



2022 Association of Asthma Educators  
Conference

**Pharmacology Pre-Conference**

**Managing Asthma in the Patient with COPD**

**Chattanooga, TN**

**August 4, 2022**

3:30 p.m.- 4:00 p.m.

# Managing Asthma in the Patient with COPD

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Pfizer – speaker

No conflict

# Objective

- Discuss the similarities and differences in the pathophysiology, diagnosis and therapy of asthma and COPD.
- Identify clinical practice guidelines proposed to diagnostic criteria, management and treatment of asthma and COPD.
- Evaluate management approaches to patients with asthma and COPD.

# Asthma and COPD

- Approximately 20% of patients with obstructive lung disease have features of both asthma and chronic obstructive pulmonary disease<sup>1</sup>
- Chronic obstructive pulmonary disease (COPD) is the third leading cause of death worldwide, causing 3.23 million deaths in 2019<sup>1</sup>
- Asthma affected an estimated 262 million people in 2019 and caused 455,000 deaths<sup>2</sup>
- Approximately 26,000,000 in the United States and annual 4,145 deaths<sup>2</sup>

# GOLD 2022

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## Global Initiative for Chronic Obstructive Lung Disease



### POCKET GUIDE TO COPD DIAGNOSIS, MANAGEMENT, AND PREVENTION

A Guide for Health Care Professionals

2022 REPORT

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Diagnosis of COPD is based on the presence of symptoms and airflow obstruction, which is demonstrated by a postbronchodilator forced expiratory volume in 1 second ( $FEV_1$ ) to forced vital capacity (FVC) ratio of less than 0.7 on spirometry

**2019 FOCUSED UPDATES TO THE Asthma Management Guidelines**

**AT-A-GLANCE GUIDE**

Box 2B of the Global Initiative for Asthma (GINA) 2019 Focused Updates to the Asthma Management Guidelines, at [www.ginasthma.org](http://www.ginasthma.org), provides a summary of the key updates to the 2019 Focused Updates to the Asthma Management Guidelines. The updates are intended to help clinicians and patients understand the key updates to the 2019 Focused Updates to the Asthma Management Guidelines. The updates are intended to help clinicians and patients understand the key updates to the 2019 Focused Updates to the Asthma Management Guidelines.

**AGES 0-4 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA**

**Management of Persistent Asthma in Individuals Ages 0-4 Years**

Step	Step 1	Step 2	Step 3	Step 4	Step 5
Controller	Low-dose inhaled corticosteroid (ICS)	Daily low-dose ICS-LABA (see table of ICS dose ranges for children)	Low-dose ICS-LABA, OR medium-dose ICS, OR very low-dose ICS-formoterol maintenance and reliever therapy (MART)	Medium-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)	High-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)
Reliever	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)

**AGES 5-11 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA**

**Management of Persistent Asthma in Individuals Ages 5-11 Years**

Step	Step 1	Step 2	Step 3	Step 4	Step 5
Controller	Low-dose inhaled corticosteroid (ICS)	Daily low-dose ICS-LABA (see table of ICS dose ranges for children)	Low-dose ICS-LABA, OR medium-dose ICS, OR very low-dose ICS-formoterol maintenance and reliever therapy (MART)	Medium-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)	High-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)
Reliever	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)

**AGES 12+ YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA**

**Management of Persistent Asthma in Individuals Ages 12+ Years**

Step	Step 1	Step 2	Step 3	Step 4	Step 5
Controller	Low-dose inhaled corticosteroid (ICS)	Low-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)	Medium-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)	High-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)	High-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART)
Reliever	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)	As-needed short-acting beta <sub>2</sub> -agonist (SABA)

**SỔ TAY HƯỚNG DẪN XỬ TRỊ VÀ DỰ PHÒNG HEN PHẾ QUẢN**  
(dành cho Người Lớn và Trẻ Em trên 5 Tuổi)

**SANG KIẾN TOÀN CẦU VỀ HEN PHẾ QUẢN**

Sổ Tay Hướng Dẫn cho Cán Bộ Y Tế  
Cập nhật 2019

DỰA TRÊN CHIẾN LƯỢC TOÀN CẦU VỀ XỬ TRỊ VÀ DỰ PHÒNG HEN PHẾ QUẢN

© Young Kwon Yoo & Eun Hye Park  
(Nguồn dịch: GS.TSKH.BS. Dương Quý Mỹ)

**STARTING TREATMENT**  
Children 6-11 years with a diagnosis of asthma

**ASSESS:** Confirmation of diagnosis, Symptom control & modifiable risk factors (including lung function), Comorbidity, Inhaler technique & adherence, Child and parent preferences and goals.

**START HERE IF:** Symptoms less than twice a month, Symptoms twice a month or more, but less than daily, Symptoms more than once a week or more, but less than daily, Symptoms most days, or waking with asthma once a week or more, Lung function.

**STEP 1:** Low-dose ICS taken whenever SABA taken. **RELIEVER:** As-needed short-acting beta<sub>2</sub>-agonist (or low-dose ICS-formoterol reliever for MART as above).

**STEP 2:** Daily low-dose inhaled corticosteroid (ICS). **RELIEVER:** As-needed short-acting beta<sub>2</sub>-agonist (or low-dose ICS-formoterol reliever for MART as above).

**STEP 3:** Low-dose ICS-LABA, OR medium-dose ICS, OR very low-dose ICS-formoterol maintenance and reliever therapy (MART). **RELIEVER:** Refer to expert advice.

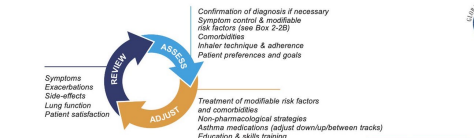
**STEP 4:** Medium-dose ICS-LABA, OR low-dose ICS-formoterol maintenance and reliever therapy (MART). **RELIEVER:** Refer to expert advice.

**STEP 5:** Refer for phenotypic assessment, a higher-dose ICS-LABA or add-on therapy, e.g. anti-IgE.



**Adults & adolescents 12+ years**  
Personalized asthma management

Assess, Adjust, Review for individual patient needs



**CONTROLLER and PREFERRED RELIEVER (Track 1):** Using ICS-formoterol as reliever reduces the risk of exacerbations compared with using a SABA reliever.

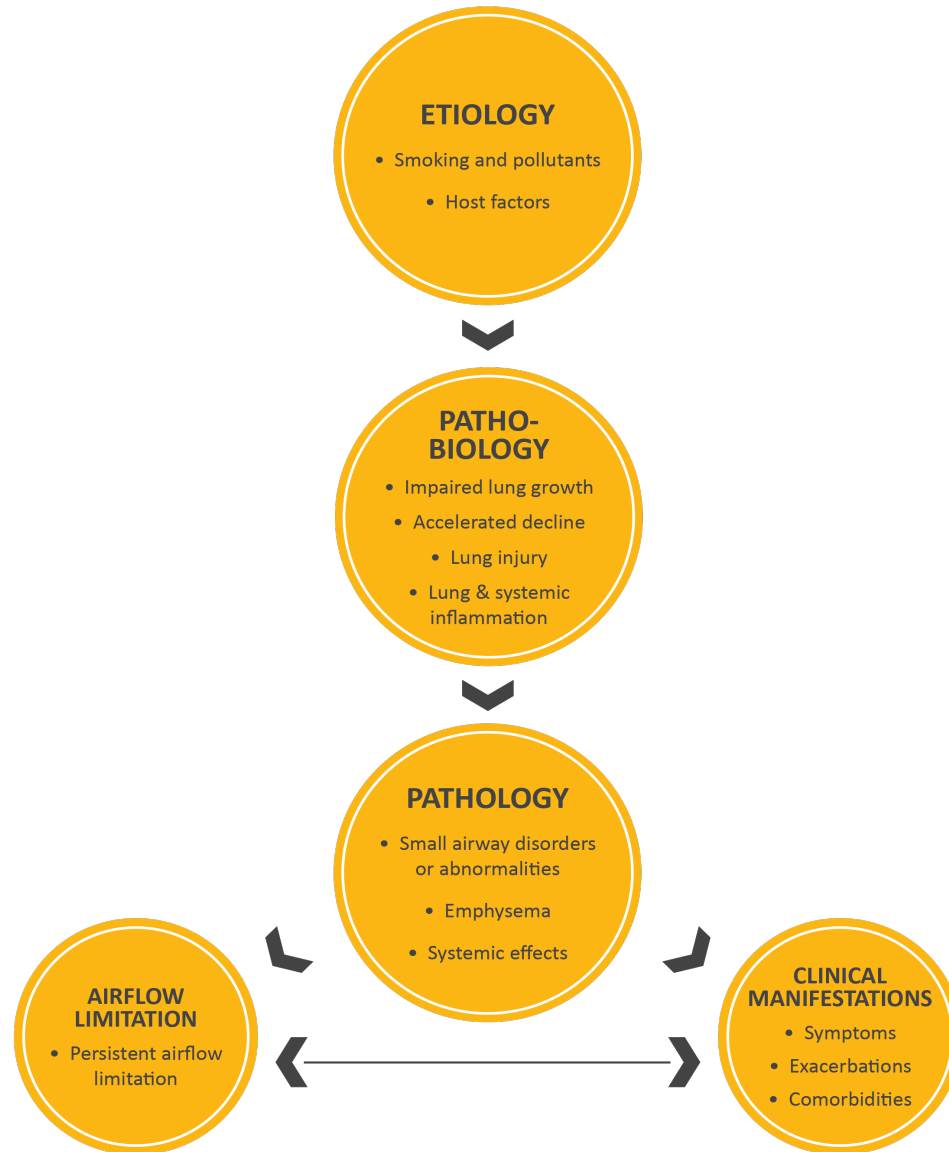
**CONTROLLER and ALTERNATIVE RELIEVER (Track 2):** Before considering a regimen with SABA reliever, check if the patient is likely to be adherent with daily controller.

**Other controller options for either track (limited indications, or less evidence for efficacy or safety):**

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Take ICS whenever SABA taken	Low-dose maintenance ICS	Low-dose maintenance ICS-LABA	Medium/high dose maintenance ICS-LABA	Add-on LAMA
RELIEVER: As-needed short-acting beta <sub>2</sub> -agonist	RELIEVER: As-needed low-dose ICS-formoterol	RELIEVER: As-needed low-dose ICS-formoterol	RELIEVER: As-needed low-dose ICS-formoterol	RELIEVER: As-needed low-dose ICS-formoterol
Low-dose ICS whenever SABA taken, or daily LTRA, or add-on LAMA SLIT	Medium-dose ICS, or add-on LTRA, or add-on LAMA SLIT	Medium-dose ICS, or add-on LTRA, or add-on LAMA SLIT	Add LAMA or LTRA or add-on LAMA SLIT, or add-on high-dose ICS	Add add-on LAMA (adults) or LTRA. As best resort consider adding low-dose ICS but consider side-effects

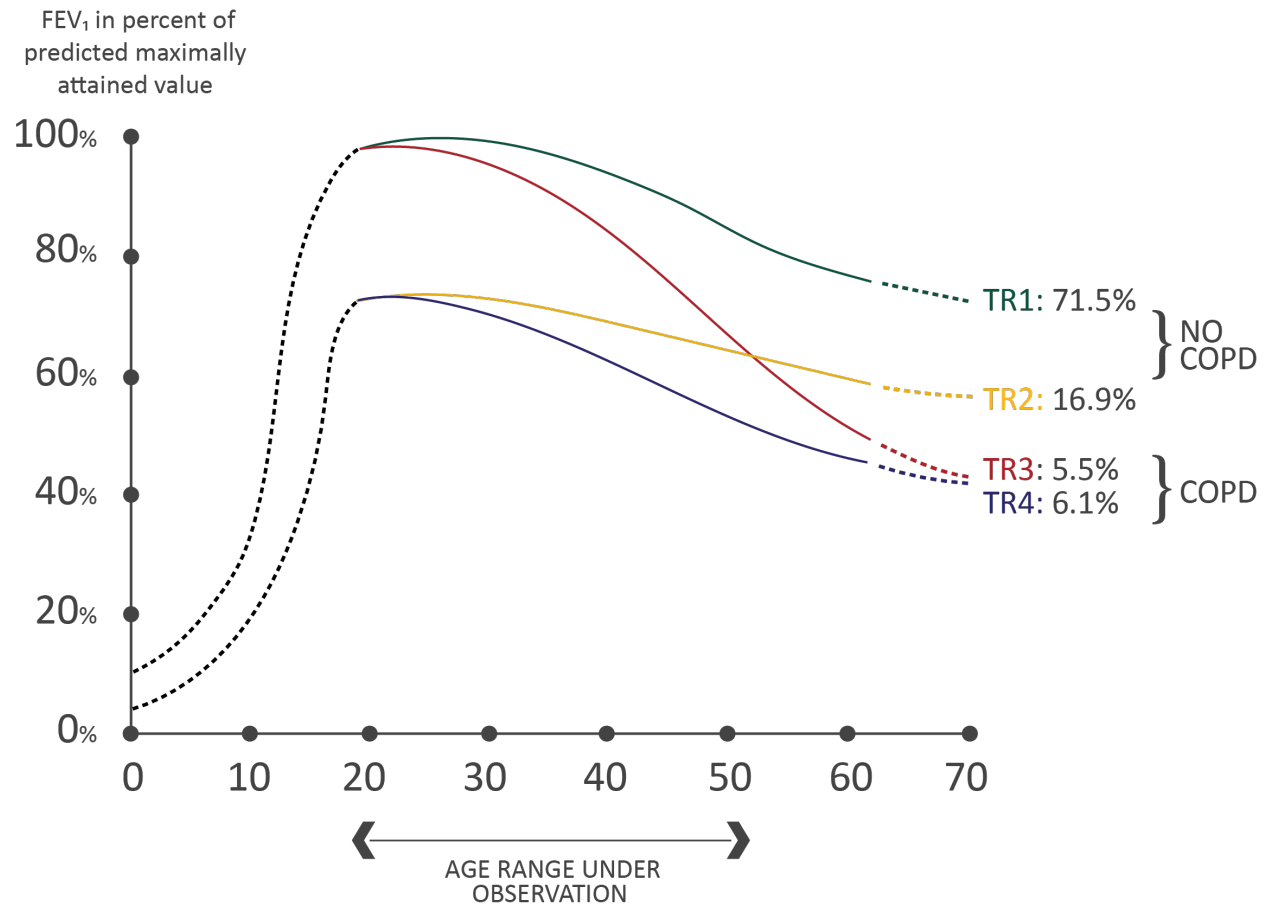
© Global Initiative for Asthma, www.ginasthma.org

# ETIOLOGY, PATHOBIOLOGY AND PATHOLOGY OF COPD LEADING TO AIRFLOW LIMITATION AND CLINICAL MANIFESTATIONS





# FEV<sub>1</sub> PROGRESSION OVER TIME

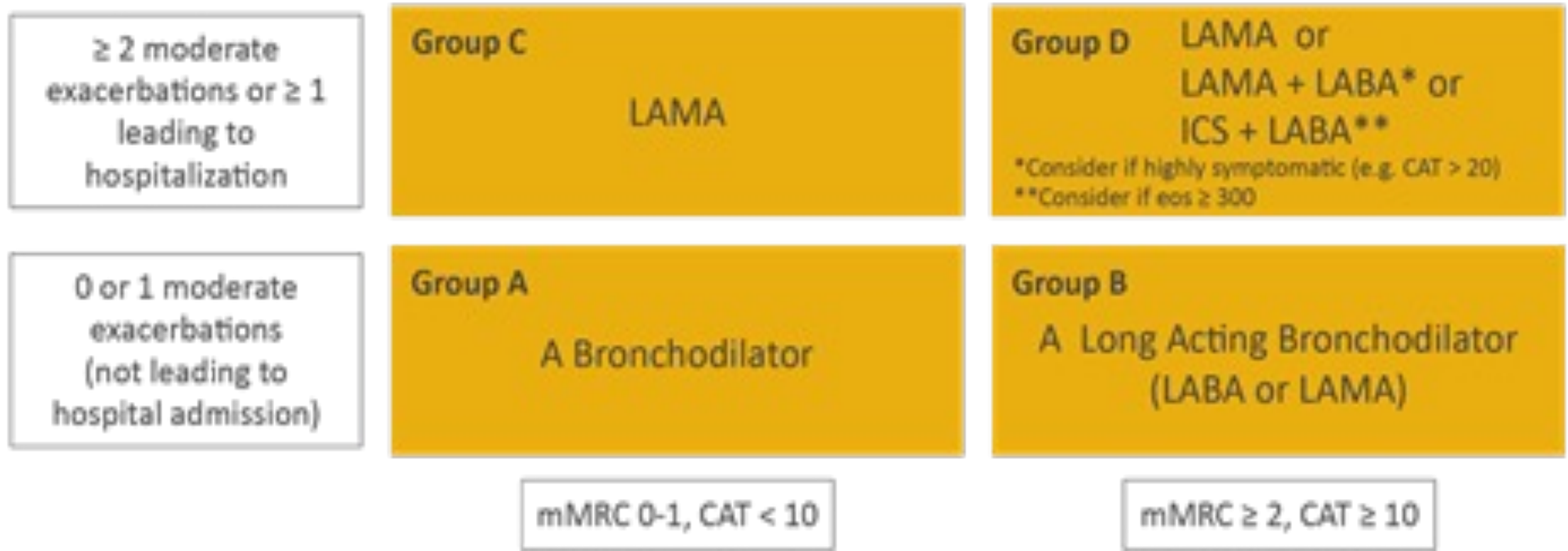


- TR1: Normal
- TR2: Small lungs but no COPD
- TR3: Normal initial FEV<sub>1</sub> with rapid decline leading to COPD
- TR4: Small lungs leading to COPD

**Note:** This is a simplified diagram of FEV<sub>1</sub> progression over time. In reality, there is tremendous heterogeneity in the rate of decline in FEV<sub>1</sub> owing to the complex interactions of genes with environmental exposures and risk factors over an individual's lifetime [adapted from Lange et al. NEJM 2015;373:111-22].

# Initial pharmacotherapy

- The recommendations on initial pharmacotherapy for patients in groups A–D are unchanged in the GOLD 2022 report
- Bronchodilators are the recommended initial treatment for patients in groups A, B, and C
- The choice of initial therapy for patients in group D who are symptomatic and at risk of exacerbations depends on the intensity of their symptoms, and may also be influenced by their blood eosinophil count.<sup>2</sup>



# Terminology Asthma and Asthma–COPD Overlap

## Terminology

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- Limitations have been highlighted in in the controversy about “asthma–chronic obstructive pulmonary disease (COPD) overlap syndrome”
- Original was to recognize the definitions of asthma and COPD are not mutually exclusive that patients with features of both conditions are commonly seen in clinical practice and have high morbidity and a heterogeneous population with a range of different underlying mechanisms

# Asthma and COPD

- In all chronic airway diseases, the dynamics of airway function are influenced by airway inflammation and bronchial hyperresponsiveness along with limitations in reversibility due to airway lung remodeling and mucous plugging
- Asthma and COPD are heterogeneous diseases with varying degrees of fluctuating airflow limitation that may be caused by different underlying mechanisms

# Asthma and COPD

- Risk of acute exacerbation is greater in patients with coexistent chronic obstructive pulmonary disease (COPD) and asthma than in those with COPD alone<sup>1</sup>
- Both severe asthma and COPD are characterized by worsening respiratory symptoms, frequent exacerbations and increased health-care utilization<sup>2</sup>

1. Su VY, Yang KY, Yang YH, et al. J Allergy Clin Immunol Pract 2018;6:1927-35.

2. Maselli DJ Hardin M, Christenson SA, et al. Chest 2019; 155(1):168-177

# Asthma and COPD

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Adult-onset asthma differs from childhood asthma in that it is more often nonatopic and severe and has a lower remission rate

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\*The diagnostic value of atopy in distinguishing adult-onset asthma from COPD decreases with advancing age

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Asthma has a relatively low mortality in younger adults, in the elderly, it is associated with substantial morbidity, healthcare utilization and mortality

1. Stockley RA, Halpin DM, Celli BR, Singh D. Am J Respir Crit Care Med. 2019 199(10):1195–1204.

2. Baptist AP, Bussee PJ. J Allergy Clin Immunol Pract. 2018 May-Jun; 6(3): 764–773.

## ASTHMA

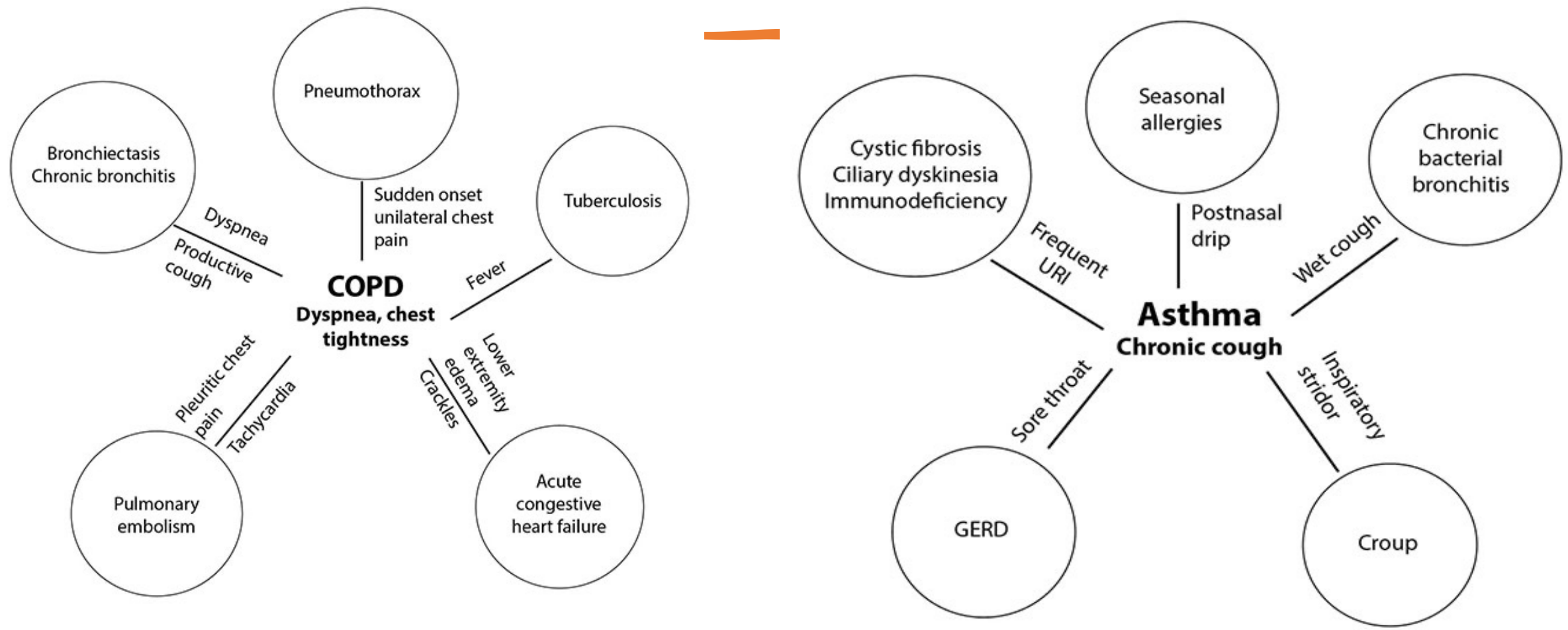
- More intermittent airflow obstruction
- Improvement in airways obstruction with bronchodilators and steroids
- Cellular inflammation with eosinophils, mast cells, T-lymphocytes, and neutrophils in more severe disease
- Broad inflammatory mediator response
- Airways remodeling

## COPD

- Progressively worsening airflow obstruction
- Often presents in 6<sup>th</sup> decade of life or later in patients
- More permanent airflow obstruction; less reversibility and less normalization of airflow obstruction
- Cellular inflammation: neutrophils, macrophages, eosinophils and mast cells may occur
- Emphysema frequently found

# Chronic Obstructive Pulmonary Disease Differential Diagnosis

## Asthma Differential Diagnosis





# Asthma and COPD

- Inhaled medications are the mainstay of treatment for both COPD and asthma
- Many patients with asthma and COPD have poor treatment adherence and/or inhaler technique
- Improvements in these patient factors have the potential to substantially increase the effectiveness of therapy and help alleviate disease burden

# Asthma and COPD: Inhaler Medications

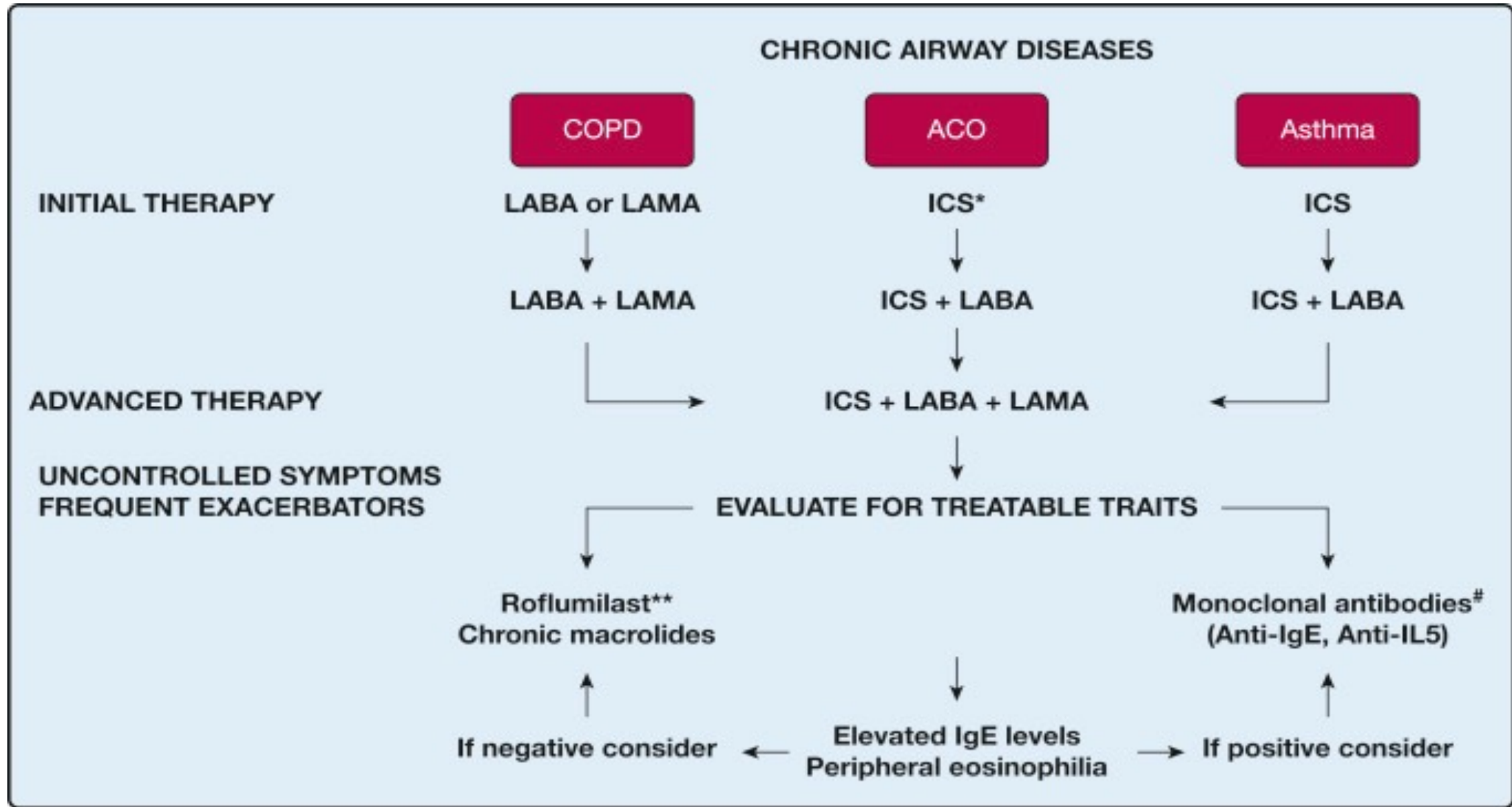
- Combined inhaled corticosteroid (ICS) and long-acting beta agonist (LABA) treatments play a central role in the management of persistent asthma (Step 3 and above) and have been associated with beneficial effects on lung function, exacerbation rates, and patient-reported outcomes compared with each treatment alone in patients with COPD
- Several inhalers containing a fixed-dose combination (FDC) of ICS and LABA are commercially available for the delivery of maintenance therapies for COPD and/or asthma.
- Convenience of having both substances in a single inhaler may help improve treatment adherence and is often cost saving, compared with using two separate inhalers

<b>Parameters</b>	<b>COPD</b>	<b>Asthma</b>
Site of disease	Peripheral airways Lung parenchyma Pulmonary vessels	Proximal airways
Cells	Neutrophil ++ Macrophages +++ CD8+T-cells +	Eosinophil ++ Macrophages + CD4+T-cells +
Key mediators	IL-8 TNF- $\alpha$ , IL-1 $\beta$ , IL-6 NO	Eotaxin IL-4, IL-5, IL-13 NO +++
Oxidative stress	+++	+

COPD: Chronic obstructive pulmonary disease, IL: Interleukin, TNF- $\alpha$ : Tumor necrosis factor-alpha

# Clinical Differences Asthma and COPD

	<b>Asthma</b>	<b>COPD</b>
Age of onset	Usually <40 years	Usually >40 years
Smoking history	Not causal	Usually >10 pack-years
Sputum production	Infrequent	Often
Allergies	Often	Infrequent
Disease course	Stable (with exacerbations)	Progressive worsening (with exacerbations)
Spirometry	Often normalizes	Never normalizes
Clinical symptoms	Intermittent and variable	Persistent



# Role of Biomarkers

Key component of the  
treatable traits concept

Increasingly utilized in  
assessing treatment options

Utilized for diagnosis and  
monitoring of obstructive  
airway diseases

# Biomarkers: COPD

- 2019 GOLD guidelines recommend ICS treatment for patients with COPD with blood eosinophil count  $\geq 300$  cells/ $\mu\text{L}$  (and consider ICS treatment for 100–300 cells/ $\mu\text{L}$ )<sup>1</sup>
- Blood eosinophil count data needs to consider exacerbation severity and frequency for accurate interpretation
- COPD biomarker studies have investigated various lung media, including sputum, bronchoalveolar lavage (BAL) and FeNO<sup>2</sup>
- Most of the published studies have involved blood biomarkers because of easy access and assay reproducibility<sup>2</sup>

1. GINA. <http://www.ginasthma.org> 2019

2. Stockley RA, Halpin DM, Celli BR, Singh D. Am J Respir Crit Care Med. 2019 199(10)1195–12042.

# Biomarkers: Asthma

## T2-high asthma

- IgE
- Eosinophils in blood and/or sputum
- Fractional Exhaled Nitric Oxide
- Periostin



# Biomarkers: Eosinophils (EOS)

- Blood eosinophil count is not useful for the diagnosis of asthma (GINA), but it can serve as prognostic biomarker and to predict several therapeutic responses in asthmatic patients with type 2 inflammation
- Blood eosinophils counts can predict responsiveness to corticosteroid therapy
- Blood eosinophils counts can predict responsiveness to corticosteroid therapy.

# Eosinophil Counts in Adults with Asthma or COPD

Elevated blood eosinophil (EOS) counts are markers of inflammation associated with poorer outcomes in individuals with asthma and chronic obstructive pulmonary disease (COPD)

In individuals with severe uncontrolled eosinophilic asthma, eosinophil depletion with various newly available biologic therapies has demonstrated improved outcomes<sup>1</sup>

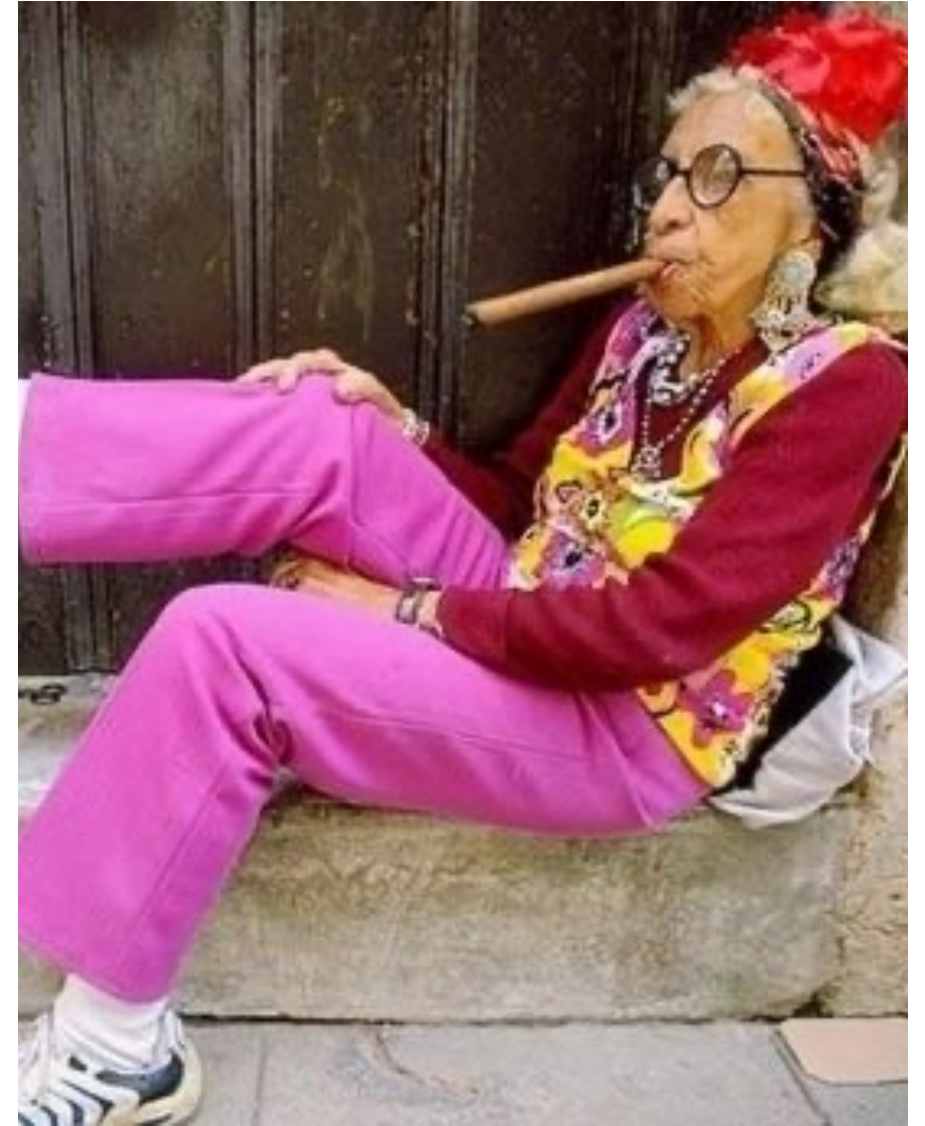
# Biomarker: Fractional Nitric Oxide (FeNO)

- FeNO is originated from nitric oxide production by the airway epithelium
- Plays key roles in lung biology as bronchodilator and inflammatory mediator
- FeNO as a single, stand-alone biomarker might not be useful and should be used as part of a more comprehensive panel
- Current guidelines for the treatment of severe asthma do not recommend the use of FeNO in the routine for the management of adults and children with asthma

**CASE**

# Case: Sofia

- Sofia is a 68-year-old white female presenting to the emergency department with acute onset shortness of breath with exertion, productive cough thick yellow tinged mucus, and wheezing. She has a history of uncontrolled asthma with multiple unscheduled medical utilization and prednisone bursts. She was diagnosed with asthma in early childhood with
- Symptoms began approximately 5 to 7 days ago and have progressively worsened. Symptoms are worse when she is outdoors and with mild exertion.
- She has increasing dyspnea on exertion over the past few years that accelerated over the past 9 to 12 months.



# Case: Sofia

Sofia started smoking cigarettes at age 16 years old. Her father used to share his cigarettes with her on family camping trips as a child.

She has smoked one to two packs of cigarettes per day until approximately 6 to 9 months ago.

She stopped smoking cigarettes “most of the time” and has replaced cigarettes with cigars or vaping.

Sofia is promising you today she will only smoke ONE cigar a day since she does not inhale cigar smoke into her lungs. She would like a prescription for prednisone as that always makes her breathing better.



# Case: Sofia

- Past medical history:

asthma self-reported as mild persistent diagnosed in early childhood, cough, chronic rhinitis, hypertension well controlled on lisinopril 20 mg 1 tablet once daily, GERD

- Sofia says she has never been told she has COPD and has never preformed spirometry

- Social history:

Sofia works as at a local restaurant 6 to 8 hours a day 5 days a week. She went to college for two years. She walks around her neighborhood block for exercise, but generally gets short-of-breath. She drinks 1 to 2 cocktails most every night. She has smoked 1 to 2 packs of cigarettes a day for 52 years. No illicit drug use. She lives alone. Her husband died of cardiac disease in 2015.

# Case: Sofia

I always take  
every medicine  
just like you say!  
ALWAYS!!



## Medications:

- Fluticasone furoate-vilanterol 100mcg/25 mcg  
1 puff inhaled once daily
- albuterol-ipratropium inhaled every 4 hours PRN
- cetirizine 10 mg 1 tablet once daily
- Fluticasone propionate nasal spray 2 sprays each nostril once daily
- Famotidine 20 mg twice daily
- Lisinopril 20 mg 1 tablet once daily
- vitamin D3 1000 units by mouth daily
- No marijuana medical card

Immunizations are  
current

COVID-19 vaccine Pfizer  
3/12/2021

4/1/2021

Booster Pfizer

11/4/2021

Flu vaccine 11/4/2021



# Case: Sofia



**Review of systems** was pertinent for shortness-of-breath, cough, wheezing, chronic rhinitis, hypertension, GERD, and occasional heartburn

## **Physical Exam**

On examination, Wt. 118. Ht. 5'3" BMI 20.3.

BP: 120/70 mmHg HR: 100 RR 16. SaO<sub>2</sub> 91% on room air

Her general appearance was thin, and notable for a pleasant female who was alert and oriented. She has mild increased work of breathing

Her oropharynx was clear without exudate and neck exam revealed no lymphadenopathy

Auscultation: scattered end expiratory wheezes throughout lung segments

Cardiac exam was normal rate with a regular rhythm.

Abdomen was thin, soft and nontender

Extremities showed no evidence of clubbing or edema.

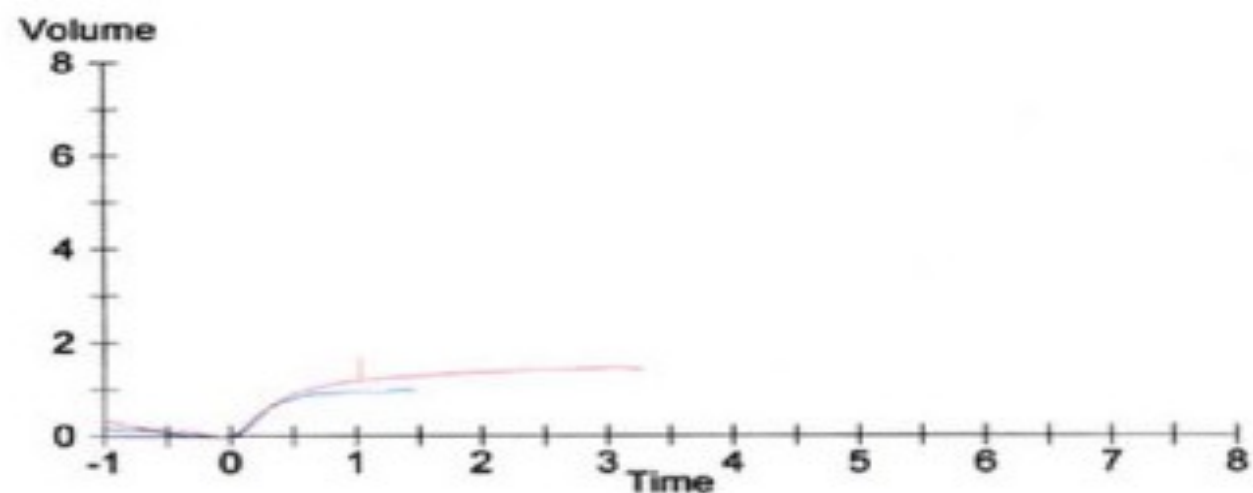
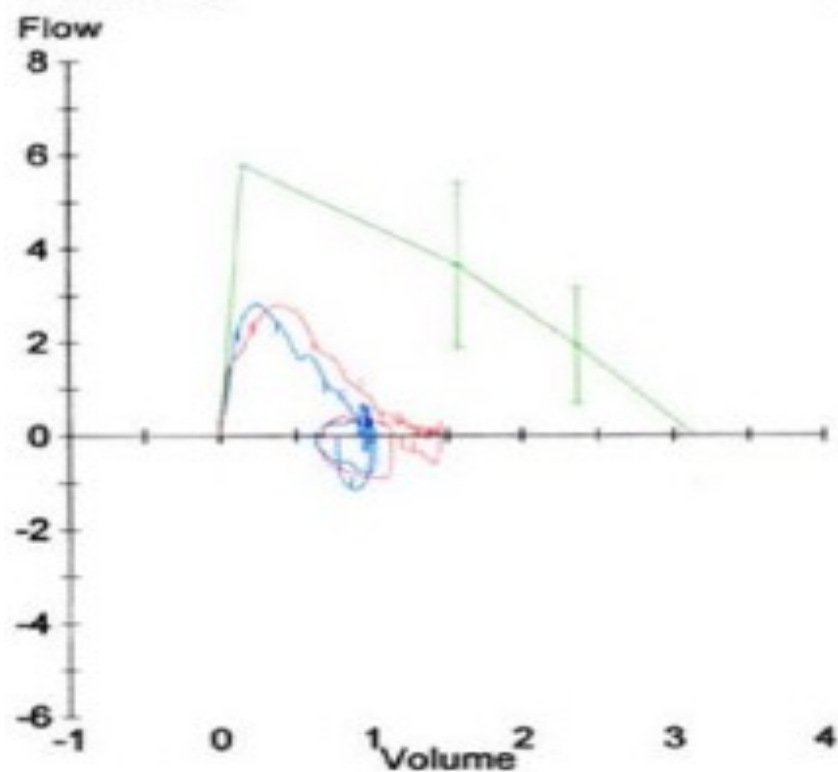
# Case: Sofia

What questions would you  
like to ask Sofia?

What test would you  
like to order?

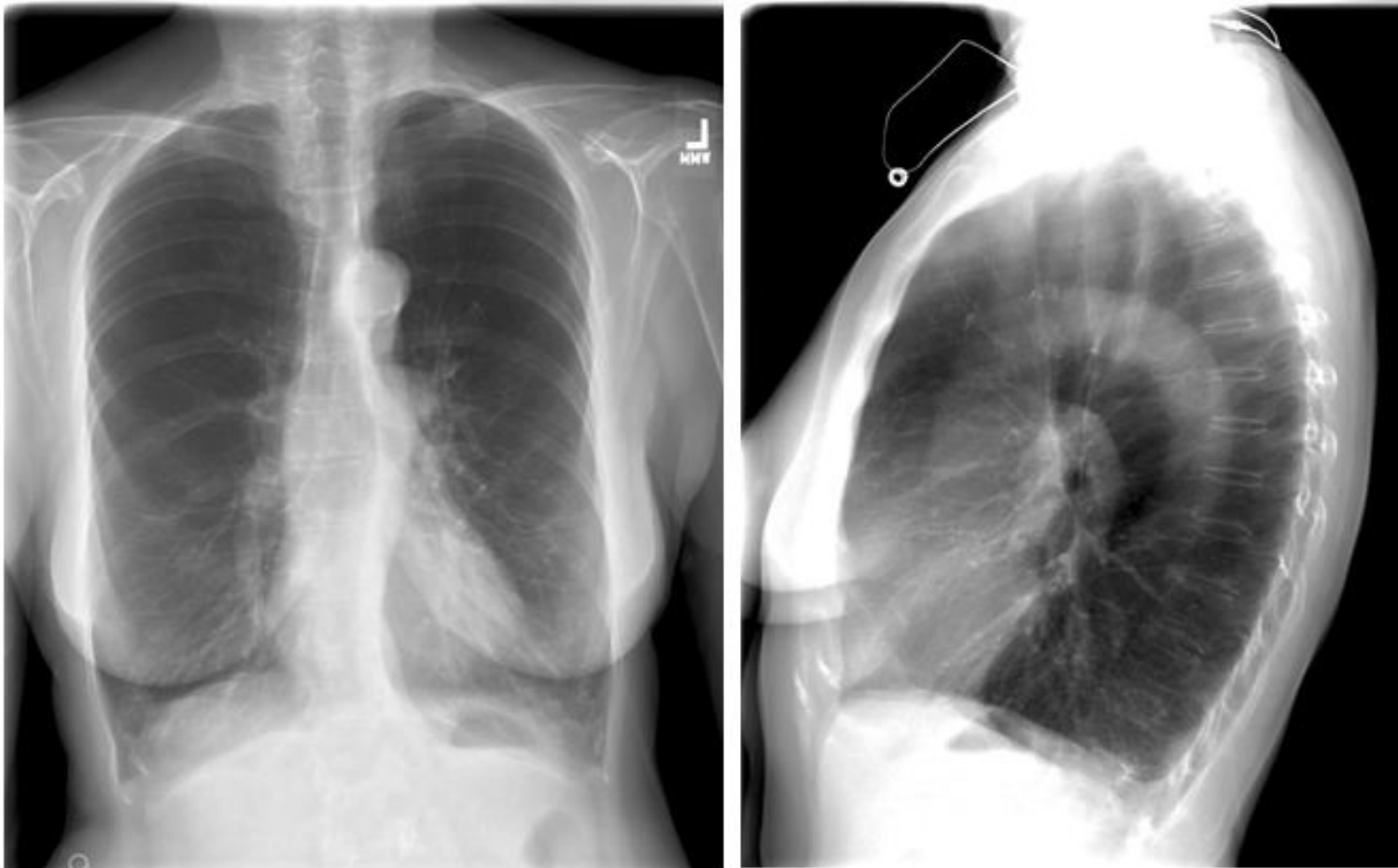
## Spirometri

		Ref	Pre Meas	Pre % Ref	Post Meas	Post % Ref	Post % Chg
FVC	Liters	3.16	1.01	32	1.47	47	46
FEV1	Liters	3.01	0.96	32	1.21	40	26
FEV1/FVC	%	86	95		82		
FEF25%	L/min		162		158		-2
FEF50%	L/min	220	134	61	112	51	-16
FEF75%	L/min	117	62	53	30	26	-51
FEF25-75%	L/min	204	108	53	79	39	-27
PEF	L/min	349	172	49	171	49	-1
FIVC	Liters	3.16	0.23	7	0.27	8	17
FVL Time			12:17		12:39		



# Spirometry

- The diagnosis of obstructive lung disease relies on spirometry
- Pre- and post-bronchodilator spirometry should be performed
- A ratio of postbronchodilator forced expiratory volume in one second (FEV<sub>1</sub>) to forced vital capacity (FEV<sub>1</sub> /FVC) of less than 0.7 confirms persistent airflow limitation consistent with COPD
- Reversibility can be defined as an FEV<sub>1</sub> increase of over 12% and more than 200 mL following bronchodilator use



Demonstrating hyperinflated lungs with emphysema



# Lab work-up

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# Medication Regimen

- What medications are you prescribing?
- Is Sophia a candidate for SMART?
  
- TRELEGY 100/62.5/25 mcg

# Written Action Plan



Guidelines recommend a written action plan as a component of self-management in COPD and asthma





# Smoking Cessation

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- Tobacco smoking is the most important risk factor for COPD, and the rate of decline in lung function can be slowed by stopping smoking
- In patients with asthma, smoking is associated with progression to severe asthma and reduced glucocorticoid sensitivity
- RX: nicotine replacement therapy

Israel E, Reddel HK. N Engl J Med 2017;377:965-76.



# Clinical Interventions for Asthma and COPD

- Bronchodilators for symptom control
- Inhaled corticosteroids for nearly all patients with asthma and selected patients with COPD
- Systemic glucocorticoids for severe exacerbations
- Smoking cessation
- Annual influenza vaccination
- Correction of inhaler technique
- Written action plan
- Management of comorbidities
- Pulmonary rehabilitation

# Patient Education

- Inhaler technique
- Adherence to medical treatment regiment
- Medications
- Signs and symptoms of worsening asthma or COPD
- Nutrition
- Basic pathophysiology of asthma and COPD
- Signs and symptoms of worsening symptoms
- Comorbidities

# Plan

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# Things to remember!

- Simplifying treatment regimens
- Personalized asthma AND COPD care
- Comorbidities
- People with asthma–COPD are at risk of cardiovascular disease secondary to smoking
- Cardiovascular disease common cause of death in patients with COPD
- Osteoporosis frequently coexists due to limited physical activity, smoking and corticosteroid use
- Biologics, have shown the potential to exhibit disease-modifying properties in patients with asthma
- Close follow-up!!

*thank  
you*

Karen L. Gregory, DNP, APRN, CNS, RRT, AE-C, FAARC  
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