

Asthma and COPD Clinical Diagnosis and Patient Presentation

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Asthma and COPD: Presentation and Evaluation

TOPICS FOR THIS SESSION

Medical History

Physical Exam

Pulmonary Function Testing

Lab Testing/Biomarkers

Imaging

Patient Questionnaires

Comorbidities

ACOS

Cases

A 47 year old female comes to your office with complaints of shortness of breath

Question: Which of these are required to establish a diagnosis of asthma?

1. History: Episodic shortness of breath or cough
2. Physiologic Tests: Improvement in FEV1 of 12% and 200 cc with a bronchodilator
3. Lab Tests: High eosinophil count
4. Aggregate: Absence of alternate diagnosis to explain the symptoms
5. Exam: Expiratory wheezes
6. 1, 2 and 4

A 59 year old female comes to your office with complaints of shortness of breath

Question: Which of these are required to establish a diagnosis of COPD?

1. History: Shortness of breath or cough
2. Physiology Tests: Airflow limitation on spirometry
3. History: Tobacco use of > 10 pack years
4. Aggregate: Absence of alternate diagnosis to explain the symptoms
5. Exam: Expiratory wheezes
6. 1, 2 and 4

The Asthma Diagnosis

DOES THE PATIENT HAVE ASTHMA?

- Confirm variable airflow limitation: review/repeat pulmonary function tests with bronchodilator
- Consider methacholine or exercise challenge tests if spirometry inconclusive and clinical response to treatment is absent or limited
- Exclude other conditions (eg, airway tumor, foreign body, COPD, bronchiectasis, vocal cord dysfunction, CF, aspiration)

← YES

NO →

A

Treat other
pulmonary
conditions if
misdiagnosed



The Asthma Diagnosis: History and testing are critical

■ NEED

- History of symptoms consistent with episodic airway obstruction
- Physiologic evidence of variable airway obstruction
 - Response to bronchodilator
 - Positive methacholine or exercise challenge
 - Dynamic changes in spirometry over time
- Absence of clear alternate diagnosis to explain symptoms

■ HELPFUL

- Corroborating history/symptoms of allergy or typical triggers
- Lab tests indicating “type 2” inflammation

What is COPD?

- COPD is a preventable and treatable lung disease with associated extrapulmonary effects
- Pulmonary component is characterized by airflow limitation (obstruction) that is not fully reversible.
- Airflow limitation is usually progressive and associated with abnormal inflammatory responses to **myriad exposures, with tobacco being the dominant factor**
- Similar to atherosclerosis, COPD develops as a pathologic response to such stimuli over decades of times
- Consequently, tissue remodeling and damage that is largely irreversible with current care is typically present at diagnosis
- Belying the simple definition, COPD is an extremely **heterogeneous** disease complicated by comorbidities
- “Letter” categories are inadequate, and biomarkers are lacking

Global Initiative for Chronic Obstructive Lung Disease, <http://goldcopd.com>

Importance of Medical History: Asthma and COPD

- Medical history and physiologic testing (spirometry) are the key components to making the diagnosis
- Distinguish asthma from other diseases with similar symptoms, notably COPD
- Allows for detection of co-morbid diseases that may worsen asthma and COPD
- Help determine disease severity and responses to therapy
- Help determine potential triggers and non-pharmacologic approaches to improve therapy

Asthma is Heterogeneous and requires a history

- Severity
- Responsiveness to therapies
- Symptom patterns
 - Seasonal
 - Allergen-induced
 - Frequent exacerbations
 - Nocturnal
- Occupational
- Exercise Induced

Asthma History: Symptoms

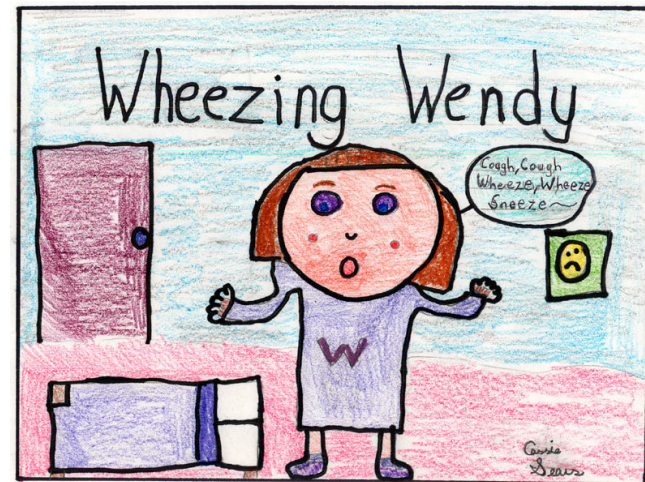
1) Episodic shortness of breath

2) Wheezing

- High pitched tones
- May be absent during severe exacerbations

3) Cough

- Dry or productive



Asthma History: Pattern of Symptoms

- Nocturnal awakenings
- **Day-to-day variability, periods with no symptoms**
- Rapid relief with short-acting bronchodilators
- Disease onset at younger age can distinguish from COPD
- Seasonal worsening
 - URIs
 - Allergens
- Atopy
- Specific triggers

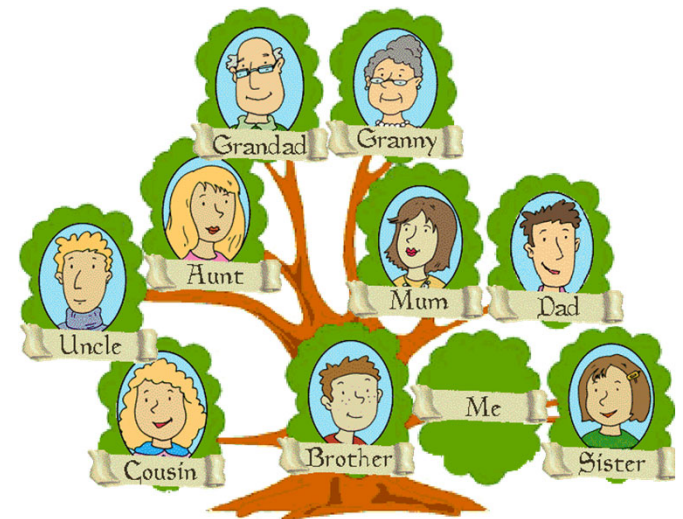
Asthma History: Precipitating Factors

- Viral infections
- Allergies
- Exercise
- Occupational exposure
- Drugs
- Pollution

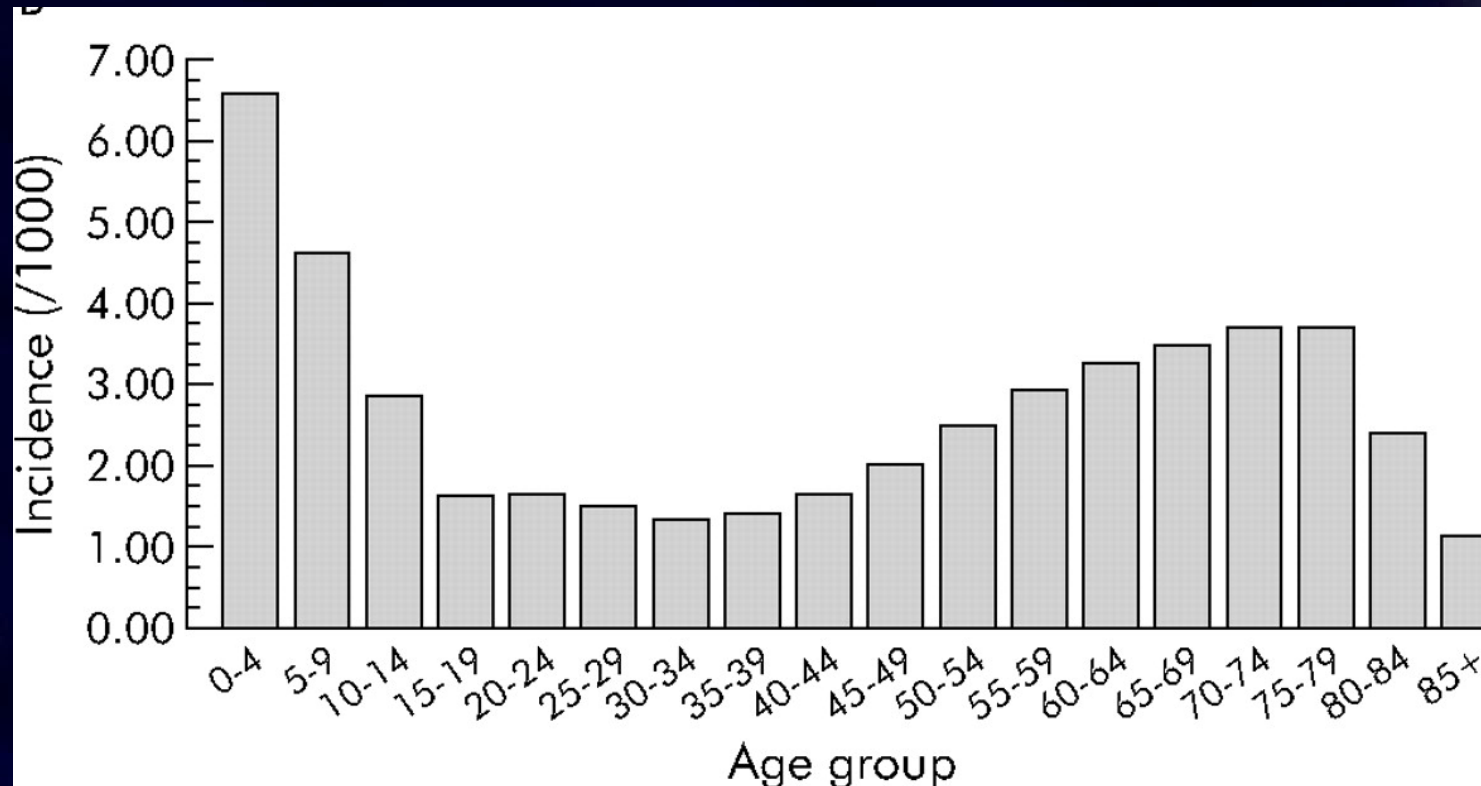


Asthma History: Development and Onset

- Age at onset
 - **Can be diagnosed at any age**
 - History of rhinitis, atopic dermatitis
 - Bi-modal distribution of incidence
- Family history of asthma or allergy



Bimodal Peak in Asthma Incidence



T Haahtela et al. Thorax 2006;61:663-670

Asthma History: Severity

- Level of symptoms over prior 2-4 weeks (e.g. ACT)
 - Nighttime awakenings
 - Short acting β agonist use (symptom control)
 - Interference with daily activity
- Lung function (physiologic assessment)
- Number of exacerbations
 - Corticosteroid use, ED visits, hospital stays, ICU
- **This evaluation is partly analogous to new Gold criteria for COPD, although spirometry is less likely to be predictive in asthma**

Social History

- Tobacco use
 - Age at initiation
 - Average amount smoked per day
 - Date when stopped
- Environmental exposures
 - Second-hand smoke
 - Occupation with dust or fumes
 - Smoke from home cooking and heating fuels
- Day care
- Pets



Physical Exam: Take Home

- Very few definitive findings on physical exam in routine office diagnosis of asthma
- Exam can be useful in identifying other diseases that cause dyspnea
- Vitals – O2 sat traditionally normal
- Head and neck exam – look for signs of allergy
- Lungs – look for signs of obstruction AND absence of signs of other disease
 - May be (and frequently is!) normal
 - May have prolonged expiratory phase
 - Wheezing - with tidal breathing and forced expiration
 - Crackles are suggestive of other disease processes
- Cardiac - evaluate for gallops elevated JVP

Integrating the History and Physical: Differential Diagnosis for Adults

- Vocal cord disease
- COPD (emphysema, chronic bronchitis)
- Post-nasal drip (chronic cough)
- GERD (cough, dyspnea, nocturnal symptoms)
- Bronchiolitis (infectious, idiopathic)
- Bronchiectasis (cystic fibrosis, aspiration, infection)
- Congestive heart failure
- Coronary artery disease
- Tumors
- Drugs (ACE inhibitors)

Comparing COPD and Asthma

COPD

- Onset in mid-life with smoking history
- Symptoms slowly progressive
- Long smoking history
- Dyspnea during exercise
- **Largely irreversible airflow limitation**
- **Normal or reduced diffusion capacity**
- **Often abnormal exam**

Asthma

- **Can have onset early in life**
- **Symptoms vary from day to day**
- *Symptoms at night*
- *Allergy, rhinitis, and/or eczema also present*
- Family history of asthma
- Largely reversible
- **Normal or increased diffusion capacity (DLCO)**
- **Often normal exam**

Is it COPD: The Medical History is Critical in the Diagnosis and Assessment of COPD

- Medical history and physiologic testing (spirometry) are the key components to making the diagnosis
- Exertional dyspnea isn't necessarily present until a patient has lost half of his/her lung function
- Most COPD patients have smoked tobacco
 - > 10 pack years is typical
 - Correlation between amount smoked and COPD severity is imperfect
 - Smoking cessation efforts are critical in COPD management
- Symptoms are insidious in onset
 - Chronic in nature so they are frequently ignored
 - Patients can be less aware of their symptoms than are the persons they live with
 - Exacerbations are a frequent driver of initial diagnosis and evaluation

COPD: Possible Presentation

- 74-year-old female with exertional dyspnea
- First noticed symptoms 3 years ago
- Can walk for about 5 minutes without limitation, then her chest feels “tight”
- No triggers for dyspnea other than exertion
- Dry cough for one year, no triggers
- Past Medical History: Hypertension and diabetes
- Social history: 20 pack year smoking history, none for 20 years
- Family history: Father died of heart attack
- Medications: Lisinopril, hydrochlorothiazide, glyburide

The “COPD History”

- Characterize breathing and shortness of breath
- Characterize cough
- Investigate corroborative evidence
- Consider comorbidities
- Quantify exacerbations

If COPD present, assess risk and apply standard of care for this complex disease

COPD History

- **Shortness of breath**
- Cough
- Risk factors for having COPD
- Evaluate risk and symptoms for comorbid diseases

COPD History: Shortness of breath

- Reproducible with specific activity level?
 - Flat walking distance
 - Stairs or hills
 - Activities of daily living (MMRC)
- Insidious progression over time?
- Associated symptoms
 - Wheezing
 - Chest tightness
 - Chest pain
- Does anything make it better?
 - Pursed Lip breathing
 - Medications
 - Oxygen
- Does anything make it worse (other than exertion)?
 - Allergens
 - Air pollution

COPD History: Other causes of shortness of breath

- Cardiac
 - Ischemia (chest pain)
 - CHF
 - Orthopnea
 - Pulmonary hypertension
 - Edema
 - Conduction
 - Arrhythmia
- GI
- Anemia
- Other lung diseases
 - IPF
 - Asthma
 - CF
- Deconditioning

COPD History: Cough

- Shortness of breath
- **Cough**
- Risk factors for having COPD
- Evaluate risk and symptoms for comorbid diseases

COPD History: Cough

- Dry or Productive?
- If productive:
 - How much?
 - Sputum color
 - What makes it better or worse?
 - Morning cough typical for COPD
 - Any allergic triggers?
 - GERD or Dysphagia symptoms?
 - Sinus Symptoms
- If dry:
 - Any new medications?

COPD: Cough Phenotype – Differential Diagnosis

Other Causes of Chronic Cough

Table 2.2

INTRATHORACIC

- Asthma
- Lung Cancer
- Tuberculosis
- Bronchiectasis
- Left Heart Failure
- Interstitial Lung Disease
- Cystic Fibrosis
- Idiopathic Cough

EXTRATHORACIC

- Chronic Allergic Rhinitis
- Post Nasal Drip Syndrome (PNDS)
- Upper Airway Cough Syndrome (UACS)
- Gastroesophageal Reflux
- Medication (e.g., ACE Inhibitors)

Can be challenging to distinguish without imaging

COPD History

- Shortness of breath
- Cough
- **Risk factors for having COPD**
- Evaluate risk factors and symptoms for comorbid diseases

COPD History: Risk factors

- Tobacco
- Tobacco
- Tobacco
- Inhaled drugs
- Vaping
- Air Pollution
- Employment
- Asthma
- Infections
- Family history
- TOBACCO

Is it COPD?

Clinical Indicators for Considering a Diagnosis of COPD

Table 2.1

Consider the diagnosis of COPD, and perform spirometry, if any of these clinical indicators are present: (these indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of the presence of COPD; in any case, spirometry is required to establish a diagnosis of COPD)

Dyspnea that is

Progressive over time

Worse with exercise

Persistent

Recurrent wheeze

Chronic cough

May be intermittent and may be unproductive

Recurrent lower respiratory tract infections

History of risk factors

Tobacco smoke (including popular local preparations)

Smoke from home cooking and heating fuels

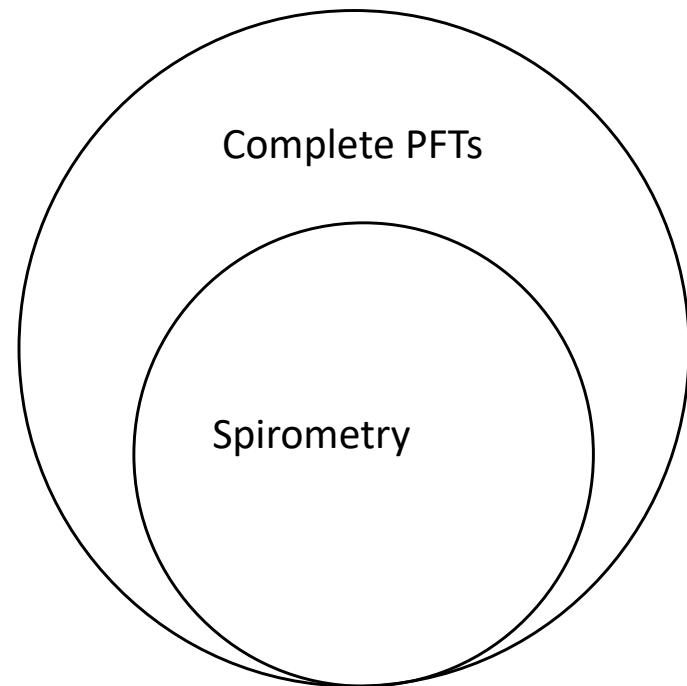
Occupational dusts, vapors, fumes, gases and other chemicals

Host factors (e.g., genetic factors, developmental abnormalities, low birthweight, prematurity, childhood respiratory infections etc.)



Testing for asthma and COPD: What are “PFTs?”

- Spirometry
- Lung volumes
- Diffusing Capacity



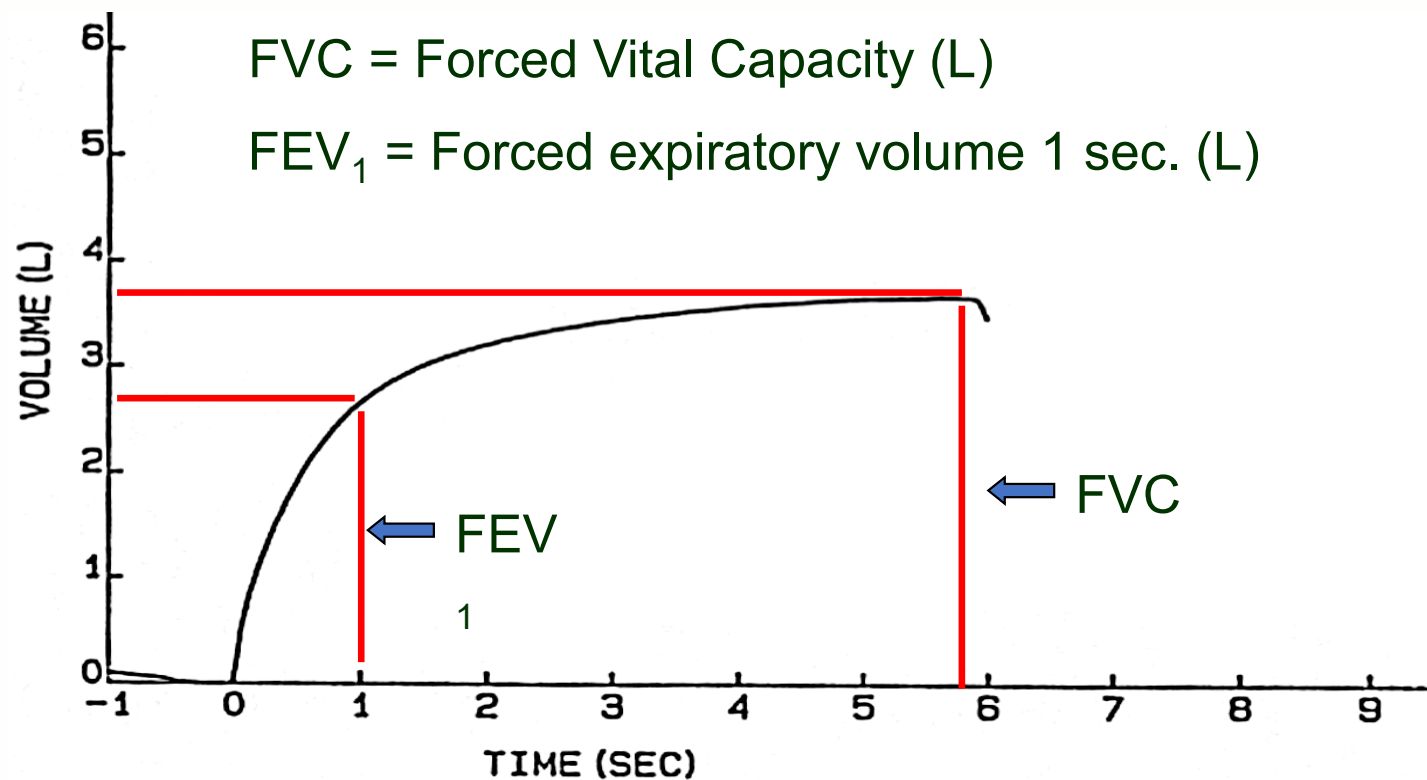
PFTs- Acronyms

TLC	Total Lung capacity
RV	Residual Volume
FVC	Forced Vital Capacity
FEV ₁	Forced Exhaled Volume in 1 sec
FEV ₁ /FVC	Index of Airway Obstruction
DLCO	Diffusing Capacity

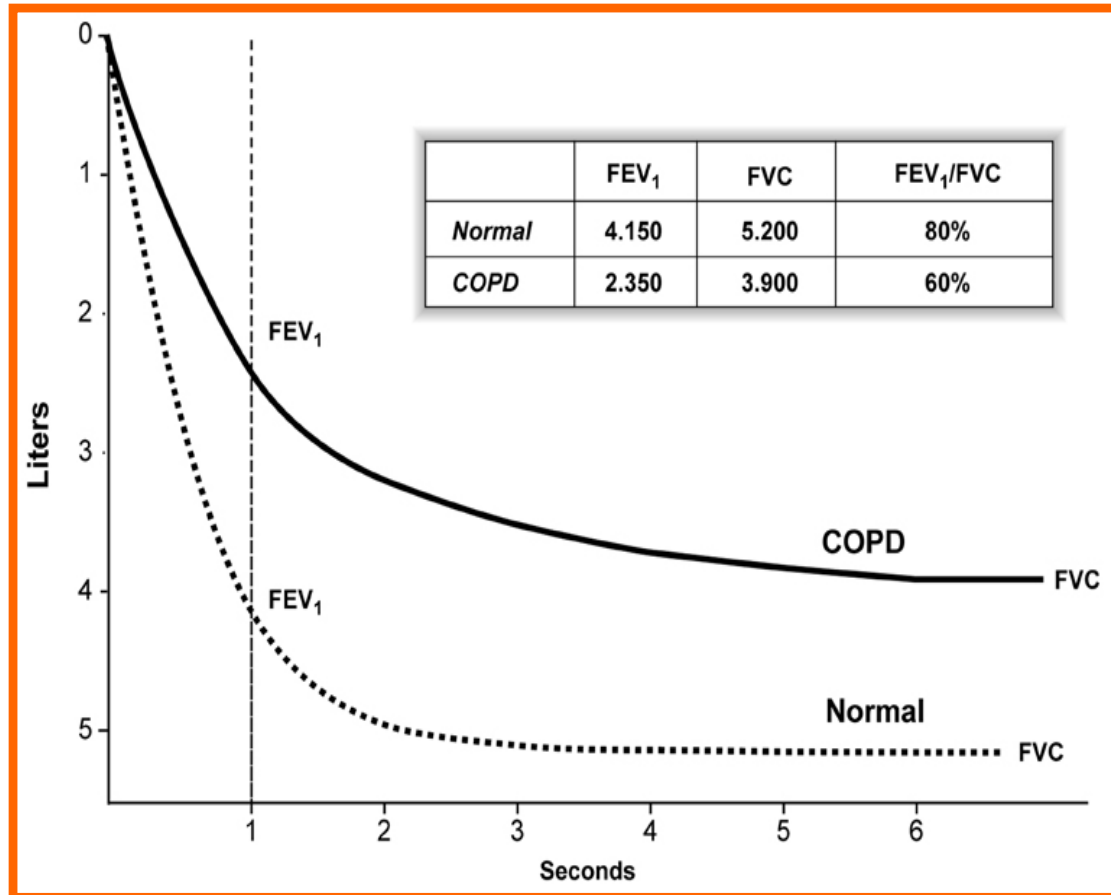
Definitions

- FEV1 = the amount of air maximally exhaled in the first second of exhalation
- FVC = the total volume of air that can be exhaled with maximum force, from maximal inhalation to maximal exhalation
- FEV1/FVC ratio – FEV1 divided by FVC
- PEF = the maximal flow rate that is attained with a forced maneuver
- Normal – based on age/sex/race/size-based population averages

Spirometry

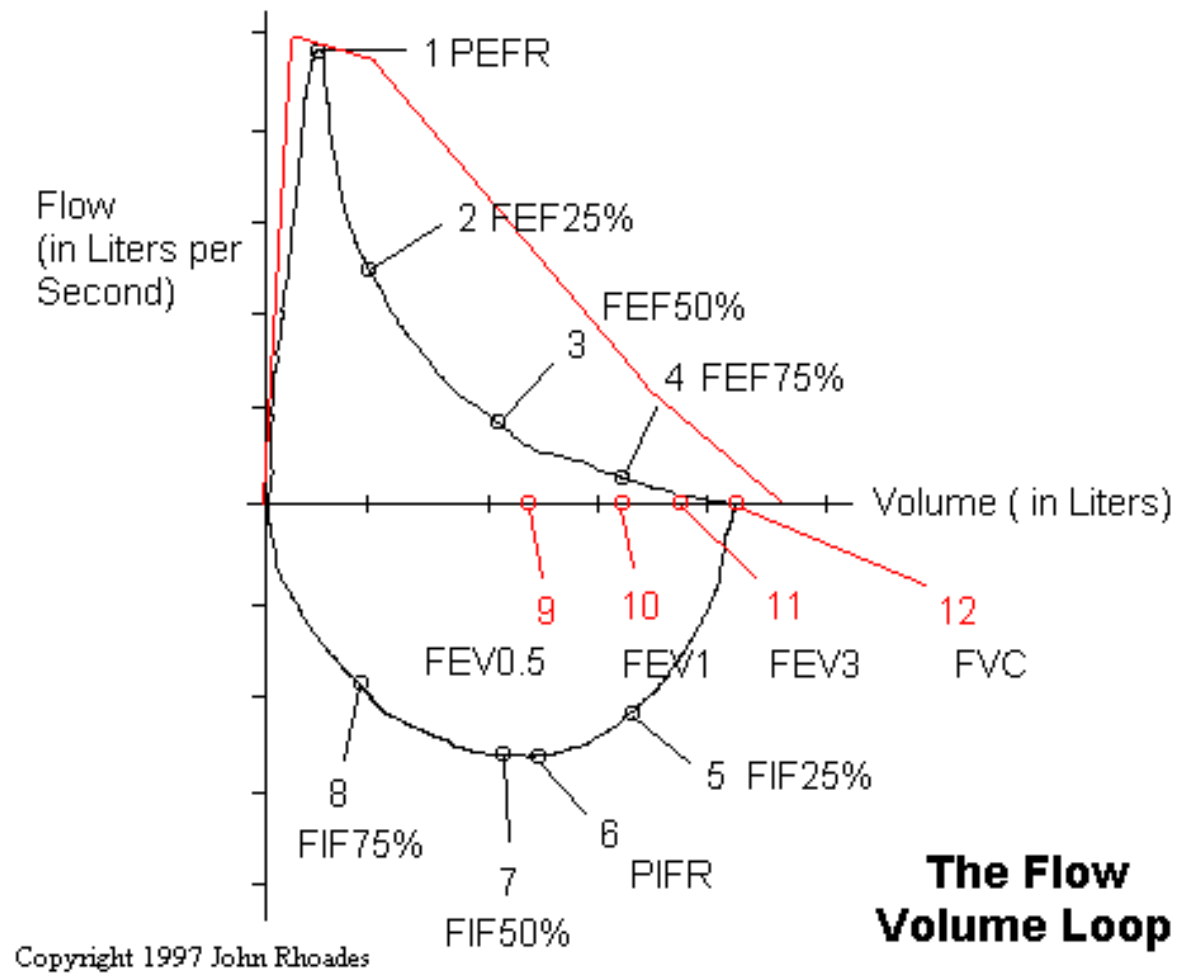


Spirometry: Normal vs Obstruction



Global Initiative for Chronic Obstructive Lung Disease, 2007 <http://goldcopd.com>

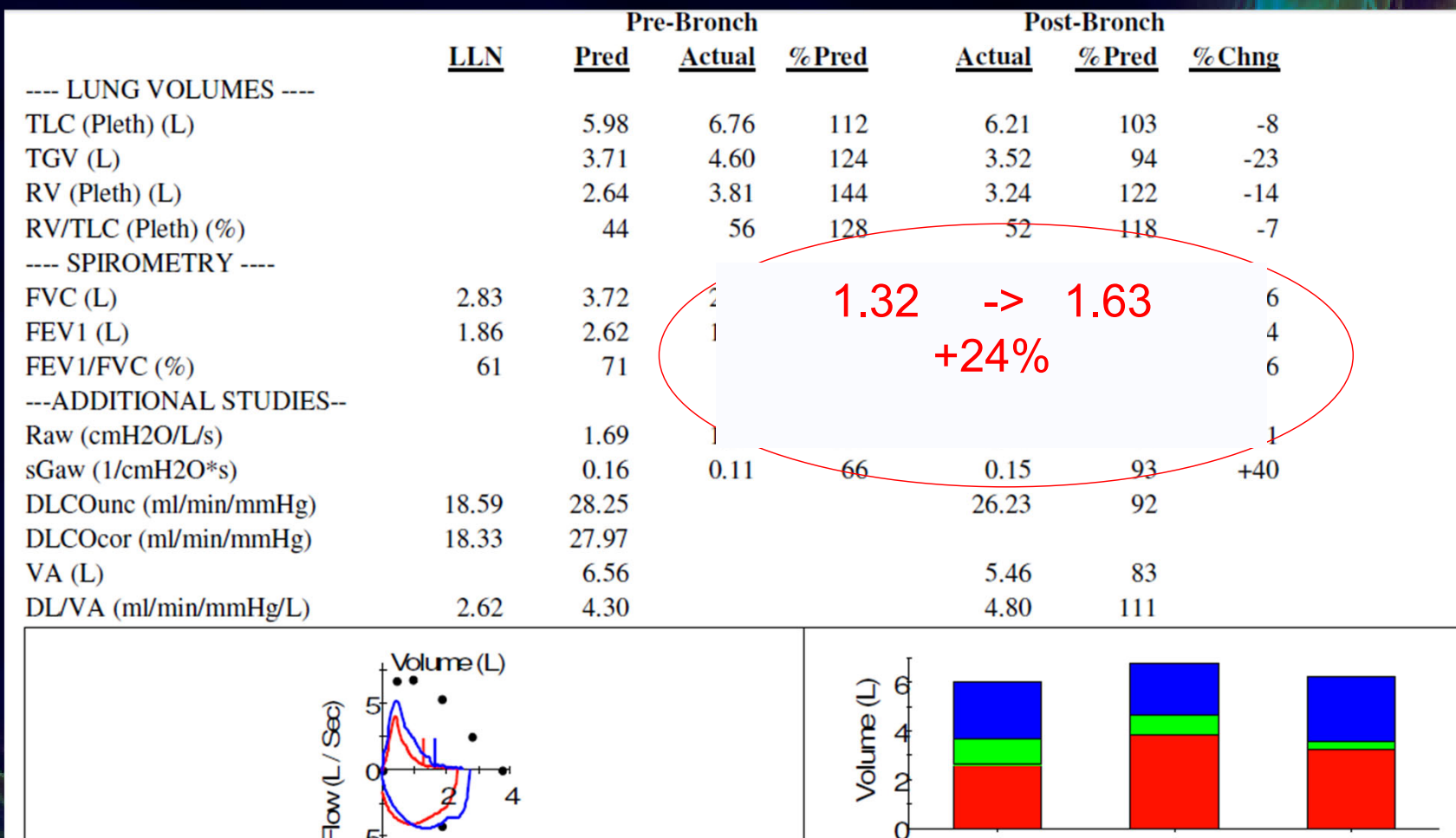
Airflow Evaluation: Spirometry



Defining a Bronchodilator Response

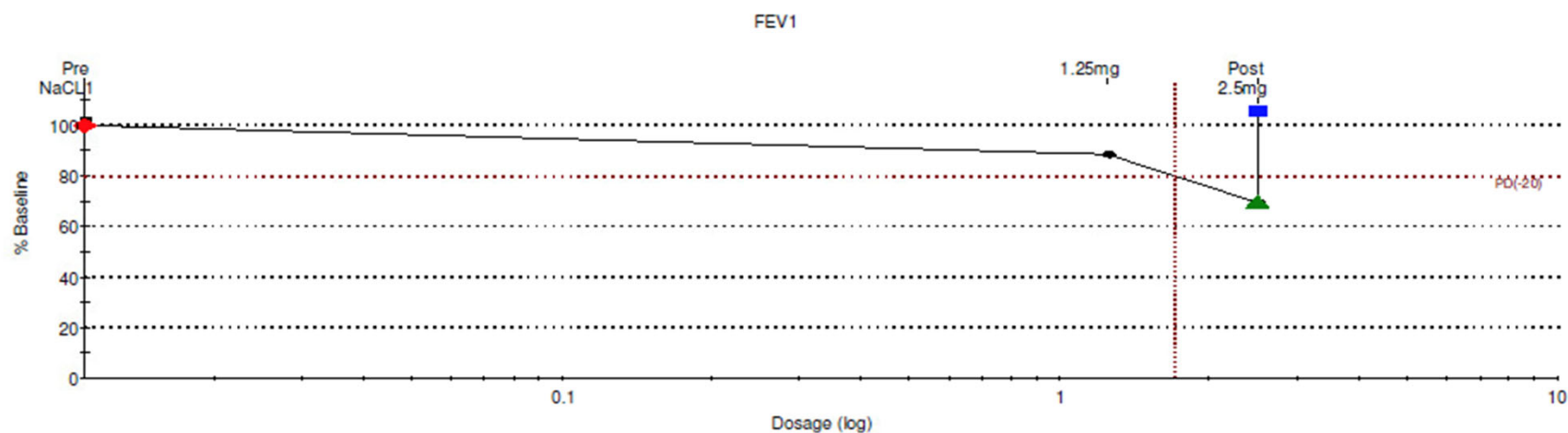
- Must have a 10% improvement in FEV_1 or FVC relative to predicted value (change from previous guidelines)
- Can be blunted by recent use of short or long-acting beta-agonists
- **The interpretation change reduces percentage of responders in patients with COPD**

Full PFTS: Significant Response to Albuterol



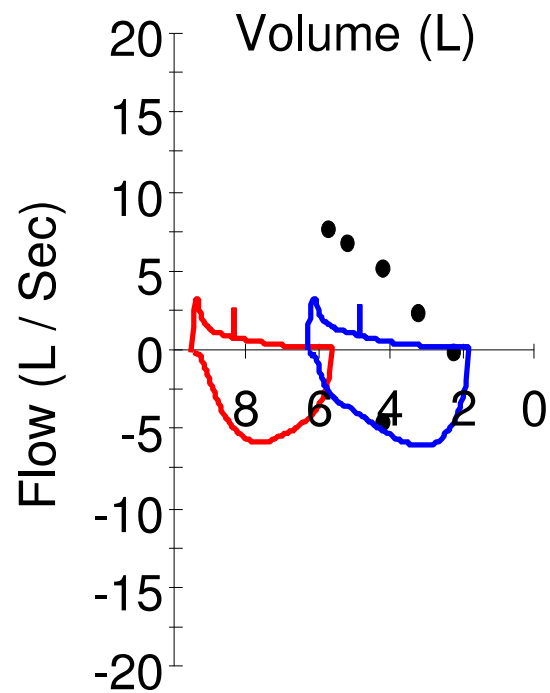
Methacholine Challenge

Stage	Pre	NaCL1	1.25mg	2.5mg	Post	PC
Dose	0.00	0.00	1.25	2.50	0.00	
Dose Units	0.00	0.00	1.25	2.50	0.00	
C.D.U.s	0.00	0.00	1.25	3.75	3.75	
FEV1 (L)	2.26	2.21	1.95	1.54	2.34	1.71
% Change	+2	+0	-11	-30	+5	1.71



Sensitivity = 2.05 cdu's, PC = 1.71

COPD Evaluation: Spirometry



COPD: Obstruction on Spirometry - Severity

- $FEV_1/FVC < 70\%$

GOLD Grades and Severity of Airflow Obstruction in COPD (based on post-bronchodilator FEV_1)

Table 2.6

In COPD patients ($FEV_1/FVC < 0.7$):

GOLD 1:

Mild

$FEV_1 \geq 80\%$ predicted

GOLD 2:

Moderate

$50\% \leq FEV_1 < 80\%$ predicted

GOLD 3:

Severe

$30\% \leq FEV_1 < 50\%$ predicted

GOLD 4:

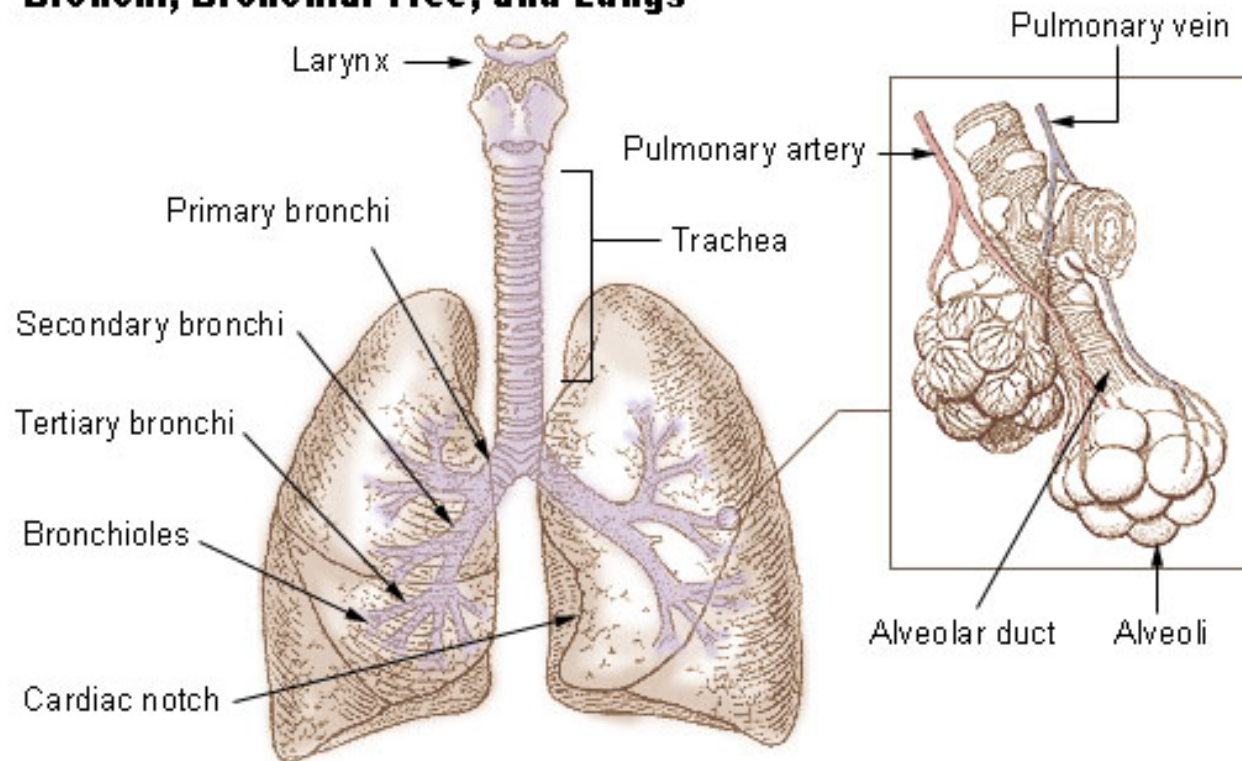
Very Severe

$FEV_1 < 30\%$ predicted



COPD Evaluation: PFTs - DLCO

Bronchi, Bronchial Tree, and Lungs



- * Subject expires to RV and then inspires to TLC from a bag or spirometer containing a mix of CO and He in air
- * Hold breath for 10 seconds
- * Expires into a new bag where gas is collected

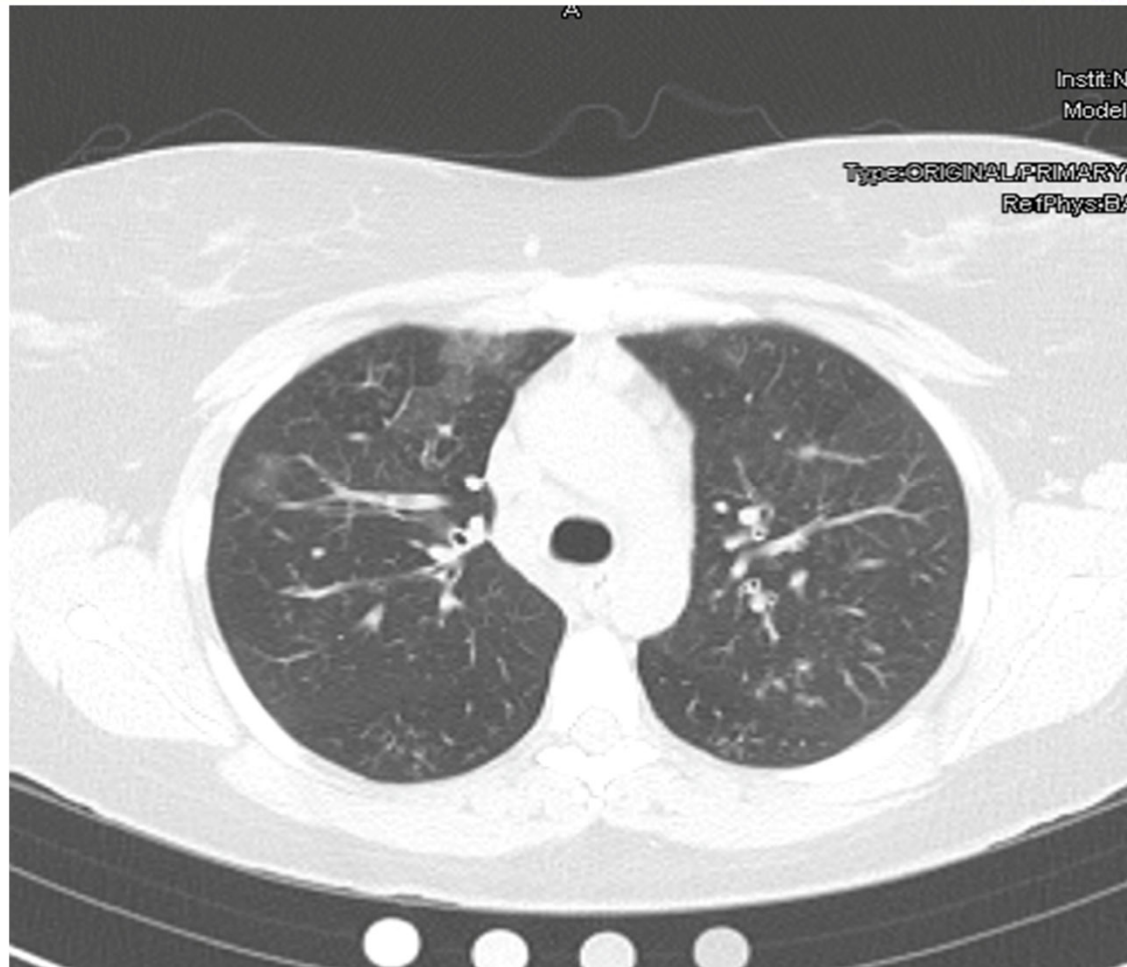
Blood, Lab and Allergy Testing

- CBC – eos
- IgE total and allergen specific
- Exhaled nitric oxide
- “Cardiac” labs and tests
- Skin Testing
- Sinus CT

High Resolution CT Scan of Chest: Asthma and COPD

- Assess disease severity
- Air trapping
- Bronchial wall thickening (Asthma and COPD)
- Assess emphysema (COPD only)
- Bronchiectasis
- Mucus plugging
- GERD (hiatal hernia, esophageal changes)
- Aspiration changes
- Lung cancer

CT Scan of Patient with Severe Asthma



Bronchiectasis and Mucus Plugging



COPD: Emphysema – Centrilobular vs. Bullous

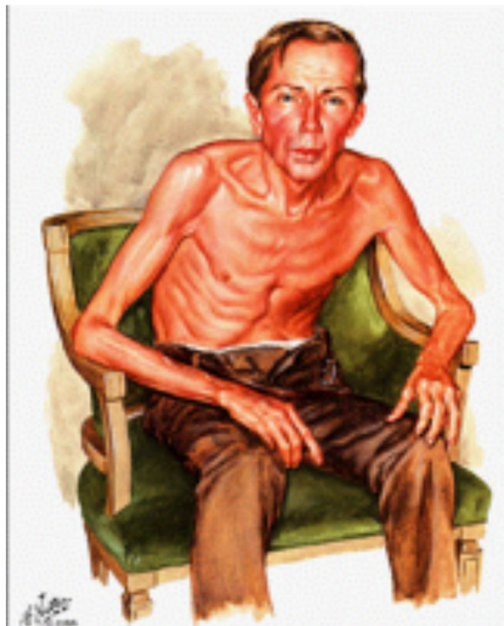


Heterogeneity of COPD: Scratching the Surface

- Classic smoking related COPD is a continuum of pure emphysema to pure chronic bronchitis
- Alpha-1 antitrypsin deficiency
- Non-smokers with environmental exposures or asthma or infections
- Frequent exacerbations vs. no exacerbations
- Distribution of emphysema
 - panlobular vs. centrilobular vs. paraseptal
 - apical vs. basilar vs. diffuse

Global Initiative for Chronic Obstructive Lung Disease, <http://goldcopd.com>

COPD: Classic phenotypes



Emphysema



Chronic Bronchitis

Netter F. Atlas Human Anatomy, Ciba:1989

COPD: Implications of Complexity and Heterogeneity For Diagnosis and Treatment

- COPD is a single disease
- COPD is NOT a single disease
- Distinct “Etiotypes” and “Phenotypes” and “Biology” within COPD Umbrella
- Biomarkers or other tests to define a COPD Endotype and match the Endotype to treatment are somewhat limited.
- Consequently, a very detailed history and detailed phenotyping is an absolute requirement for the evaluation and care of COPD patients
- Hitting the standard of care to link patients to therapies and interventions of known benefit is only possible with detailed history and evaluation

COPD “Etiotypes”

- COPD as a disease is comprised of complex set of subtypes
 - Causes
 - Phenotypes
- COPD “risk” is multi-factorial



Proposed Taxonomy (Etiotypes) for COPD

Table 1.1

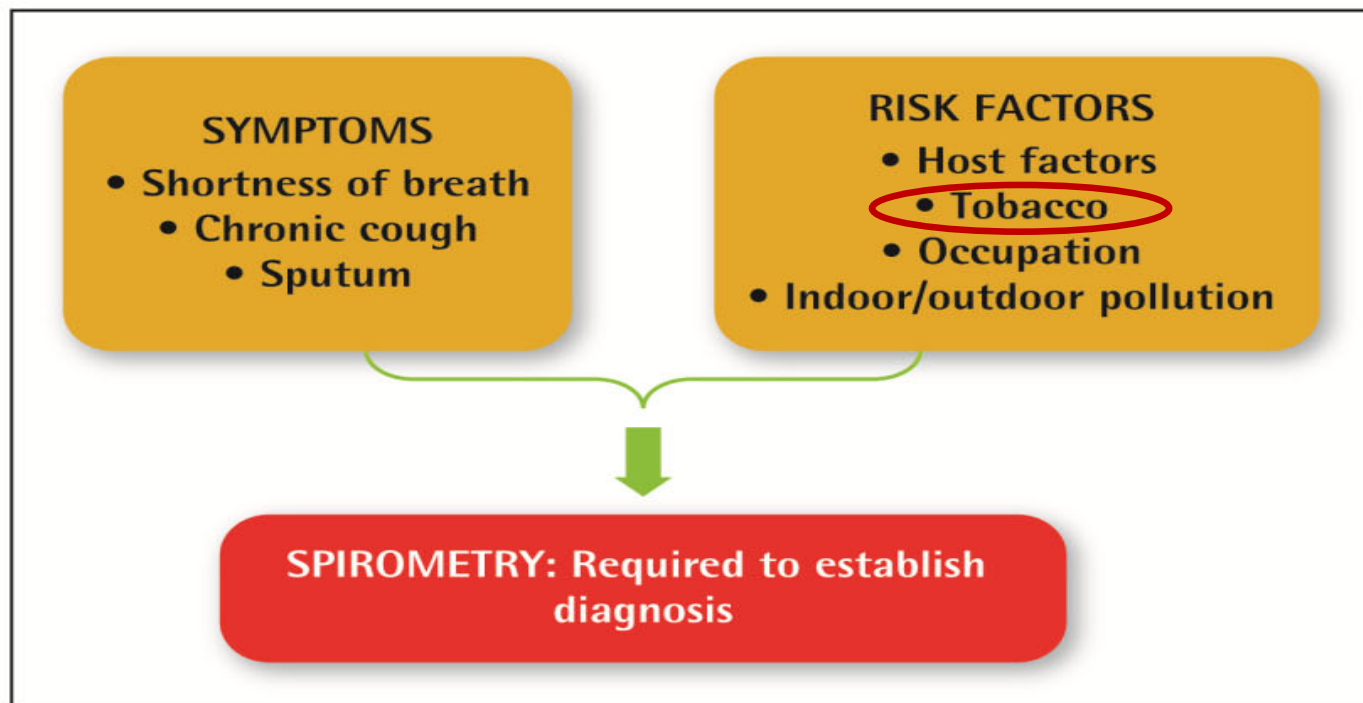
Classification	Description
Genetically determined COPD (COPD-G)	Alpha-1 antitrypsin deficiency (AATD) Other genetic variants with smaller effects acting in combination
COPD due to abnormal lung development (COPD-D)	Early life events, including premature birth and low birthweight, among others
Environmental COPD	
Cigarette smoking COPD (COPD-C)	<ul style="list-style-type: none"> • Exposure to tobacco smoke, including <i>in utero</i> or via passive smoking • Vaping or e-cigarette use • Cannabis
Biomass and pollution exposure COPD (COPD-P)	Exposure to household pollution, ambient air pollution, wildfire smoke, occupational hazards
COPD due to infections (COPD-I)	Childhood infections, tuberculosis-associated COPD, HIV-associated COPD
COPD & asthma (COPD-A)	Particularly childhood asthma
COPD of unknown cause (COPD-U)	

*Adapted from Celli et al. (2022) and Stolz et al. (2022)

Is it COPD? Is it asthma?

- 61-year-old hospitalized for 2 days two weeks ago with breathing problems
- Diagnosed with a “COPD exacerbation” and follow-up arranged with pulmonary (provided LABA/LAMA)
- No prior history of respiratory problems, but has seasonal allergies, which have been worse over last 2-3 years
- Does not exercise routinely due to low back pain, which bothers him after walking ¼ mile
- Feels he is 80% back to baseline, but now feels that he may be more out of breath than he “should be” when he walks up stairs.
- 35 pack year smoking history, stopped on his 50th birthday.
- No history of CAD, but has pre DM2 and hypertension

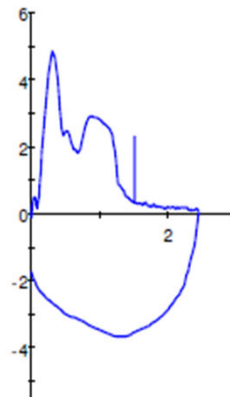
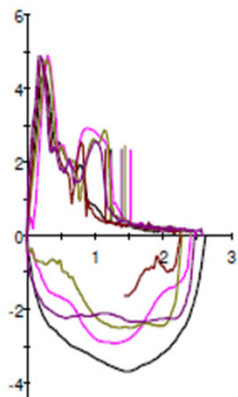
COPD: Chronic OBSTRUCTIVE Pulmonary Disease



Spirometry

---- SPIROMETRY ----

	<u>Pred</u>	<u>LLN</u>	<u>Actual</u>	<u>%Pred</u>
FVC (L)	3.71	2.82	2.57	69
FEV1 (L)	2.61	1.85	1.53	58
FEV1/FVC (%)	71	61	59	83
FEF Max (L/sec)	6.69	4.46	4.61	68
FEF 25-75% (L/sec)	1.76	0.23	0.60	33
FEV6 (L)	3.44	2.57	2.41	70
Expiratory Time (sec)			6.72	
FIF Max (L/sec)	4.16		3.68	88



Which of the following is correct?

- This patient has confirmed asthma
- Asthma does not develop de novo in older people, so this is unlikely to be asthma and must be COPD
- This could be asthma or COPD, but additional tests are needed

Lab and other testing: Asthma and COPD

Testing – tailored to history

- Lab testing – CBC with eos, FeNO, IgE, consider skin tests
- Imaging – **Chest CT scan, Tailored Barium Swallow**
- Cardiac – **Evaluate for ischemia, Echocardiogram**
- GI – Esophagram, impedance study
- Sleep – Sleep Study

COPD History: Are Symptoms Only From COPD?

- Comorbid diseases- a broad spectrum
 - Cardiac
 - Sleep Apnea
 - Asthma
 - Allergies/Sinus
 - VCD
 - Swallowing
 - GERD
 - Rheumatologic
 - Deconditioning
 - Sedentary lifestyle

COPD History: Are Symptoms Only From COPD?

Testing – tailored to history

- Lab testing – CBC, FeNO, IgE, BNP, A1AT
- Imaging – Chest CT scan, Tailored Barium Swallow
- Cardiac – Evaluate for ischemia, Echocardiogram
- GI – Esophagram, impedance study
- Sleep – Sleep Study

COPD: Lab Testing Can Help with Diagnosis and Prognosis and Treatment Choices

ORIGINAL ARTICLE

Blood Eosinophils and Exacerbations in Chronic Obstructive Pulmonary Disease

The Copenhagen General Population Study

Signe Vedel-Krogh^{1,2,3}, Sune F. Nielsen^{1,2,3}, Peter Lange^{3,4,5}, Jørgen Vestbo⁶, and Børge G. Nordestgaard^{1,2,3}

¹Department of Clinical Biochemistry, Herlev and Gentofte Hospital, ³The Copenhagen General Population Study, Herlev and Gentofte Hospital, and ⁵Medical Unit, Respiratory Section, Hvidovre Hospital, Copenhagen University Hospital, Copenhagen, Denmark; ²Faculty of Health and Medical Sciences and ⁴Section of Social Medicine, Department of Public Health, University of Copenhagen, Copenhagen, Denmark; and ⁶Centre for Respiratory Medicine and Allergy, The University of Manchester and University Hospital South Manchester NHS Foundation Trust, Manchester, United Kingdom

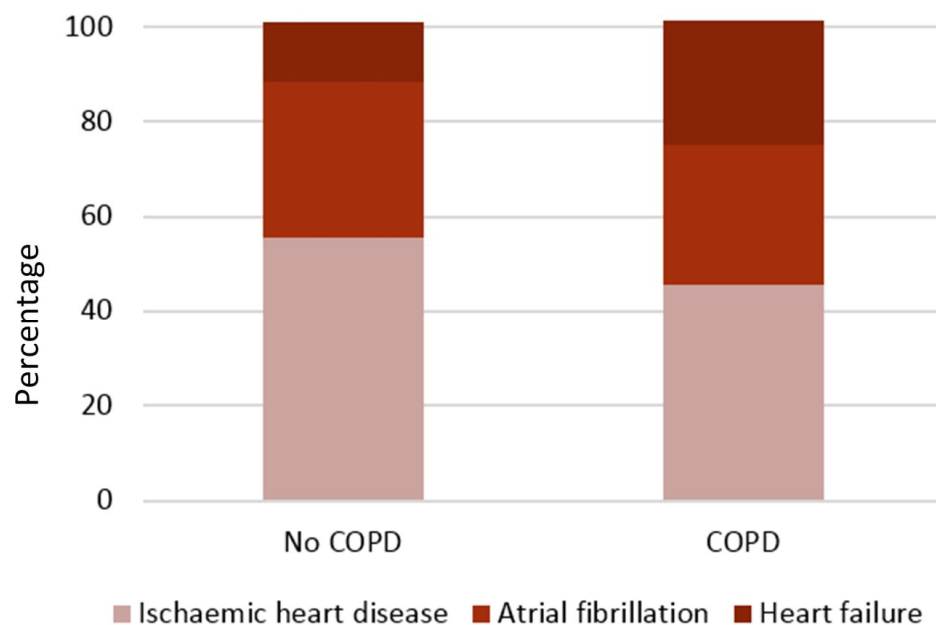
Published in: Signe Vedel-Krogh; Sune F. Nielsen; Peter Lange; Jørgen Vestbo; Børge G. Nordestgaard; *Am J Respir Crit Care Med* 193965-974.

DOI: 10.1164/rccm.201509-1869OC

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COPD: Heart disease

Distribution of the initial manifestation of cardiovascular disease in individuals with and without COPD. Total percentage exceeds 100% because some individuals were diagnosed with more than one cardiovascular disease at initial presentation (ie, atrial fib...)



Amy Groenewegen et al. *BMJ Open Resp Res* 2022;9:e001307

**BMJ Open
Respiratory
Research**

Labs/PFTs

- LABS: IgE 74, Complete blood count: Eos – 3.8%, 0.4k/uI
- PFTs- TLC 120%, Bronchodilator response DLCO 78%, DL/VA 95%
- Skin testing: positive for Russian thistle
- Exhaled nitric oxide 89

Eval/Treatment

- Cardiac eval normal
- Started ICS with LABA/LAMA
- Ordered Pulmonary rehab
- Return to office in 3 months for assessment

Assessing Control of a Patient on Therapy - Asthma

Components of CONTROL		Age (Years)	Level of Asthma CONTROL	
			Well Controlled	Not Well Controlled
Impairment	Symptoms	0 – 4	≤ 2 days/week but ≤ 1 x/day	> 2 days/week or multiple times on ≤ 2 days/week
		5 – 11		
		≥ 12	≤ 2 days/week	> 2 days/week
	Nighttime awakenings	0 – 4	≤ 1 x/month	> 1 x/month
		5 – 11		≥ 2 x/month
		≥ 12	≤ 2 x/month	1–3x/week
	Interference with normal activity	All	None	Some limitation
	SABA use for symptoms	All	≤ 2 days/week	> 2 days/week
	Lung function			
	FEV ₁ (predicted) or PEF (personal best)	≥ 5	$> 80\%$	60-80%
	FEV ₁ /FVC	5 – 11	$> 80\%$	75-80%
	Validated questionnaires			
	ATAQ	≥ 12	0	1–2
	ACQ	≥ 12	≤ 0.75	≥ 1.5
	ACT	≥ 12	≥ 20	16–19

NHLBI. National Asthma Education and Prevention Program. Full report of the Expert Panel: Guidelines for the Diagnosis and Management of Asthma (EPR-3). Available at: <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm>.

COPD History and Data: Integrated Risk Assessment

- Shortness of breath
- Cough
- Risk factors for having COPD
- **Evaluate risk**

COPD History: Multifactorial and Complex Risk

- Symptom severity (MMRC, CAT)
- Medication adherence
- Hypoxemia
- Exacerbations
- Smoking quantity and cessation
- Cachexia
- Bone loss
- Fall risk
- Social isolation
- Poor mobility
- Depression

Validated Tools



CAT™ Assessment

Figure 2.2

For each item below, place a mark (x) in the box that best describes you currently.
Be sure to only select one response for each question.

EXAMPLE: I am very happy	0 <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	I am very sad	Score
I never cough	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	I cough all the time	
I have no phlegm (mucus) in my chest at all	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	I am not at all confident leaving my home because of my lung condition	
I sleep soundly	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	I don't sleep soundly because of my lung condition	
I have lots of energy	0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	I have no energy at all	

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.

TOTAL SCORE:

Modified MRC Dyspnea Scale

Table 2.7

PLEASE TICK IN THE BOX THAT APPLIES TO YOU | ONE BOX ONLY | Grades 0 - 4

mMRC Grade 0	mMRC Grade 1	mMRC Grade 2	mMRC Grade 3	mMRC Grade 4
I only get breathless with strenuous exercise	I get short of breath when hurrying on the level or walking up a slight hill	I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level	I stop for breath after walking about 100 meters or after a few minutes on the level	I am too breathless to leave the house or I am breathless when dressing or undressing
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reference: ATS (1982) Am Rev Respir Dis. Nov;126(5):952-6.

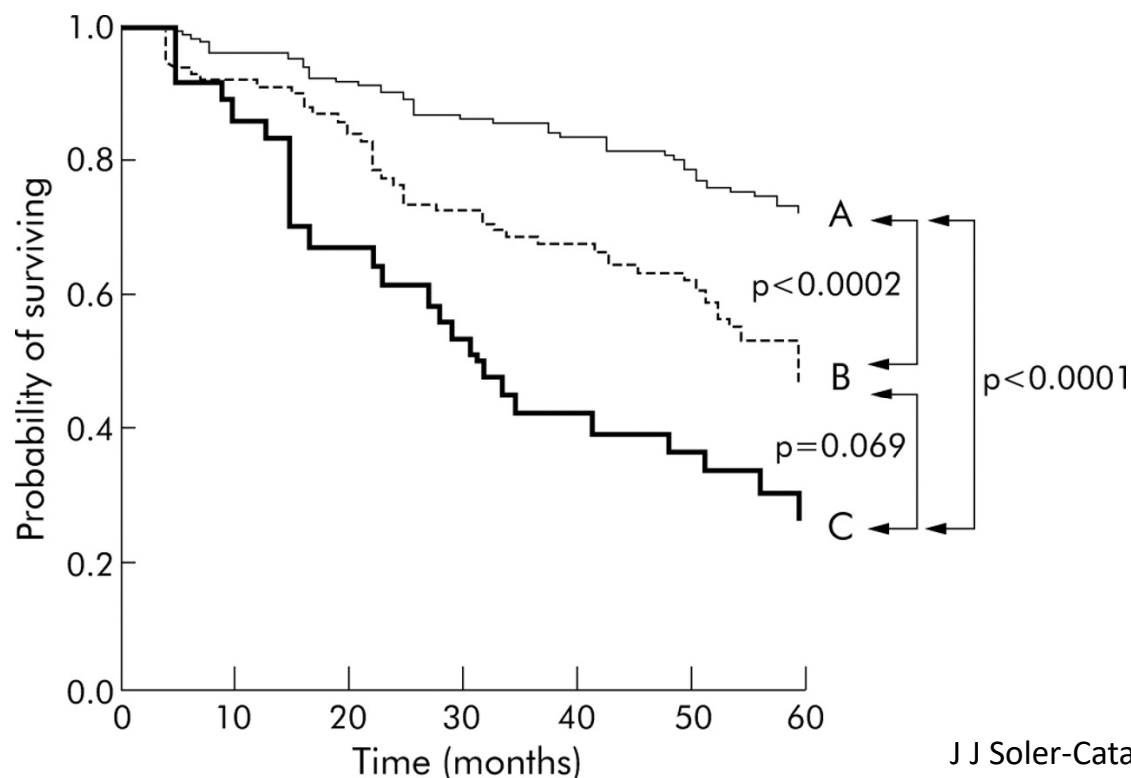


COPD: Exacerbation “Risk” Assessment

- Exacerbations are typically historically defined.
- A very severe exacerbation is generally easy to document.
- No gold standard for moderate exacerbations other than medications used.
- Patients with more advanced disease that seek care for worse symptoms are highly likely to receive treatment, which defines a moderate exacerbation.
- Low FEV1 at baseline may not show an objective change with an exacerbation.
- With advent of specific therapies based on exacerbation history, it is critical to accurately assess whether treated exacerbations were true exacerbations.

COPD: Exacerbations and Mortality

Kaplan-Meier survival curves by frequency of exacerbations in patients with COPD: group A, patients with no acute exacerbations of COPD; group B, patients with 1–2 acute exacerbations of COPD requiring hospital management; group C, patients with ≥ 3 acute exacerbations of COPD.



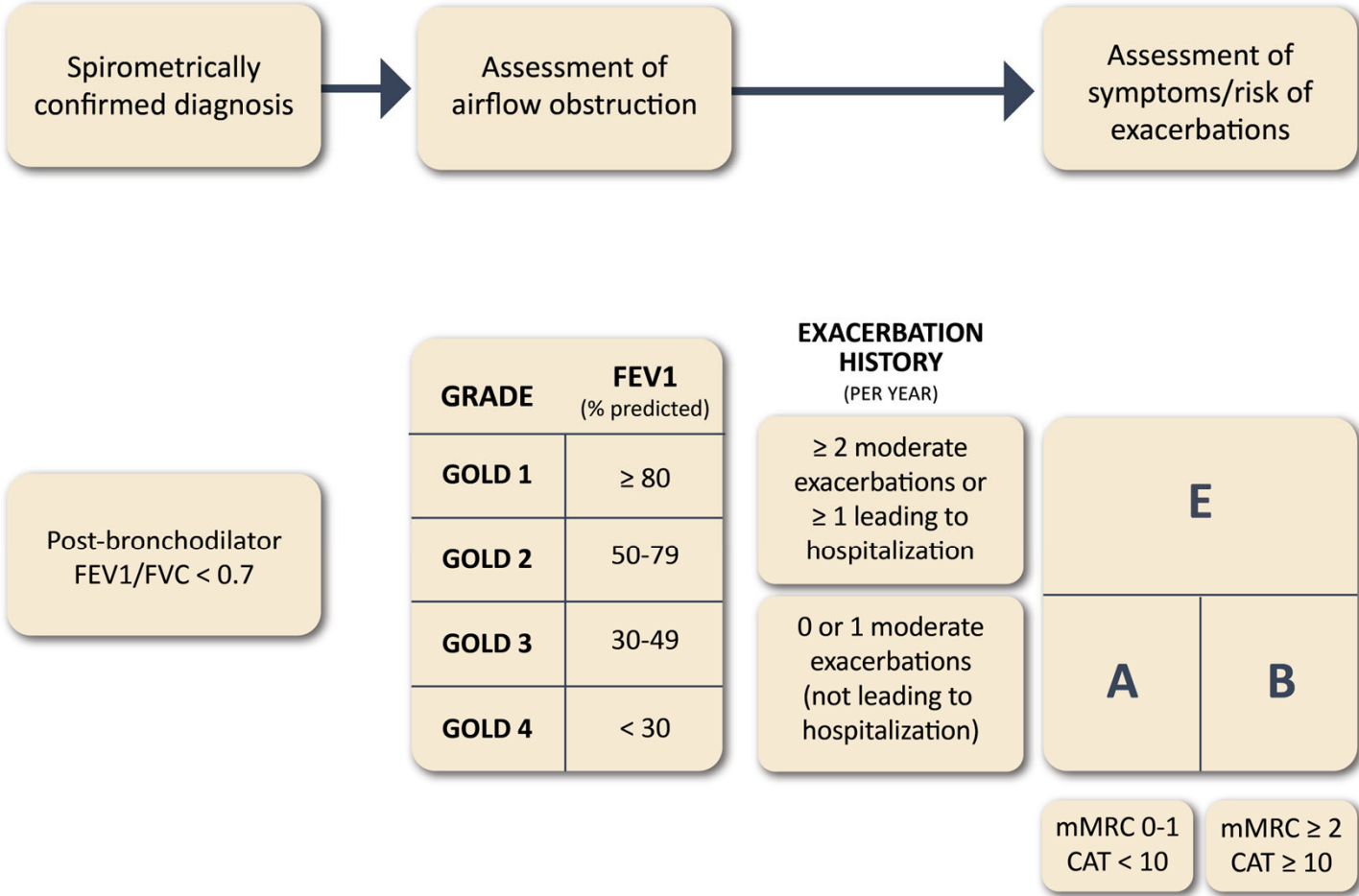
J J Soler-Cataluña et al. *Thorax* 2005;60:925-931

COPD: ABE “Risk” Assessment

GOLD ABE Assessment Tool

Figure 2.3

- “Moderate” Exacerbation?
- How many years?
- “E” is heterogeneous



Asthma and COPD: An integrated case

- Previously healthy 68 y/o male with 40 pack year smoking history, stopped 10 years ago.
- Progressive dyspnea on exertion for two years, no chest pain
- Intermittent cough
- Diagnosed with COPD by his primary and treated with LABA/LAMA
- 4 episodes of increased cough and worse dyspnea over last year
- Uses oral steroids for these episodes, which always improve his symptoms
- IgE 154; FeNo- 78; CBC -> Eos 4.2%

Asthma and COPD: An integrated case

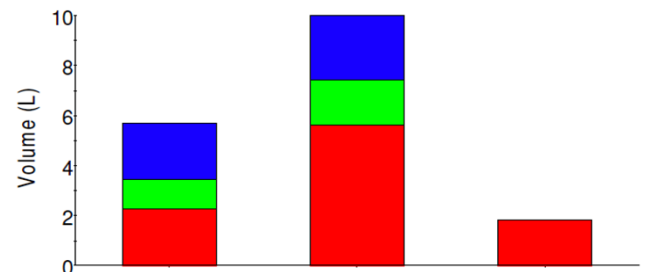
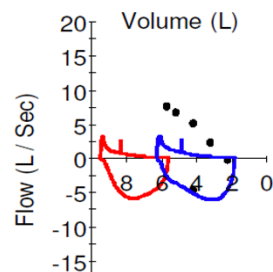
- PMH: Hypertension, mild reflux, high lipids (low calcium score)
- At baseline, can walk for ~3 minutes without stopping and has no dyspnea with normal daily living
- Snores and is tired

Exam: Prolonged exp phase, mild wheezes, minimal lower extremity edema

- Tests include:
 - IgE 154; FeNo- 78; CBC -> Eos 4.2%, Hct 47
 - Chest CT mild emphysema, bronchial wall thickening, mild calcifications of coronary, no basilar opacities

Asthma and COPD: An integrated case

	<u>LLN</u>	<u>Pre-Bronch</u>			<u>Post-Bronch</u>		
		<u>Pred</u>	<u>Actual</u>	<u>% Pred</u>	<u>Actual</u>	<u>% Pred</u>	<u>% Chng</u>
---- LUNG VOLUMES ----							
TLC (Pleth) (L)		5.70	10.00	175			
TGV (L)		3.44	7.28	211			
RV (Pleth) (L)		2.28	5.60	245			
RV/TLC (Pleth) (%)		40	56	140			
---- SPIROMETRY ----							
FVC (L)	3.08	3.92	3.91	99	4.47	113	+14
FEV1 (L)	2.18	2.89	1.21	41	1.45	50	+20
FEV1/FVC (%)	64.3	74.0	30.9	41	32.5	43	+5
---ADDITIONAL STUDIES--							
Raw (cmH2O/L/s)		1.69	1.48	87			
sGaw (1/cmH2O*s)		0.17	0.08	47			
DLCOunc (ml/min/mmHg)	19.37	29.03			13.71	47	
DLCOcor (ml/min/mmHg)	19.02	28.66					
VA (L)		6.10			6.08	99	
DL/VA (ml/min/mmHg/L)	3.08	4.76			2.25	47	



Asthma and COPD: An integrated case – Options

- High Dose ICS/LABA/LAMA with coaching in technique
- PDE3/PDE4?
- Azithro?
- Further evaluation for comorbidities – echo, swallowing study, sleep study?
- Pulm rehab
- Would this patient benefit from IL4/IL13 blockade?
- Do you start IL4/IL13 blockade immediately or in a staged manner after adding ICS?

Presentation and Evaluation of Asthma COPD - Summary

1. Medical Histories for Asthma and COPD are complex and highly relevant for diagnosis and treatment
2. Comorbid conditions must be evaluated.
3. Risk must be assessed through a combination of history, testing, and patient reported symptoms.
4. Risk informs specific interventions and testing.
5. Established flow scheme for asthma, with the apex being biologics driven by symptoms and phenotype
6. Aspirational (and now in part actioned) flow scheme for COPD diagnosis and effective targeted therapies