Asthma
Diagnosis and Managment

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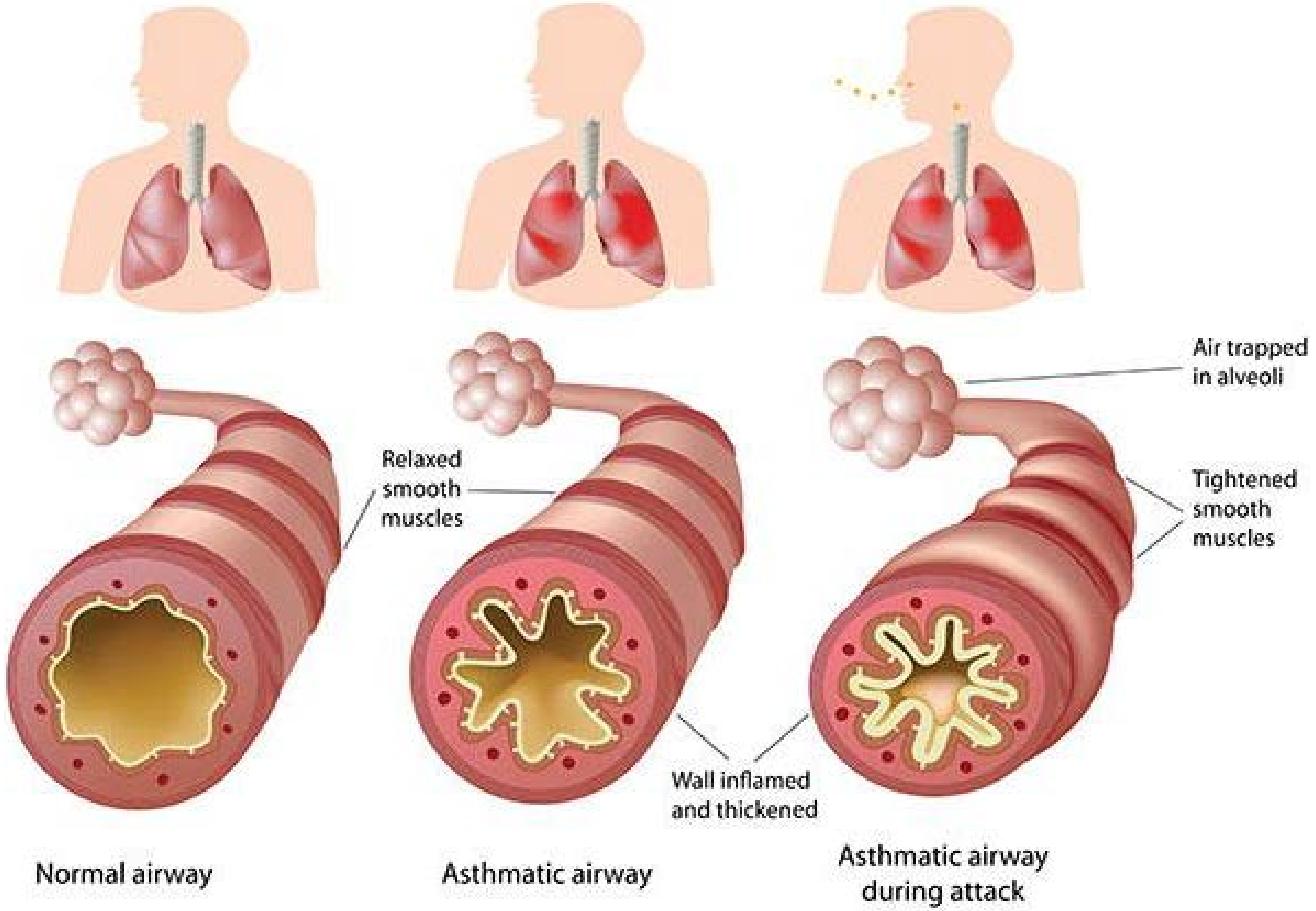
Definition

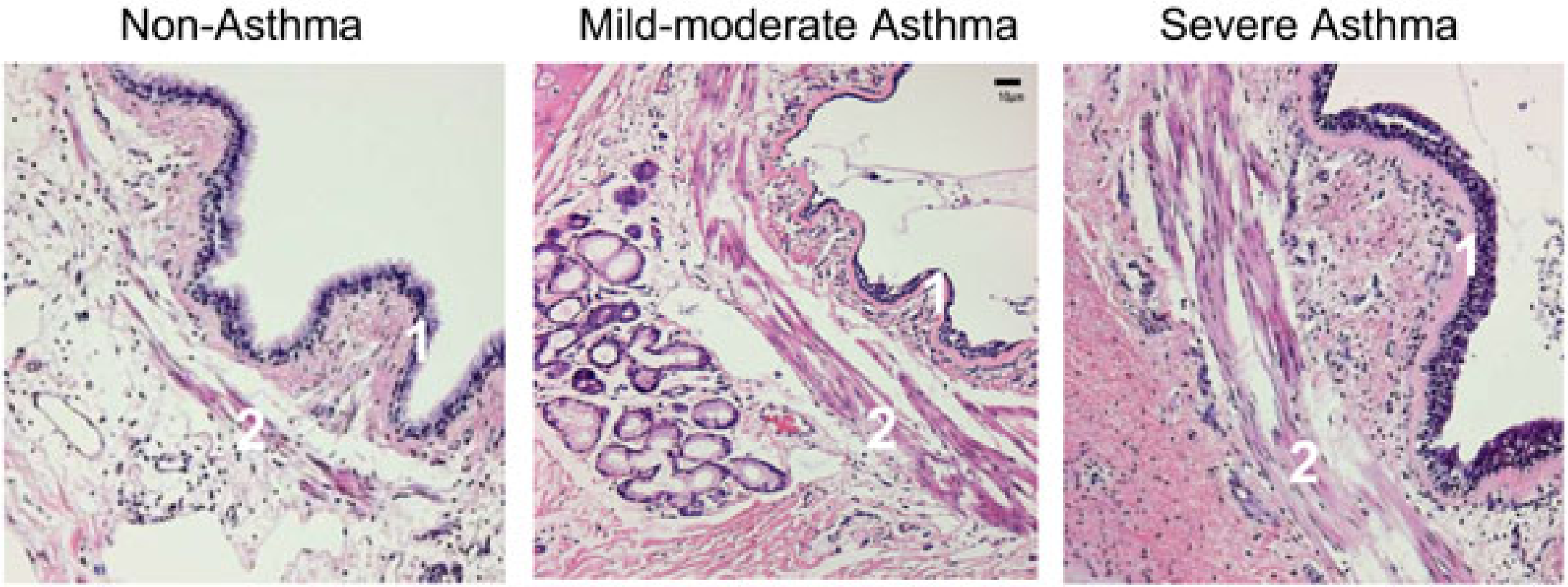
- National Asthma Education and Prevention Program
  - "a common chronic disorder of the airways that is complex and characterized by variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and an underlying inflammation.
- Global Initiative for Asthma
  - "Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory airflow limitation.“
- Reactive airways disease ?

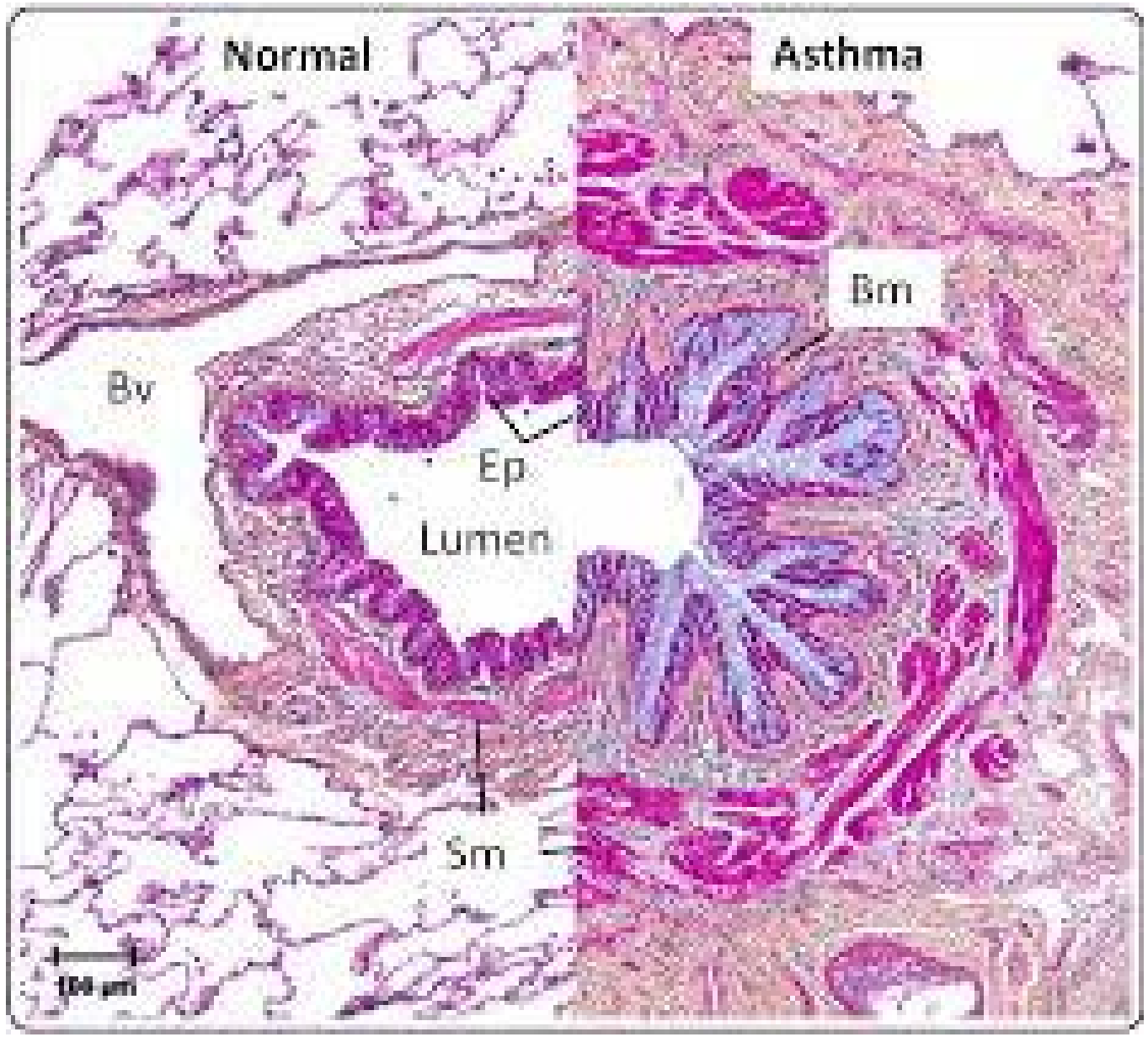
- How is this different than COPD??

Asthma and Your Airways



Histology




Normal
Asthma
Bm
Bv
Ep
Lumen
Sm
100 µm

Who Gets Asthma?

- Children < 7 years old
  - 75% of cases
  - Can “outgrow”
  - May recur

- Adult Onset
  - F > M
  - Occupational
  - Eosinophilic
  - ASA sensitive

Epidemiology

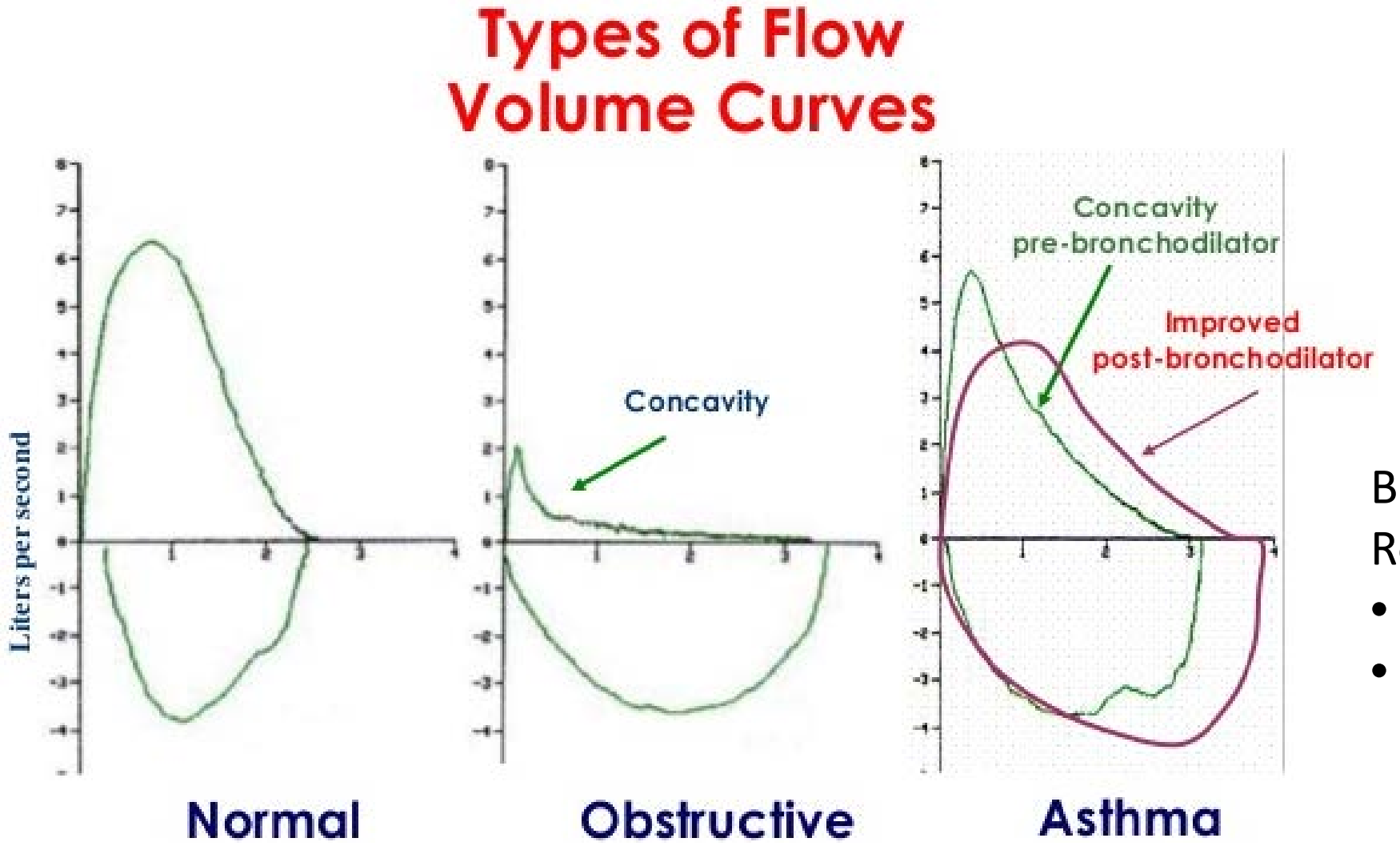
- Affects > 25 million Americans
- >$50 Billion dollars in direct costs per year
  - ? Indirect costs
- ~3,500 preventable deaths per year directly attributable to asthma
- Which state has the worst asthma?

Diagnosis

- Classic History AND Airflow obstruction
- Classic History
  - 1.
  - 2.
  - 3.

- Airflow Obstruction
  - 1. and if non diagnostic?
  - 2.

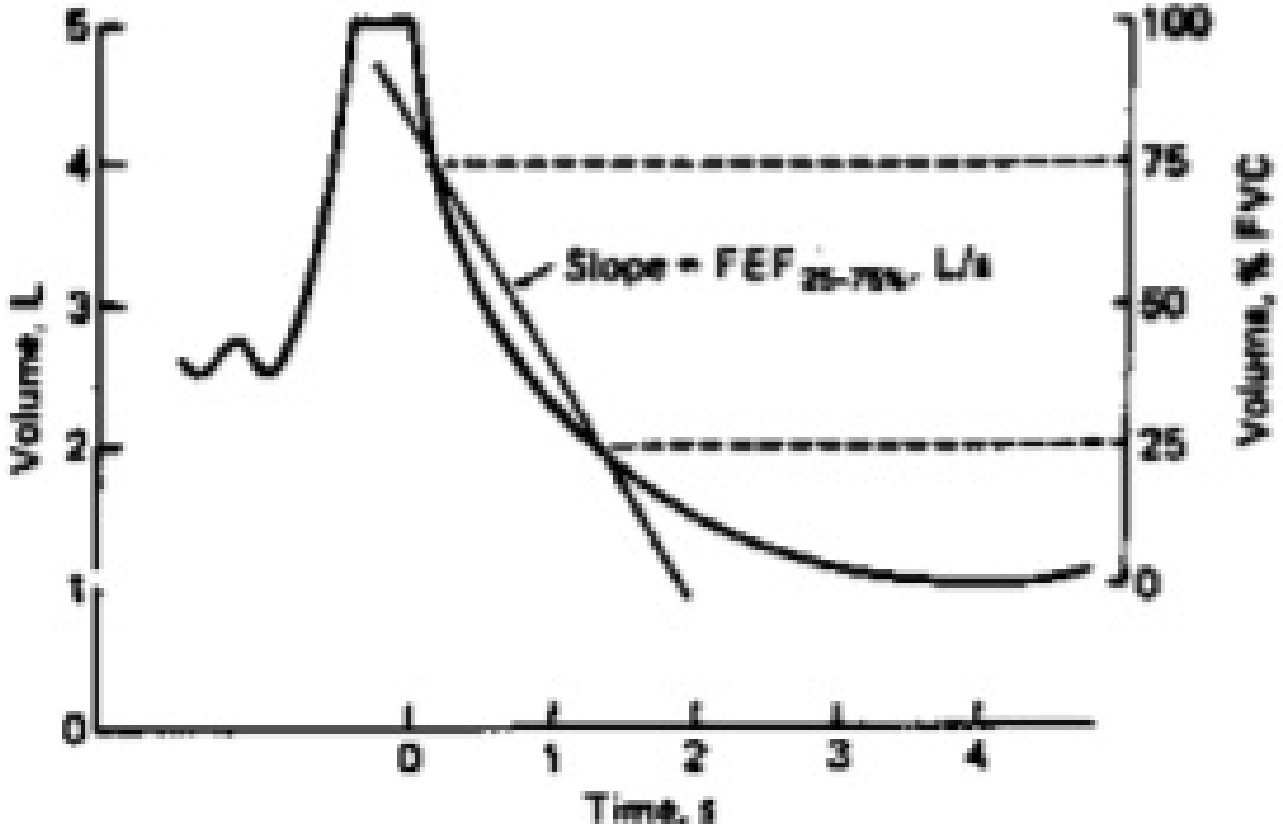
Airflow Obstruction

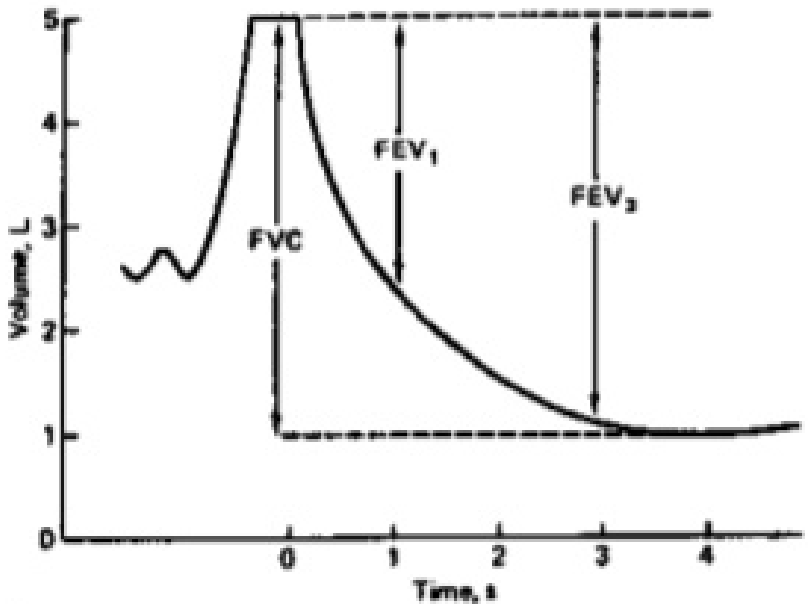


Bronchodilator Response:

- 1.
- 2.

Airflow Obstruction

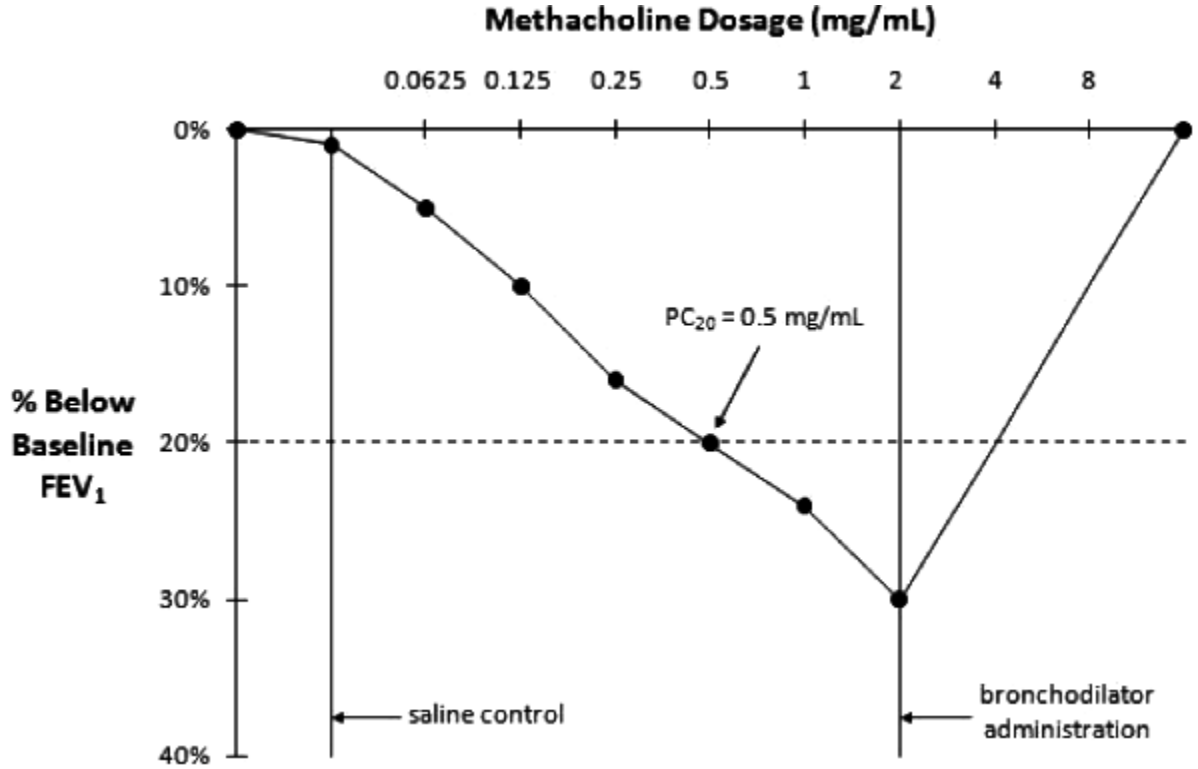




FEF 25-75%: mean forced expiratory flow during middle half of FVC, sensitive to small airways disease

Airflow Obstruction

- Methacholine Challenge Test
- Exercise Test
- Lung Volumes
- DLCo



Differential Diagnosis

- 1.
- 2.
- 3.
- …
- Other Testing
  - SHAPE Test
  - Cardiopulmonary Exercise test
  - ASA sensitivity
  - RAST Testing
  - IgE

Treatment

- Intermittent or Persistent?

- Questions to help classify:
  - 1.
  - 2.
  - 3.
  - 4.
  - 5.

Classification

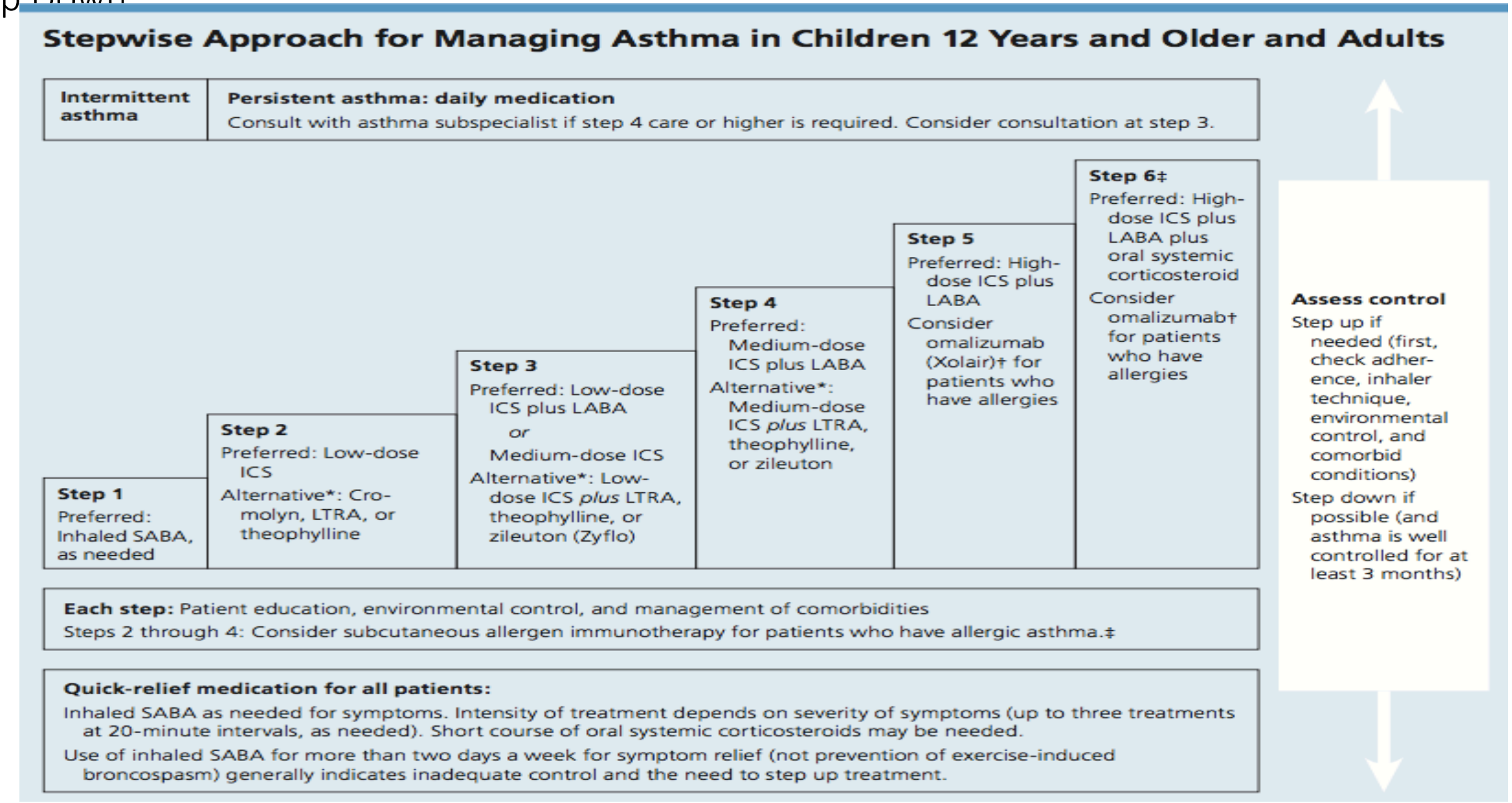
Classifying Asthma Severity in Children 12 Years and Older and Adults

Classifying severity for patients who are not currently receiving long-term control medication*

		Classification of asthma severity			
		Intermittent	*Persistent*		
Components of severity			*Mild*	*Moderate*	*Severe*
Impairment Normal FEV_1/FVC: 8 to 19 years = 85% 20 to 39 years = 80% 40 to 59 years = 75% 60 to 80 years = 70%	Symptoms	≤ 2 days per week	> 2 days per week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤ 2 times per month	3 to 4 times per month	> 1 time per week but not nightly	Every night
	Short-acting $beta_2$ agonist use for symptom control (not prevention of EIB)	≤ 2 days per week	> 2 days per week but not > 1 time per day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	Normal FEV_1 between exacerbations FEV_1 > 80% predicted FEV_1/FVC normal	FEV_1 ≥ 80% predicted FEV_1/FVC normal	FEV_1 > 60 % but < 80% predicted FEV_1/FVC reduced 5%	FEV_1 < 60% predicted FEV_1/FVC reduced > 5%

Management

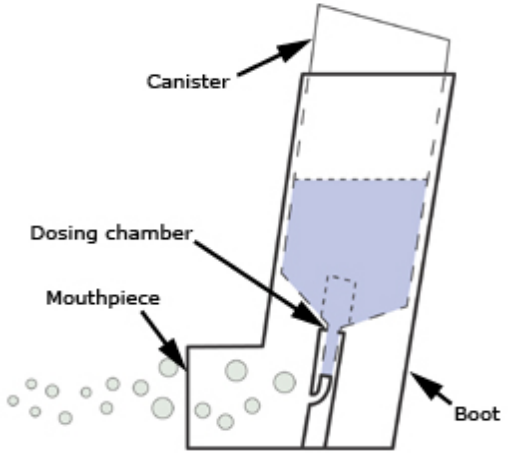
Step Up vs Step Down




NIOX

Treatment Failure

- Triggers
- Compliance
- Technique
  - Spacer
  - SVN vs MDI vs DPI
  - Coordination and Dexterity



Additional/Alternative Treatments

- Leukotriene Modifiers
- Methylxanthines
- Cromolyn
- Monoclonal Antibodies
- Immunotherapy

Classifying severity in patients after asthma becomes well controlled, by lowest level of treatment required to maintain control‡

	Classification of asthma severity			
	Intermittent	*Persistent*		
		Mild	*Moderate*	*Severe*
Lowest level of treatment required to maintain control (see Figure 2 for treatment steps)	Step 1	Step 2	Step 3 or 4	Step 5 or 6

■ Lips or fingernails are blue

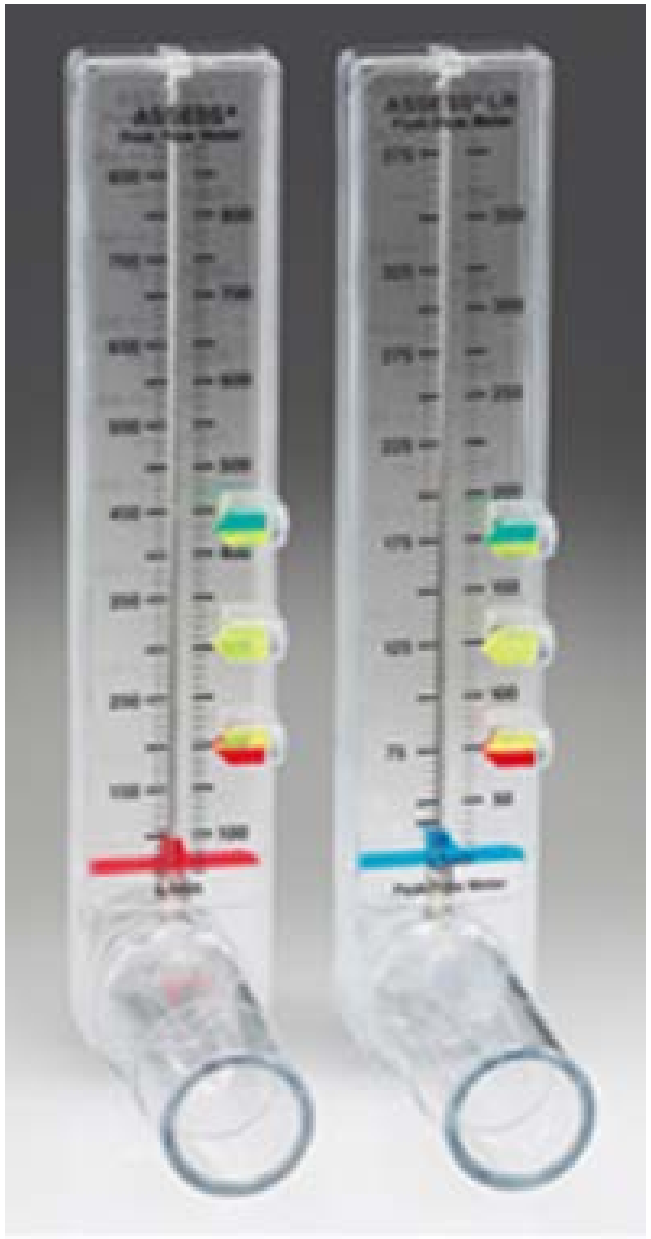
reath

■ Take ❒ 4 or ❒ 6 puffs of your quick-relief medicine AND
■ Go to the hospital or call for an ambulance

(phone)

NOW!

Peak Flow Meter



Acute Exacerbations

- Severity?
  - Peak Flow % of personal best
  - RR
  - Accessory muscle use
  - HR
  - O2 sat
  - ABG

- Increase SABA
- Oral Steroids
- Monitor up to 6 hours in ED
- Admit
  - Floor vs ICU?

ABG in exacerbation

- Normal response
  - RR? → PCO2? → pH?
  - O2?

- Worsening/Failure of treatment?
  - 1.
  - 2.
  - 3.

- Reasons for Failure

Adjuvant Therapy for Severe Exacerbation

- Magnesium
- Helium
- Parental Beta-Agonist
- Leukotriene modifiers
- Paralysis
- General Anesthetic

- Ineffective therapies
  - Methylxanthine
  - Empiric Abx
  - Nebulized furosemide

Question 1

- A 30-year-old man is evaluated for chronic cough that has lasted nearly 1 year. He recalls noticing the cough initially after a “bad cold.” At that time he received two courses of antibiotics (including a macrolide and a fluoroquinolone) with improvement in the acute symptoms. However, he subsequently noted persistent cough, particularly at nighttime and on cold days. Episodes of cough often occur after exercise or laughing. He is currently asymptomatic, with no postnasal drip, nasal congestion, or heartburn. He does not smoke. He has no history of occupational or other exposures. He has a remote history of hay fever. Multiple family members have seasonal allergies. His only medication is a proton pump inhibitor, which he has taken for the past 6 months without benefit.
- On physical examination, vital signs are normal. The oropharynx appears normal, with no cobblestone appearance. There is no mucus in the nostrils or oropharynx. Pulmonary examination is normal. Spirometry shows an FEV_1 of 90% of predicted and an FEV_1/FVC ratio of 80%. Chest radiograph is normal.

Which of the following is the most appropriate diagnostic test to perform next?

- *Bordetella*-specific antibodies
- Bronchial challenge test
- Bronchoscopy
- Chest CT scan

Question 2

- A 35-year-old woman is evaluated in an urgent care center for an acute exacerbation of asthma. She has a history of frequent asthma exacerbations requiring unscheduled visits; however, between these exacerbations, her examination and pulmonary function studies have been unremarkable. Her current medications are inhaled budesonide and inhaled albuterol.
- On physical examination, she is in moderate distress with audible inspiratory and expiratory wheezing. Temperature is 37.0 °C (98.6 °F), pulse rate is 110/min, and respiration rate is 26/min. Monophonic inspiratory and expiratory wheezing is heard predominantly in the central lung fields. Other than tachycardia, the cardiac examination and remainder of the physical examination are normal.
- She receives intravenous methylprednisolone and three nebulized albuterol-ipratropium bromide treatments. On follow-up evaluation 1 hour later, she still has wheezing, tachycardia, and tachypnea and is in moderate respiratory distress. Oxygen saturation is 96% breathing ambient air.

Which of the following is the most appropriate next step in management?

- CXR
- Intravenous magnesium sulfate
- Laryngoscopy
- Levofloxacin

Question 3

- A 22-year-old woman is evaluated in the emergency department for a 3-day history of progressive dyspnea that is now severe. She has asthma and has a history of poor adherence to her medication regimen. Bedside spirometry reveals severe airflow obstruction with an FEV_1 of 25% of predicted. Her asthma medications are an inhaled corticosteroid and an albuterol inhaler as needed.
- On physical examination, she is alert, appears anxious, and is speaking in partial sentences. Temperature is 37.0 °C (98.6 °F), blood pressure is 118/58 mm Hg, pulse rate is 116/min, and respiration rate is 30/min; BMI is 34. Oxygen saturation is 89% breathing ambient air and 93% breathing 2 L/min of oxygen by nasal cannula. Pulmonary examination reveals prolonged expiration and diffuse expiratory wheezes bilaterally. The abdominal muscles contract with expiration.
- She is started on continuous nebulized albuterol, nebulized ipratropium, and methylprednisolone. After 2 hours of treatment, her bedside FEV_1 is 30% of predicted. Arterial blood gas studies reveal a pH of 7.48, a PCO_2 of 30 mm Hg (4.0 kPa), and a PO_2 of 70 mm Hg (9.3 kPa) on 2 L/min of oxygen. Chest radiograph shows hyperinflation without infiltrates.

Which of the following is the most appropriate next step in management?

- Start Abx
- Admit to ICU
- Electively intubate
- Laryngoscopy

Questions?

References

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