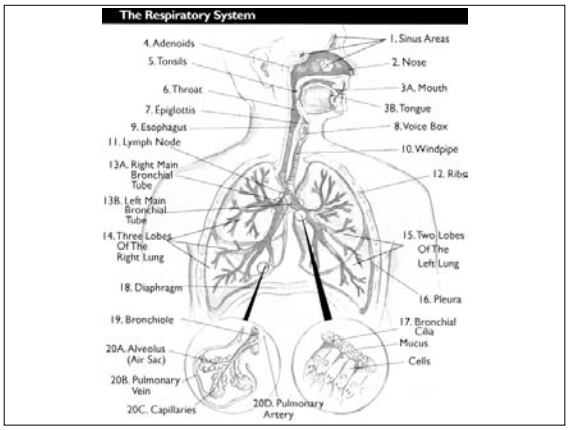


Evaluation of the patient with lung disease

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	Disease
isocyanates	occupational asthma
asbestos	pulmonary fibrosis
chlorine gas	ARDS
high altitude	pulmonary edema
rapeseed oil	pulmonary hypertension
uranium	bronchogenic carcinoma
pigeons	hypersensitivity pneumonitis
homeless shelter	tuberculosis
dust	RADS/?COPD
cigarette smoke	COPD, lung cancer

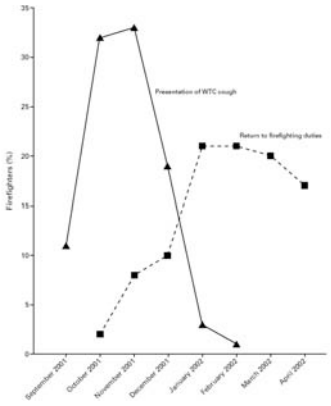
The New England Journal of Medicine

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

DAVID J. PREZANT, M.D., MICHAEL WEIDEN, M.D., GISELA I. BANAUCH, M.D., GEORGEANN MCGUINNESS, M.D., WILLIAM N. ROM, M.D., M.P.H., THOMAS K. ALDRICH, M.D., AND KERRY J. KELLY, M.D.

- 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

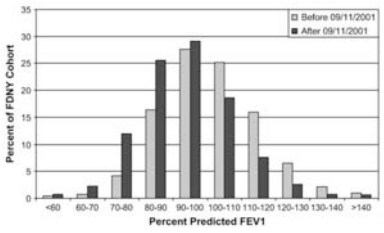
Characteristic	Early Exposure	Intermediate Exposure	Late Exposure	Nonexposed	Total
Demographics					
Number (% of FDNY cohort)	1,660 (13.7)	8,185 (67.8)	1,921 (15.9)	313 (2.6)	12,079 (100)
Age on 09/11/01, yr	40 ± 7.6	39.7 ± 7.5	40.2 ± 8.3*	40.7 ± 9†	39.7 ± 7.7
Height, cm	179.3 ± 7.6	179.6 ± 7.4	178.3 ± 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	3.3*	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. FEV$_1$ 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): Liters	Last FEV$_1$, before 09/11/2001: Percent Predicted	Last FEV$_1$, before 09/11/2001: Percent Below Lower Limit of Normal	First FEV$_1$, after 09/11/2001 (Median, Interquartile Range, and Percent): Liters	First FEV$_1$, after 09/11/2001: Percent Predicted	First FEV$_1$, after 09/11/2001: 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 (3.85–4.83)	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)	17.6*†
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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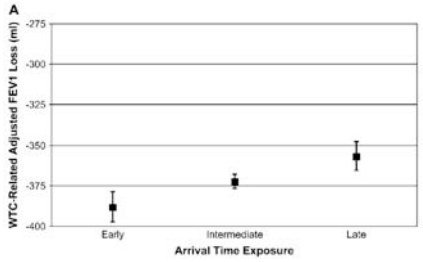
Lung function after exposure to WTC dust



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

Lung disease associated with biomass fuel exposure

Condition	Setting	Assessment tool
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

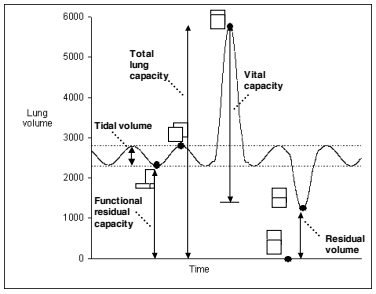
1. Schei et al. J Exp Anal Environ Epi 2004; 14: S110-117
2. Ozbay et al. Respirology 2001; 6: 255-258
3. Arslan et al. Eur J Radiol 2004; 52: 192-199
4. Rinne et al. Respir Med 2006 100: 1208-1215
5. Regalado et al. AJRCCM 2006; 174: 901-905
6. Mishra. Int J Epi 2003; 32: 847-853

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

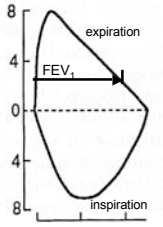
Tools for the diagnosis of lung disease

Physiologic	Anatomic	Pathologic
ABG	Chest radiograph	Transbronchial lung biopsy
PFTs	CT scan	
V/Q scan	Bronchoscopy	Thoracentesis
Exercise testing		Pleural biopsy
		Open lung biopsy

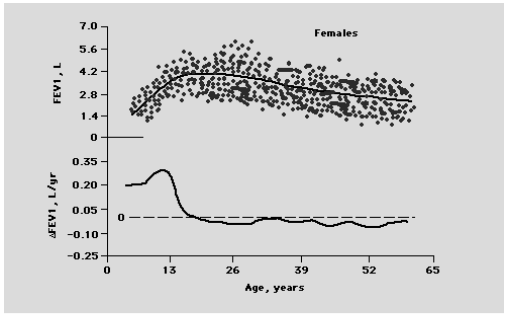


Spirogram

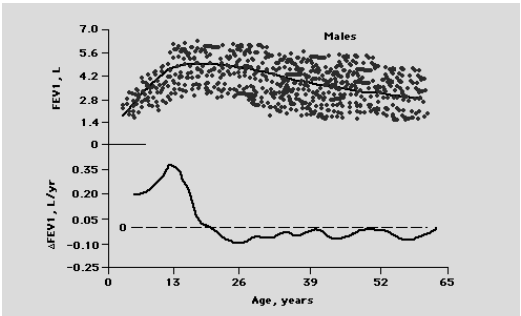
Flow rate (liters•sec^{-1})



Volume

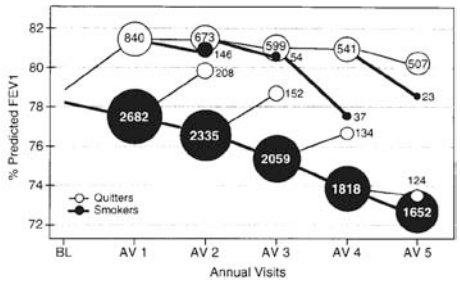


FEV1 and age in healthy females Growth and decline of lung function in healthy females. Actual values are shown in the top panel and growth velocity in the bottom panel. (Redrawn from Sherrill, DL, Camilli, A, Lebowitz, MD, Am Rev Respir Dis 1989; 140:638.)



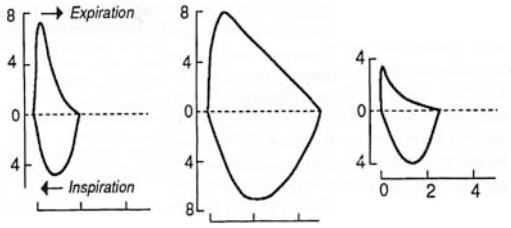
FEV1 and age in healthy males Growth and decline of lung function in healthy males. Actual values are shown in the top panel and growth velocity in the bottom panel. (Data from Sherrill, DL, Camilli, A, Lebowitz, MD, Am Rev Respir Dis 1989; 140:638.)

Effect of smoking on decline of lung function



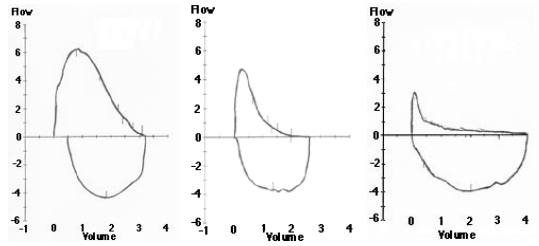
Scanlon et al. Am J Respir Crit Care Med 2000; 161: 381-390

Flow-volume patterns of lung disease



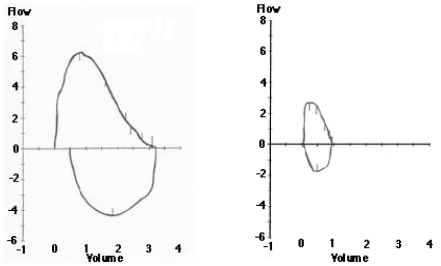
Restrictive lung disease | Normal | Obstructive Lung disease

Spirometry in obstructive lung disease

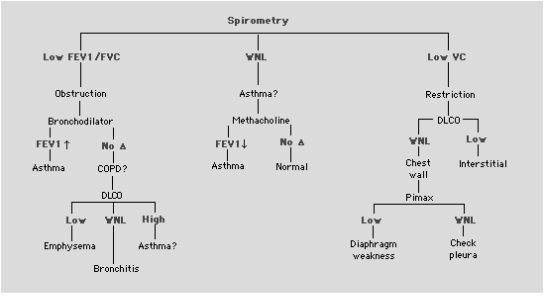


normal | mild obstruction | severe obstruction

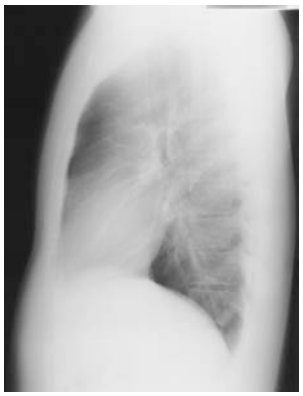
Spirometry in restrictive lung disease

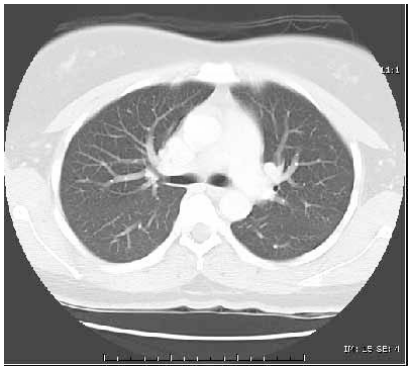


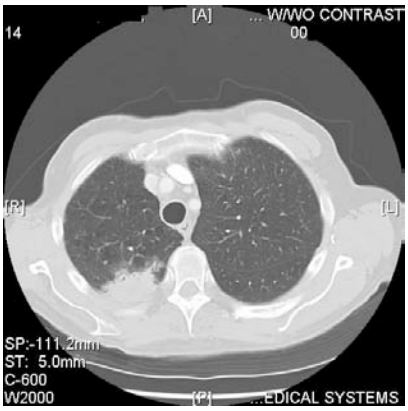
normal | Severe restriction



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

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