

Evaluation of the patient with lung disease

History

Physical examination

Physiologic evaluation

Anatomic evaluation

Pathologic evaluation

History taking in patients with lung disease

Onset, duration, triggers, and severity of symptoms

dyspnea (rest, exercise)

cough (dry, productive)

chest pain (pleuritic, constant)

fever

Occupational/environmental exposures

Smoking history

Family history

Underlying illnesses (e.g. collagen vascular disease)

Environmental/occupational causes of lung disease: models

Exposure

isocyanates

asbestos

chlorine gas

high altitude

rapeseed oil

uranium

pigeons

homeless shelter

dust

cigarette smoke

Disease

occupational asthma

pulmonary fibrosis

ARDS

pulmonary edema

pulmonary hypertension

bronchogenic carcinoma

hypersensitivity pneumonitis

tuberculosis

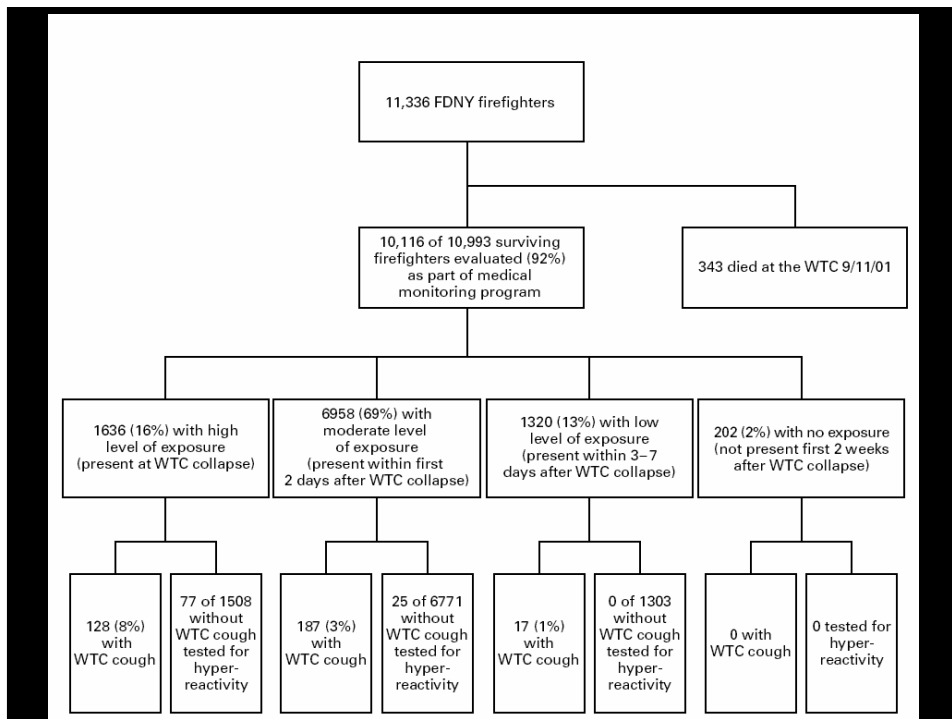
RADS/?COPD

COPD, lung cancer

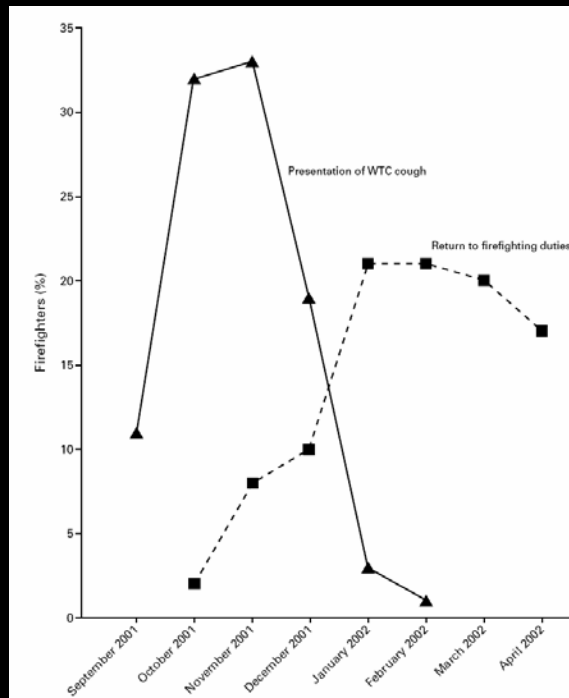
COUGH AND BRONCHIAL RESPONSIVENESS IN FIREFIGHTERS
AT THE WORLD TRADE CENTER SITE

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- Short intense exposure to inorganic dust, products of combustion, other material among those present at site of World Trade Center after attack on September 11, 2001
- Respiratory complaints common in firefighters who had been at World Trade Center site



Clinical course of WTC cough syndrome



Lung function after exposure to WTC dust

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF FDNY COHORT BY ARRIVAL TIME-BASED WORLD TRADE CENTER EXPOSURE

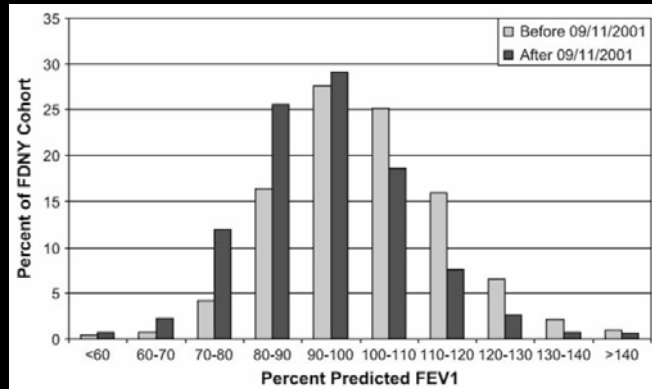
Characteristic	Early Exposure	Intermediate Exposure	Late Exposure	Nonexposed	Total
Demographics					
Number (% of FDNY cohort)	1,660 (13.7)	8,185 (67.8)	1,921 (15.9)	313 (2.6)	12,079 (100)
Age on 09/11/01, yr	40 ± 7.6	39.7 ± 7.5	40.2 ± 8.3*	40.7 ± 9 [†]	39.7 ± 7.7
Height, cm	179.3 ± 7.6	179.6 ± 7.4	178.3 ± 8.4*	174 ± 9.1 [†]	178.3 ± 7.6
Sex, % male	96.7	97.1	91.9*	71.2 [†]	95.6
Race, % white	86.2	88.3	78.2*	55.3 [†]	85.6
Ever smokers, %	28.9	27.5	33.4*	39.9 [†]	29
Work assignment on 09/11/01, % EMS	18.1	13.8	33*	88.8 [†]	19.4
FDNY tenure on 09/11/01, yr	11.2 ± 7.9	11.1 ± 7.9	10.4 ± 8.3*	6.4 ± 5.3 [†]	10.9 ± 8.3

TABLE 2. FEV₁ CHARACTERISTICS OF WORLD TRADE CENTER-EXPOSED FDNY RESCUE WORKERS BY ARRIVAL TIME-BASED WORLD TRADE CENTER EXPOSURE

Arrival Time-based WTC Exposure	Last FEV ₁ , before 09/11/2001 (Median, Interquartile Range, and Percent)			First FEV ₁ , after 09/11/2001 (Median, Interquartile Range, and Percent)		
	Liters	Percent Predicted	Percent Below Lower Limit of Normal	Liters	Percent Predicted	Percent Below Lower Limit of Normal
Early exposure (n = 1,660)	4.21 (3.64–4.73)	101 (92–111)	7.7	3.85 [†] (3.34–4.36)	93 [†] (84–102)	19.2 [†]
Intermediate exposure (n = 8,185)	4.32 (3.83–4.83)	101 (92–111)	6.4	3.96 [†] (3.52–4.42)	93 [†] (85–102)	16.3 [†]
Late exposure (n = 1,921)	4.27 (3.78–4.76)	100 (91–110)	7.8*	3.87 [†] (3.42–4.32)	92 [†] (83–102)	17.8 [†]
Total	4.30 (3.80–4.80)	101 (92–111)	6.8	3.93 (3.47–4.40)	93 (85–102)	15.3

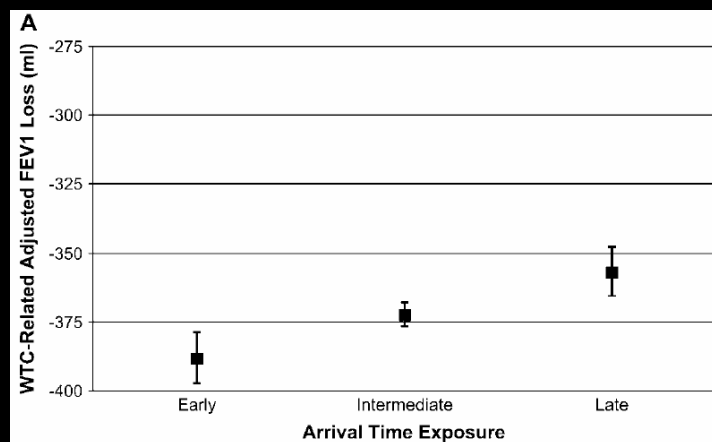
Banauch et al. Am J Resp Crit Care Med 2006; 174: 312-319

Lung function after exposure to WTC dust



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Lung function after exposure to WTC dust



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Lung disease associated with biomass fuel exposure

<u>Condition</u>	<u>Setting</u>	<u>Assessment tool</u>
Childhood asthma ¹	rural Guatemala	Symptom questionnaire (ISAAC)
Emphysema ²	Turkey (eastern Anatolia)	Symptom questionnaire PFT, HRCT
ILD ³	Turkey	PFT, HRCT
Abnormal lung function in childhood ⁴	Ecuador	PFT
Respiratory symptoms ⁵	rural Mexico	Questionnaire, PFT
ARI in children ⁶	Zimbabwe	Questionnaire

1. Schei et al. J Exp Anal Environ Epi 2004; 14: S110-117
2. Ozbay et al. Respirology 2001; 6: 255-258
3. Arslan et al. Eur J Radiol 2004; 52: 192-199

4. Rinne et al. Respir Med 2006 100: 1208-1215
5. Regalado et al. AJRCCM 2006; 174: 901-905
6. Mishra. Int J Epi 2003; 32: 847-853

Physical examination in patients with lung disease

Physical examination

- respiratory rate and pattern
- shape of thoracic cage
- quality of breath sounds and percussion note (normal, dull/absent, hyperresonant)
 - normal breath sounds
 - wheezes
 - crackle
- clubbing
- cyanosis
- peripheral edema

Tools for the diagnosis of lung disease

Physiologic

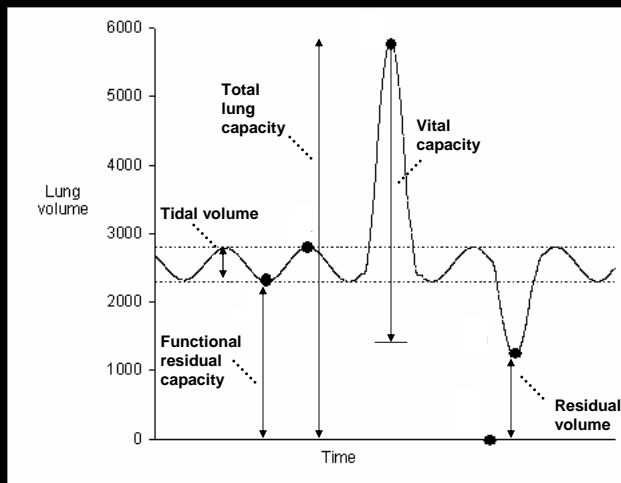
ABG
PFTs
V/Q scan
Exercise testing

Anatomic

Chest radiograph
CT scan
Bronchoscopy

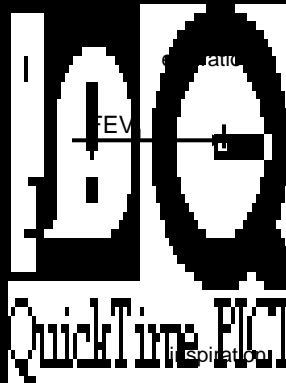
Pathologic

Transbronchial lung biopsy
Thoracentesis
Pleural biopsy
Open lung biopsy

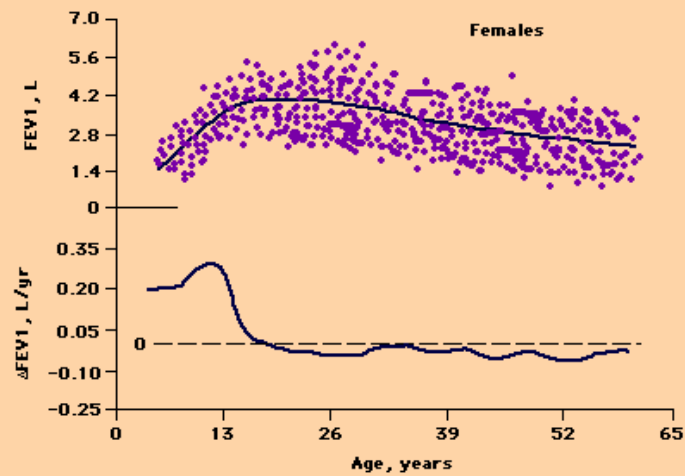


Spirogram

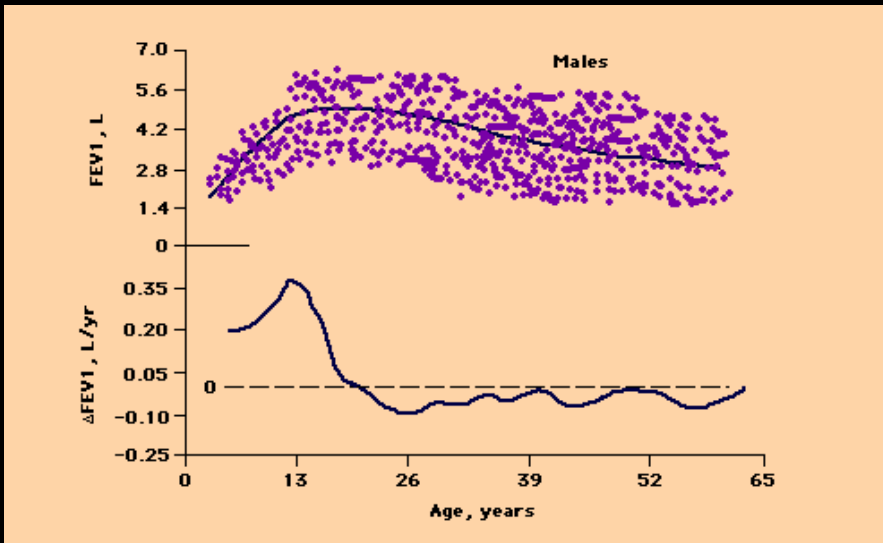
Flow rate
(liters \cdot sec $^{-1}$)



Volume

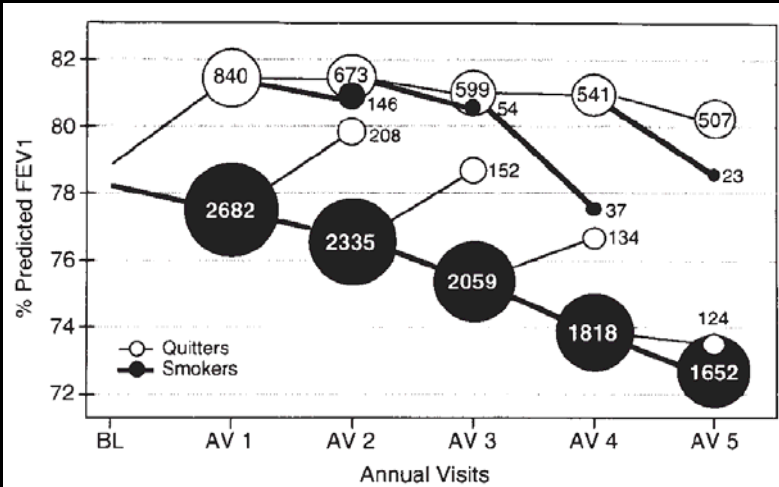


FEV1 and age in healthy females Growth and decline of lung function in healthy females. Actual values are shown in the top panel and growth velocity in the bottom panel. (Redrawn from Sherrill, DL, Camilli, A, Lebowitz, MD, Am Rev Respir Dis 1989; 140:638.)



FEV1 and age in healthy males Growth and decline of lung function in healthy males. Actual values are shown in the top panel and growth velocity in the bottom panel. (Data from Sherrill, DL, Camilli, A, Lebowitz, MD, Am Rev Respir Dis 1989; 140:638.)

Effect of smoking on decline of lung function



Scanlon et al. Am J Respir Crit Care Med 2000; 161: 381-390

Flow-volume patterns of lung disease

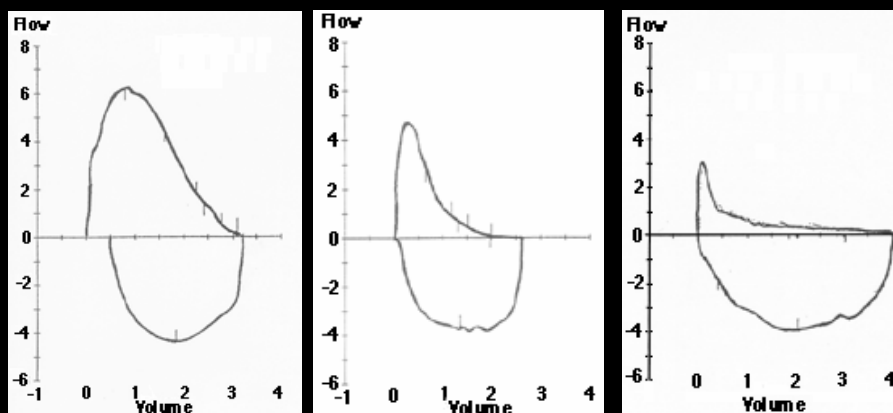


Restrictive
lung disease

Normal

Obstructive
Lung disease

Spirometry in obstructive lung disease

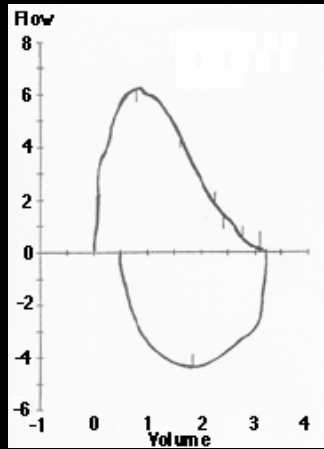


normal

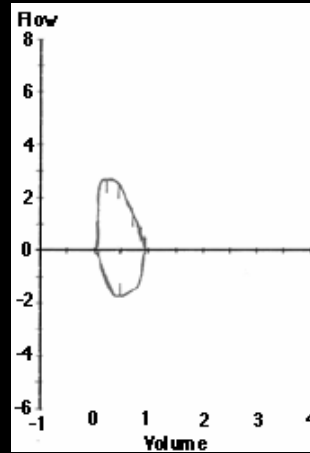
mild obstruction

severe obstruction

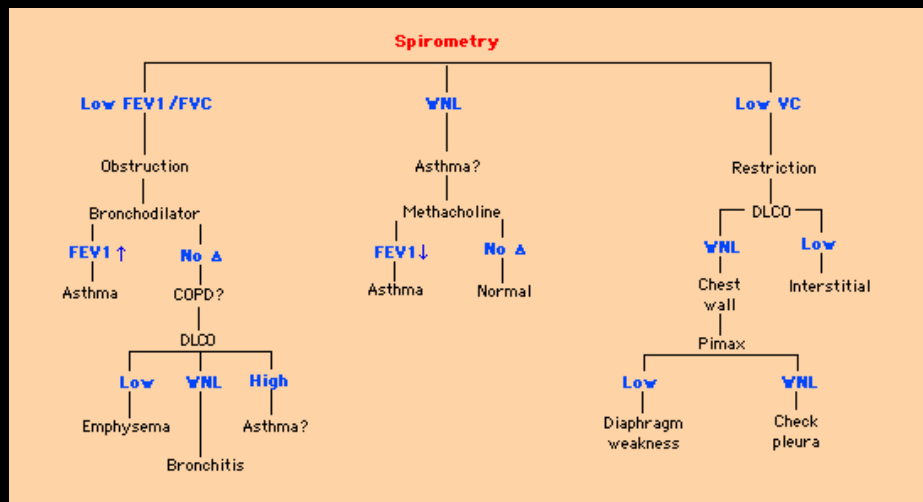
Spirometry in restrictive lung disease



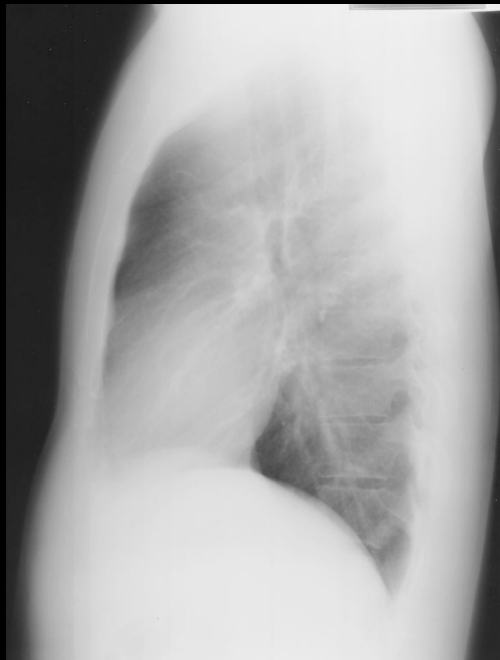
normal

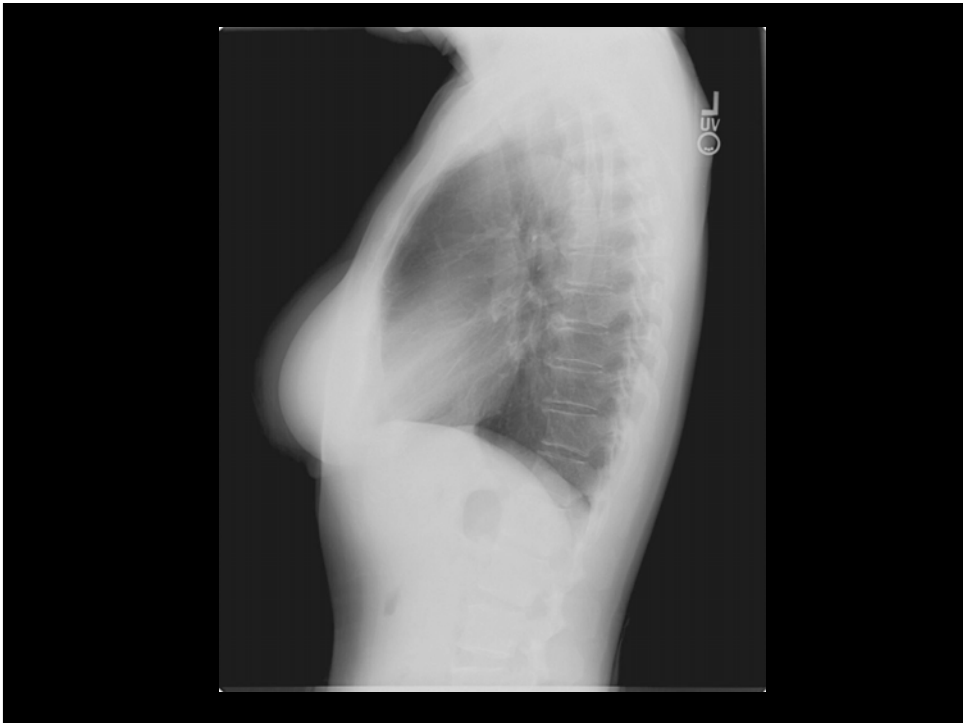
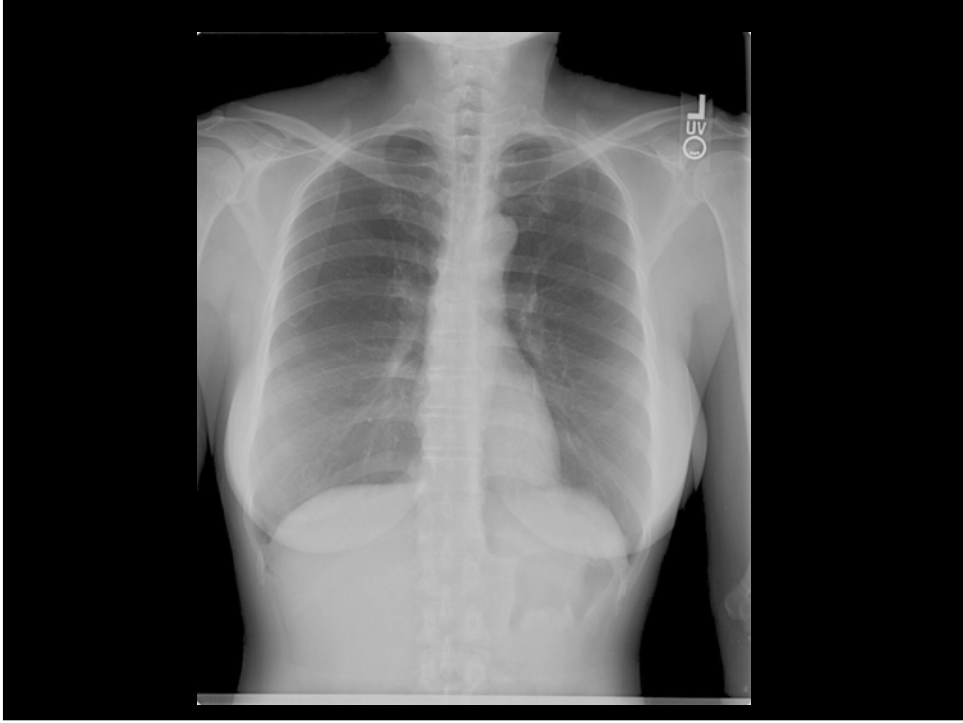


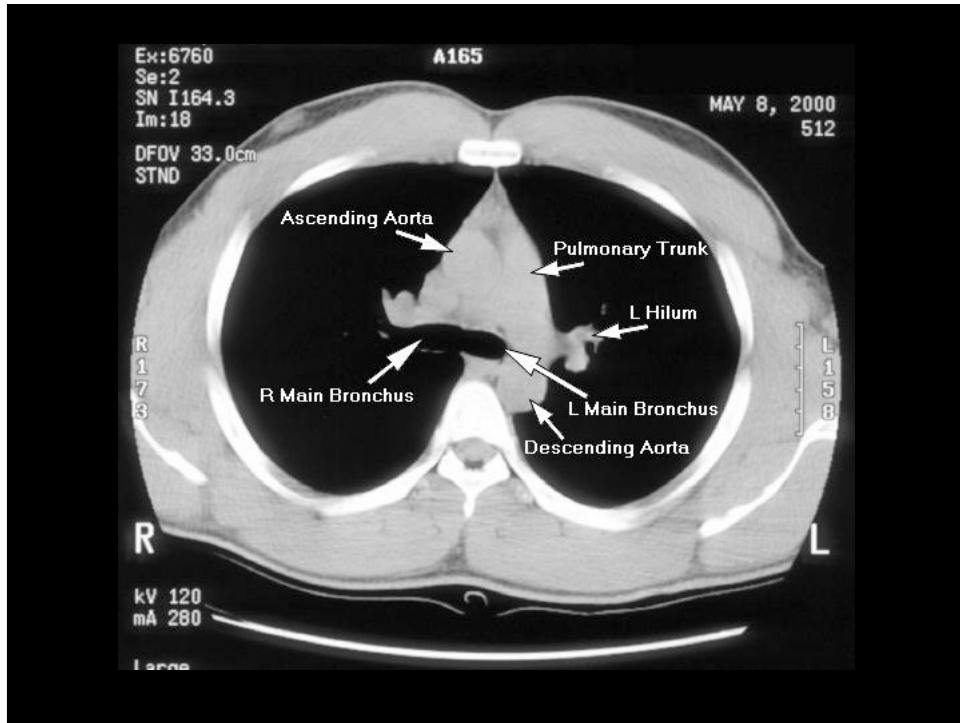
Severe restriction

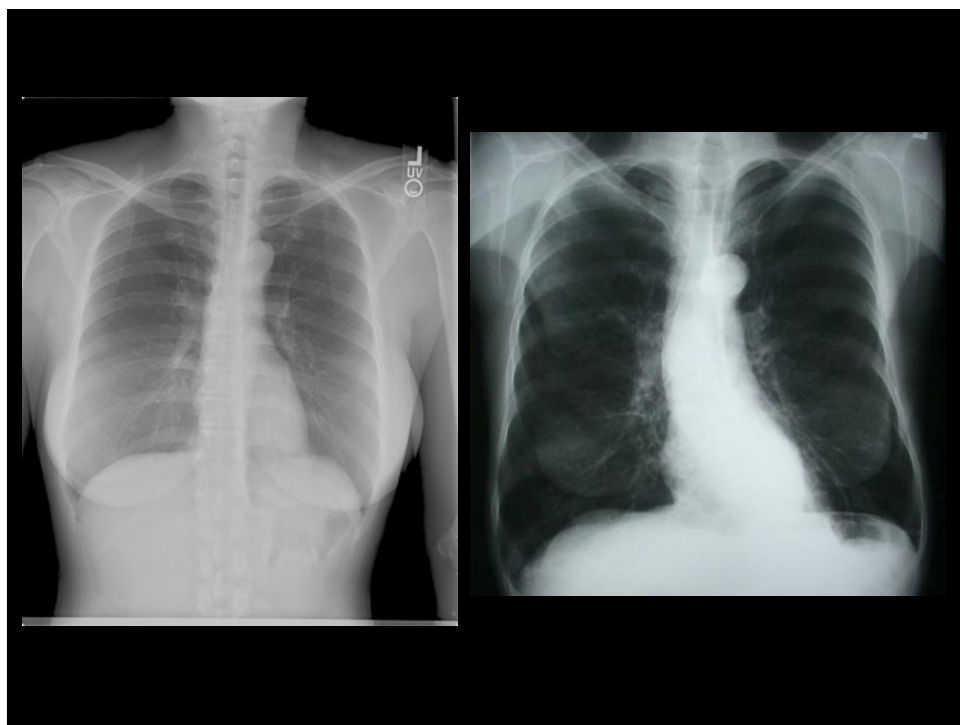
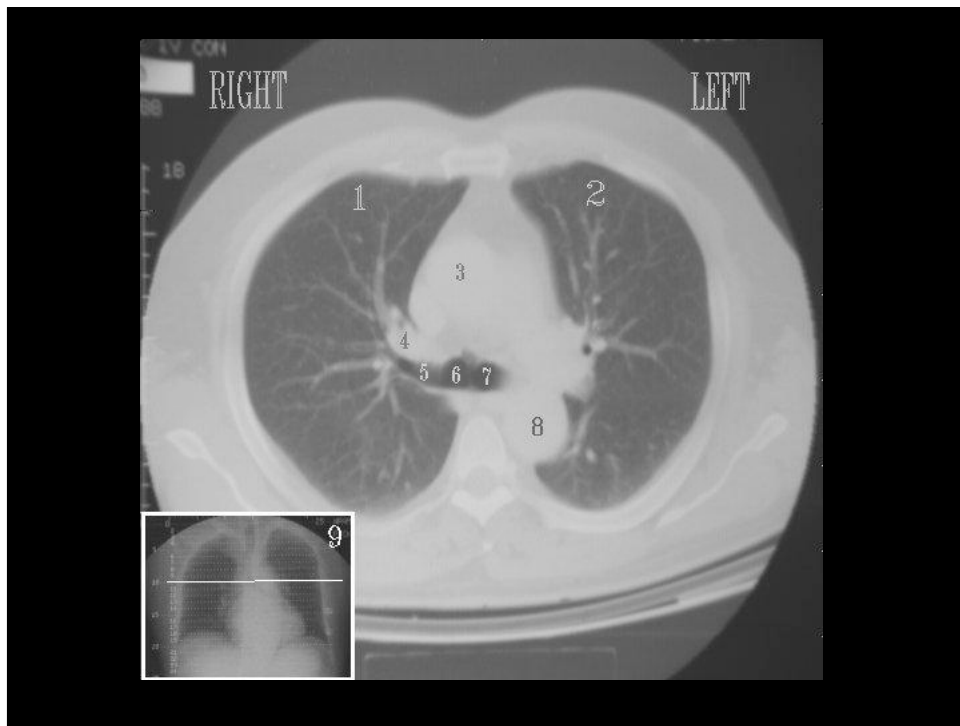


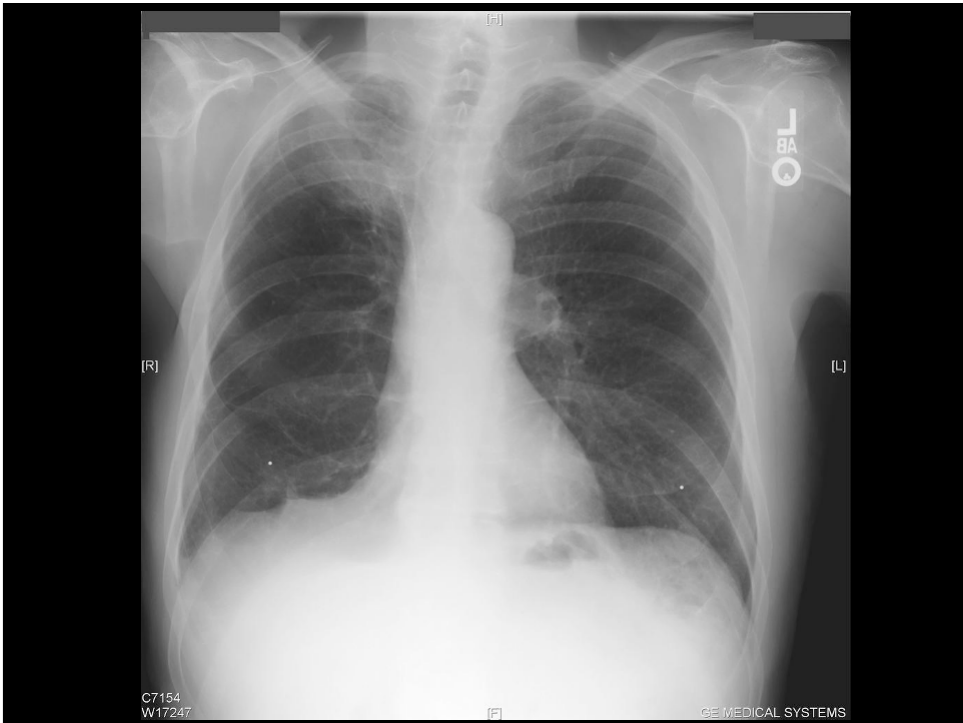
Approach to the patient with dyspnea An efficient stepwise method of determining the cause of chronic dyspnea using pulmonary function tests. WNL = within normal limits; VC = vital capacity; TLC = total lung capacity; DLCO = diffusing capacity.

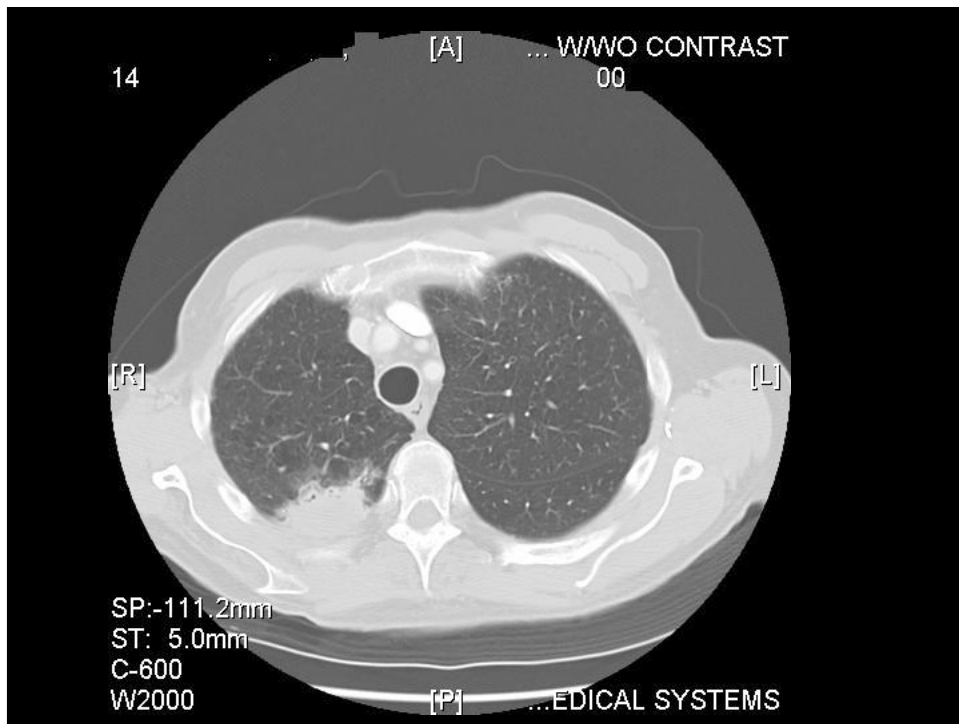












Anatomic, physiologic, and pathologic classification of lung disease

<u>Disease</u>	<u>Anatomy</u>	<u>Physiology</u>	<u>Pathology</u>
Emphysema	Hyperinflation	Obstruction	Loss of alveolar Tissue
Sarcoidosis	Enlarged LN, parenchymal infiltrates	Restriction	Granulomatous Inflammation Airways inflammation
Asthma	Normal	Obstruction	Airways inflammation
Usual interstitial pneumonitis	Parenchymal infiltrates	Restriction	Interstitial infiltration, fibrosis