

ASTHMA DIAGNOSIS

FLAME LECTURE: 25

RISH 6.15.19

LEARNING OBJECTIVES

- ▶ Describe how to diagnose asthma using:
 - ▶ History & Physical exam
 - ▶ Confirmatory testing
- ▶ Describe asthma severity classification
- ▶ Describe the common diagnostic differences between asthma and COPD
- ▶ Prerequisites:
 - ▶ NONE
- ▶ See also – for closely related topics
 - ▶ FLAME LECTURE 24: Pathophysiology of Asthma
 - ▶ FLAME LECTURE 26: Treatment Overview of Asthma
 - ▶ FLAME LECTURE 35: Asthma Maintenance

DIAGNOSIS OVERVIEW

- ▶ Impact: 1 in 12 people have a diagnosis of “asthma”
- ▶ However, 1/3 of these cases are a misdiagnosis
 - ▶ Most due to no confirmation testing
- ▶ Other diagnoses that can mimic asthma: COPD, CHF, GERD, allergies, infections, medication side effect, airway obstruction, vocal cord dysfunction
- ▶ If history/exam are strongly suggestive of asthma, then a trial of treatment is reasonable prior to objective testing
 - ▶ If trial is successful, patient should continue treatment and confirmatory testing should be done at later date
- ▶ Children 0-4-years old are usually unable to participate in confirmatory testing. Asthma is clinical diagnosis in this age range. If suspected, treat!

DIAGNOSIS

HISTORY

- ▶ Intermittent dyspnea, cough, wheeze, chest tightness
 - ▶ Typically worse at night
 - ▶ Worse with triggers: allergens (dust, animal fur, perfumes, chemicals), exercise, viral infections, cold air, etc
 - ▶ Improves with rest
- ▶ Family or personal history of atopy
- ▶ Symptoms relieved by trial of bronchodilators
- ▶ Exercise-induced asthma: symptoms occur 5-15 minutes after brief exercise or 15 minutes into prolonged exercise

DIAGNOSIS

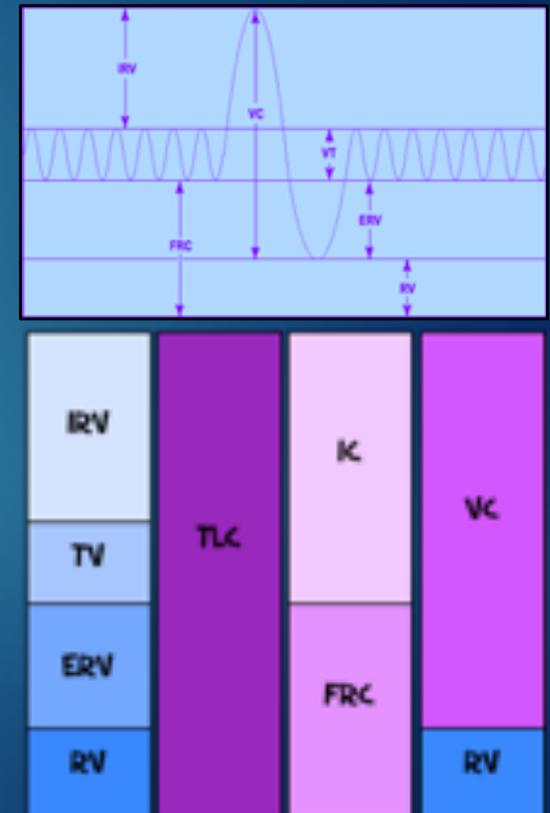
PHYSICAL EXAM

- ▶ Findings upon auscultation:
 - ▶ Diffuse, high-pitched, “musical” (different pitches) wheezes when breathing out (expiration)
 - ▶ Decreased air entry
 - ▶ Prolonged expiratory phase
 - ▶ Hyperexpanded chest
- ▶ Other findings: eczema, nasal congestion, nasal polyps
- ▶ Clubbing is NOT associated with asthma

DIAGNOSIS

RESPIRATORY NOMENCLATURE BRIEF REVIEW

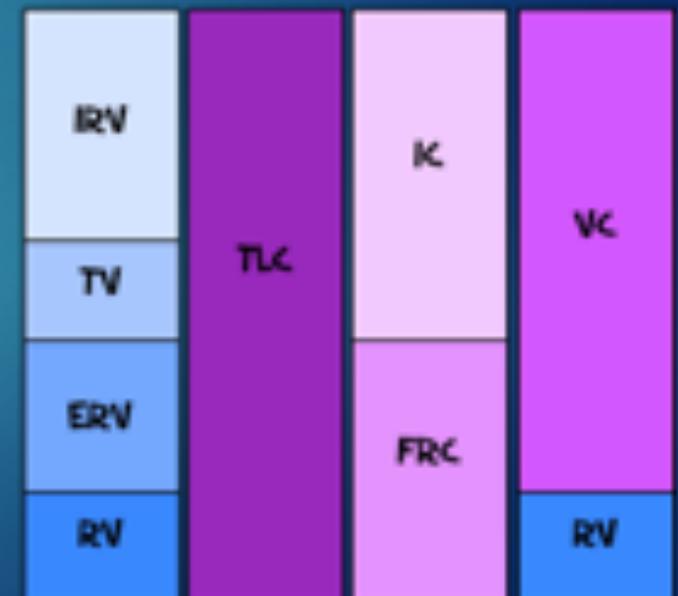
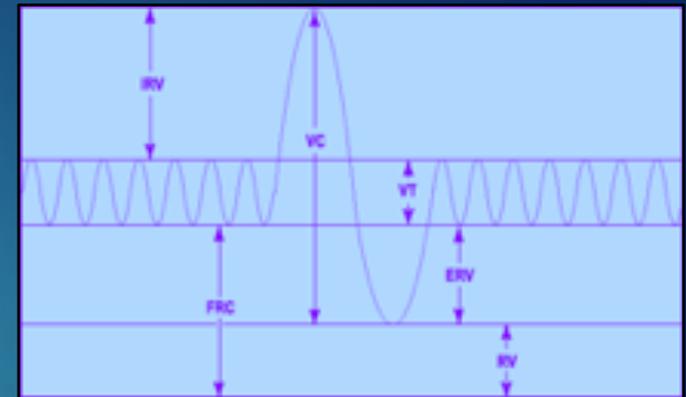
- ▶ The lung has 4 different volumes:
 - ▶ **IRV** (inspiratory reserve volume) - maximal volume that can be inhaled from the end-inspiratory level
 - ▶ **TV** (tidal volume) - volume of air moved into or out of the lungs during quiet breathing
 - ▶ **ERV** (expiratory reserve volume) - maximal volume of air that can be exhaled from the end-expiratory position
 - ▶ **RV** (residual volume) - volume of air remaining in the lungs after a maximal exhalation
- ▶ 2 or more volumes together = a capacity:
 - ▶ **TLC**: total lung capacity = IRV + TV + ERV + RV
 - ▶ **VC**: vital capacity = IRV + TV + ERV
 - ▶ **IC**: inspiratory capacity = IRV + TV
 - ▶ **FRC**: functional reserve capacity = ERV + RV



DIAGNOSIS

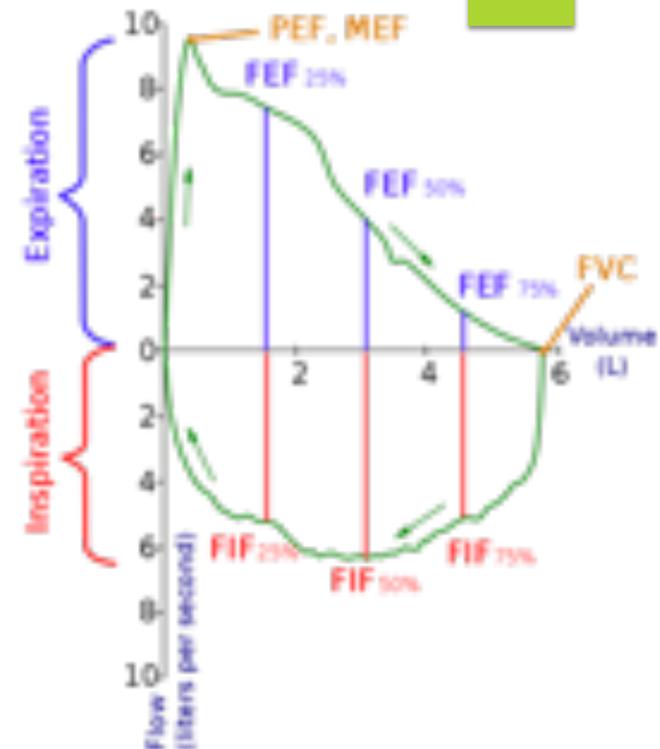
MORE NOMENCLATURE

- ▶ **FVC:** just the VC, but forced! In other words, the total volume of air patient is able to exhale for total duration with max effort
- ▶ **FEV1:** the total volume of air patient is able to exhale in 1st second with max effort
- ▶ **FEV1/FVC:** The % of FVC expired in 1 second
- ▶ **MINUTE VENTILATION:** volume of air inspired/expired per minute
 - ▶ Can increase with *deeper breaths* or *more frequent breaths*



DIAGNOSIS SPIROMETRY

- ▶ Is the preferred method of diagnosis
- ▶ Patient should start with maximum inhalation → rapid and complete exhalation
- ▶ Thus, you will capture current baseline FEV1 and FEV1/FVC
- ▶ Then, you test bronchodilator response by giving 2-4 puffs albuterol and repeating spirometry 10-20 minutes later
 - ▶ In asthma, there should be reversibility
 - ▶ Aka, an increase in FEV1 $\geq 12\%$ and ≥ 200 ml



Example Flow-Volume Loop

DIAGNOSIS

OTHER EVALUATIONS

- ▶ Peak Expiratory Flow: measured during brief forceful exhalation
 - ▶ Used more for monitoring rather than diagnosis
 - ▶ Normal 80-100 L/min
- ▶ Bronchoprovocation
 - ▶ Inhaled methacholine, inhaled mannitol, or exercise
 - ▶ Used if + symptoms of asthma with negative spirometry
 - ▶ + test indicates airway hyperresponsiveness; - result rules out asthma
- ▶ Exhaled Nitric Oxide
 - ▶ Measures level of NO exhaled
 - ▶ Increased is indicative of asthma
- ▶ Chest X-ray
 - ▶ To rule out other causes if symptoms don't respond to treatment
- ▶ Allergy testing
 - ▶ Helps evaluate role of allergens in asthma management
- ▶ CBC w/ differential
 - ▶ Mild eosinophilia common in asthma
- ▶ IgE
 - ▶ Mild elevation common in asthma

ASTHMA SEVERITY CLASSIFICATION

	Mild Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
Symptoms	≤2 day/wk	>2 day/wk	Daily	Throughout the day
Nighttime awakenings	≤2 x/month	3-4x/month	>1x/wk, not nightly	Often 7x/wk
Use of rescue inhaler	≤2 days/wk	>2 days/wk, not daily	Daily	Several times a day
Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Lung Function	<ul style="list-style-type: none"> - Normal FEV1 between exacerbations - FEV1 >80% predicted - FEV1/FVC Normal * (>85% 5-11 yo) 	<ul style="list-style-type: none"> - FEV1 > 80% predicted - FEV1/FVC Normal * (> 85% 5-11 yo) 	<ul style="list-style-type: none"> - FEV1 60-80% predicted - FEV1/FVC reduced 5% (75-80% 5-11 yo) 	<ul style="list-style-type: none"> - FEV1 <60% predicted - FEV1/FVC reduced >5% (<75% 5-11 yo)
Exacerbations requiring systemic steroids	0-1/year	≥ 2 in one year	“	“
			“	“

* Normal FEV1/FVC by age: >85% 8-19 yo, >80% 20-39 yo, >75% 40-59 yo, >70% 60-80 yo

Adapted from NIH Asthma Quick Care Reference 2012

ASTHMA VS COPD DIAGNOSIS (CLASSIC DIFFERENCES)

	Asthma	COPD
Age of onset	Usually <40 yo	Usually >40 yo
Smoking history	Not usually, but will worsen symptoms	Usually
Sputum production	Infrequent	Common
Chronic cough	Uncommon	Common
Allergies	Common	Uncommon
Clinical symptoms	Intermittent and variable	Persistent and progressive
Course of disease	Stable with exacerbations	Progressive worsening with exacerbations

REFERENCES

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2. Am Fam Physician. 2004 Sep 1; 70 (5): 893-898
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4. Uptodate.com- Diagnosis of Asthma in Adolescents and Adults
5. Uptodate.com- Asthma in children younger than 12 years: Initial evaluation and diagnosis
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