\leq 59\%$ of predicted or	$\leq 40\%$ of predicted or
FEV1/FVC	FEV1/FVC 70% and	Between 60-69% or	Between 41-59%	$\leq 40\%$
DLCO	80% of predicted	Between 60-79% or	$\geq 41\%$ and $\leq 59\%$ of predicted or	$\leq 40\%$ of predicted
• Vo ₂ max	• Vo ₂ max ≥ 25 mL/(kg•min) or > 7.1 METS	≥ 20 and < 25mL/(kg•min) or 5.7-7.1 METS	≥ 20 and < 25mL/(kg•min) or 4.3 to < 5.7 METS	< 15 mL/(kg•min) or 1.05 L/min <4.3 METS

Impairment Classification for prolonged Physical Work Intensity by Oxygen Consumption

Work Intensity for 70-kg person	Oxygen Consumption	Excess Energy Expenditure
Light Work	7 mL/kg; 0.5 L/min	< 2 METS
Moderate Work	8-15 mL/kg; 0.6-1.0 L/min	2-4 METS
Heavy Work	16-20 mL/kg; 1.1-1.5 L/min	5-6 METS
Very Heavy Work	21-30 mL/kg; 1.6-2.0 L/min	7-8 METS
Arduous Work	> 30 mL/kg; > 2.0 L/min	> 8 METS

Principles of Pulmonary Assessment

Disability

- **Disability is defined as:** “an alteration of an individual’s capacity to meet personal, social, or occupational demands because of an impairment”
- **Remember:** the physicians role is to determine impairment and to provide medical information to assist in disability determination
- An impaired individual may or may not have a disability

Activities of Daily Living

Activity	Example
Self-Care, personal hygiene	Bowel/bladder function, brushing teeth, combing hair, bathing, dressing, eating
Communication	Writing, typing, seeing, hearing, speaking
Physical activity	Standing, sitting, reclining, walking, climbing stairs
Sensory function	Hearing, seeing, tactile feeling, tasting, smelling
Non-specialized hand activities	Grasping, lifting, tactile discrimination
Travel	Riding, driving, flying
Sexual function	Ejaculation, lubrication, orgasm
Sleep	Restful, nocturnal sleep pattern

What Makes Pulmonary Assessment SO Difficult?

- Symptomatic assessment although useful provides little quantitative information and should not be used as the sole criteria upon which to make decisions about impairment
- **You MUST:** obtain objective data about the extent of the limitation and integrate those findings with the subjective complaints.

Objective Data

- Thoracic cage abnormalities
- Radiographs
- CT scans and MRI images
- Pulmonary Function Tests
- Cardiopulmonary Exercise Test
- Laboratory Findings
- Pathologic Specimens??



Symptoms Associated with Respiratory Disease

- Dyspnea
- Cough
- Sputum Production
- Hemoptysis
- Wheezing
- Chest pain or tightness



Document symptoms and their course over time
Correlate them with objective measures (physical exam, radiography, lung function, labs)

Cardiopulmonary Exercise Testing

- Diseases/Occupational Exposures that affect the heart, lungs, circulation, or blood, will cause an abnormal response to exercise.
- The results of the test can indicate whether a problem is physiological or psychological.
- For people with shortness of breath, Cardiopulmonary Exercise Testing is the gold standard.
- When properly performed and interpreted, the CPET can help differentiate pulmonary impairment from cardiac impairment or physical deconditioning

Paracelsus

The Founder of Toxicology

1493-1541



described dyspnea and cachexia from mining, and connected it with breathing in his 1536 monograph *Von der Bergsucht oder Bergkranckheiten drey Bucher* of occupational diseases of miners and smelter workers written 1531-1534

"All substances are poisons; there is none which is not a poison. The dose differentiates a Poison and a remedy"

Chemicals

What Are They?

- Everything in your life except light, radiation and sound waves
- Chemicals are plants, food, cars, and all living things

Harbison 2014



Modern assessment of occupationally induced disease is complicated by many biases of perception and by misinterpretation both of the information provided on Manufacturer's Safety Data Sheets and of regulatory standards and guidelines.

Harbison 2014



What is Causation?



- **General Causation:** can the substance in question cause the illness
- **Specific Causation:** Requires an exposure to a degree and in a manner, that it actually did cause the illness (an exposure in harmful quantities) dose, duration, intensity

Rule-In: Rule-Out: an expert can not give opinion in testimony to a jury regarding specific causation if the expert has not engaged in the process of differential diagnosis "In re Paoli RR Yard PCB Litig., 2000 WL 1279922 at *5"



Specific Causal Association Between an Individual's Exposure and the Onset of Disease

An expert who opines that exposure to a compound caused a person's disease engages in deductive clinical reasoning.

The opinion is based on an assessment of the individual's exposure, including the amount, the temporal relationship between the exposure and disease, and other disease-causing factors. This information is then compared with scientific data on the relationship between exposure and disease.

The certainty of the expert's opinion depends on the strength of the research data demonstrating a relationship between exposure and the disease at the dose in question and the presence or absence of other disease-causing factors (also known as confounding factors).

“In most specific causation issues involving exposure to a chemical known to be able to cause the observed effect, the primary issue will be whether there has been exposure to a sufficient dose to be a likely cause of this effect. ”



Reference Manual on Scientific Evidence 638 (3rd ed. 2011)

The attributable fraction is that portion of the excess risk that can be attributed to an agent, above and beyond the background risk that is due to other causes.

Thus, when the relative risk is greater than 2.0, the attributable fraction more likely than not exceeds 50%.

Reference Manual on Scientific Evidence 612 (3rd ed. 2011)

Florida Workers Compensation Statute 440.09(1): Proving Medical Causation



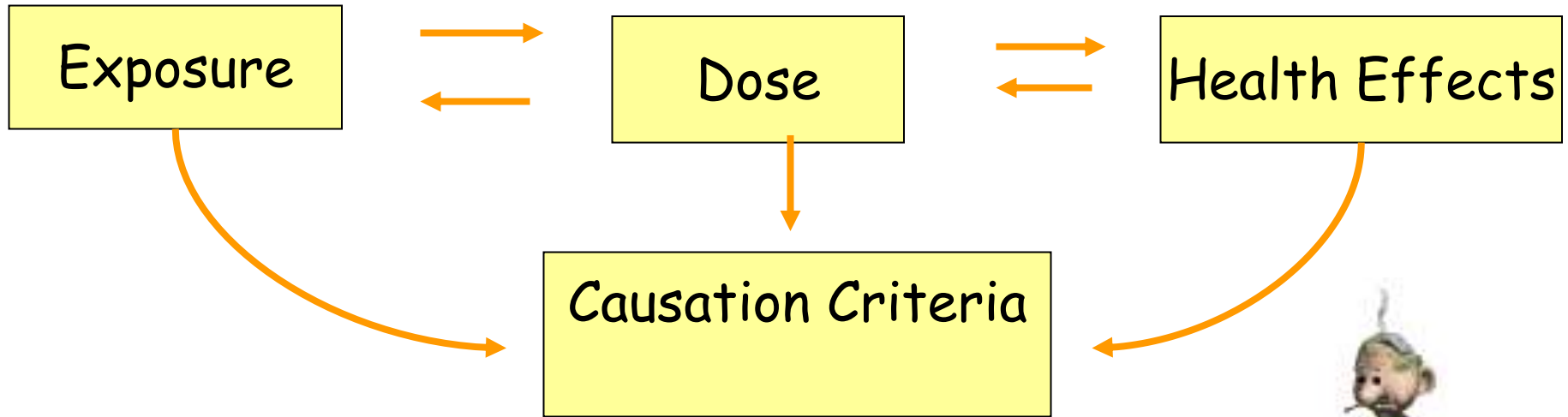
"major contributing cause" means the cause which is more than 50 percent responsible for the injury as compared to all other causes combined for which treatment or benefits are sought.

In cases involving occupational disease or repetitive exposure, both causation and sufficient exposure to support causation must be proven by clear and convincing evidence.

Compensability requires **clear and convincing evidence of a specific, harmful substance** shown to be present in the workplace

Defines occupational disease as a disease for which there are epidemiological studies showing that exposure to the specific substance, at the levels to which the claimant was actually exposed, can cause the precise disease suffered.

I Am Sick So It Must Be From the Exposure I Never Had Symptoms Before the Exposure!



- A. Exposure and dose
- B. Literature precedence
- C. Confounder analysis
- D. Temporality
- E. Biological plausibility and consistency



The possible chemical causes of diseases or illness

Consider the Following

52 year old male with history of coronary artery disease controlled with nitroglycerine presents with complaints of headache.

⇒ He explains his headaches can be severe while other times they may be a nagging annoyance

⇒ His last angina attack occurred Monday but he has experienced no further symptoms

What would you include in the problem list?

What additional information would you seek?

What if?

- The patient was an accountant who has had the same job and residence for many years
- The patient worked for a air conditioning service company and developed chest pain at work
- The patient lived near a hazardous waste site

The bottom line

Unless an exposure history is pursued by the clinician, the etiologic diagnosis might be missed, treatment may be inappropriate, and exposure can continue



"I've got it, too, Omar....a strange feeling like we've just been
Going in circles"

Taking the Occupational History

The Quick Survey

Chief complaint and Past history

What kind of work do you do?
Do you think your health problems are related to your work?
Are your symptoms better or worse at home or work?
Are any of your co-workers experiencing similar symptoms?

Review of Systems

Are you now or have been exposed to:
Metals
Dusts
Fumes
Chemicals
Radiation
Loud noise

Taking the Occupational History

Detailed Questioning Based on Initial Survey

Self Administered
Questionnaire for all patients

Chronology of Jobs
Exposure Survey

Review of Exposure, with
the Questionnaire as a
guide

Job History
Current job
And description

Examination of the link
between work and the chief symptom

Clinical clues
Temporal link
Co-workers?

Essential Elements of the Occupational History and Questionnaire

- Job title; industry and employer
- Dates of employment
- Job description
- Work hours
Shift changes
- Protective equipment
Gloves, clothes, safety goggles, hearing or respiratory
- Other employees with similar health problems
- Current Exposure
Dusts, fumes, chemicals, radiation, physical or biologic hazards



Exposures

- Timing of symptoms in relation to work
 - ☒ Worse at work or better at home
 - ☒ Coincide with introduction of new exposure or change in job description
 - ☒ Re-exposure relationship
- Evaluation of non-work exposures
- Home environment
- Recreational activities



Case 1

LOC-Entire Left Side
Contusions/Strains, Lung Collapsed,
Chest



- 59 year old male works as a janitor

Standing on 20 foot ladder when he "passed out" and remembers waking up on floor sweating and in pain

- Taken to Hospital with the following Chest x ray and CT findings:

☑Initial Chest X Ray: Minimal displaced fracture involving the dorsal lateral aspect of the left third through ninth ribs. No evidence of Pneumothorax

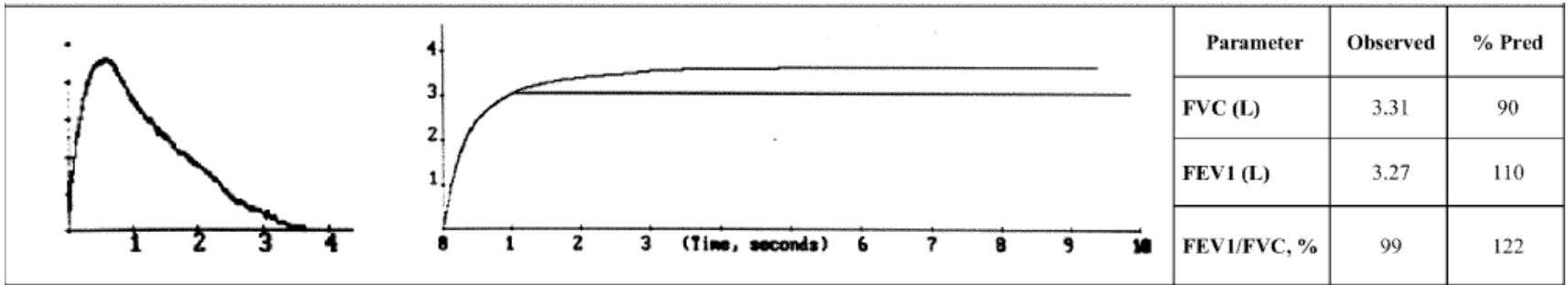
☑Chest CT: There are multiple left-sided rib fractures including the lateral aspect of the left 3rd through 10th ribs. A small pneumothorax is identified.

- **Hospital Course:** enlarging pneumothorax with left sided hemothorax and possible tension necessitated chest tube placement.
- **Cardiology and Neurology** concluded he passed out due to hypotension: There were no complaints or documentation of sensory loss to his chest.
- Hospitalized a total of 8 days and sent home with an incentive spirometry and pain meds (both of which were discontinued 6 months later)
- Returned to sedentary work 2 months following the accident

- **In Follow Up:** Complained of decreased sensation to chest 6 months following the injury
- **PFT's:** Less than 2 months after the injury -

Parameter	Observed	%Predicted
FEV1	1.76L	44%
FVC	1.93	38%
FEV1/FVC	117	

What stands out about these numbers?
List some of the causes



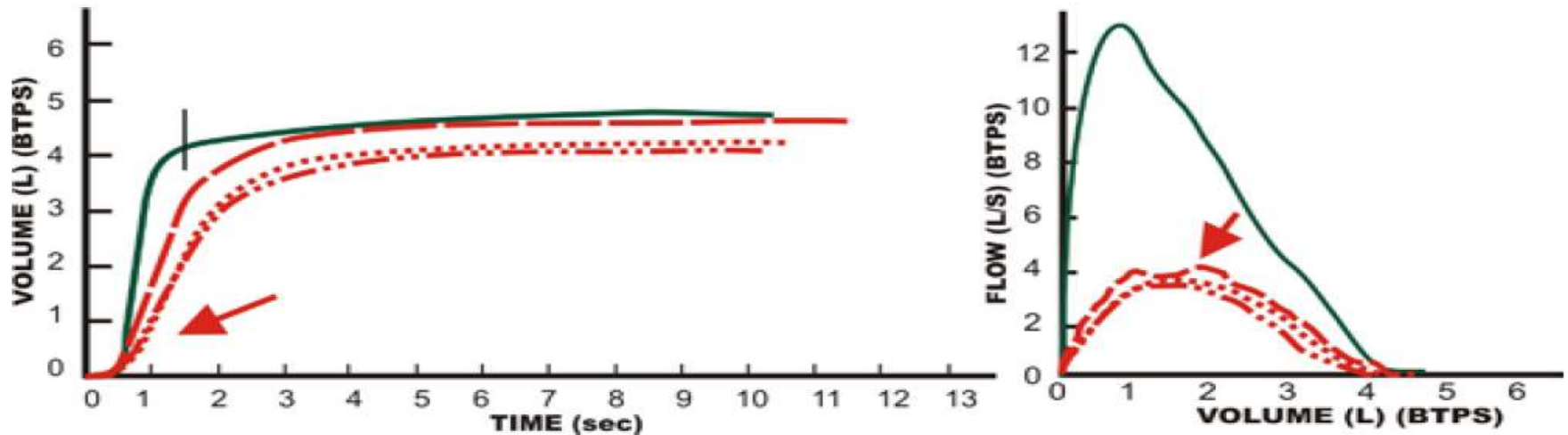
What is this?

The FVC is falsely reduced and may be misinterpreted as indicating a "restrictive impairment." In addition, the FEV1/FVC ratio may be falsely elevated, resulting in normal FEV1/FVC even when the subject has a mild obstructive impairment.

**Spirometry Testing in
Occupational Health
Programs**

Best Practices for
Healthcare Professionals

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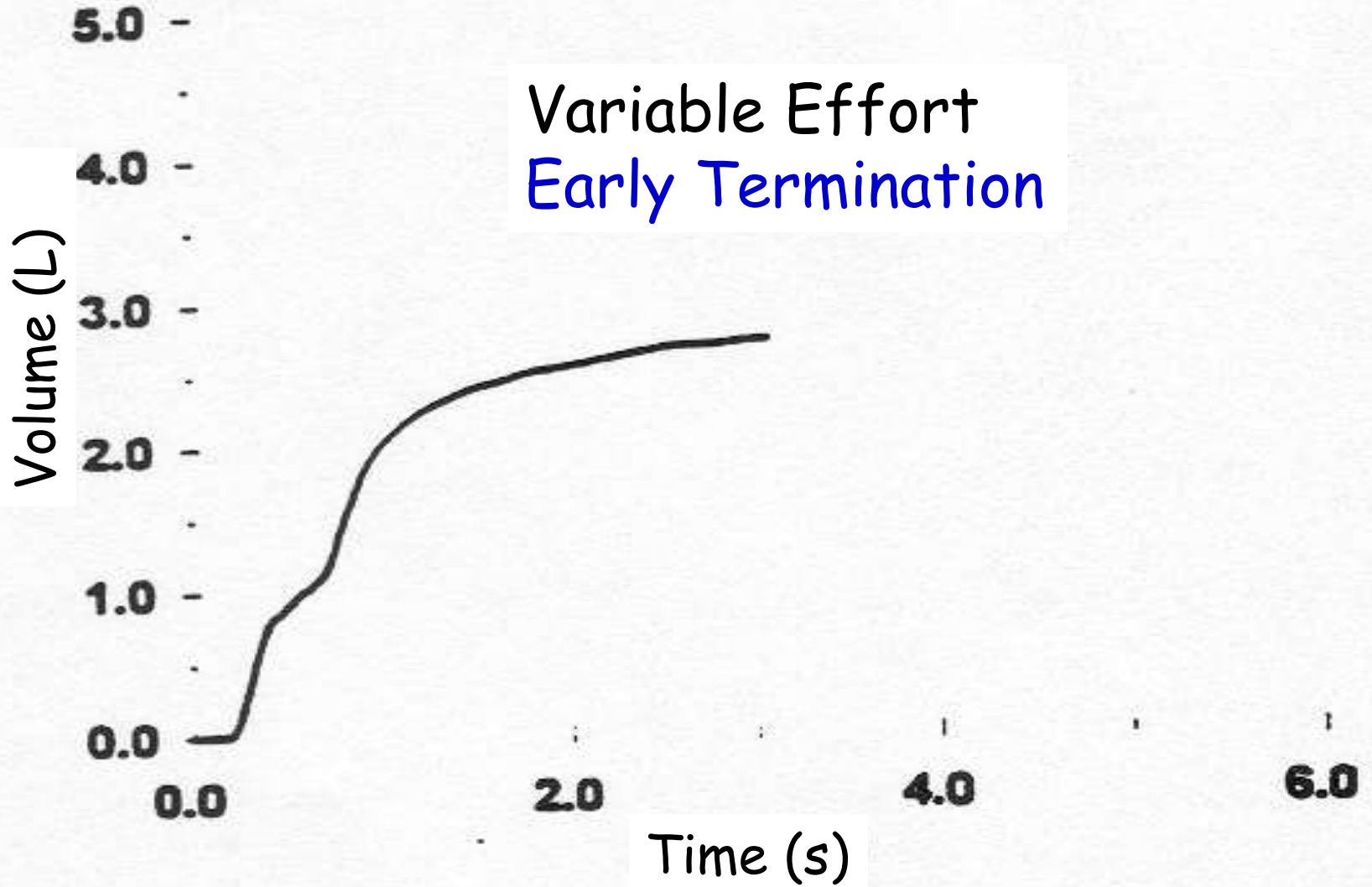


Test Result Implications: A curve with a low peak flow will have a falsely Reduced FEV1 and FEV1/FVC ratio that may be misinterpreted as "obstructed Impairment" if other good curves are not available. A repeatable test (Both the FEV1 and FVC) may occur with sub-maximal effort. In this example the FVC is repeatable but The FEV1 is not.

What if there was poor effort throughout the maneuver?



Variable Effort
Early Termination



Impairment Report Submitted 2 Months Following the Injury

- 1) Fracture of ribs 3-10 on the left
- 2) Chronic myofascial pain of the left anterior chest wall, left lateral ribs secondary to the fracture of ribs 3-10 and general trauma to the left rib cage
- 3) Left sided intercostal nerve damage which has resulted in chronic pain in the left anterior chest wall and left lateral ribs and loss of sensation in these areas.
- 4) Permanent respiratory impairment with FVC of 1.93L, which is 38% of predicted value. The FEV1 is 1.76L which is 44% of Predicted. This severe impairment is a class 4 permanent impairment according to the 1996 Florida Uniform Permanent Impairment Ratings Schedule. Impairment of the whole person would be 65% according to these guidelines in my opinion
- 5) There is also permanent impairment to the left lower hemithorax with opacification secondary to the trauma to the left rib cage, the left pneumothorax and left hemothorax.

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Specifically Address the Following

- Continued need for treatment
- Degree of Disability
- Determine/Verify Diagnosis
- Work capability/RTW
- MMI/PIR
- Are the patients subjective complaints supported by the objective findings?



What Do You Need to Assess Before Determining MMI, PIR and Disability

- Subjective Complaints:

How do they interfere with ADL's, Socially and Work?

- Objective Data:

PFT's, CXR, CT scan



Subjective Complaints

What Are You Going to Ask Him?

- **Work:** Currently works for daughter 40 hours a week in sales.
 - ☎ Delivers (drives mostly with right hand but able to use his left) 10 pound packages carrying with right hand.
- **Recreational:** Plays golf once a week but he explains he has "altered my swing to compensate for pain on the left side"
- **ADL's:** Able to go grocery shopping and carries groceries (30-40pounds) in right arm - showers daily - Walks unlimited

What About His Pain

- Wakes up at 3am 4 x a week for "no apparent reason" In the silence of night he hears crackling in his chest without wheezing and feels if he took a deep breath he would cough.
- Currently denies pain but feels "heat" on the left side
- Not able to lie on left side due to pain
- Has difficulty falling back asleep but not able to quantify

Other Complaints

- Feels he is "not getting oxygen in" on humid or cold days. Unable to quantify this however this sensation lasts from a couple of seconds up to 5 hours. Not sure when the last time this occurred or estimate how often it happens.
- Feels "can't get air in"



Objective Data

What would you request?



PFT's

Age: 61 Race: Caucasian
 Height(in): 69 Weight(lb): 194
 Indication for Testing: DYSPNEA

Room: Out-Pt
 Physician: THOMAS TRUNCALE, MD
 Technician: DELIA PALOS, RRT

Spirometry

	(BTPS)	PRED	PRE-RX		POST-RX		% Chg
			BEST	%PRED	BEST	%PRED	
FVC	Liters	4.54	2.74	60	2.89	69	-2
FEV.5	Liters	2.88	1.35	47	1.54	54	15
FEV1	Liters	3.57	1.72	48	1.88	53	10
FEV1/FVC %		78	63	80	70	89	12
FEF25-75% L/sec		3.39	0.78	23	1.13	33	44
PEF	L/sec		6.89		7.16		4
FVC	Liters	4.54	1.82	36	0.89	20	-45

Lung Volumes

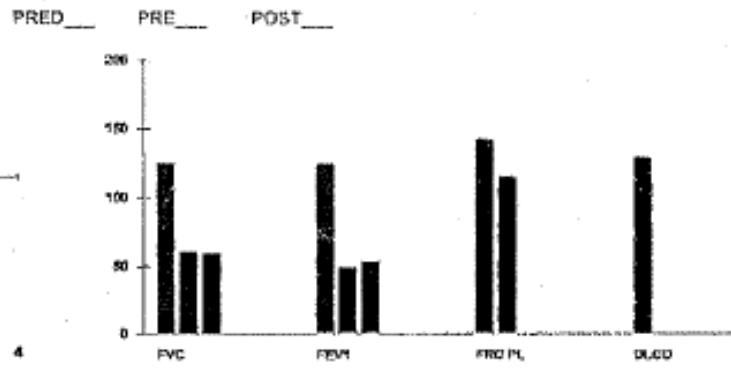
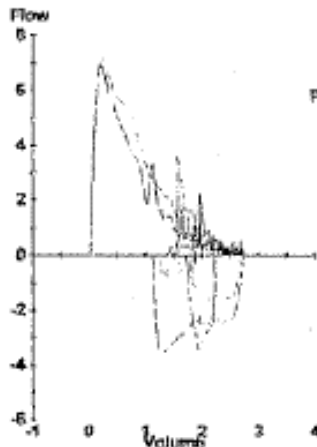
FRC N2	Liters	3.52		
FRC PL	Liters	3.52	4.04	115
Vtg	Liters	3.86	4.14	107
RV	Liters	2.20	2.99	136
TLC	Liters	6.77	5.73	85
RV/TLC	%	33	52	159

Diffusion

DLCO	mL/mmHg/min	27.8
DL Adj	mL/mmHg/min	27.8
DLCO/VA	mL/mHg/min/L	4.27
DLVA Adj	mL/mHg/min/L	
VA	Liters	

ABG:

Level	pH	PCO2	PO2	HCO3	BE	Hb %	HbO2 %	%HbCO	SeO2
		mmHg	mmHg	meq/L		gm/dL	%	%	%



Comments:
 TESTING WAS PERFORMED WITH DIFFICULTY
 PT HAD A PERSISTENT COUGH. THE SPIROMETRY WAS INCONSISTENT AND THE DLCO COULD NOT BE PERFORMED PROPERLY
 DUE TO THE PERSISTENT COUGH.
 BEST OBTAINED RESULTS ARE REPORTED

() * OUTSIDE 95% CONFIDENCE INTERVAL

Norm Set: Capra/Hsu/Miller

Version: IVS-0101-12-7

Chest CT: 3 Years Following the Injury

On lung windows, no pneumothorax is seen. In the medial right upper lobe there is 5 mm density. In the central right upper lobe there is a 7.5 mm density. Both are nodules. They may be granulomas or scar or areas of atelectasis.

In the left upper lobe posteriorly there is a calcified nodule 3 mm in diameter compatible with granuloma.

In the posterolateral left lower lobe near the CP angle there is pleural reaction and atelectasis or scarring. There is some minimal platelike atelectasis in the right lower lobe medially in the paraspinal region. The left lower lobe peripheral changes are adjacent to an old healed rib fracture. There is an old lateral left 6th rib fracture also noted with healing. There are degenerative changes in the spine. The aorta is normal in size. There are degenerative osteophytes throughout the thoracic spine.

IMPRESSION:

1. Atelectasis or scarring posterolateral left lower lobe.
2. Small nodular densities bilaterally, probably granulomas, scars or a combination. Clinical correlation is recommended.
3. Not mentioned above, there are also a couple of nodules in the superior segment of the right lower lobe 0.7 cm in diameter, and a 1 cm nodule sitting on the major fissure with triangular shape, probably a scar or granuloma also.
4. Multiple old healed left rib fractures as described. No evidence of pneumothorax.

How Do You Address the Following?

- His diagnosis of restrictive lung disease:

Can pleural reactions and scarring as described result in restrictive lung disease?

- What are the causes of Interstitial Lung Diseases:

Sarcoidosis, Vasculitities, Chronic Aspiration, Amyloidosis, Hemorrhagic Syndromes (Goodpastures or Pulmonary Hemosiderosis), Alveolar Proteinosis, Idiopathic Pulmonary Fibrosis, Radiation Fibrosis: Environmental or Occupational Exposures: Silica, Asbestos, Coal, Metals

How Do You Address his PFT's?

- Is spirometry diagnostic for restrictive lung disease?

If not, what is on PFT's?

- Is it biologically plausible that minimal pleural reaction involving the costophrenic angle of the left lower lobe with atelectasis and/or scarring and minimal atelectasis of the right lower lobe could cause the "severe" degree of restriction on his Spirometry?

What would you expect his CT to look like if he indeed had interstitial lung disease?

How Do You Address his Cough?

- The causes of cough include:
 - Asthma, GERD, laryngopharyngeal reflux (LPR), respiratory tract infections, lung cancer, VCD and MTD.
- Is there any scientific, epidemiologic or medical literature to suggest that cough can be caused by rib fractures, hemothorax, pneumothorax or the changes seen on his CT scan?

What Are Your Conclusions?

Work Restrictions

- **Lifting - Carrying - Bending - Climbing - Hand movements - Pushing/Pulling?**
- He can exert up to 20 pounds of force occasionally and or up to 10 pounds of force frequently, and or negligible amount of force constantly to move objects with his right hand/arm. He should avoid lifting or carrying more than 20 pounds and is restricted from lifting above his waist and lifting/carrying in his left hand. He can occasionally bend at the waist and squat. He is restricted from climbing, working on ladders and reaching above his shoulders. He is able to perform fine manipulation and simple grasping with his left and right hand but is restricted from pushing or pulling with his left hand. He is able to push and pull leg controls.

Is There Pulmonary Impairment?

What About MMI?

- It is my opinion within a reasonable degree of medical certainty that Mr. X suffers no pulmonary impairment or disability. The bases for my opinion is that there is no scientific, medical or epidemiologic literature to suggest that rib fractures, pleural scarring, pneumothorax or any of the findings on Mr. X CT scan can result in restrictive or obstructive lung disease, that his injuries including but not limited to hemothorax, pneumothorax, pleural scarring and atelectasis are not known causes of restrictive or obstructive lung disease, and that there is no intrinsic pulmonary biologic mechanism that can explain how these injuries can result in pulmonary impairment or disability. He has reached maximum medical improvement from a pulmonary standpoint.

Is There Any Impairment?

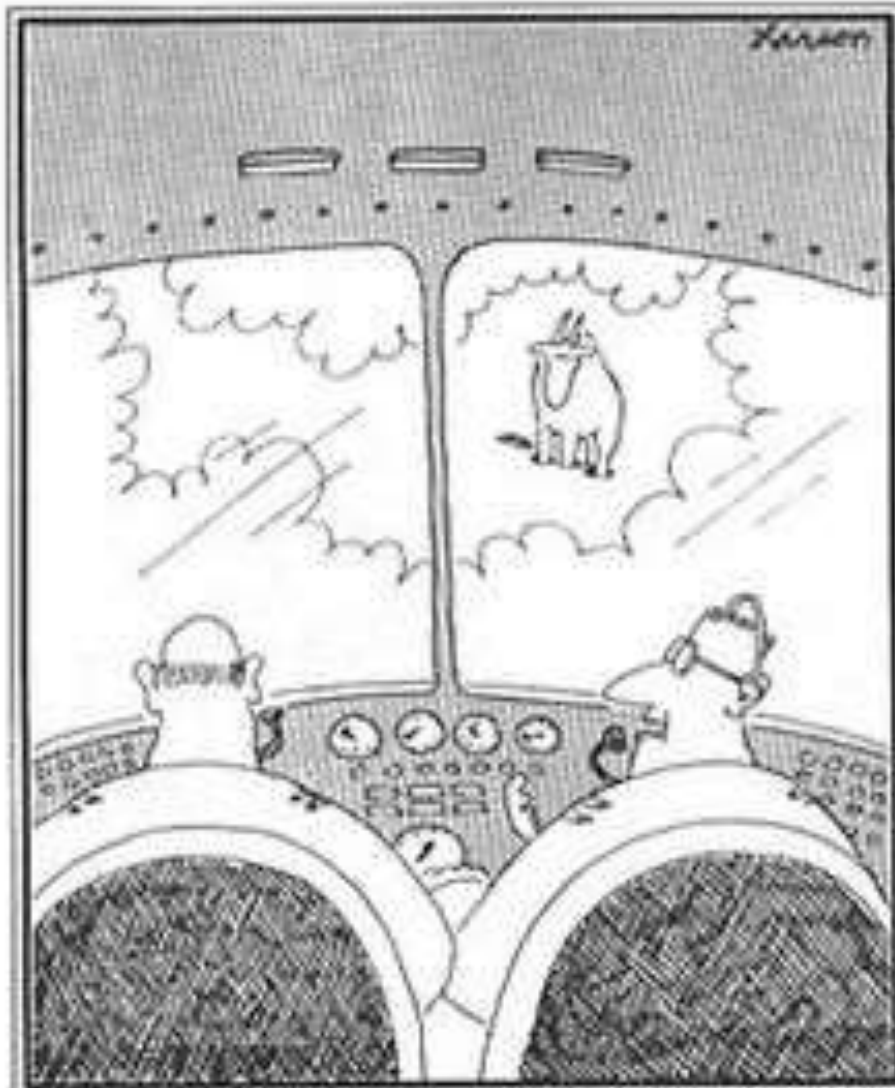
What About the Need to Treat?

- Any impairment or disability related to his workplace injury is secondary to chronic pain and not intrinsic lung disease, pulmonary impairment or disability.

Further, for reasons described above, the need to evaluate and/or treat his subjective complaint of cough, which resulted in abnormal spirometry, within a reasonable degree of medical certainty is unrelated to his reported workplace injury.

- What About the Pulmonary Nodules?

He has evidence of multiple new pulmonary nodules not seen on previous chest x-ray in 2010 or chest MRI in 2011. This/these findings are new and in no way related to his workplace injury. They do however require follow up by his primary care doctor following Fleischner Society recommendations for pulmonary nodules.



"Say...What's a mountain goat doing up here in
A cloud bank?"

Case(s) 2 and 3

Chlorine Inhalation

- 55 and 40 Year Old male(s) work as pool maintenance workers
- The 1st works at a facility with 4 pools 183,000 and 30,000 gallons.
- In a 20x20ft room with 8 ft. ceilings PVC piping containing a mixture of muriatic acid began to leak spraying the mixture on to a 250 pound chlorine container and the "level of the lid"
- He was alerted to leak by the smell of chlorine outside the room



- He went and put on his personal protective equipment (cartridge mask, spill resistant rubber chemical suit that met OSHA requirements and rubber gloves) opened the fire door and shut the power off to the area of the leak which was inside the room and on the left.
- He noticed a green cloud that extended from about two feet off the ground to 8 feet high and covered about 75% of the room in total.
- The total time he was in the room was about 15 seconds when he stood at the doorway. About twenty seconds later, after the green cloud was dispersed, he repaired the broken equipment, flushing the hopper, replaced the piping, dumping the chlorine pellets into the safety containers and lowered them into the pit.

- After repairing the leak and the equipment which took about 2 hours and fifteen minutes he went into the Men's room which was about 15 feet from the entrance of the pool maintenance door.
- It was at that point that when he pulled off the mask, he noticed a green color to the center of the cartridge on the right one. Because of this, he called the manufacturer of the mask and discussed with them that he was having a burning sensation in his mouth and his voice was hoarse.
- After calling the manufacturer, he was advised to flush his face and nose with water. He explained that initially (after going into the men's room and removing the protective equipment) he was gasping for air, felt dizzy and weak. He also complained of being nauseated, and noticed some blood streaked sputum that he was coughing up. After flushing his face and nose with water for 45 minutes he called back the manufacturer. At some point he is not sure when, the safety people from work arrived at the scene and because he was still having symptoms (like someone had "kicked me in the chest", complaining of a sore throat and feeling that he was not getting air from his upper chest up) he was taken to the hospital and diagnosed with chemical pneumonitis.

- **CURRENT COMPLAINTS:**

feeling as if he "can't get air in", when exposed to fuel, gasoline, chlorine or bleach my "throat closes up" causing him to develop shortness of breath from the nose to the upper third of his chest, dizziness and lightheadedness associated with these exposures



- The 2nd was in a 10x12ft room with another worker attempting to repair some PVC piping when the other worker removed the chlorine and acid lines from the feeder and a small amount of it spilled on the floor. As he walked in the room he explains he was hit with a chlorine smell and immediately lost his breath, his chest tightened, he developed a cough and runny nose. After taking 2-3 breaths total, he walked out of the room and stood outside when after 5 minutes he regained his breath and his runny nose resolved.
- The other worker remained in the room for an unknown amount of time trying to repair the lines. He is "unable to recall" the symptoms of the other worker and there was no additional claim associated with this exposure
- After 30 minutes he went back into the room fixed the remaining leak but c/o chest pain without eye or nose irritation.
- He completed the job and worked the next day, in fact he had not missed a day of work because of the exposure
- At home, he noticed burning in his chest, tightness and mucus from his nose but was unable to quantify any of these complaints
- **1 month** after the exposure he was first seen by a physician and told he "had a burnt airway" and was diagnosed with "toxic effects of unspecified gas/fume or vapor", "unspecified asthma" and "pneumonitis".

- **CURRENT COMPLAINTS:**

Chest tightness and hoarseness following exposure to perfumes/chemicals/detergents: when he has these episodes he notices numbness and tingling throughout his body, lightheadedness and is "unable to get air in". When exposed to chlorine he describes his chest tightness "up in my throat" and his airway "closes".



What is The Challenge in These Cases?

- Cough
- Shortness of breath
- Sore throat
- Headache
- Can't do what I used to be able to do

- Hoarseness
- Hemoptysis
- Abdominal pain
- Nosebleeds



The essential element of any workers' compensation claim

Causation

- Must be proved
- Medical literature checklist



- Has the exposure been linked to the clients illness?
- Was the exposure in a dose known to cause disease?
- What is the expected outcome of the exposure?
- Is there a latency?
- How rare is the condition in the general public?
- Are there other causes?

Water Solubility

Level of Impact

Compounds

High

Eyes

Aldehydes

Nose

Ammonia

Pharynx

Chlorine

Larynx

Sulfur dioxide

Medium

Trachea

Ozone

Bronchi

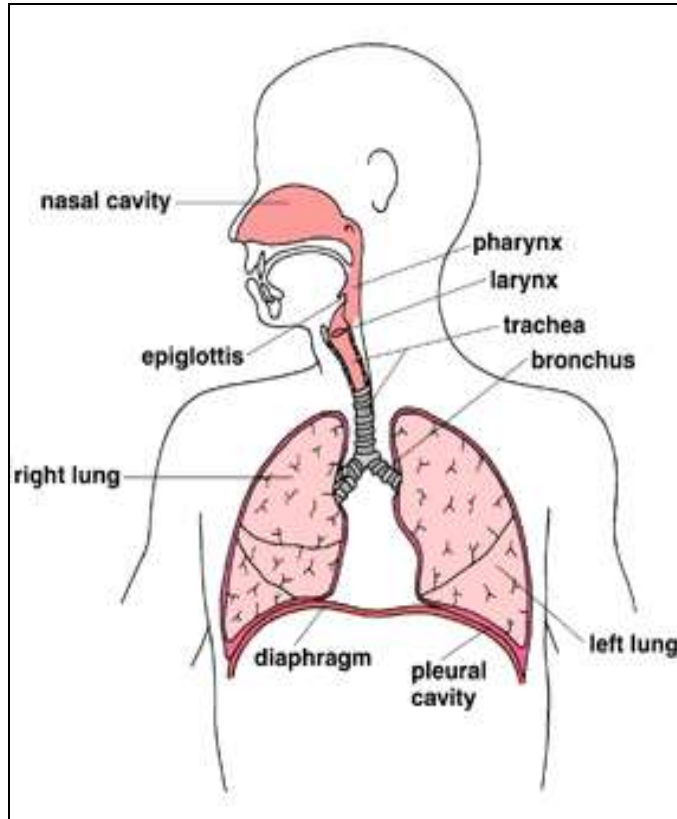
Low

Bronchioles

Nitrogen

Alveoli

Phosgene



- Any physician who considers specific causation must consider what?
 - whether the level of, frequency, intensity and duration of inhalation can actually cause the alleged lung conditions that are subsequently causing the patients continuing and present complaints and conditions
- Under accepted principles of medicine and toxicology, in order to reach a conclusion the physician's opinion must be based upon reliable evidence such that: 1) There was a harmful amount of chlorine, hydrochloric acid or chloramines. 2) That the patient(s) was/were exposed to a harmful amount of these alleged chemicals. 3) That the dose, frequency and duration of the exposure were sufficient to cause the claimed injury and continued and present complaints and conditions. 4) That claimed lung injury and continuing and present complaints and conditions resulted from exposure to an unknown substance thought to be chlorine, hydrochloric acid or chloramines.

Physical Findings/Objective Data

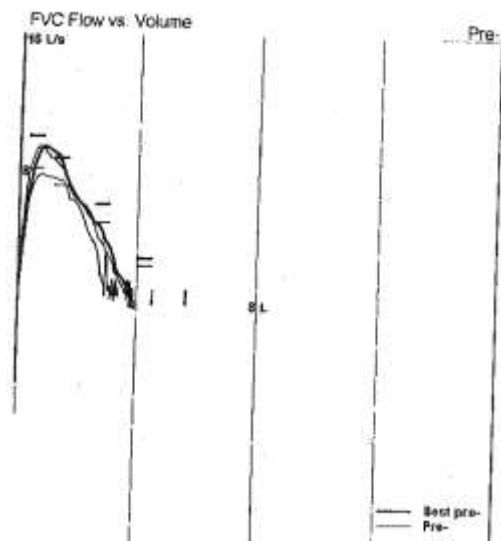
What would you expect/request?



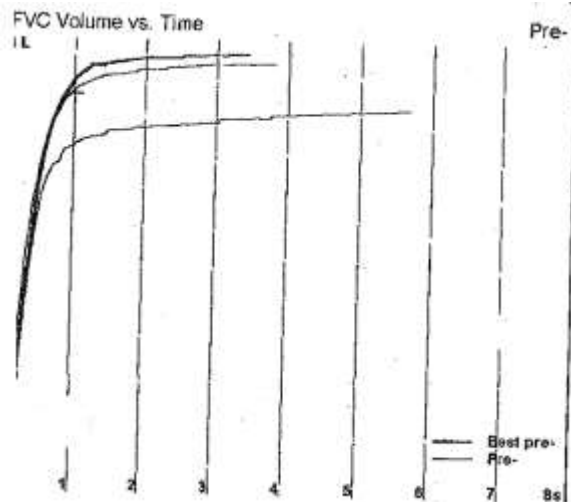


- What would you expect to see in acute upper (RUDS) or lower airway injury (reactive airways dysfunction syndrome (RADS), chemical pneumonitis, chemical bronchitis, inhalation injury or “chemical airway burn”)
- What diagnostic evidence of exposure would you expect?

1st patient initial PFT



	Pred	Best	%Prd	2nd	3rd
Pre- FVC	5.63	3.86*	69%	3.78*	3.39*
FEV.5	3.50	3.10	89%	3.01	2.75
FEV.5/FVC	--	0.80	--	0.80	0.81
FEV1	4.38	3.69	84%	3.57	3.10*
FEV1/FVC	0.77	0.96	124%	0.94	0.91
FEV1/FEV6	--	--	--	--	--



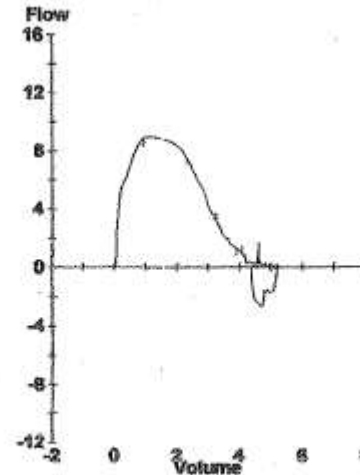
Interpretation. Moderate restrictive pattern indicated by the reduction in FVC with preservation of the FEV1/FVC ratio. This interpretation is valid only upon physician review and signature.

1st Patient 2nd set of PFT's 2 years later

Spirometry

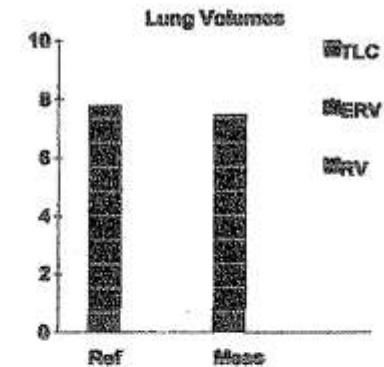
		Ref	Pre Meas	Pre % Ref	Post Meas	Post % Ref	Post % Chg
FVC	Liters	5.45	5.25	96			
FEV1	Liters	4.25	4.10	97			
FEV1/FVC	%	78	78				
FEF25-75%	L/sec	3.88	3.82	98			
PEF	L/sec	9.75	8.98	92			
FIVC	Liters	5.45	0.86	16			
FIV1	Liters						
PIF	L/sec		2.68				
FET100%	Sec		10.55				
MVV	L/min	160					

Physician: Dr. Truncate



Lung Volumes

		Ref	Pre Meas	Pre % Ref	Post Meas	Post % Ref	Post % Chg
Vtg	Liters		5.51				
VC	Liters	5.45	5.31	97			
TLC	Liters	7.79	7.48	96			
FRC PL	Liters	4.08	3.84	89			
FRC N2	Liters	4.08					
ERV	Liters	1.80	1.34	74			
RV	Liters	2.36	2.15	91			
RV/TLC %		31	29				



Diffusion

Hb:	CO Hb:	Ref	Pre Meas	Pre % Ref	Post Meas	Post % Ref	Post % Chg
DLCO	mL/mmHg/min	31.2	26.4	91			
DL Adj	mL/mmHg/min	31.2	26.4	91			
VA	Liters	7.94	7.38	93			
DLCO/VA	mL/min/l	4.17	3.85	92			
Kroghs K	1/min	3.89	3.32	90			
IVC	Liters		5.31				



Technician Comments

The patient has difficulty performing the inspiratory limb of the spirometry maneuvers due to "tightness in the throat".

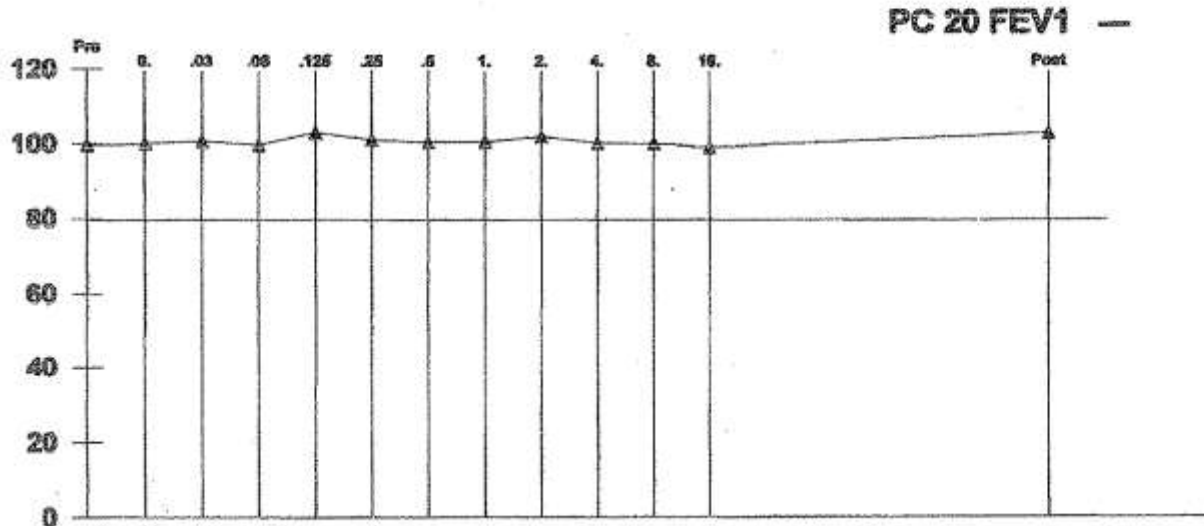
Bronchochallenge Report

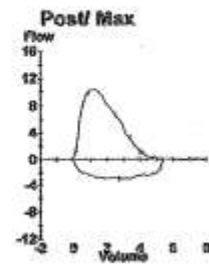
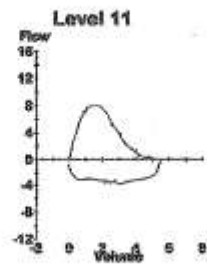
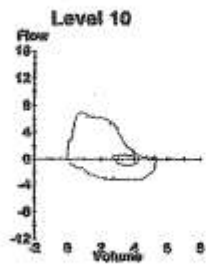
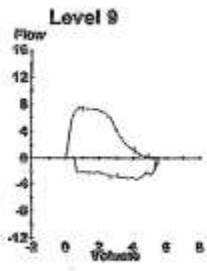
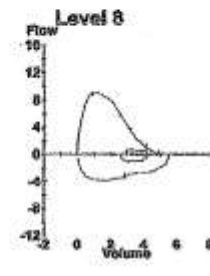
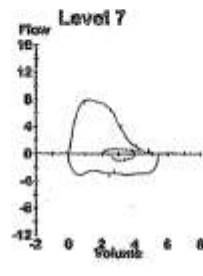
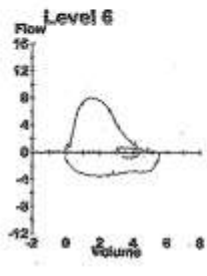
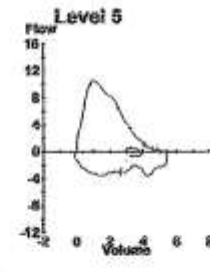
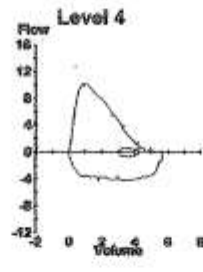
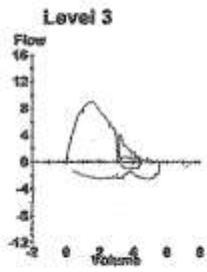
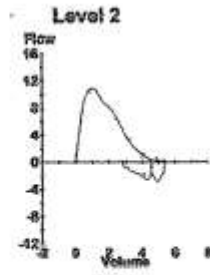
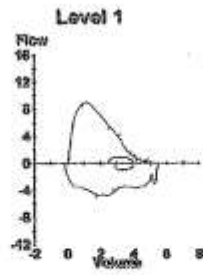
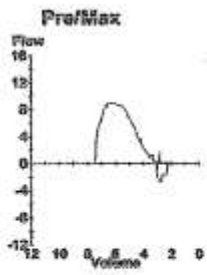
Protocol: PC20 Methacholine

XXXXXXXXXXXXXXXX
ZZZZZZZZZZZZZZZZZZZZ

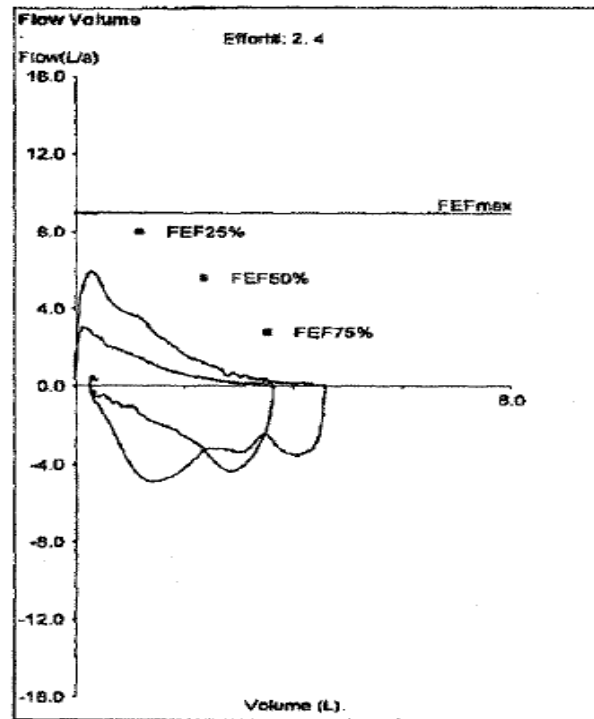
	Ref	Pre	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10	Level 11	Post
	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas	Meas
Dose		0.0	.03	.06	.125	.25	.50	1.0	2.0	4.0	8.0	16.0		
FVC Liters	5.45	5.25	5.45	5.45	5.58	5.72	5.50	5.54	5.48	5.55	5.54	5.33	5.53	5.42
% Ref		96	101	100	103	105	101	102	100	102	102	98	101	99
% Chg			5	4	7	9	5	6	4	6	6	2	5	3
Dose		0.0	.03	.06	.125	.25	.50	1.0	2.0	4.0	8.0	16.0		
FEV1 Liters	4.25	4.10	4.12	4.15	4.11	4.25	4.16	4.14	4.14	4.20	4.13	4.12	4.08	4.24
% Ref		97	97	98	97	100	98	97	97	99	97	97	96	100
% Chg			0	1	0	3	1	-1	1	2	1	0	-1	3
Dose		0.0	.03	.06	.125	.25	.50	1.0	2.0	4.0	8.0	16.0		
FEF25-75%	3.88	3.82	3.18	3.52	3.04	3.22	3.45	3.34	3.44	3.40	3.43	3.14	3.99	
% Ref		96	82	91	78	83	89	86	89	103	88	80	81	103
% Chg			-17	-8	-21	-16	-10	-12	-12	4	-11	-10	-16	4
Dose		0.0	.03	.06	.125	.25	.50	1.0	2.0	4.0	8.0	16.0		
PEF L/sec	9.75	8.96	9.83	10.87	10.16	10.48	10.94	9.38	8.80	9.15	7.59	8.64	9.72	11.38
% Ref		92	101	112	104	106	112	96	90	94	78	89	100	117
% Chg			10	21	13	17	22	5	-2	27	-15	-4	8	27

PC 20 FEV1: ---





2nd patients PFT's



Pre-Drug Datasheet

	Predicted (Favor Mean)	Pre Drug Reported	Pre Drug % Predicted	Pre Drug Effort 1	Pre Drug Effort 2	Pre Drug Effort 3	Pre Drug Effort 4	Pre Drug Effort 5
FVC	4.71	3.64	77 <	2.14	3.64	3.62		
FEV1	3.65	1.86	45 <	1.35	1.86	1.72		
FEF25-75%	3.91	0.57	15 <	0.82	0.57	0.57		
FEFmax	6.93	3.05	34 <	2.52	3.05	3.83		

2nd patients PFT's

Smoke Status: Quit, : 20 Years: 0.50, Packs/Day : = 10.00 Pack Years

SPIROMETRY

	Units	Predicted	Pre Drug Reported	Pre Drug % Predicted	Post Drug Reported	Post Drug % Predicted	%Change
FVC	L,btps	4.71	3.64	77 <	4.59	98	28
FEV1	L,btps	3.65	1.86	45 <	2.51	69 <	52
FEV1/FVC	%	77.62	46.46	58 <	54.80	70 <	20
FEF25-75%	L/s	3.91	0.57	15 <	0.87	22 <	52
FEFmid	L/s	8.93	3.05	34 <	5.92	66 <	94
FEF25%	L/s	8.00	1.77	22 <	3.57	45 <	102
FEF50%	L/s	5.99	0.74	13 <	1.27	23 <	73
FEF50/FIF50	%		30.05		39.86		33
MVV	L,min,btps	133.20					

LUNG VOLUMES

	Units	Predicted	Pre Drug Reported	Pre Drug % Predicted	Post Drug Reported	Post Drug % Predicted	%Change
TLC	L,btps	6.52	6.52	100			
FRC	L,btps	3.55	3.13	88			
RV	L,btps	1.81	2.09	115			
RV/TLC	%	27.79	32.02	115			
VC	L,btps	4.71	4.43	94			
IC	L,btps	2.98	3.39	114			
ERV	L,btps	1.74	1.04	60 <			

Physician Interpretation

There is severe airflow obstruction with significant bronchodilator response.

The lung findings are generally within normal with the exception of a low ERV consistent with his body habitus, the diffusion is normal.

- Was there physical evidence of an exposure?
- Was there objective evidence of injury?
- Is it biologically plausible the dose, duration and intensity of the exposure caused the alleged toxicity?
- Were other conditions considered?
Despite maximum treatment with bronchodilators, inhaled and oral steroids both patients failed to improve

What "other" conditions would you consider?

- Rhinosinusitis, an allergic condition, gastroesophageal reflux, laryngeal/pharyngeal reflux, vocal cord dysfunction (VCD) and muscle tension dysphonia.
- Considering these diagnosis' what diagnostic tests would you order?

Vocal Cord Dysfunction

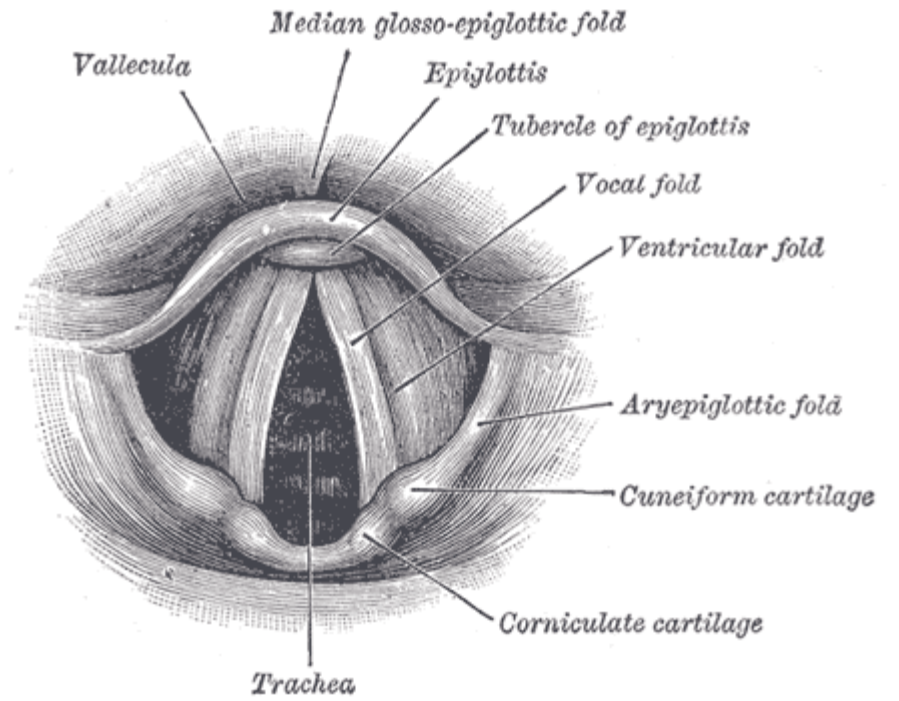
- **VCD: inappropriate adduction of the vocal cords during inspiration, exhalation or both**
 - ① Typically present with acute-onset of shortness of breath, tightness in the throat or upper chest and stridor or laryngeal wheezing
 - ② Patients are often misdiagnosed with Asthma, Allergies or upper airway obstruction
 - ③ Many are maintained on excessive and often unnecessary medications
 - ④ Many have recurrent ED visits or hospitalizations

VCD: Early Description

1974 Downing et al: "Munchhausen's Stridor"

1982 Patterson et al: Factitious Asthma

- Pseudo-asthma
- Upper airway dysfunction
- Functional (or nonorganic) upper airway obstruction
- Irritable larynx syndrome
- Emotional laryngeal wheeze
- Laryngeal hyperresponsiveness
- Paradoxical vocal cord movement
- Paradoxical vocal fold motion (PVFM)
- Functional inspiratory stridor
- Nonorganic functional or psychogenic upper airway obstruction
- Psychogenic stridor
- Emotional laryngeal wheezing
- Episodic laryngeal dyskinesia
- Episodic laryngeal obstruction



Clinical Presentation: VCD



• Symptoms

- Throat or upper chest tightness
- Shortness of breath
- Sensation of choking or suffocation
- More difficulty getting air in than out (air hunger)
- Cough
- Lightheadedness or dizziness
- Heavy sensation of the extremities
- Perioral or extremity numbness or tingling
- Rapid onset and resolution of symptoms
- Difficulty swallowing

• Signs

- Tachypnea or hyperventilation
- Stridor
- Neck or Chest Retractions
- Pallor but no cyanosis
- Hoarseness or dysphonia
- Frequent throat clearing
- Worsening of asthma symptoms despite treatment

☑ Risk Factors

- Upper airway inflammation: allergic or non-allergic rhinitis, chronic sinusitis, recurrent upper respiratory infections
- GERD/LPR
- Previous traumatic event (abuse)
- Severe emotional stress
- Female gender (3:1)
- Competitive athletes
- Psychiatric illness

☑ Triggers

- Cold air
- Exercise
- Perfume
- Cleaners
- Detergents
- Chemical odors
- Stress

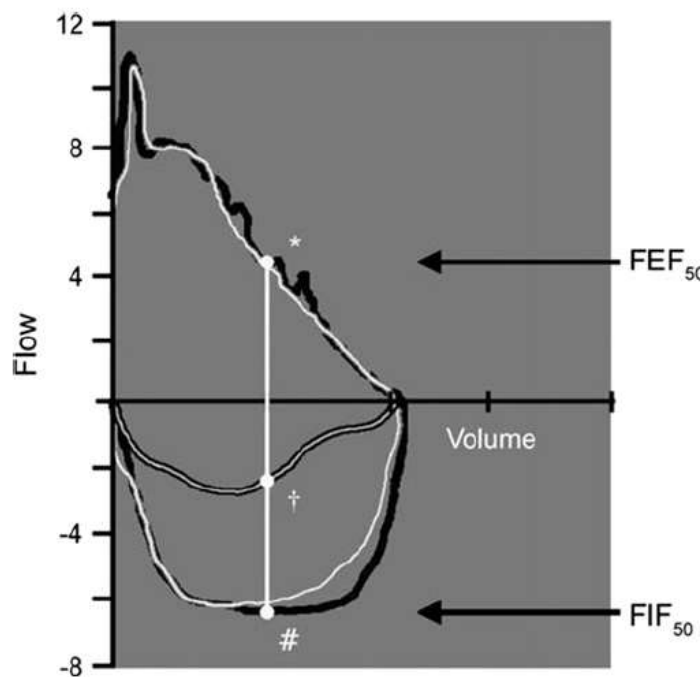


Differential diagnosis of VCD

Infectious	Epiglottitis, bronchiolitis, laryngitis, pertussis, croup, abscess
Rheumatologic	Rheumatoid cricoarytenoid arthritis, relapsing polychondritis, Laryngeal sarcoidosis
Neoplastic	Ca Head and Neck, cystic hygroma, hemangioma, rhabdomyosarcoma, teratoma, lymphoma, papilloma
Endocrine	Thyroid goiter
Traumatic	Laryngeal, thermal, upper airway hemorrhage, caustic ingestion
Allergic	Angioedema, anaphylaxis, exercise-induced anaphylaxis
Neurologic	Brainstem anomalies, postpolio, MG, Parkinson, recurrent laryngeal nerve retraction, MS, paralysis (head/neck cancer:chest/thyroid surgery)
Pulmonary	Asthma, exercise, COPD, foreign body aspiration, hyperventilation syndrome, PE
Congenital	Laryngomalacia, laryngeal cleft, intrathoracic vascular ring, subglottic stenosis, laryngeal web
Psychiatric	Conversion disorder, Munchausen, Malingering, panic/anxiety, somatization disorder
GI	GERD, Laryngeal-Pharyngeal Reflux (LPR)
Occupational	Gulf War laryngotracheitis, World Trade Center cough, inhalation injury
Laryngospasm	Intubation, Allergic IgE mediated disease, nocturnal aspiration

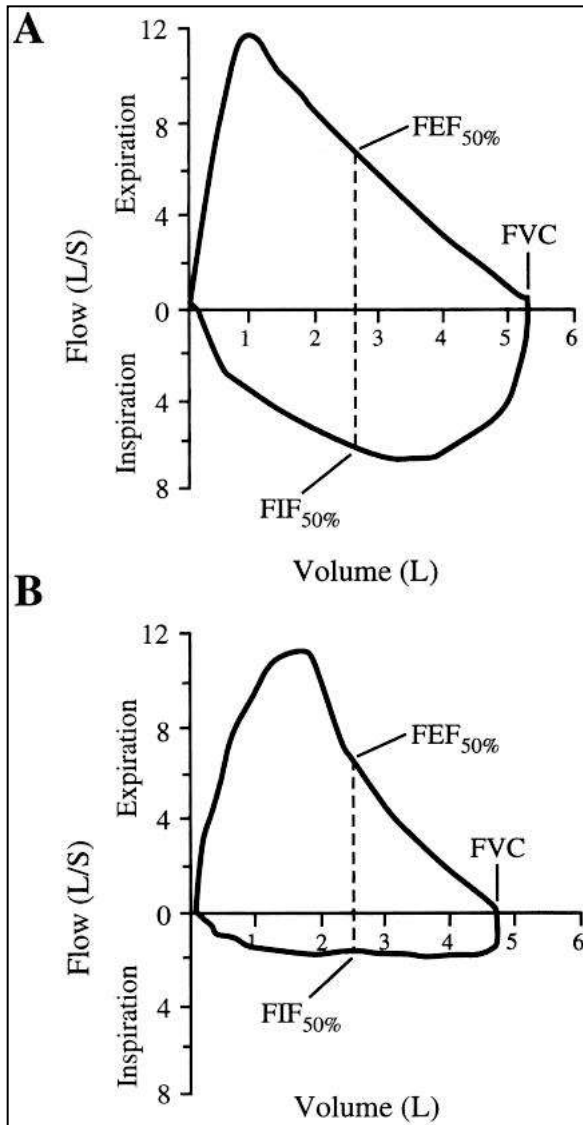
Diagnostic Criteria for VCD

Clinical Symptoms	Prolonged Symptoms
	Recurrent, intermittent episodes
	Shortness of breath
	Upper airway stridor or wheezing
	Reproducible causative or inciting factor
PFT (criteria for suspected VCD)	Normal Spirometry (no response to bronchodilator)
	Negative bronchoprovocation testing (although VCD can cause an abnormal MTC)
	Abnormal (truncated or flattened) inspiratory loop
	PEF50%/PIF50% >1
Laryngoscopy	Adduction of vocal cords during inspiration, or both inspiration and expiration
	> 50% closure of cords
Intermittent findings	May be normal when asymptomatic
	May normalize with vocalization
	"Posterior chinking" (variable)



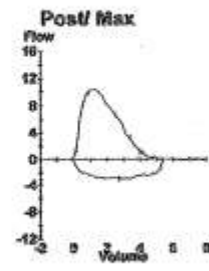
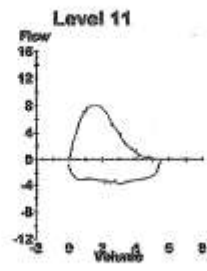
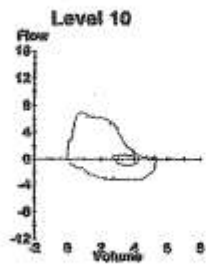
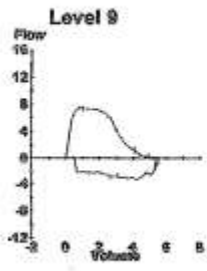
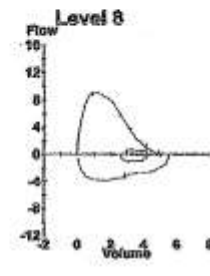
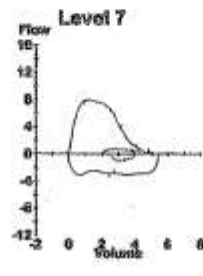
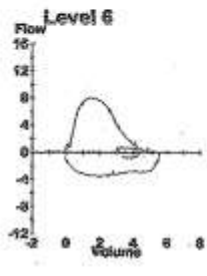
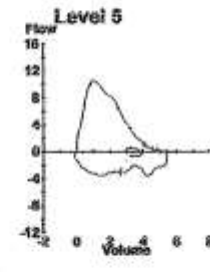
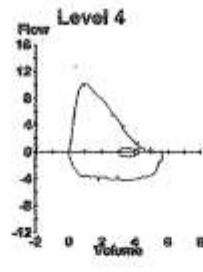
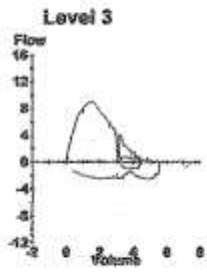
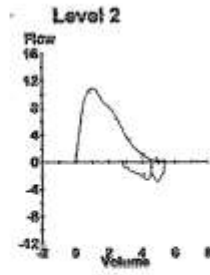
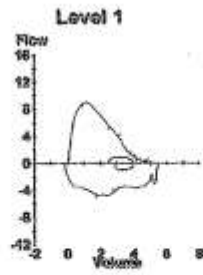
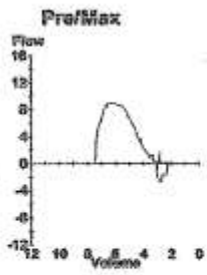
The flow-volume loop showing normal inspiratory loop (deeper loop, marked with hash) and the truncated inspiratory loop of VCD (flattened loop, marked with dagger). The FEF50 is marked with an asterisk. The FIF50 is marked with a hash on the normal inspiratory loop and with a dagger on the VCD inspiratory loop. The FEF50/FIF50 ratio is normally less than 1, as shown by the ratio of asterisk to hash. In VCD, the FEF50/FIF50 ratio is usually greater than 1, as shown by the ratio asterisk to dagger

(Prim Care Clin Office Pract 2008 and Immunol Allergy Clin N Am 2012)



(A) A normal flow-volume loop. (B) Extrathoracic airflow obstruction with truncation of the inspiratory loop. FVC, forced vital capacity; FIF₅₀, forced inspiratory flow at 50% forced vital capacity; FEF₅₀, forced expiratory flow at 50% forced vital capacity.

Journal of Occupational & Environmental Medicine.
40(2):136-143, February 1998.



The Standard for Diagnosing VCD

- Direct visualization of adduction of the vocal cords during inspiration (32%-60%) but normal laryngeal function when the patient is asymptomatic does not exclude VCD

Specific maneuvers such as repeating low- and high-pitched sounds, forceful inspiration and expiration, and exposure to substances known by the individual patient to induce symptoms can be helpful in inducing an attack during laryngoscopy

The pathognomonic, posterior, diamond-shaped glottis chink seen in 3-6% of patients



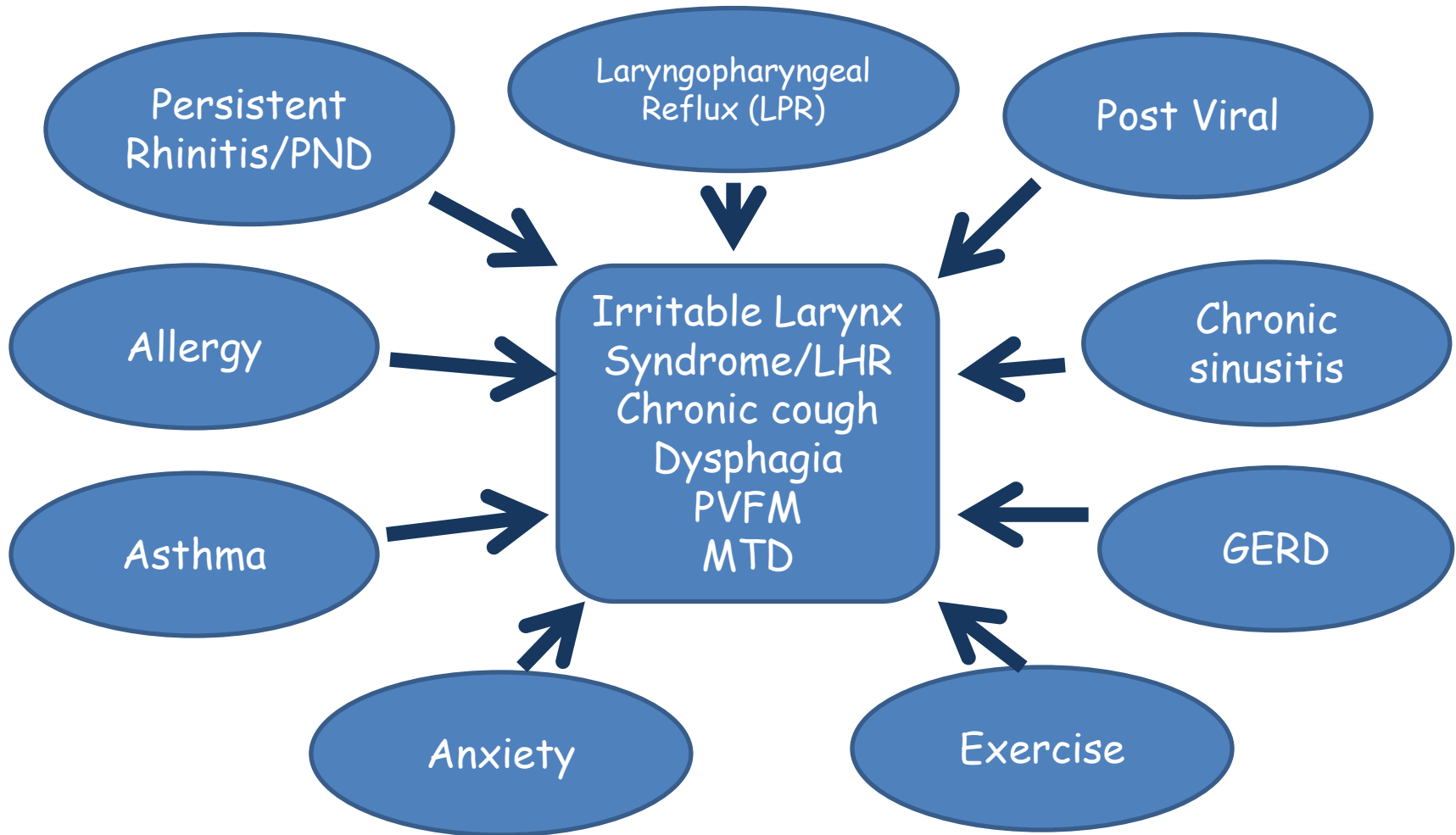
Ann Allergy Asthma Immunol. 2011;106

Clinical Findings From VCD Literature

Age, mean	29.6
Adults>18/Pediatric<18	70% / 30%
Male/Female	30% / 70%
PFT	
Associated etiology	
Asthma	445 cases (28%)
Exercise	269 (17%)
Psychiatric/emotional	270 (17%)
Gastroesophageal reflux	267 (17%)
Chemical Irritants	103 (6%)
URI	98 (6%)

Chest 2010; 138(5)

The Relationship Between Chronic Cough and PVFM (VCD)



Acute Management

- Confirm diagnosis in patients without prior VCD diagnosis
- Treatment should be aimed at relieving the obstruction (Bronchodilators and steroids typically do not work)
 - Reassure patient the condition is benign
- Benzodiazepines
- Heliox in 80:20, 70:30 concentration
- Intra-laryngeal injection of botulinum toxin type A
- Severity of Symptoms has led to intubation and tracheostomy

Journal of Occupational & Environmental Medicine. 40(2):136-143, February 1998.

Immunol Allergy Clin N Am 2012

Chronic Management

- **Speech therapy:** regarded as the primary therapy for VCD
- **Psychotherapy:** remains a primary treatment modality along with speech therapy; remind them they are expected to completely recover
- **Biofeedback**
- **Discontinue any unnecessary medications**
- **Diagnose and treat comorbid conditions**

GERD

Post nasal Drip

Allergies

Psychiatric Diagnosis

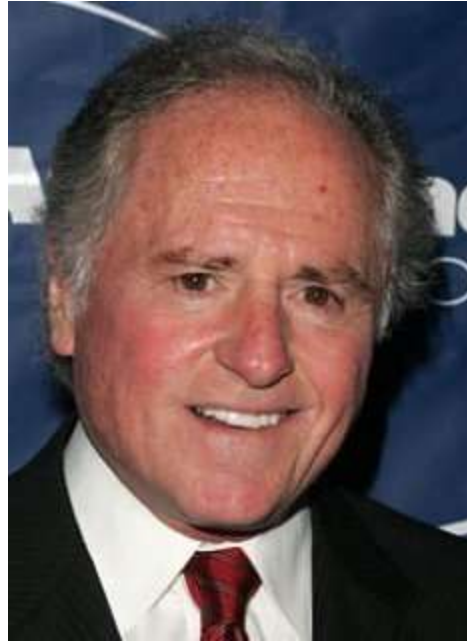
Journal of Voice 1994 Volume 8, Annals of Allergy, Asthma, and Immunology, 2006; 96, Journal of Speech, Language and Hearing Research, 1998; 41, J Asthma 1998 35
Immunol Allergy Clin N Am 2012, JOEM 1998 (40)

Speech therapy techniques used for relief of VCD symptoms

- ① Relaxed throat breathing with abdominal support
 - a. Lower shoulders
 - b. Place hand on midabdomen to support it
 - c. Breathe gently in through nose and make sure abdomen comes out
 - d. Breathe gently out through slightly pursed lips and make sure abdomen comes in
 - e. Ensure that breathing is comfortable and easy so that there is no tugging of the torso or neck muscles
- ② Quick Inhalation
 - a. Inhale quickly through the nose or mouth for approximately 1 second
 - b. Use caution with rapid inhalation through the nose in patients with sinus disease or postnasal drip, so as not to trigger cough or throat clearing because of secretions
 - c. Causes forced abduction of the vocal cords
- ③ Pursed-lip Breathing
 - a. Breathe out slowly through pursed lips (as if to whistle) for 2 to 3 seconds
 - b. Ensure that what is being inhaled is also being exhaled
 - c. Focus on timing to make sure that exhalation is not too long, which generates tension rather than relieving it
 - d. Pursed-lip breathing slows down the breathing rate and creates pressure behind the lips and throughout the pharynx to forcibly abduct the vocal cords

Lets go to the Videotape

- VCD
- Reflux
- MTD





A speech pathology consultation was obtained including videostroboscopy

Findings: Significant interarytenoid edema, pachydermia and a diffusely erythematous supraglottis; all of these findings are consistent with gastroesophageal reflux. He was prescribed a treatment for this by his primary care physician and unfortunately has never taken it.

Untreated gastroesophageal reflux had been scientifically shown to provoke laryngospasm.

He was also found to have an elevated serum IgE of more than



"Whoa! *That* was a good one! Try it, Hobbs — just poke his brain right where my finger is."

Case 4

Videotaped IME



Review the tape and answer the following questions

- Was there an exposure?
- If so, did the exposure result in a dose sufficient to cause his specific illness or complaints?
- Are his ailments known to be caused in humans?
- Is the ailment temporally eligible to have been caused by the exposure?
- Is the alleged effect biologically plausible?
- Other factors have been eliminated as possible causes of the ailment
- ⇒ Does he meet criteria for pulmonary impairment, if so, is he disabled?

Case 4

Allergy Issues



- 47-year old male
- Complains of "Allergy issues" which began when he moved into his 5000 sq ft home in 1999
- What was his description of the exposure?
- Water intrusion in the corner of the family room near the ceiling and extended down behind the bookcase (about 12 inches)
- House smelled moist
- Mold in the elevator shaft in 2003 (Mold everywhere)
- Mold behind baseboard (after he moved out)

Case 4

Mold Exposure



What were his complaints?

- Smelly musty odor but no other complaints
- "Dry eyes" and "Runny nose" started in 2000 (pretty constant) and pain in his upper lip
- Inability to take a deep breath "Some days are better than others"

Case 4

Allergy Issues



What ADL's could he perform?

- Works independently and has never missed work because of illness or been cited for poor job performance
- Rides bikes with his children "a couple times a week"
- Goes to the gym 2-3 times a week (walks on treadmill for 30 minutes) and is able to get his heart rate up "pretty high" then lifts weights
- Admits motivation alone limits him from going more often

Case 4

Allergy Issues

- **PMH:** GERD, sinusitis, spondylolithesis
- **PSH:** Tonsillectomy, knee surgery, sinus surgery
- **Allergies:** NKDA however non-specific allergies reported by the patient
- **Medications:** Xolair 1 time a week, xopenex 2-4 puffs bid 5 x week, pulmicort 2 puffs BID, Prozac 40mg QD, Zantac OTC 1 time a week
- **Social History:** Lifetime non-smoker, denies recreation drug use or alcohol use
- **FH:** Parents, 2 brothers and 1 sister healthy

Case 4

Allergy Issues



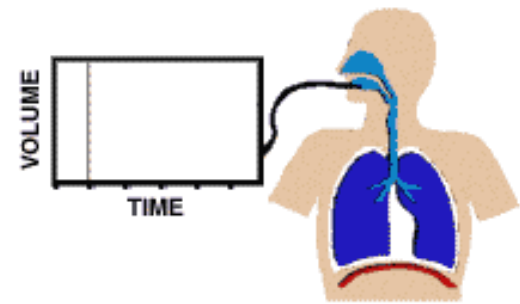
- **Physical Exam:** VS: HR 78 regular, BP 130/90, respiratory rate 12, BMI normal
- **HEENT:** wnl
- **Lung:** CTA, no wheezes rales or rhonchi
- **Neuro:** wnl

Case 4

Medical Records

Spirometry:

- FEV1: 3.80 or 81% of predicted
- FVC: 5.10 or 88% of predicted
- FEV1/FVC ratio 75%
- FEF 25-75 was 3.31 or 69% of predicted
- There was no bronchodilator response
- He was diagnosed with "minimal" obstruction according to the attending physician



Case 4

Medical Records

- Radioallergosorbent assay Southeast U.S.
- Dust mite, fungal (penicillium, cladosporium, aspergillus and alternaria), cat and dog dander, cockroach, bermuda, bahia and rye grass, bayberry, tree groupings: australian pine, queen palm. Weed grouping: ragweed fennel
- Responses in the equivocal range: Bayberry, Oak, Queen Palm and Penicillium (lowest)

Case 4

Medical Records

- Immunoglobulin serum concentration
- **IgA:** 133 (68-423)
- **IgG:** 901 (844-1912) all subclasses wnl
- **IgM:** 67 (50-196)
- **IgE:** 53 (0-100)
- **Sed Rate:** 5 (0-10)
- **Alpha 1 antitrypsin:** 62 mg/dl (90-200)
(Phenotype M1Z)

Chest X Ray 12/29/10



Environmental Air Survey

Completed 9/5/09

- Downstairs Family room
- Upstairs near top of stairs
- Fireplace
- Upstairs bedroom
- Elevator shaft
- Outdoor samples (2 locations)
- Swab culture
- 938 CFU/m³
- 998 CFU/m³
- 1,290 CFU/m³
- 646 CFU/m³
- 703 CFU/m³
- 3,634 CFU/m³ and 7,911 CFU/m³
- No growth

Asp-PCN like (no species given) were seen in 3% of the 3,634 total outdoor
In the front, 38% of the 938 family room, 50% of the 1,290 fireplace, 29%
of the 998 top of stairs and 8% of the outside in the back

Case 4

Videotaped IME

Since you have reviewed the tape
answer the following questions

- Was there an exposure?
- If so, did the exposure result in a dose sufficient to cause his specific illness or complaints?
- Are his ailments known to be caused in humans?
- Is the ailment temporally eligible to have been caused by the exposure?
- Is the alleged effect biologically plausible?
- Other factors have been eliminated as possible causes of the ailment
- ➔ Does he meet criteria for pulmonary impairment, if so, is he disabled?

Case 4

Conclusions

- His reported exposure is **in-consistent** with an exposure to harmful levels of mold known to induce medical illness (Symptoms, Physical exam, known toxic effects, medical records and results of diagnostic studies (cxr, RAST, PFT's))
- His allergic response was greater for various tree species and grasses common in the area of the country he lives
- This gentleman has reached maximum medical improvement and suffers 0% permanent impairment as the result of his reported exposure to mold at home. I expect no respiratory disease to develop as a result of his exposure to mold at home more than 4 years ago.
- In addition, it is also my opinion within a reasonable degree of medical certainty that the need for ongoing medical care is not and has never been causally related to his reported exposure to mold at home.

Case 5

Pulmonary Fibrosis: Is it Work Related? Does the Patient Suffer from Permanent Respiratory Impairment?

- 61 Y.O male works for the Polk County sheriff's department as senior supply clerk
- Previously worked as detention deputy in 3 different jails for >25 years
- Presents to OM clinic complaining of fatigue, shortness of breath and coughing

Case 5

Pulmonary Fibrosis: Is it Work Related?

- **Physician notes:** He is here because he is SOB. He is trying to figure out why he has SOB especially over the last few weeks. He states that the roof leaks at his building and there are stained ceiling tiles and stained carpet from water damage. He has not noted a smell in the building. He was recently away from work and feels better. He has been working at the site for years. He has reported the problem to his supervisor and they have looked into problems with the building.

Case 5

Pulmonary Fibrosis: Is it Work Related?

- **PMH, PSH, Allergies:** not obtained but he is a lifetime non-smoker
- **PE:** VS normal, BMI 33, O2 sat on RA 96%.
"He doesn't move quickly around the room"
- **Lungs:** decreased breath sounds
- **Dx:** Shortness of breath - 786.05
- **Diagnostic testing ordered:** PFT's, Chest x Ray, EKG, Air sampling
- **Work Status:** Off work

Case 5

Pulmonary Fibrosis: Is it Work Related?

- The heart is upper limits of normal
- There are coarse markings noted in both lungs which may represent pulmonary fibrosis
- There is no PTX or focal infiltrate
- EKG: WNL

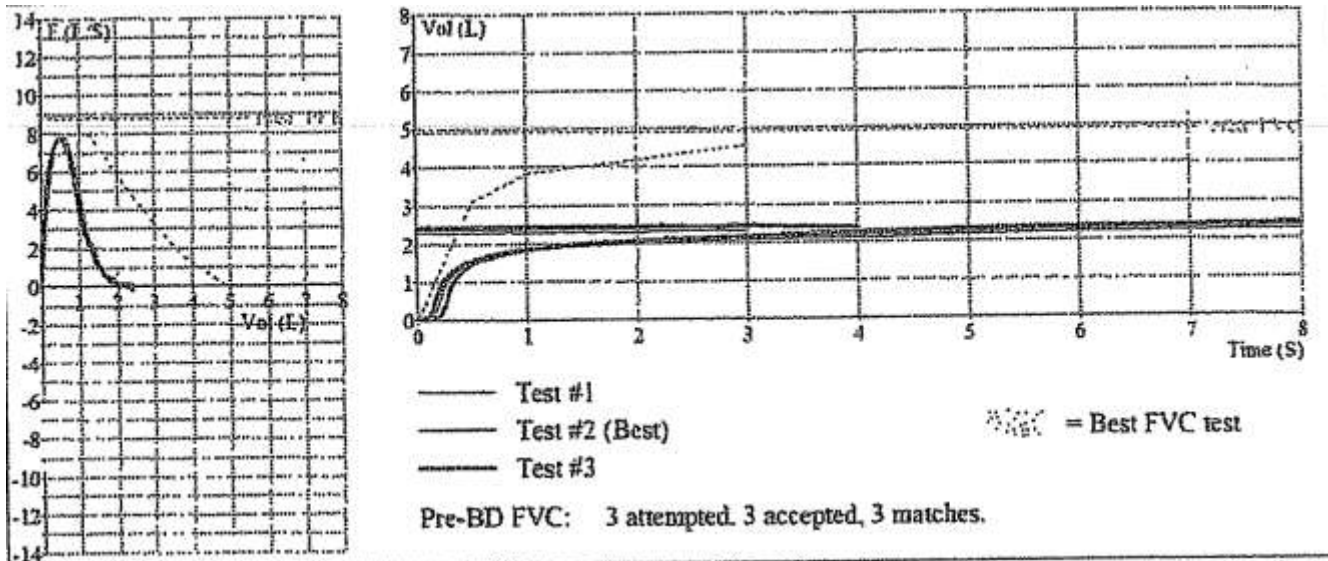


PFT's

PFT's

- FVC
- FEV1
- FEV1/FVC ratio

Predicted	Actual	% Pred
4.886	2.281	47%
3.812	1.842	48%
78%	81%	104%



Case 5

Pulmonary Fibrosis: Is it Work Related?

- Seen in follow-up 2 weeks later and off work for 9 days
- PE: unchanged, chest x ray/PFT's, air sampling abnormal
- DX: Shortness of breath (786.05)
- Work Status: Off work
- Plan: refer to pulmonologist

Case 5

Pulmonary Fibrosis: Is it Work Related?

- What do you want to know about his current job?
- Works as senior supply clerk in a warehouse (50ftx300ft) with 10 ft ceilings and office 14ftx30ft with 10 ft ceilings
- What about his previous job(s)?
- Detention Deputy for 20 years

Case 5

Pulmonary Fibrosis: Is it Work Related?

- Where does he work and for how long?
- Warehouse and office
- What did he see in the office:
- Brown water stains on ceiling 15 in all over last 1 $\frac{1}{2}$ years. Tiles replaced over the last year. Water stains along seam near garage door. Standing water 10 feet from the door when it rained
- Did not see any mold growth but noticed a stale smell

Case 5

Pulmonary Fibrosis: Is it Work Related?

- What was he exposed to?
- What were his symptoms at the time of exposures?
- Did not report eye irritation, runny nose, cough or shortness of breath
- What are his current symptoms?

Progressive shortness of breath, unable to walk up the steps to his office or from parking lot to the building, ADL's limited, non-productive cough

Case 5

Pulmonary Fibrosis: Is it Work Related?

- **Exposure History:** Condition not improved after leaving work 2 months ago
- **Current Complaints:** Shortness of breath
- **PMH:** HTN, Kidney stones, GERD
- **PSH:** Surgery to remove kidney stones, elbow and ankle surgery
- **MEDS:** Lisinopril/HCTZ 20/12.5mg, Prilosec 20mg, alieve PRN
- **Allergies:** Ampicillin (anaphylactic reaction)

Case 5

Pulmonary Fibrosis: Is it Work Related?

- PE: VS stable, BMI 32.9, Sats 95% on RA
- Lungs: inspiratory crackles in the bases bilaterally

Environmental Air Survey

Completed 6/28/12

- Warehouse Office
 - Warehouse (under roof leak)
 - Center of warehouse
 - Warehouse (boot storage rack)
 - Warehouse (behind boot rack)
 - Outdoor samples (2 locations)
 - Swab culture
- 953 CFU/m³
 - 777 CFU/m³
 - 530 CFU/m³
 - 565 CFU/m³
 - 883 CFU/m³
 - 1341 CFU/m³ and 1836 CFU/m³
 - No growth

Case 5

Pulmonary Fibrosis: Is it Work Related?

- ① What do the results of the environmental air survey actually mean?
- ② If the swab culture grew mold: is that significant? Why or Why Not?
- ③ What's wrong with the design of the survey?

Questions to Answer



- Was he exposed to harmful levels of mold?
- Why is this gentleman short of breath and is it work related? **Please support your opinion!!!!!!**
- Can a diagnosis be made by his spirometry results?
- His chest x ray suggests pulmonary fibrosis, how long does this take to develop and how does this relate to his exposure at work?
- What do you do if he is found to be sensitized to mold?
- What are your recommendations? Does he need further testing?
- Did his working environment result in Impairment or Disability?



"C'mon, c'mon---it's either one or the other"