



Conversations in  
**PULMONOLOGY**

**Individualize and Reassess: Biologics for Severe Asthma**



# Faculty

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## **Njira Lugogo, MD**

Professor of Internal Medicine

Division of Pulmonary & Critical Care Medicine

Asthma Program Director

University of Michigan

Ann Arbor, MI



# Disclosures

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- **Njira Lugogo** has disclosed the following financial relationship:
  - Consultant: AstraZeneca, Sanofi, Teva, Regeneron, GSK, Amgen, NIOX, Genentech
  - Advisor: AstraZeneca, Sanofi, Teva, Regeneron, GSK, Amgen, NIOX, Genentech
  - Speaker: AstraZeneca, GSK
  - Contracted Research: Amgen, GSK, Genentech, AstraZeneca, Teva, Regeneron, Sanofi
  - All her disclosures are related to respiratory

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# Learning Objectives

## Discuss



Discuss the relationship between pathophysiology, phenotypes/endotypes, and biological agent treatment targets in asthma

## Individualize



Individualize the selection of biologic agent for patients with severe asthma based on phenotype, comorbidities, and SDM

## Assess



Assess treatment response to biologic therapy using quantitative measures, noting the relationship between persistent symptoms and common comorbidities



# Pre-test Questions



## Pre-test Question 1

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**Pre-AB1: Which of the following characteristics is the best predictor for response to anti-IL-5 therapy in a patient with severe asthma?**

- A. IgE > 30 IU/mL
- B. Blood eosinophils > 1500 cells/ $\mu$ L
- C. Comorbid eosinophilic esophagitis
- D. Fractional exhaled nitric oxide (FeNO) > 50 ppb



## Pre-test Question 2

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**Pre-AB2: Which of the following characteristics in a patient with severe asthma suggests high risk for exacerbations?**

- A. IgE > 150 IU/mL
- B. Blood eosinophils > 400 cells/ $\mu$ L
- C. Need for high-dose ICS/LABA/LAMA
- D. Comorbid atopic conditions (e.g., allergy, atopic dermatitis)



## Pre-test Question 3

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**Pre-AB3: 33 y/o male with severe asthma has been referred for evaluation for biologic therapy. Reports daily symptoms and SABA use.**

**PMH:** Asthma (3 exacerbations in past year), eosinophilic esophagitis

**Meds:** High-dose ICS/LABA/LAMA, albuterol prn, PPI

**Labs:** Blood eosinophils 320 cells/ $\mu$ L, IgE 120 IU/mL, FeNO 65ppb, negative allergy testing.

**Which biologic would be most appropriate to initiate?**

- A. Benralizumab
- B. Dupilumab
- C. Omalizumab
- 8 D. Reslizumab





## Pre-test Question 4

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**Pre-AB4: 40 y/o female returns for follow-up after starting biologic agent 12 months ago.**

**Reports asthma symptoms are well controlled. No exacerbations in past year.**

**PMH:** Severe asthma, seasonal allergies.

**Meds:** High-dose ICS/LABA, mepolizumab

FEV1 80% predicted. ACT score 23.

**The patient asks if he can reduce or stop any medications. What would you recommend?**

- A. Continue biologic and current inhaler therapy
- B. Continue biologic, change inhaler to albuterol (rescue)
- C. Discontinue biologic, continue inhaler at current dose
- 9 D. Continue biologic, change inhaler to medium-dose ICS/LABA



## Pre-test Question 5

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**Pre-AB5: Please rate your overall level of confidence in your responses to the previous questions.**

- A. Very confident (4)
- B. Confident (3)
- C. Somewhat confident (2)
- D. Not at all confident (1)



## Pre-test Question 6

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**Pre-AB6: How confident are you in your ability to adjust biologic therapy with respect to response in patients with severe asthma?**

- A. Very confident (4)
- B. Confident (3)
- C. Somewhat confident (2)
- D. Not at all confident (1)



## Pre-test Question 7

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**Pre-AB7: How often do you consider biomarkers when assessing patients with severe asthma for biologic therapy?**

- A. Always (4)
- B. Often (3)
- C. Rarely (2)
- D. Never (1)



## Pre-test Question 8

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**Pre-AB8: Which of the following describes your perspective regarding the selection and use of biologic treatments for asthma? (choose all that apply)**

- A. Overwhelmed by the breadth of literature and lack of clear guidelines
- B. Worried about long-term efficacy and safety of biologic agents
- C. Hopeful that asthma might be a disease that can be treated to remission
- D. Empowered by the number and variety of biologic treatments available



# Inflammation, Patient Characterization, Targets, and Treatments

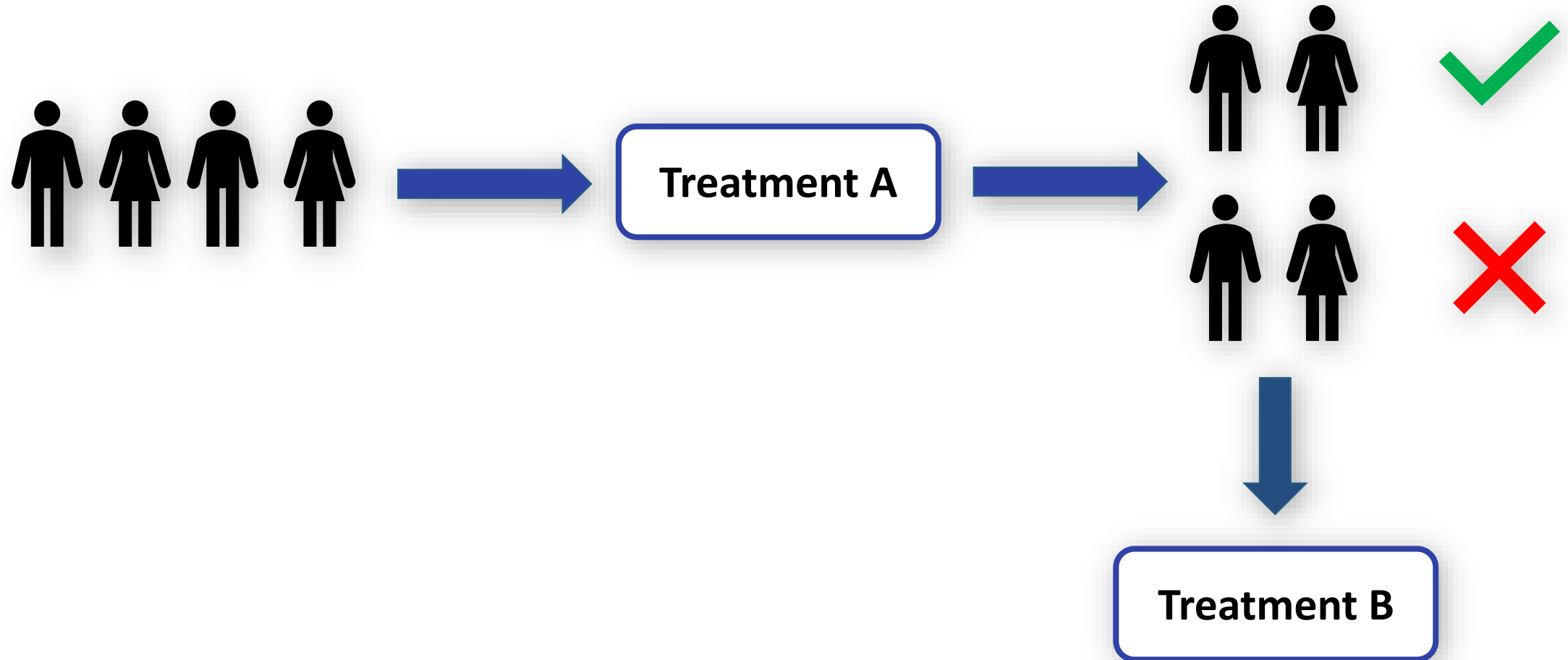


# Definitions of Severe Asthma

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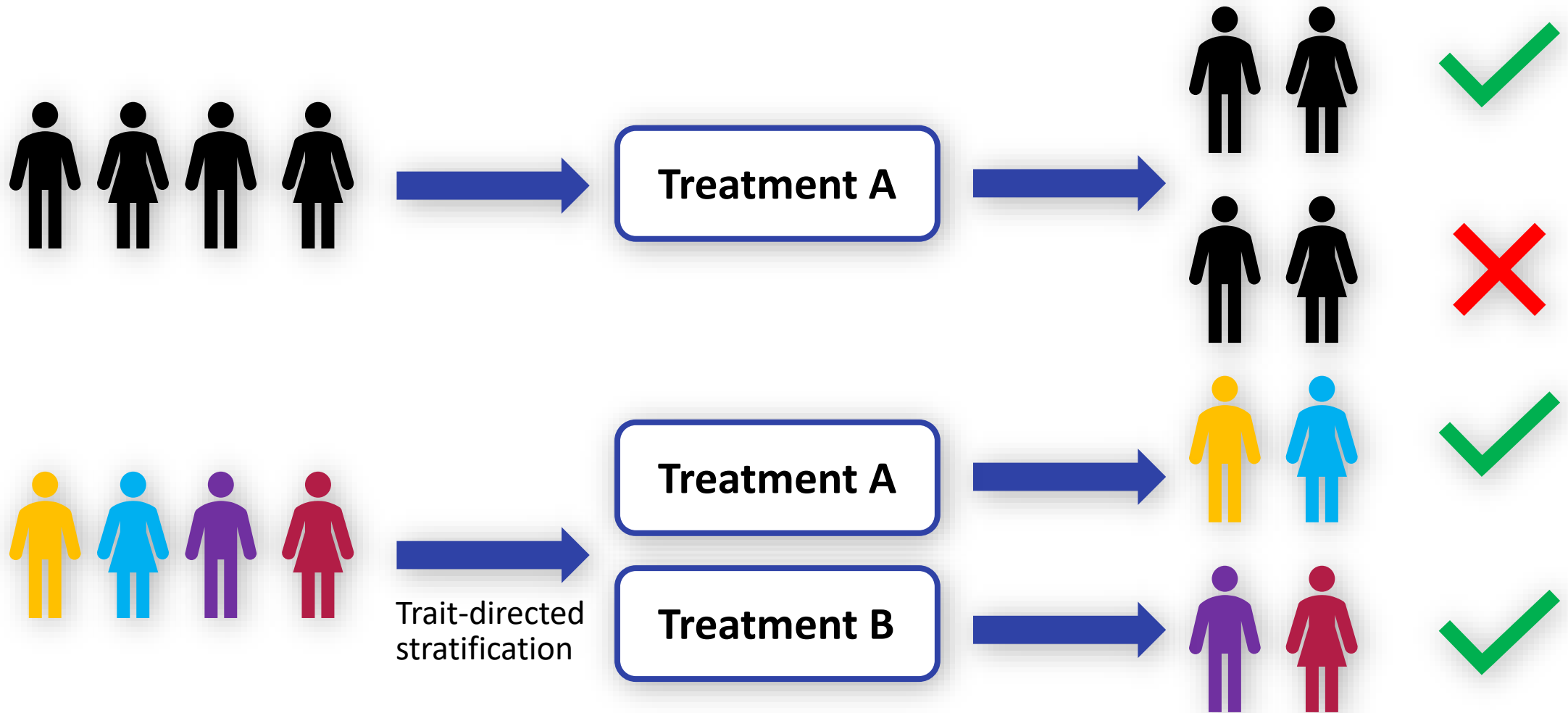
- Difficult-to-treat asthma:
  - Asthma with uncontrolled symptoms/frequent exacerbations due to modifiable factors or untreated coexisting conditions
  
- Severe asthma:
  - Requires high-dose ICS + LABA or systemic corticosteroids for  $\geq 50\%$  of the year OR asthma that is “uncontrolled” despite these therapies
  
  - Other components:
    - $\geq 2$  exacerbations/year OR 1 requiring hospitalization or ICU
  
    - FEV1  $<80\%$

# Previous Approach to Asthma Treatment

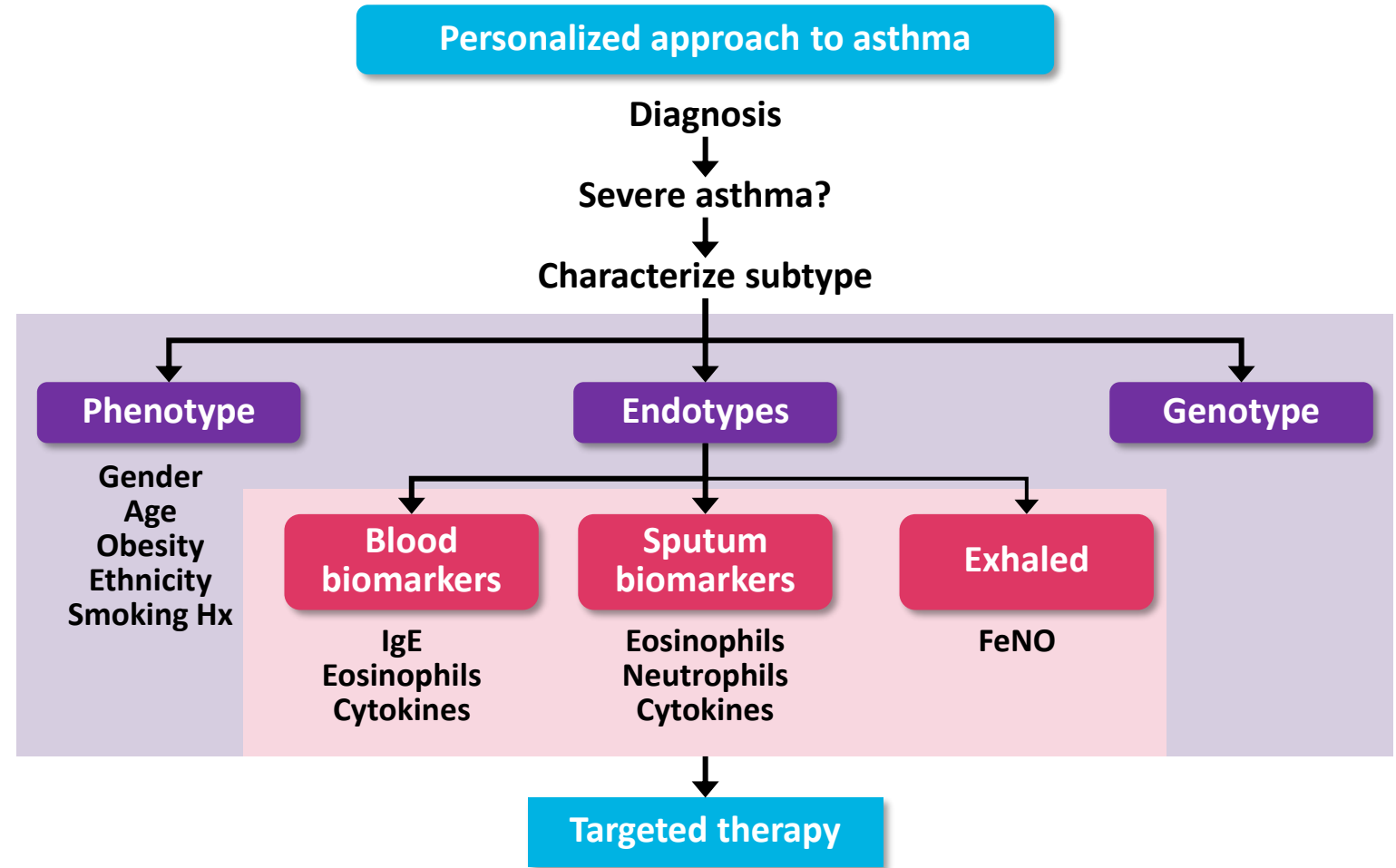
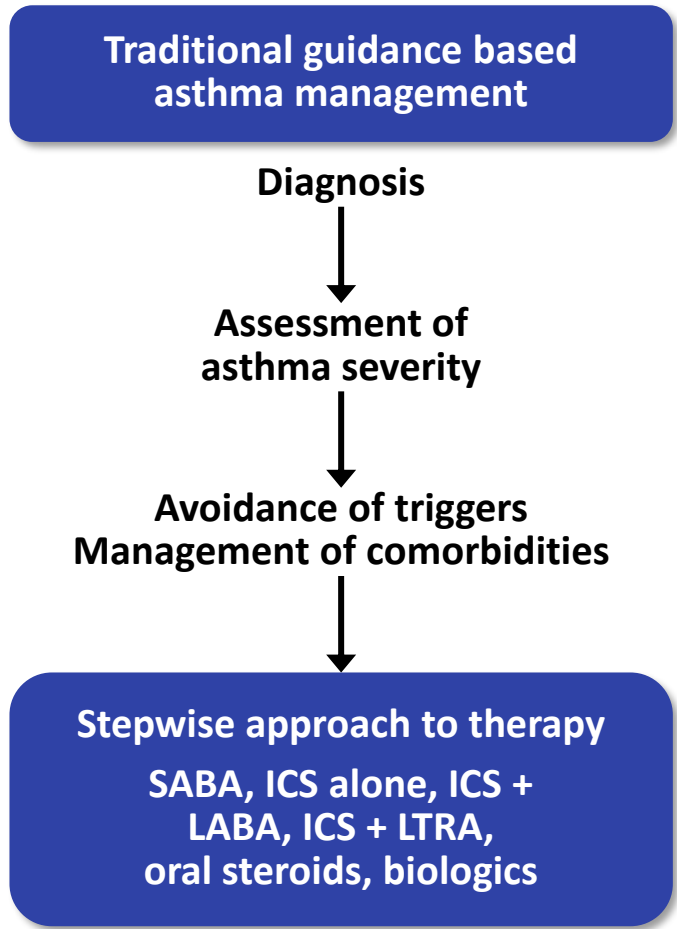




# New Approach to Asthma Treatment



# Approach to Severe Asthma Therapy



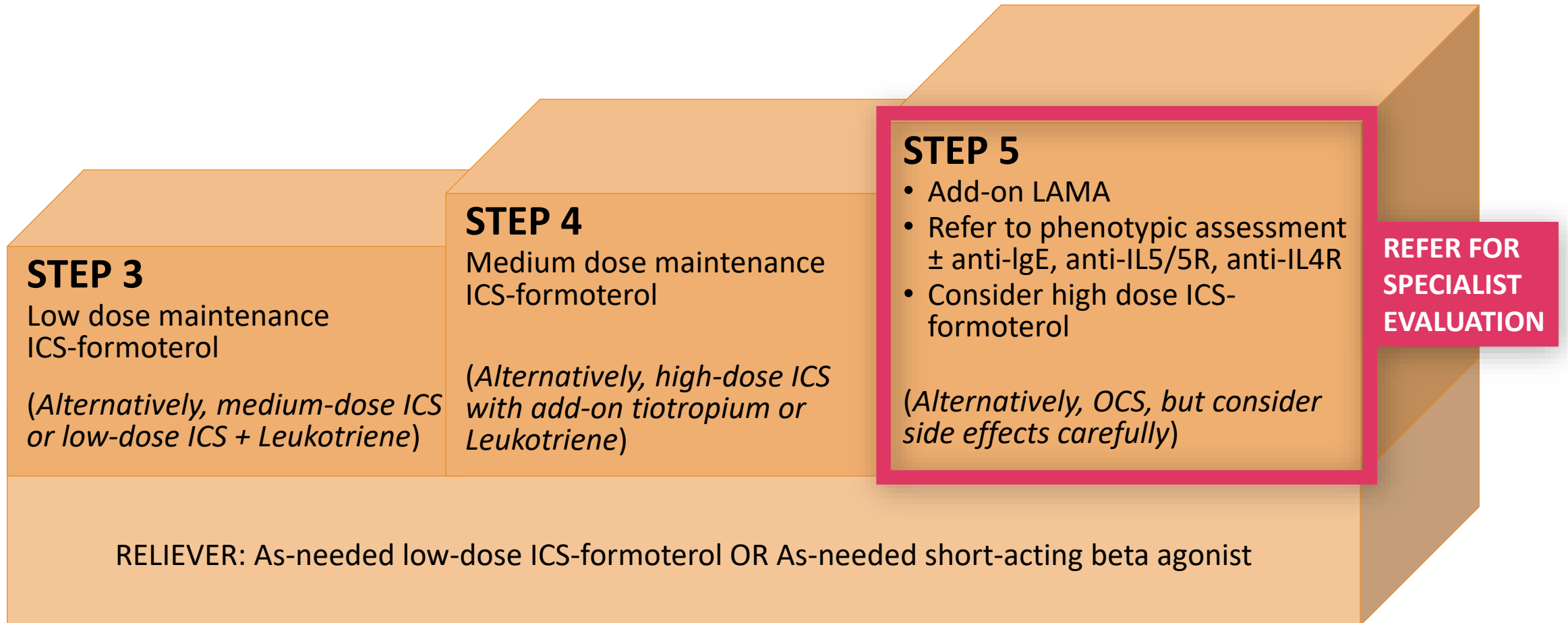


# Biomarkers in Severe Asthma

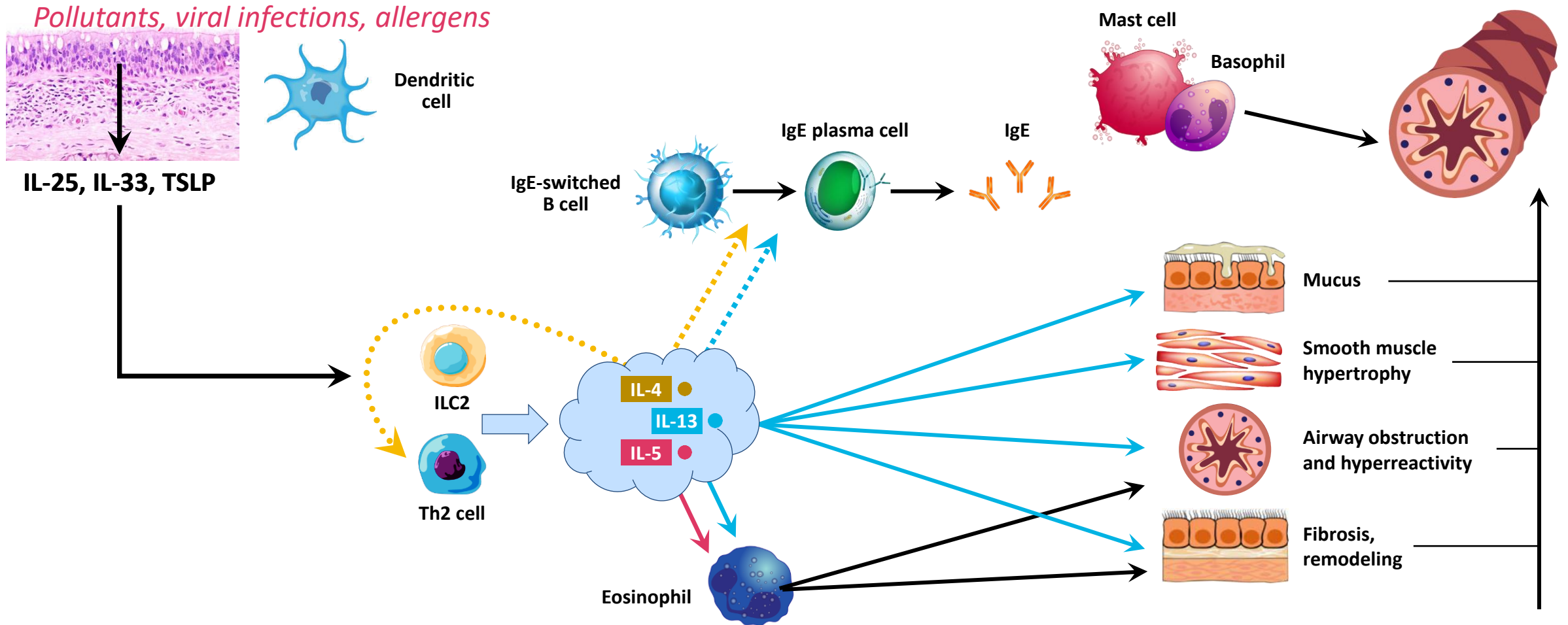
Biomarker	T2 Levels			Limitations
	Low	Medium	High	
Total IgE (IU/mL)	< 30	31-149	> 150	<ul style="list-style-type: none"><li>▪ Affected by oral steroids</li><li>▪ Not well-correlated with asthma severity or outcomes</li></ul>
Blood eosinophils (cells/ $\mu$ L)	< 150	151-399	> 400	<ul style="list-style-type: none"><li>▪ Decreased by OCS; slight reduction possible by ICS</li><li>▪ Elevations can be seen in other conditions</li><li>▪ Highly predictive of exacerbation risk</li></ul>
Sputum eosinophils (%)	—	—	$\geq 3$	<ul style="list-style-type: none"><li>▪ Confined to research settings</li></ul>
FeNO (ppb)	< 25	26-49	> 50	<ul style="list-style-type: none"><li>▪ Suppressed by ICS; less affected by OCS</li><li>▪ Affected by age, smoking, and respiratory infections</li><li>▪ Indicator of disease progression &gt; exacerbation risk</li></ul>
Allergy testing in vitro or in vivo	—	+	+++	<ul style="list-style-type: none"><li>▪ Availability, variability from region to region</li></ul>

**May repeat biomarkers up to 3 times (when asthma worsens or before oral steroids)**

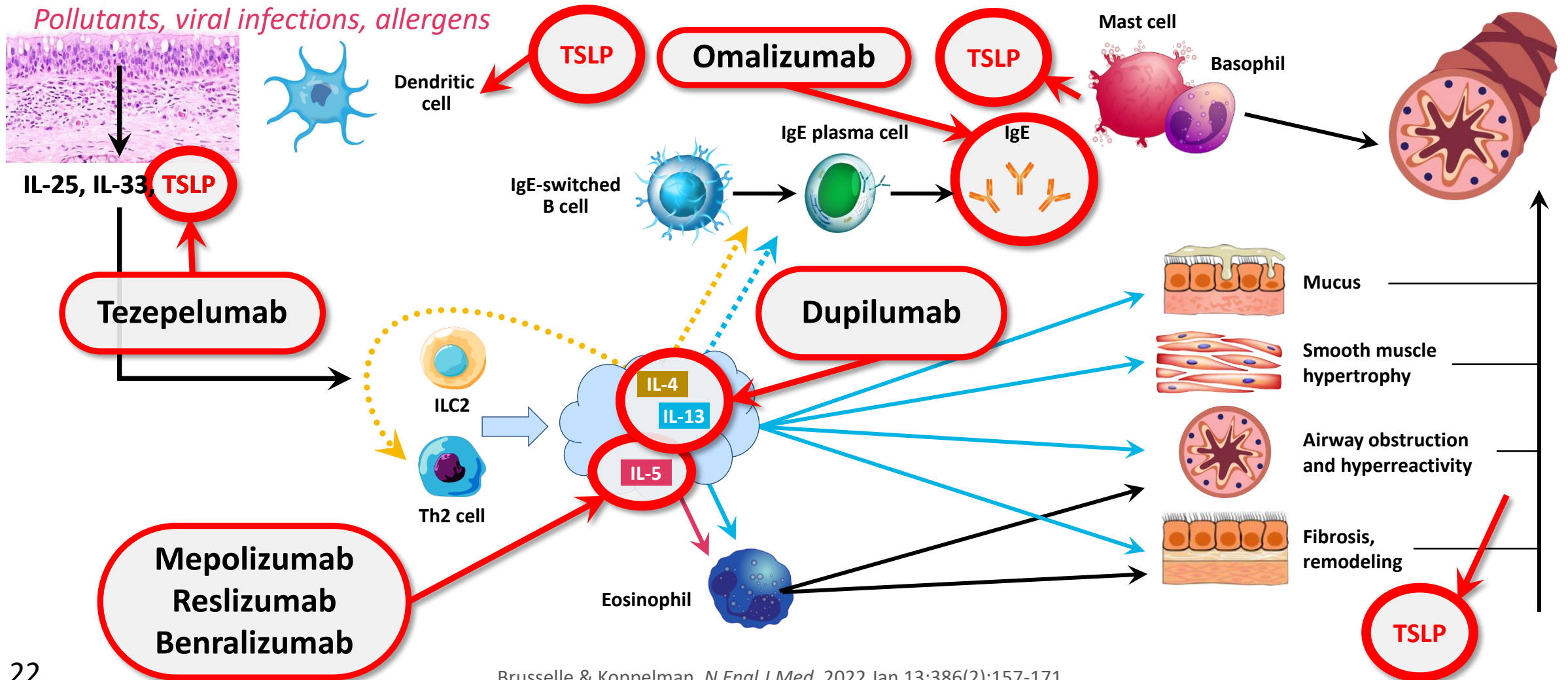
# Step 5: Focus on Biologics and Move Away From Systemic Corticosteroids



# Effects of Type 2 Inflammation



# Effects of Type 2 Inflammation



Brusselle & Koppelman. *N Engl J Med*. 2022 Jan 13;386(2):157-171.



# Overview of Biologics in Severe Asthma

Biologic	Target	Treatable Traits	Approved For
<b>Omalizumab</b>	IgE	IgE level (30-700 IU/ml) + perennial allergies	Moderate-to-Severe Asthma AND Chronic spontaneous urticaria, chronic rhinosinusitis w/nasal polyps, food allergy
<b>Mepolizumab</b>	IL-5	Eosinophilic phenotype (> 150 cells/ $\mu$ L)	Severe Asthma AND EGPA, HES, chronic rhinosinusitis with nasal polyps
<b>Reslizumab</b>	IL-5	Eosinophilic phenotype (> 400 cells/ $\mu$ L)	Severe Asthma
<b>Benralizumab</b>	IL-5R	Eosinophilic phenotype (> 150 cells/ $\mu$ L)	Severe Asthma
<b>Dupilumab</b>	IL-4R	Eosinophilic phenotype (> 150 cells/ $\mu$ L)	Moderate-to-Severe Asthma AND Atopic dermatitis, chronic rhinosinusitis with nasal polyps, eosinophilic esophagitis, prurigo nodularis
<b>Tezepelumab</b>	TSLP	No specific biomarker threshold	Severe Asthma



# Overview of Biologics in Severe Asthma

Biologic	Target	Treatable Traits	Approved For
Omalizumab	IgE	IgE level (30-700 IU/ml) Perennial allergies	Moderate-to-Severe Asthma AND Chronic spontaneous urticaria, chronic rhinosinusitis
Mepolizumab	IL-5	Eosinophils (> 300 cells/ $\mu$ L)	Severe Asthma AND Nasal polyps
Reslizumab	IL-5	Eosinophils (> 300 cells/ $\mu$ L)	Severe Asthma
Benralizumab	IL-5R $\alpha$	Eosinophils (> 300 cells/ $\mu$ L)	Severe Asthma
Dupilumab	IL-4R $\alpha$	Eosinophils (> 150 cells/ $\mu$ L)	Atopic dermatitis, chronic rhinosinusitis with nasal polyps, eosinophilic esophagitis, prurigo nodularis
Tezepelumab	TSLP	No specific biomarker threshold	Severe Asthma

**REMEMBER**

- Blood eosinophils are variable
- Dupilumab has **indication** for OCS-dependent asthma
- Mepolizumab/benralizumab/tezepelumab demonstrated to reduce maintenance OCS dose (**steroid-sparing**)



# Efficacy and Safety of Biologics in Moderate-To-Severe Asthma



## Efficacy

- Multiple clinical studies:
  - ↑ Quality of life
  - ↓ Exacerbations
  - ↓ ER visits
  - ↓ Hospitalizations
  - ↓ Steroid requirements

## Safety

- Very low incidence of side effects in trials (< 3%), including:
  - Headache
  - Nasopharyngitis
  - Injection-site reactions
  - Ocular effects (dupilumab, in atopic dermatitis patients)
  - Rare anaphylactic reactions

Maselli DJ, et al. *J Asthma Allergy*. 2016 Aug 31;9:155-62; Maselli DJ, et al. *Ther Clin Risk Manag*. 2018;14:2059-2068; Brusselle GG, et al. *N Engl J Med*. 2022 Jan 13;386(2):157-171; Fasentra (benralizumab) [package insert]. Wilmington, DE: AstraZeneca Pharmaceuticals LP; October 2019; Nucala [package insert]; Philadelphia, PA; GlaxoSmithKline LLC; September 2019; Cinqair. [package insert] West Chester, PA; Teva Respiratory, LLC; February 2020; Wechsler ME, et al. *Respir Res*. 2020; 21: 264; Dupixent. [Package insert]. Tarrytown, NY; Regeneron Pharmaceuticals, Inc; January, 2021; Xolair. South San Francisco, CA; Genentech USA, Inc; November 2020.



# **Selection of Biologic Therapies in Severe Asthma**

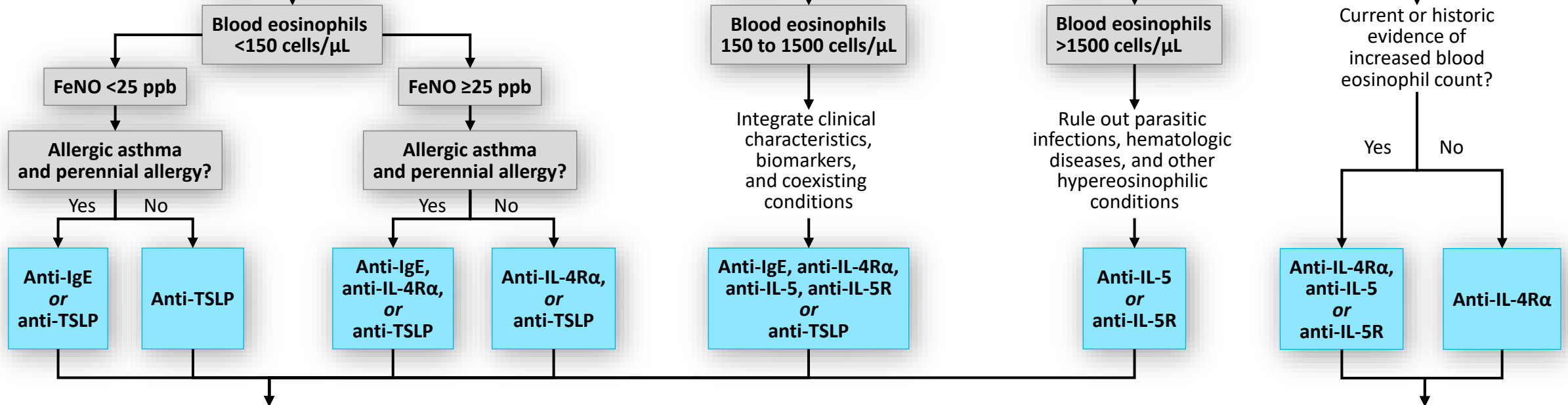
# Algorithms For Selecting Biologics

Severe asthma despite high-dose ICS + LABA and adequate management

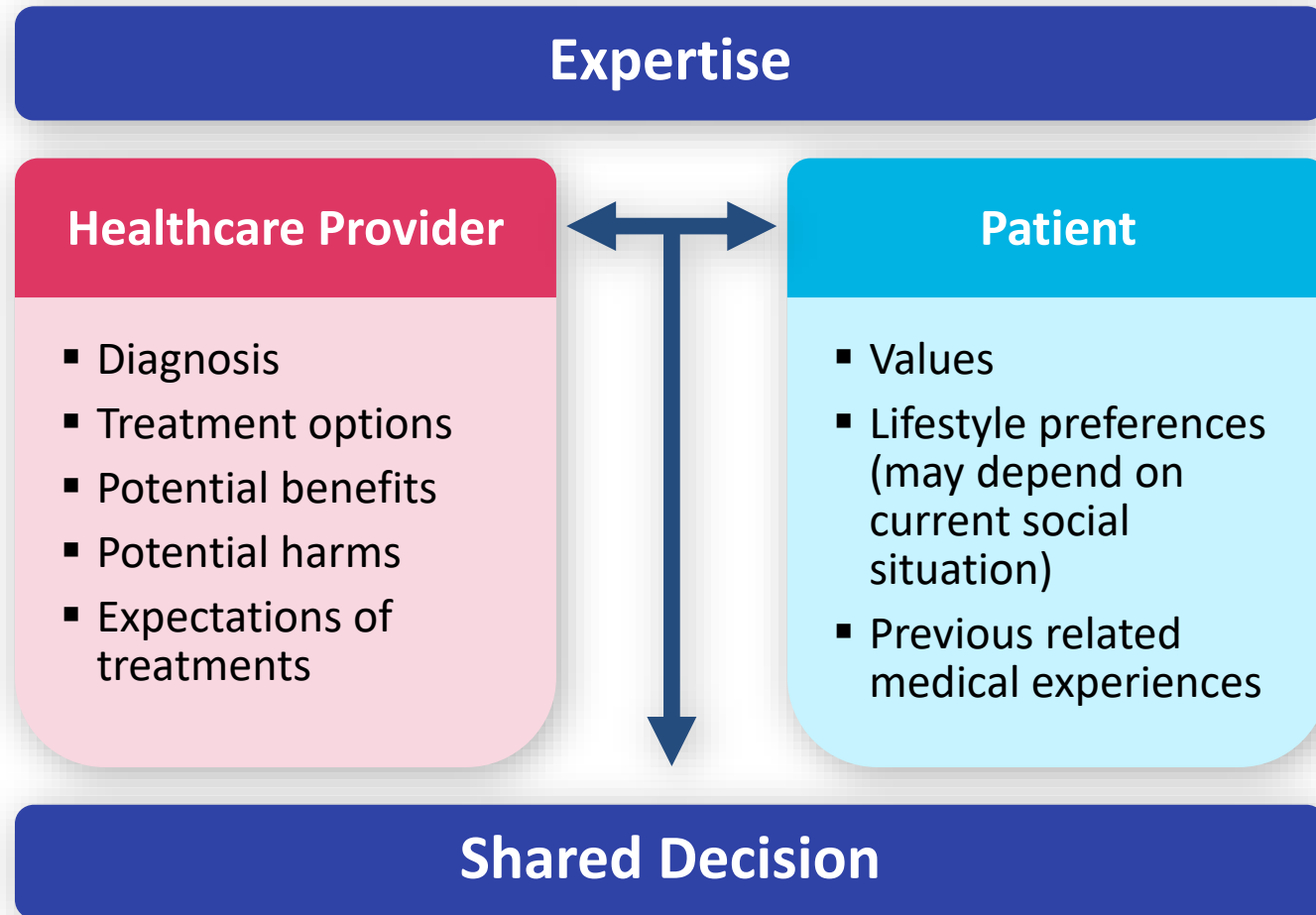
- Determine blood eosinophil count and FeNO
- Assess coexisting conditions (eg, severe atopic dermatitis, CRSwNP, allergic rhinitis, eosinophilic pneumonia, EGTPA)

Severe asthma (without daily OCS)

OCS-dependent severe asthma



# Shared Decision Making Is Essential When Selecting Biologics



- Psychological benefits
  - Improved patient knowledge and understanding of risks
  - More active involvement
  - Less indecision
  - Improved understanding of patient goals/values
- Clinical benefits
  - Improved adherence
  - Better outcomes
- Health care resources benefits
  - Less healthcare resource utilization
  - Lower health care costs
  - Lower use of invasive options

# ARS Question 1

## Case 1: Mr. Flannagan

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- 62 y/o male with persistent asthma symptoms.
- **PMH:** Adult-onset severe asthma, nasal polyps s/p resection 2 years ago.
- 3 exacerbations in last year.
- **Meds:** High-dose ICS/LABA/LAMA, 10 mg prednisone daily, albuterol prn.
- **FEV1:** 60% predicted, 24% reversibility.
- **ACT score:** 8.
- **Biomarkers:** Blood eosinophils 280 cells/ $\mu$ L, FeNO 50 ppb, IgE 250 IU/mL.
- Negative allergy testing.

**ARS-AB10: Which biologic would you consider for this patient?**

- A. Anti-IgE (omalizumab)
- B. Anti-TSLP (tezepelumab)
- C. Anti-IL-4/IL-13 (dupilumab)
- D. Anti-IL-5 (benralizumab, mepolizumab, reslizumab)

# ARS Question 2

## Case 2: Ms. Nguyen



- 42 y/o female with persistent asthma symptoms.
- **PMH:** Adult-onset severe asthma, chronic rhinosinusitis with nasal polyps.
- 4 exacerbations in past year.
- **Meds:** High-dose ICS/LABA, albuterol prn.
- **FEV1:** 58% predicted, 10% reversibility.
- **ACT score:** 13.
- **Biomarkers:** Blood eosinophils 1500 cells/ $\mu$ L, FeNO 20 ppb, IgE 35 IU/mL.
- Negative allergy testing.

**ARS-AB11: Which biologic would you consider for this patient?**

- A. Anti-IgE (omalizumab)
- B. Anti-TSLP (tezepelumab)
- C. Anti-IL-4/IL-13 (dupilumab)
- D. Anti-IL-5 (benralizumab, mepolizumab, reslizumab)

# ARS Question 3

## Case 3: Ms. Roberts

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- 28 y/o female with persistent asthma symptoms.
- **PMH:** Childhood-onset severe asthma. Triggered by smoke, poor air quality.
- 2 exacerbations in past year.
- **Meds:** High-dose ICS/LABA/LAMA, albuterol prn.
- **FEV1:** 75% predicted, 24% reversibility.
- **ACT score:** 10.
- **Biomarkers:** Blood eosinophils 225 cells/ $\mu$ L, FeNO 65 ppb, IgE 250 IU/mL.
- Negative allergy testing.

**ARS-AB12: Which biologic would you consider for this patient?**

- A. Anti-IgE (omalizumab)
- B. Anti-TSLP (tezepelumab)
- C. Anti-IL-4/IL-13 (dupilumab)
- D. Anti-IL-5 (benralizumab, mepolizumab, reslizumab)



# Practical Management of Biologic Therapy





# Assessing Response to Biologic Therapy

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- Use a **systematic** approach to each assessment:
  - Identify treatable traits (pulmonary, extrapulmonary)
  - Define treatment targets (patient and clinician)
  - Identify expected outcomes
  - Temper patient expectations (if necessary)
  - Define length of initial treatment trial (usually 4-6 months)
  - Monitor systematically and compare outcomes to targets
    - Regular follow-up intervals
    - Assess exacerbations, as well as PFTs, symptoms, medication use, triggers, etc.
      - Symptom Questionnaires (ACT, AIR-Q, ACQ)

# Treatable Traits in Asthma

- Clinically relevant, measurable, and modifiable traits
- May include genetic, biomarker, phenotypic, psychosocial, environmental, or behavioral factors that impact disease control or prognosis

## Pulmonary

- Airflow limitation (PFTs)
- Eosinophilic airway inflammation
- Exacerbations
- Pulmonary infection
- Bronchiectasis

## Extrapulmonary

- Upper airway disease (allergic rhinitis, rhinosinusitis, nasal polyps, vocal cord dysfunction)
- Obstructive sleep apnea
- GERD
- Obesity
- Atopic dermatitis



# Defining Clinical Response to Biologic Therapy

## Exacerbations

- Most biologics result in a 30%–55% reduction in severe asthma exacerbations<sup>1</sup>

## OCS sparing

- Biologics show an OCS reduction<sup>1</sup>

## Achieving control

- A modest change in ACQ/ACT is expected<sup>1</sup>

## Lung function improvement

- Not all patients experience improvements in FEV<sub>1</sub><sup>1</sup>
- Expect the improvement in range of 114–320 mL (pre-bronchodilator), depending on the drug and individual patient factors<sup>2–4</sup>

## Achieving control

- Reduced ICS dose<sup>1</sup>
- Assess side effects, affordability and patient satisfaction<sup>1</sup>
- Reevaluate patients every 3–6 months<sup>1</sup>

ACQ, Asthma Control Questionnaire; ACT, Asthma Control Test; FEV<sub>1</sub>, forced expiratory volume in 1 second; ICS, inhaled corticosteroid(s); OCS, oral corticosteroid(s)

1. GINA 2019. Available from: <https://ginasthma.org/wp-content/uploads/2019/06/GINA-2019-main-report-June-2019-wms.pdf> (Accessed 10 September 2019);  
2. Nair P, et al. *N Engl J Med* 2017;376:2448–58; 3. Bel E, et al. *N Engl J Med* 2014;371:1189–97; 4. Rabe K, et al. *N Engl J Med* 2018;378:2475–85

# Assessing Response to Biologic Therapy

## Severe asthma (without daily OCS)

Assess response  
(after 4 to 6 months),  
side effects, and  
patient satisfaction

### Good response

- Decrease in exacerbation rate of  $\geq 50\%$
- Decrease in symptoms
- Improved asthma control

Continue add-on treatment with biologic agent

### Poor response

- Reassess differential diagnosis, adherence, coexisting conditions, phenotypes, and biomarkers
- Stop ineffective biologic agents
- Consider switching to a different biologic agent
- Share decision making

## OCS-dependent severe asthma

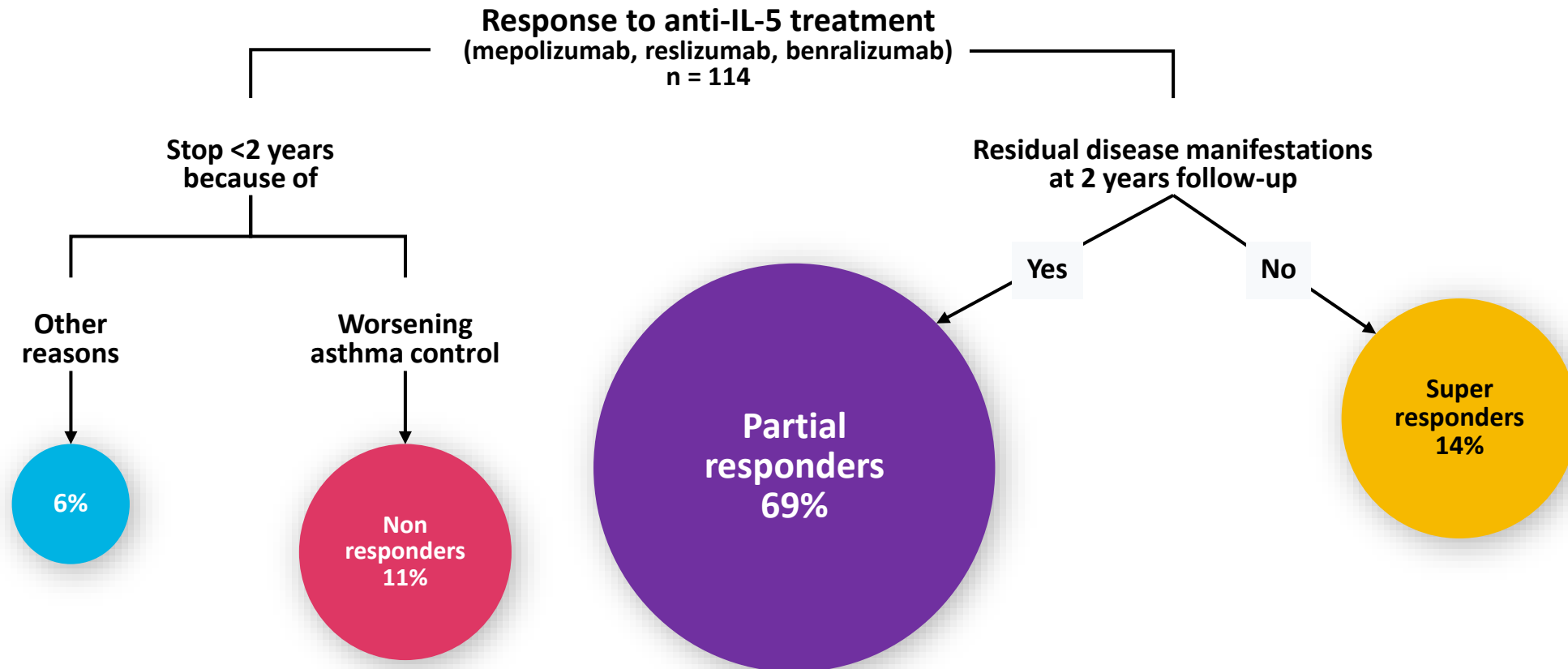
Taper OCS gradually  
Monitor for adrenal insufficiency  
Monitor for unmasking of EGPA  
Assess response, side effects,  
and patient satisfaction

### Good response

- Decrease in OCS dose of  $\geq 50\%$
- Decrease in exacerbation rate

Continue add-on treatment with biologic agent

# Response to Biologics Is Heterogenous





# Residual Disease in Partial Responders

## Clinical characteristics

ACQ score  $\geq 1.5$  **48%**

## Lung function

FEV<sub>1</sub>  $< 80\%$  **59%**

## Surrogate Inflammation markers

Chronic OCS **32%**

$\geq 1$  OCS burst **24%**

FeNO  $> 50$  **26%**

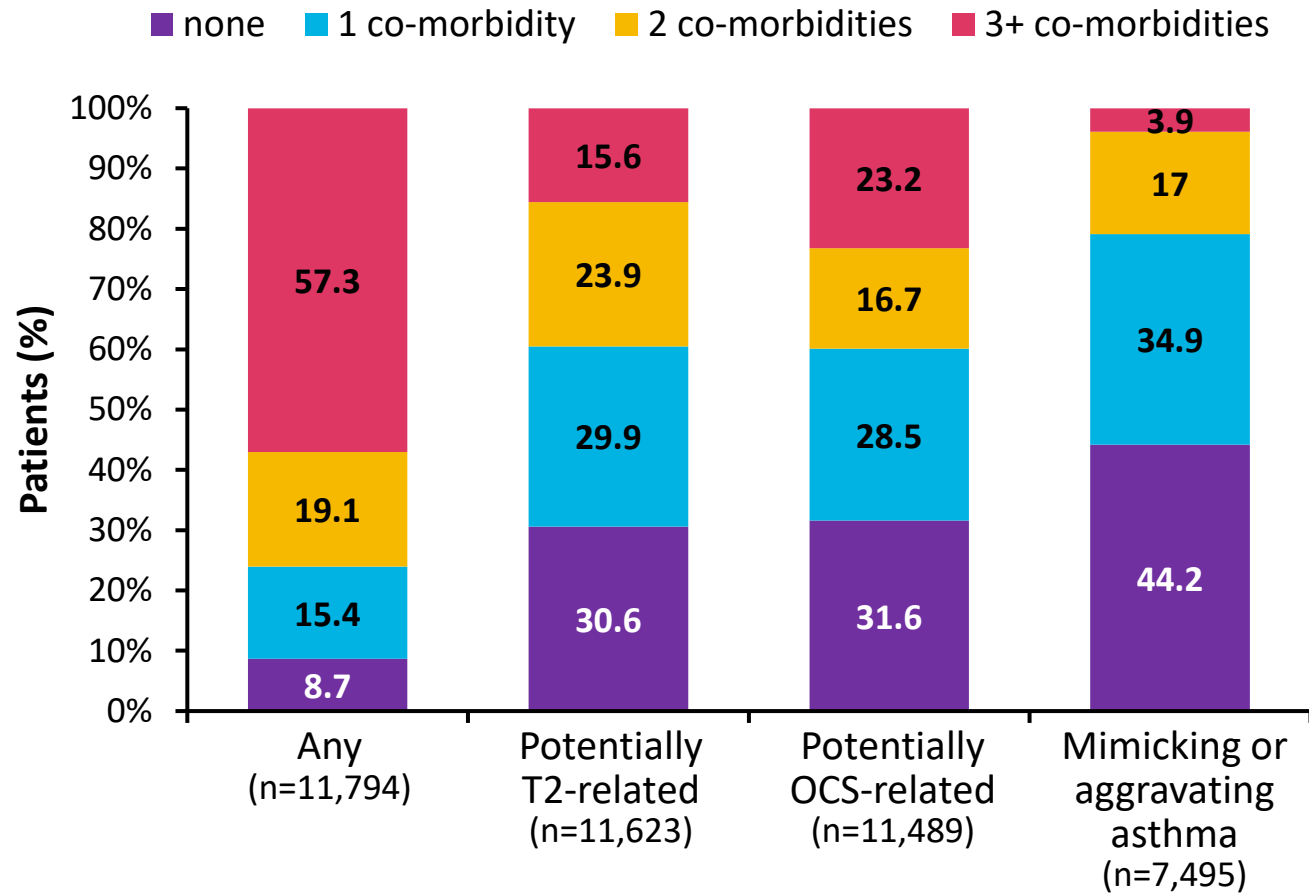
## Comorbidities

Sinonasal disease **58%**

Atopic disease **23%**

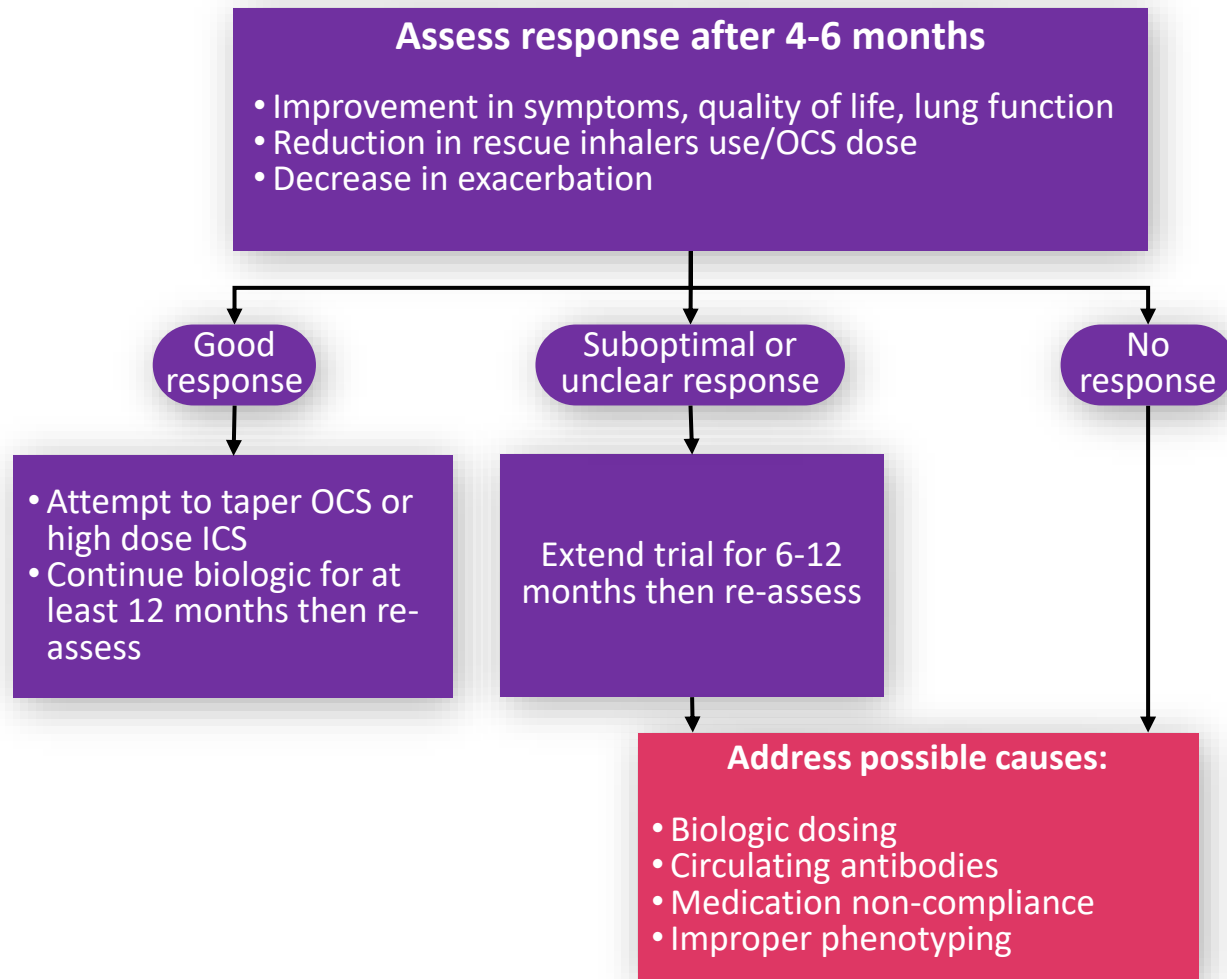
AI **10%**

# Impact of Comorbidities in Severe Asthma



- Analysis of International Severe Asthma Registry (N = 11,821)
- Clear relationship between number of comorbidities and extent of asthma outcome impairment
- Comorbidities were generally associated with OCS use and higher exacerbation rates, with variable impact on lung function and asthma control
- Chronic rhinosinusitis with nasal polyps was particularly associated with more exacerbations and OCS use

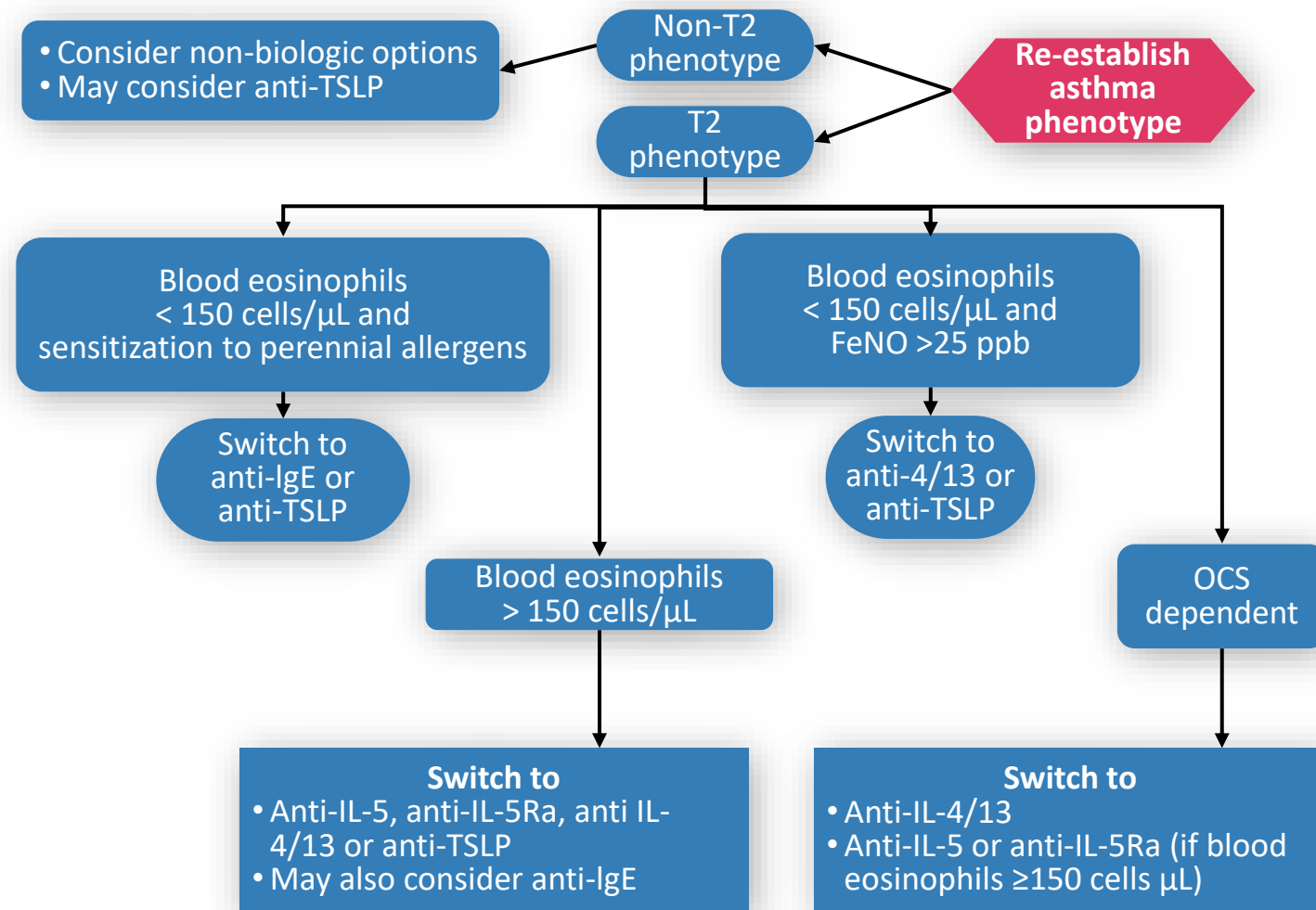
# Assessing Biologic Response: A Proposed Algorithm



- No well-defined criteria for assessing biologic response
- Review asthma symptoms, exacerbations, OCS/ICS dose, lung function, and QoL
- Maintain biologic for 4–6 months before re-evaluation
- If response is intermediate or unclear, consider 6–12 month extension
- When response is suboptimal, assessment of biomarkers is recommended



# Assessing Biologic Response: A Proposed Algorithm



- No well-defined criteria for assessing biologic response
- Review asthma symptoms, exacerbations, OCS/ICS dose, lung function, and QoL
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- When response is suboptimal, assessment of biomarkers is recommended

# ARS Question 1

## Case 1: Mr. Flannagan, Cont'd

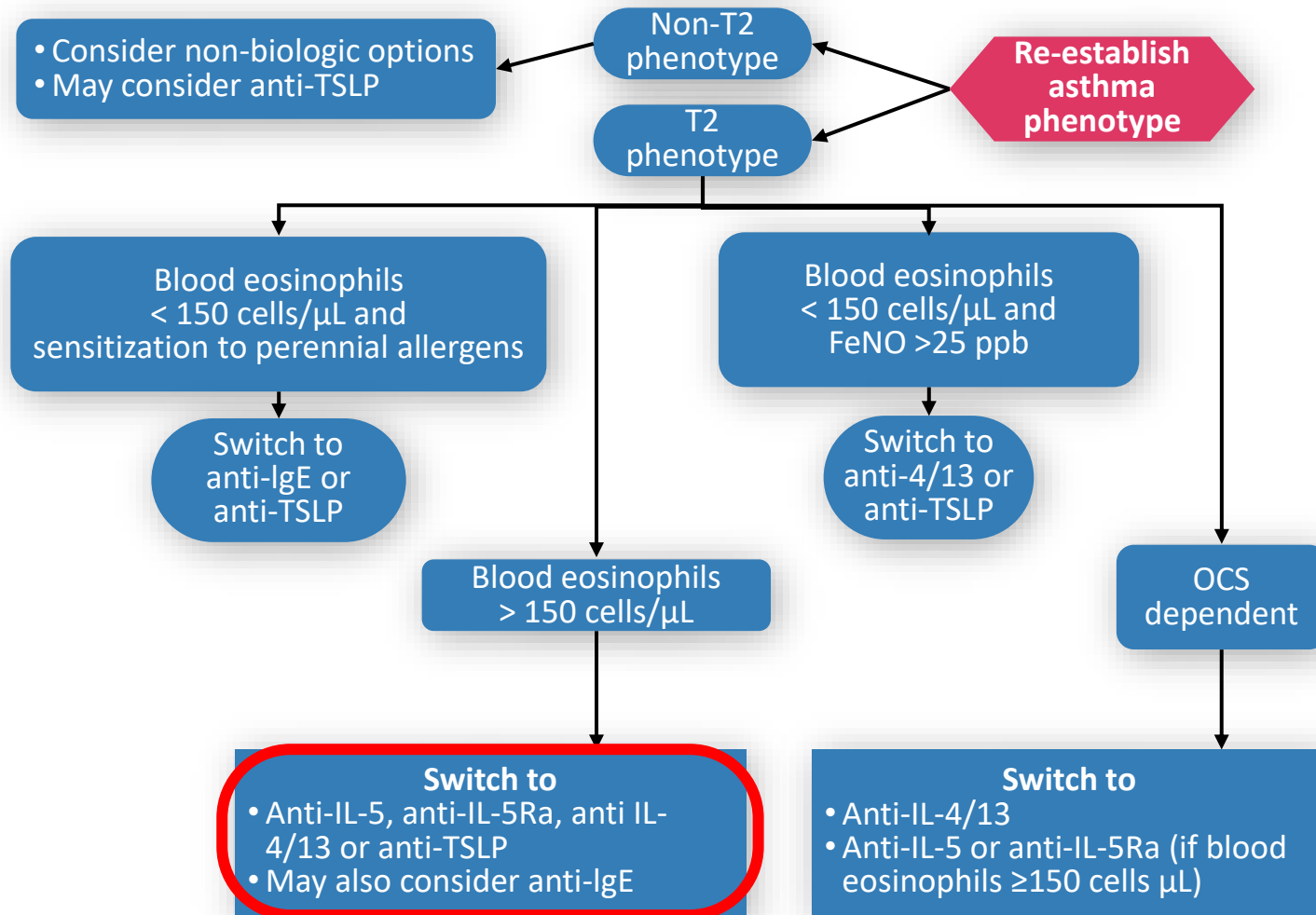


- 62 y/o male with persistent asthma symptoms.
- PMH: Adult-onset severe asthma, nasal polyps s/p resection 2 years ago.
- 3 exacerbations in last year.
- Meds: High-dose ICS/LABA/LAMA, 10 mg prednisone daily, albuterol prn.
- FEV1: 60% predicted, 24% reversibility.
- ACT score: 8.
- Biomarkers: Blood eosinophils 280 cells/ $\mu$ L, FeNO 50 ppb, IgE 250 IU/mL.
- Negative allergy testing.
  - **Treated with benralizumab.**
  - **After 5 months, symptoms are unchanged. ACT score 7. FEV1 60% predicted. Continues to require OCS.**

### ARS-AB13: What would you recommend now?

- A. Maintain current therapy for 1 year
- B. Switch to anti-IgE agent (omalizumab)
- C. Switch to anti-TSLP agent (tezepelumab)
- D. Switch to anti-IL-4 agent (dupilumab)
- E. Switch between anti-IL-5 agents (mepolizumab, reslizumab)
- F. Repeat evaluation for environmental triggers, adherence, and allergies

# Managing Biologic Nonresponse



## Systematic assessment:

- Treatable traits: Airflow limitation, exacerbations, OCS use, eosinophilia
- Did not meet targets: No improvement in lung function, symptoms, or OCS use
- Treatment duration sufficient for initial trial (5 months)
- Is patient taking medication as prescribed?
- Is dose sufficient?
- Confirm phenotype/endotype?
- Consider switch to anti-IL-5 or anti-TSLP agent

# ARS Question 2

## Case 2: Ms. Nguyen, Cont'd

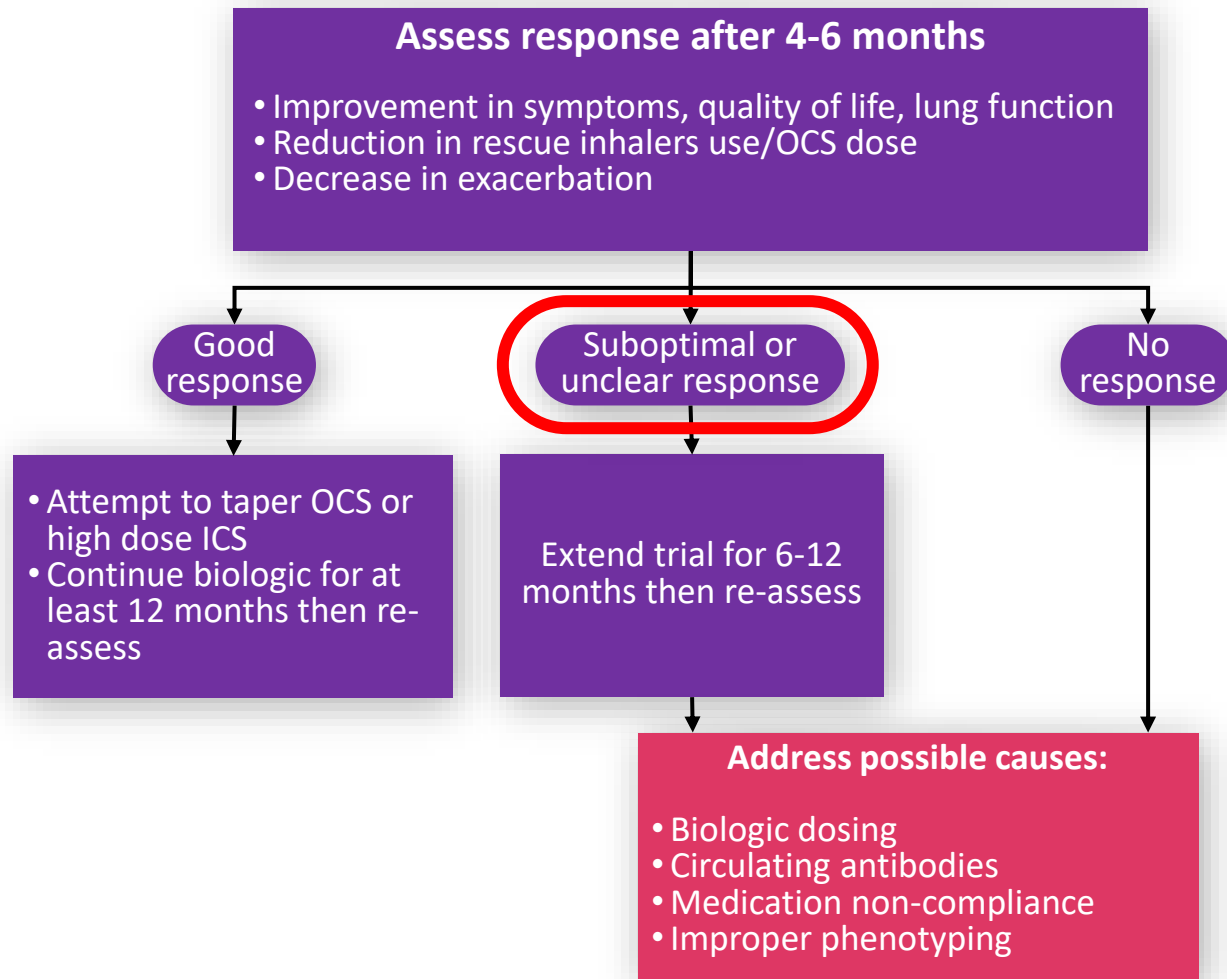


- 42 y/o female with persistent asthma symptoms.
- PMH: Adult-onset severe asthma, chronic rhinosinusitis with nasal polyps.
- 4 exacerbations in past year.
- Meds: High-dose ICS/LABA, albuterol prn.
- FEV1: 58% predicted, 10% reversibility.
- ACT score: 13.
- Biomarkers: Blood eosinophils 1500 cells/ $\mu$ L, FeNO 20 ppb, IgE 35 IU/mL.
- Negative allergy testing.
  - **Treated with mepolizumab.**
  - **After 6 months, patient reports improved but residual symptoms. ACT score 18. FEV1 62% predicted.**
  - **No OCS and no exacerbations.**

### ARS-AB14: What would you recommend now?

- A. Start OCS taper
- B. Switch to alternative biologic
- C. Maintain current therapy and add LAMA
- D. Maintain current therapy and re-evaluate in 6-12 months
- E. Add therapy for rhinosinusitis with polyps and/or refer for surgical consultation

# Managing Biologic Partial Response



## Systematic assessment:

- Treatable traits: Airflow limitation, exacerbations, extreme eosinophilia, rhinosinusitis w/ polyps
- Partial improvements in lung function, symptoms
- Consider extending treatment for 6-12 months, then reassess

# ARS Question 3

## Case 3: Ms. Roberts, Cont'd

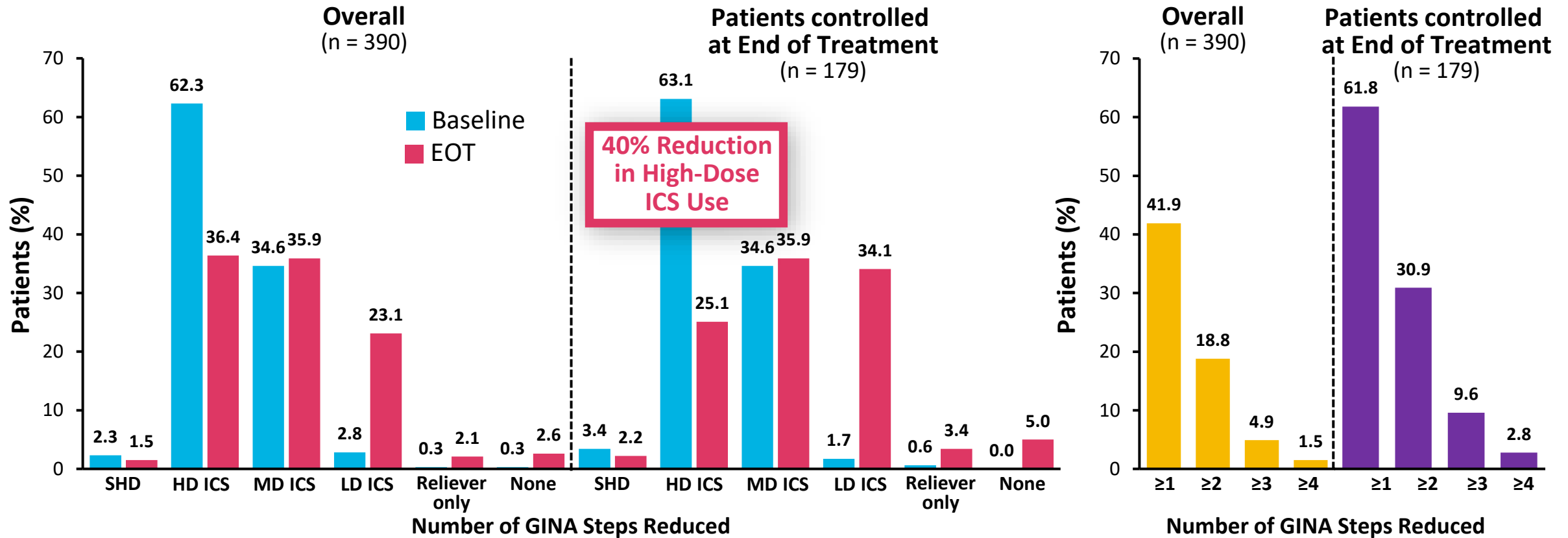


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- PMH: Childhood-onset severe asthma. Triggered by smoke, poor air quality.
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- FEV1: 75% predicted, 24% reversibility.
- ACT score: 10.
- Biomarkers: Blood eosinophils 225 cells/ $\mu$ L, FeNO 65 ppb, IgE 250 IU/mL.
- Negative allergy testing.
  - **Treated with dupilumab.**
  - **After 1 year, all symptoms well controlled. ACT score 23. No exacerbations in >12 months.**
  - **Patient asks if she can reduce or discontinue any therapies.**

### ARS-AB15: What would you recommend?

- A. Hold biologic, reduce dose of ICS/LABA
- B. Continue biologic and current inhaler therapy
- C. Continue biologic, change inhaler to albuterol (rescue)
- D. Hold next dose of biologic, continue inhaler at current dose
- E. Continue biologic, change inhaler to medium-dose ICS/LABA

# Withdrawal of Background Therapy Post-Biologic



**Asthma control: ACQ-6 <1.5 and no recent clinically significant exacerbations**

SHD, supra-high dosage; HD, high dose; MD, medium dose; LD, low dose; ICS, inhaled corticosteroids.

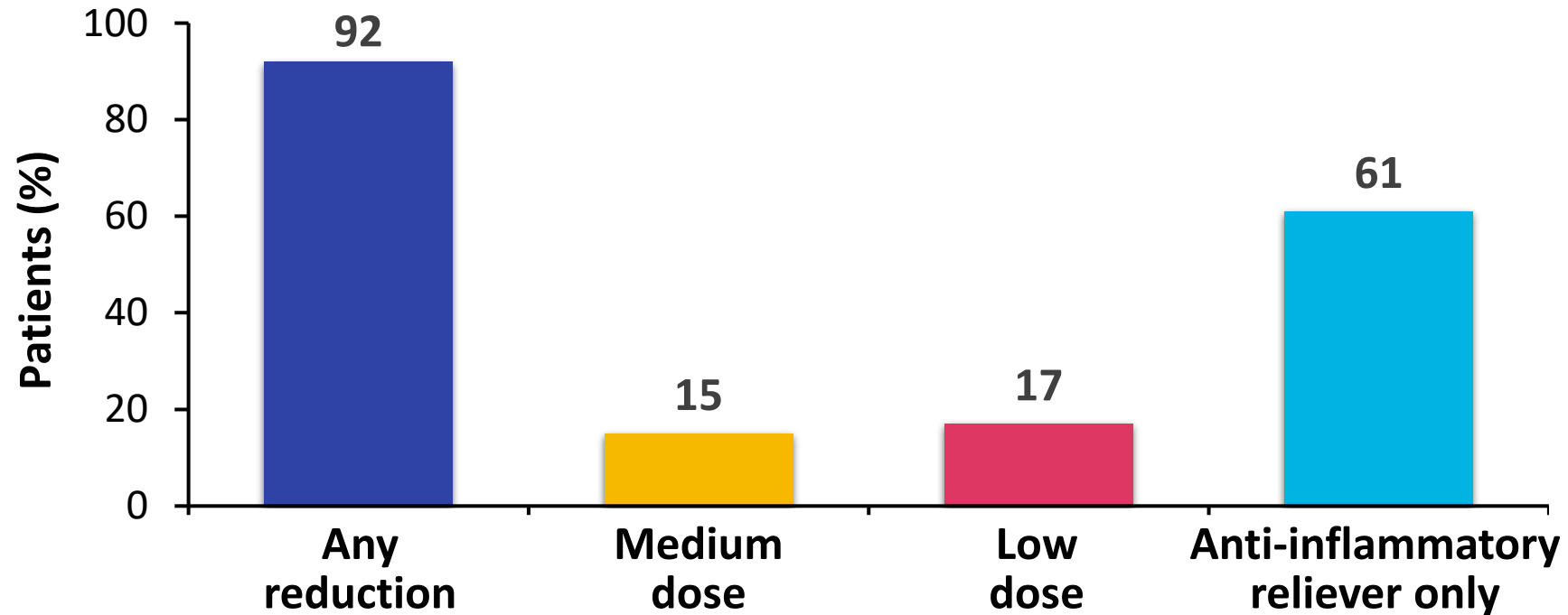
Louis R et al. *J Allergy Clin Immunol Pract.* 2023;11(6):1759-70.

# Can We Reduce Maintenance Medications?

## SHAMAL Study

(N = 208)

### Reductions in ICS while maintaining asthma control Week 32







# Asthma Remission, Defined

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- ACAAI, American Academy of Asthma, AAAAI, and ATS (endorsed by EUFOREA)
- Consensus paper with expert opinion criteria for asthma remission
  - In the prior 12 months (all criteria must be present):
    - No exacerbations requiring medical visit/care and/or systemic corticosteroids
    - No missed work/school due to asthma-related symptoms
    - Stable/optimized PFTs, measured 2+ times
    - Use of controller medication, with ICS no more than low-medium (based on GINA)
    - ACT > 20 | AirQ < 2 | ACQ < 0.75 — for all measurements, measured 2+ times
    - Reliever therapy utilization no more than once per month



# Post-test Questions



## Post-test Question 1

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**Post-AB1: Which of the following characteristics is the best predictor for response to anti-IL-5 therapy in a patient with severe asthma?**

- A. IgE > 30 IU/mL
- B. Blood eosinophils > 1500 cells/ $\mu$ L
- C. Comorbid eosinophilic esophagitis
- D. Fractional exhaled nitric oxide (FeNO) > 50 ppb



## Post-test Question 2

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**Post-AB2: Which of the following characteristics in a patient with severe asthma suggests high risk for exacerbations?**

- A. IgE > 150 IU/mL
- B. Blood eosinophils > 400 cells/ $\mu$ L
- C. Need for high-dose ICS/LABA/LAMA
- D. Comorbid atopic conditions (e.g., allergy, atopic dermatitis)



## Post-test Question 3

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**Post-AB3: 33 y/o male with severe asthma has been referred for evaluation for biologic therapy. Reports daily symptoms and SABA use.**

**PMH:** Asthma (3 exacerbations in past year), eosinophilic esophagitis

**Meds:** High-dose ICS/LABA/LAMA, albuterol prn, PPI

**Labs:** Blood eosinophils 320 cells/ $\mu$ L, IgE 120 IU/mL, FeNO 65ppb, negative allergy testing.

**Which biologic would be most appropriate to initiate?**

- A. Benralizumab
- B. Dupilumab
- C. Omalizumab
- D. Reslizumab



## Post-test Question 4

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**Post-AB4: 40 y/o female returns for follow-up after starting biologic agent 12 months ago.**

**Reports asthma symptoms are well controlled. No exacerbations in past year.**

**PMH:** Severe asthma, seasonal allergies.

**Meds:** High-dose ICS/LABA, mepolizumab.

FEV1 80% predicted. ACT score 23.

**The patient asks if he can reduce or stop any medications. What would you recommend?**

- A. Continue biologic and current inhaler therapy
- B. Continue biologic, change inhaler to albuterol (rescue)
- C. Discontinue biologic, continue inhaler at current dose
- D. Continue biologic, change inhaler to medium-dose ICS/LABA



## Post-test Question 5

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**Post-AB5: Please rate your overall level of confidence in your responses to the previous questions.**

- A. Very confident (4)
- B. Confident (3)
- C. Somewhat confident (2)
- D. Not at all confident (1)



## Post-test Question 6

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**Post-AB6: After completing this activity, how confident are you in your ability to adjust biologic therapy with respect to response in patients with severe asthma?**

- A. Very confident (4)
- B. Confident (3)
- C. Somewhat confident (2)
- D. Not at all confident (1)





## Post-test Question 7

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**Post-AB7: After completing this activity, how often do you intend to consider biomarkers when assessing patients with severe asthma for biologic therapy?**

- A. Always (4)
- B. Often (3)
- C. Rarely (2)
- D. Never (1)



## Post-test Question 8

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**Post-AB9: About how many patients with severe asthma do you see on a weekly basis?**

- A. None
- B. 1-5
- C. 6-10
- D. 11-15
- E. 16-20
- F. > 20



# Q&A