Differential Diagnosis of Conditions Commonly Misdiagnosed as Asthma

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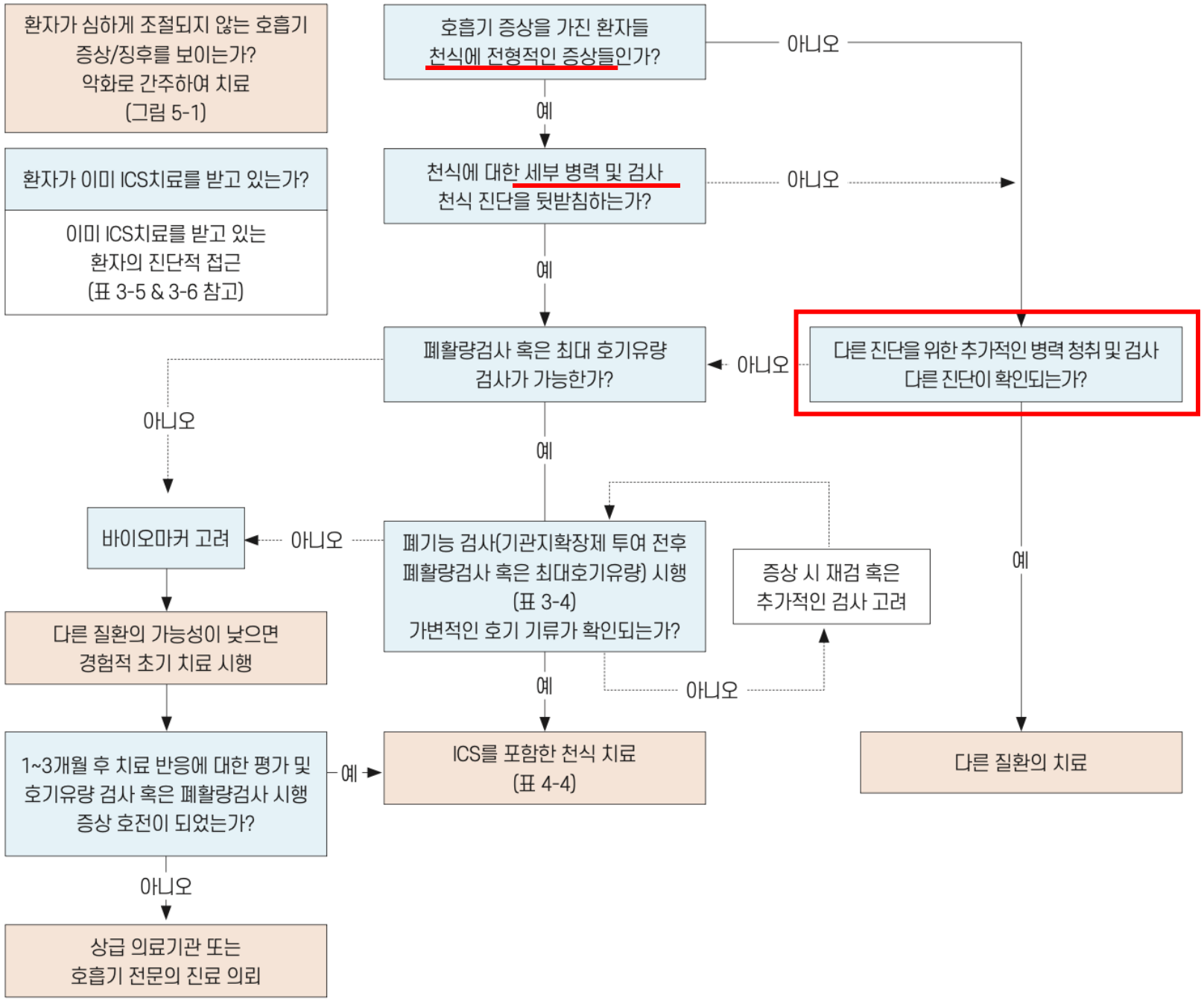
- Diagnosis and Intermediate Probability
- Misdiagnosis of Asthma
- Commonly Misdiagnosed Conditions
  - Pulmonary: COPD, NAEB
  - Cardiac: Cardiac asthma
  - Upper airway: VCD, AR, CRS
  - Gastrointestinal: GERD
  - Metabolic: Obesity
  - Special population: The elderly
- Take Home Messages

Diagnosis of Asthma

- Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation

- Defined by the history of **respiratory symptoms**, such as wheeze, shortness of breath, chest tightness and cough, that **vary over time and vary in intensity**

- Together with **variable expiratory airflow limitation**


환자가 심하게 조절되지 않는 호흡기 증상/징후를 보이는가? 악화로 간주하여 치료 (그림 5-1)
환자가 이미 ICS치료를 받고 있는가?
이미 ICS치료를 받고 있는 환자의 진단적 접근 (표 3-5 & 3-6 참고)
호흡기 증상을 가진 환자들 천식에 전형적인 증상들인가?
아니오
예
천식에 대한 세부 병력 및 검사 천식 진단을 뒷받침하는가?
아니오
예
다른 진단을 위한 추가적인 병력 청취 및 검사 다른 진단이 확인되는가?
아니오
폐활량검사 혹은 최대 호기유량 검사가 가능한가?
아니오
예
바이오마커 고려
아니오
폐기능 검사(기관지확장제 투여 전후 폐활량검사 혹은 최대호기유량) 시행 (표 3-4) 가변적인 호기 기류가 확인되는가?
증상 시 재검 혹은 추가적인 검사 고려
아니오
예
다른 질환의 가능성이 낮으면 경험적 초기 치료 시행
1~3개월 후 치료 반응에 대한 평가 및 호기유량 검사 혹은 폐활량검사 시행 증상 호전이 되었는가?
예
ICS를 포함한 천식 치료 (표 4-4)
아니오
상급 의료기관 또는 호흡기 전문의 진료 의뢰
다른 질환의 치료

Intermediate Probability of Asthma

wheeze, shortness of breath, cough and chest tightness

High probability

- Vary over time and in intensity
- Worse at night or
- Triggered by exer
- Occur or worsen
- Worsen after sto
- Personal or famil
- Expiratory polyphonic wheeze
- Unexplained blood eosinophilia

Low probability

- Chronic sputum production

ngling

inspiration

Intermediate probability of asthma

preferred approach is to carry out **further investigations, including an explicit trial of treatments for a specified period, before confirming a diagnosis and establishing maintenance treatment**.

GINA 2026
British guideline on the management of asthma 2014

Overdiagnosis of Asthma Is Common

- Problems associated with diagnosis of current asthma: **underdiagnosis** vs **overdiagnosis**

- **30–35%** of patients diagnosed asthma do not have current asthma and may be overdiagnosed
- **Objective testing** : 35% of confirmed asthma > 16% of ruled-out patients

Country	n	Re-evaluation	NOT asthma
Canada	613	Spirometry → bronchial challenge → medication taper	**33%**
Sweden	86	Spirometry → single methacholine challenge	**34%**
UK	262	Spirometry + bronchoprovocation (both normal)	**34%**

BMC Pulm Med 11.1 (2011): 27
JAMA 317.3 (2017): 269-279
Fam pract 16.2 (1999): 112-116
Prim Care Respr J 21.3 (2012): 283-287

Burden of Asthma Overdiagnosis

- **Clinical harm: Missed alternative diagnosis**
  - Unrecognized serious cardiorespiratory disease : **6% (12/203)**
    (e.g., critical coronary artery disease, subglottic stenosis)

- **Medication burden**
  - **79%** of overdiagnosed patients using asthma medication
  - **35%** on daily controller therapy, with no opportunity for benefit
  - Side effects of ICS/OCS use
  - Elevated health insurance rates for patients with chronic respiratory disease

BMC Pulm Med 11.1 (2011): 27
Breathe 15.1 (2019): e20-e27
JAMA 317.3 (2017): 269-279

Real Practice of Asthma in Korea

[표 4] 종별 평가대상자(환자) 현황

(단위: 명, 건, 회)

구분	2024년(11차)				
	평가대상 환자 수(C)		명세서 건수(D)		연간내원 횟수(D/C)
전체	603,283	(100.0)	2,412,141	(100.0)	4.0
상급종합병원	58,265	(9.7)	199,016	(8.3)	3.4
종합병원	107,569	(17.8)	400,313	(16.6)	3.7
병원	26,988	(4.5)	104,313	(4.3)	3.9
요양병원	919	(0.2)	4,654	(0.2)	5.1
의원	425,381	(70.5)	1,701,005	(70.5)	4.0
보건소	314	(0.1)	1,110	(0.0)	3.5
보건지소	104	(0.0)	402	(0.0)	3.9
보건의료원	387	(0.1)	1,328	(0.1)	3.4

[표 9] 종별 폐기능검사 시행률

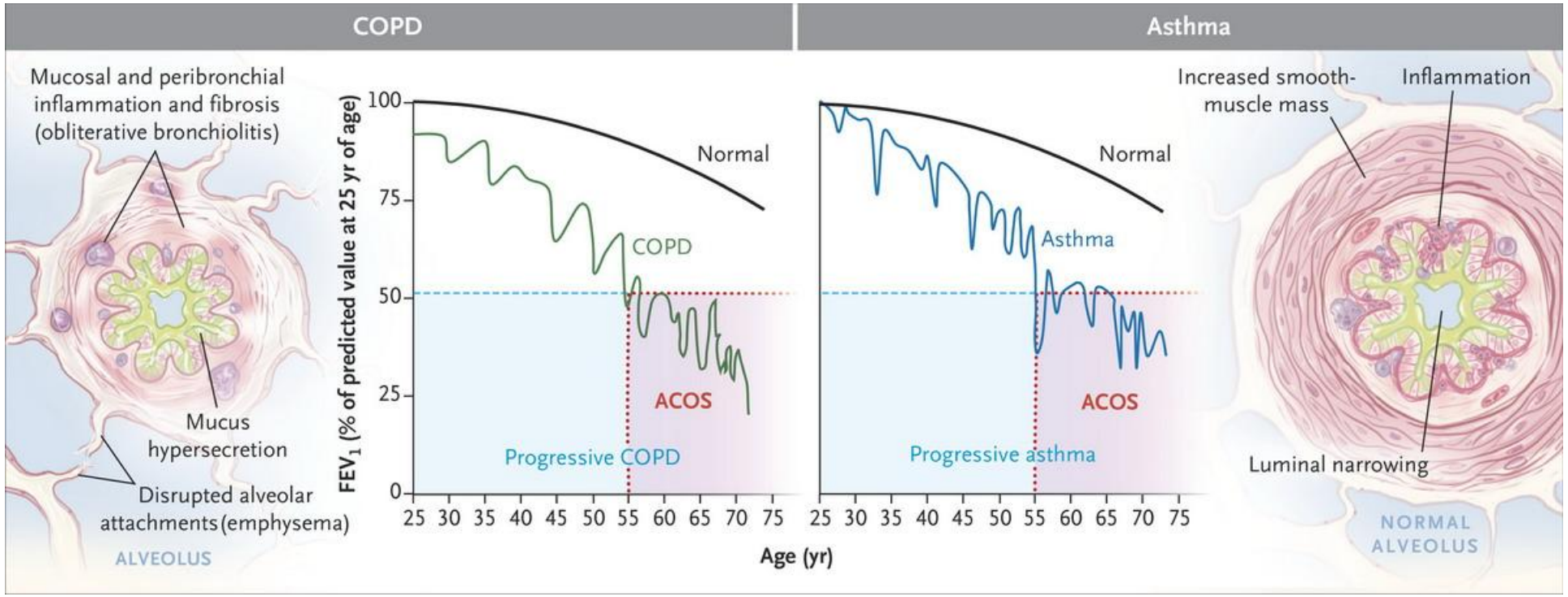
(단위: 명, %, %p)

구분	2024년(11차)			증감 (B−A)
	검사 평가 대상 환자 수	폐기능검사 시행		
		환자 수	시행률(B)	
전체	554,612	231,097	41.7	+0.2
상급종합병원	52,654	48,387	91.9	−0.1
종합병원	93,737	73,046	77.9	−0.9
병원	23,899	10,131	42.4	+0.6
요양병원	633	169	26.7	−3.9
의원	397,686	111,383	28.0	+1.0
보건소	286	56	19.6	+2.9
보건지소	93	26	28.0	+0.4
보건의료원	337	72	21.4	+2.6

Commonly Misdiagnosed Conditions As Asthma

Asthma or COPD?: A Common Diagnostic Dilemma

- Distinguishing asthma from COPD can be difficult, particularly in smokers and older adults
- Some patients may have features of both asthma and COPD



GINA 2026
N Engl J Med 373.13 (2015): 1241-1249

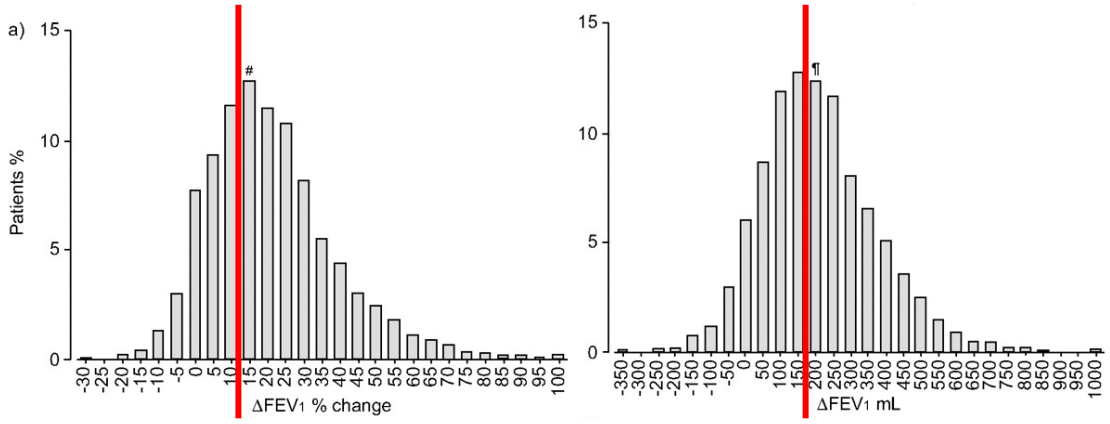
Differentiating Asthma from COPD using BDR

- **Negative BDR** is common in **asthma**: **50~80%** (depending on the study population)
  : Limited reversibility in more severe asthma

UPLIFT post-hoc analysis

(n=5,756, moderate–very severe COPD)

- BDR positive (ΔFEV_1 ≥12% & ≥200 mL): **53.9%** of **COPD** patients



NOVELTY observational study

Asthma (n = 3,519), ACO (n = 833), COPD (n = 2,436)

- BDR : Low diagnostic value for separating asthma from COPD (AUC 0.51-0.70)
- Marked BDR improves accuracy slightly (AUC 0.77)

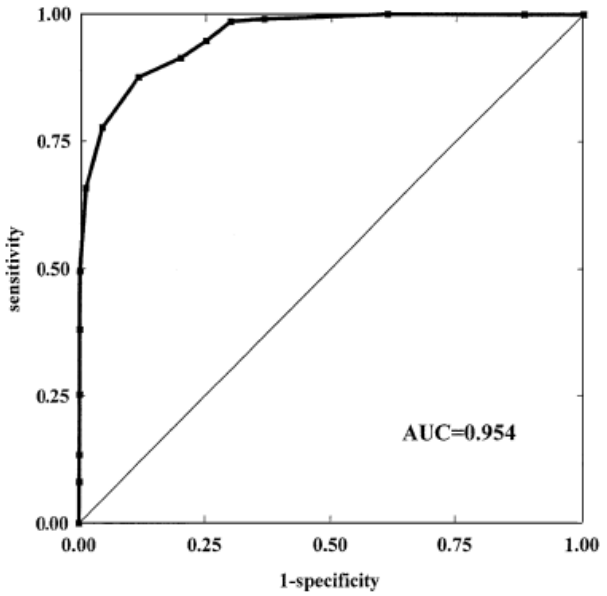
BDR Definition	Asthma (*n* = 3,519)	Asthma and COPD (*n* = 833)	COPD (*n* = 2,436)	Asthma vs. COPD	
				AUC (95% CI)	Sensitivity, Specificity
High-likelihood asthma or COPD (1)	Asthma HL (*n* = 1,820)		COPD HL (*n* = 1,260)	AUC (95% CI)	Sensitivity, Specificity
ΔFEV_1 or ΔFVC ⩾12% and ⩾200 ml	351/1,658 (21.2%)		338/1,222 (27.7%)	0.619 (0.586, 0.652)	0.54, 0.26
ΔFEV_1 ⩾12% and ⩾200 ml	313/1,681 (18.6%)		176/1,223 (14.4%)	0.703 (0.664, 0.742)	0.56, 0.17
ΔFVC ⩾12% and ⩾200 ml	153/1,676 (9.1%)		260/1,227 (21.2%)	0.602 (0.562, 0.642)	0.42, 0.40
ΔFEV_1 ⩾15% and ⩾400 ml	148/1,681 (8.8%)		24/1,223 (2.0%)	0.765 (0.673, 0.857)	0.80, 0.04
ΔFEV_1 >10% pred	275/1,652 (16.6%)		89/1,203 (7.4%)	0.592 (0.572, 0.613)	0.16, 0.93
ΔFVC >10% pred	134/1,647 (8.1%)		210/1,207 (17.4%)	0.614 (0.593, 0.635)	0.08, 0.83
ΔFEV_1 or ΔFVC >10% pred	315/1,629 (19.3%)		242/1,202 (20.1%)	0.508 (0.487, 0.530)	0.19, 0.80

N Engl J Med 373.13 (2015): 1241-1249
Eur Respir J 31.4 (2008): 742-750
Am J Respir Crit Care Med 209.4 (2024): 390-401

History Taking Discriminates Asthma from COPD Very Well

- **Key discriminators**: age of onset, atopy, smoking pack-years, symptom variability (day-to-day, nocturnal), triggers (cold air, smoke, fragrance), and cough characteristics

Pulmonary specialist referrals in Germany
(n = 1434)



History alone: AUC = 0.954

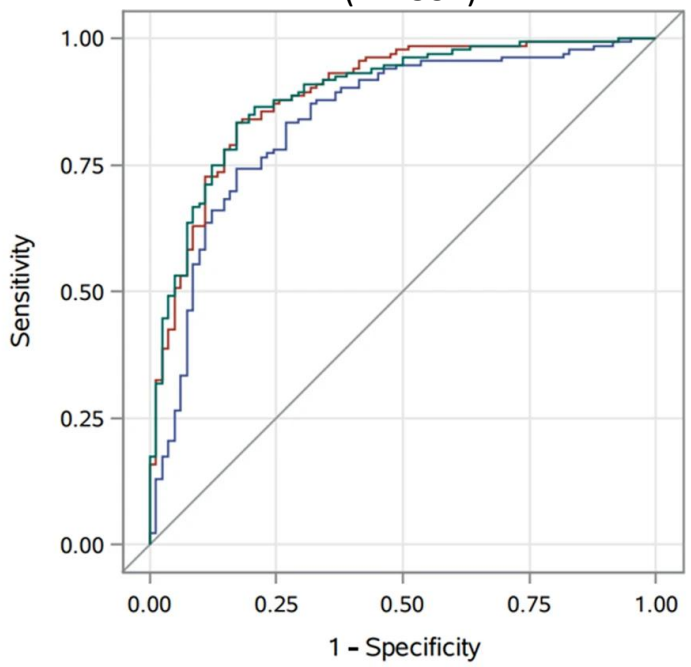
- Age of onset
- Atopy
- Smoked packyears
- Cough characteristics (dry cough, no cough, productive cough)

Respir Med 98.7 (2004): 591–597

History Taking Discriminates Asthma from COPD Very Well

- Key discriminators: age of onset, atopy, smoking pack-years, symptom variability (day-to-day, nocturnal), triggers (cold air, smoke, fragrance), and cough characteristics
- Adding spirometry improves accuracy only slightly (AUC 0.84 → 0.89)

10 Dutch general practices
(n = 532)



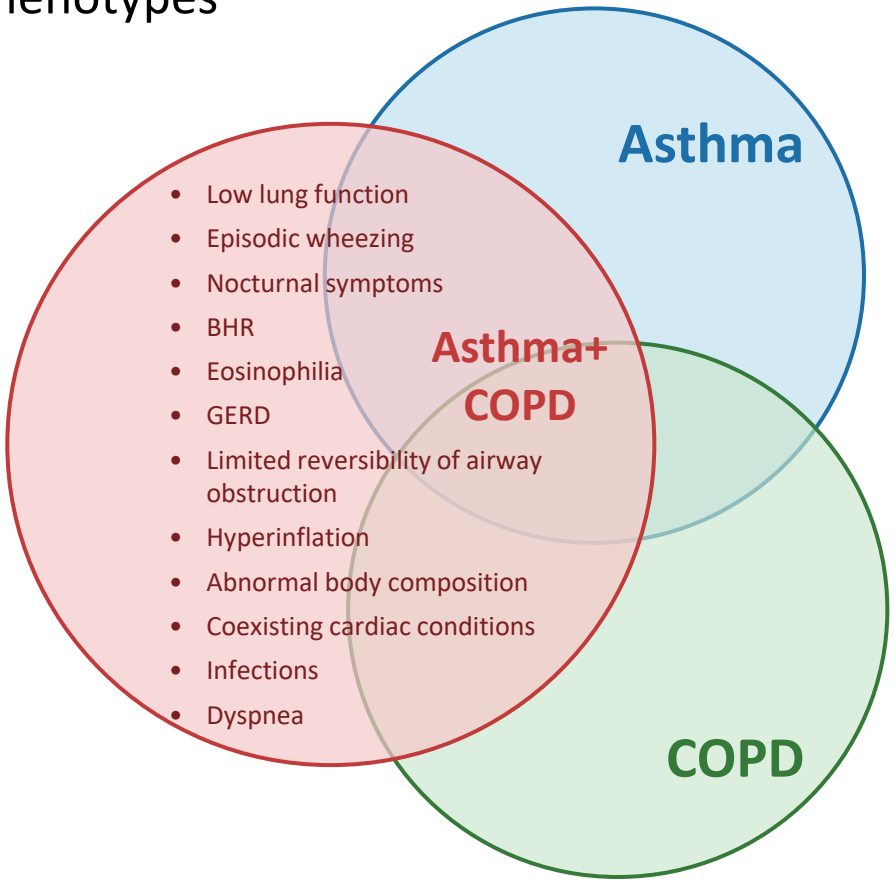
AUC 0.84 (History taking)
AUC 0.89 (History taking + Spirometry)
AUC 0.89 (History taking + Spirometry + DLco + Lung volume)

		Scenario 1		
Subsection		Asthma	COPD	p^m
Medical history questions	Age	0.97 (0.94, 1.01)	1.03 (1.00, 1.06)	0.096
	Gender (female)	x[l]		
	Packyears[a]	0.97 (0.95, 0.99)	1.03 (1.01, 1.06)	0.015
	Wheeze[b]	2.76 (1.33, 5.57)	0.36 (0.17, 0.75)	0.007
	Phlegm[c]	0.33 (0.12, 0.90)	2.99 (1.11, 8.08)	0.030
	Breathlessness[d]	x		
	Ever respiratory allergy[e]	6.97 (3.38, 14.35)	0.14 (0.07, 0.30)	<0.001
	Respiratory problems[f]	x		

Asthma + COPD: A Real Overlap

- GINA: **Persistent airflow limitation** + **Features of both** asthma and COPD
- Multiple criteria proposed — **No consensus definition**
- Not a single disease — a descriptive term covering multiple phenotypes

- Concurrent doctor-diagnosed asthma and COPD: **15-32%**



GINA 2026
PLoS One 12.3 (2017): e0173830
Allergol Int 67.2 (2018): 165-171
Ann Am Thorac Soc 16.9 (2019): 1143-1150

Asthma, COPD, and Asthma+COPD

	천식	COPD	ACO	천식에 가까움	COPD에 가까움
발생 시기	대체로 아동기에 발생하나 어느 나이에나 발생할 수 있음	대체로 > 40세	대체로 ≥40세이나 아동기 혹은 이른 성인기에서 증상 발생할 수 있음	☐ 20세 전에 발생	☐ 40세 이후 발생
호흡기 증상의 양상	증상은 시간에 따라 다양함(날마다, 혹은 좀 더 긴 기간에 걸쳐), 종종 활동에 제한이 있음 종종 운동, 웃음을 비롯한 감정, 먼지 혹은 알레르기항원 노출에 의해 유발	만성적이고 대체로 지속적임, 특히 운동 시, 더 좋은 날도 있고 더 나쁜 날도 있음	운동성호흡곤란을 포함한 호흡기 증상은 지속적이나 가변성이 현저할 수 있음	☐ 분, 시, 날에 따라 증상이 달라짐 ☐ 밤이나 이른 아침에 증상이 악화됨 ☐ 운동, 웃음을 비롯한 감정, 알레르기항원에 대한 노출에 의해 증상 유발	☐ 치료에도 불구하고 지속 ☐ 좋거나 나쁜 날이 있지만 항상 매일의 증상과 운동성호흡곤란이 있음 ☐ 유발인자에 관계없이 호흡곤란 발생에 앞서 만성적 기침, 가래 있음
폐기능	현재 그리고/혹은 과거의 가변적 기류제한(예: 기관지확장제 가역성, 기도 과민성)	치료 후 FEV_1이 호전될 수 있으나, 기관지확장제 투여 후 FEV_1/FVC <0.7은 지속	기류제한이 완전히 가역적이지는 않으나 종종 현재 혹은 과거의 가변적 기류제한	☐ 가변적 기류제한 (폐활량, 최대호기유량)	☐ 지속적 기류제한 (기관지확장제 투여 후 FEV_1/FVC <0.7)
증상 사이의 폐기능	정상일 수 있음	지속적인 기류제한	지속적인 기류제한	☐ 정상	☐ 비정상
과거력/가족력	다수의 환자가 아동기에 알레르기나 천식의 과거력 그리고/혹은 천식 가족력 있음	유해입자와 가스에 노출 과거력(주로 흡연과 생체연료)	과거에 의사에 의해 천식 진단받은 적 있음, 알레르기 과거력, 천식 가족력 그리고/혹은 유해입자 노출 과거력 있음	☐ 과거에 의사에 의한 천식 진단 ☐ 천식이나 다른 알레르기 질환 가족력	☐ 과거에 의사에 의한 COPD, 만성 기관지염, 혹은 폐기종 진단 ☐ 위험인자에 심한 노출: 흡연, 생체연료

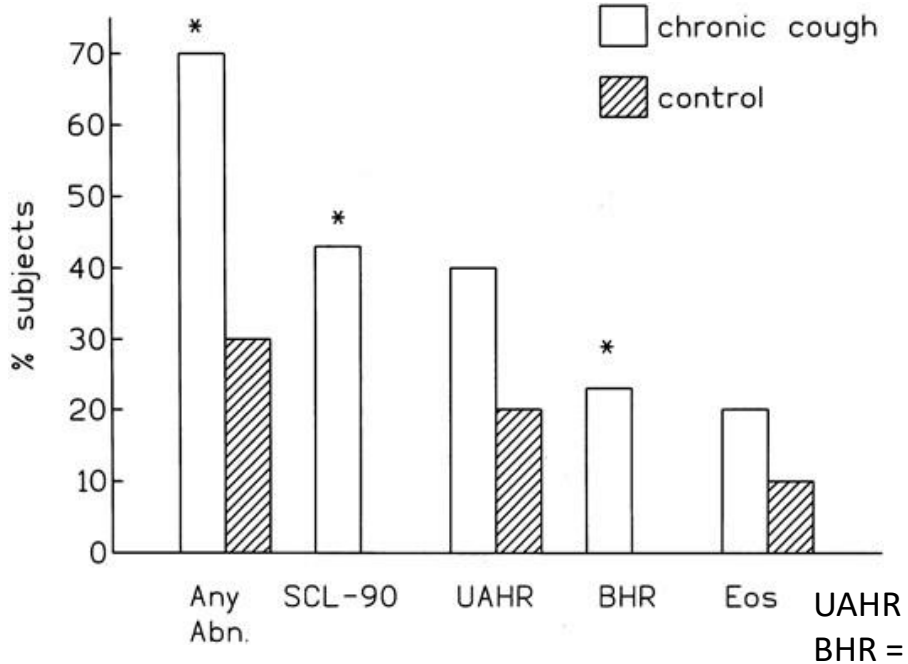
	천식	COPD	ACO	천식에 가까움	COPD에 가까움
경과	저절로 혹은 치료로 호전되나 고정된 기류제한이 발생할 수 있음	일반적으로, 치료에도 불구하고 수년에 걸쳐 서서히 진행됨	증상이 치료에 의해 부분적이긴 하나 유의하게 감소됨 일반적으로 진행되며 치료가 필요함	☐ 시간 경과에 따른 증상 악화 없음. 증상은 계절 혹은 해에 따라 가변적임 ☐ 저절로 호전되거나 기관지확장제나 흡입스테로이드제에 대해 수주에 걸쳐 호전	☐ 증상은 시간 경과에 따라 서서히 악화됨 (수 년에 걸쳐 진행) ☐ 속효성기관지확장제는 제한된 증상 호전만을 제공
흉부 X선 사진	대체로 정상	심한 과팽창과 COPD의 다른 변화들이 보임	COPD와 유사	☐ 정상	☐ 심한 과팽창
급성악화	급성악화가 발생하나, 급성악화의 위험은 치료에 의해 상당히 감소됨	치료에 의해 감소될 수 있음. 동반질환이 있을 경우 장애에 기여	급성악화가 COPD보다 더 흔히 있을 수 있으나 치료에 의해 감소됨 동반질환이 장애에 기여할 수 있음		
전형적인 기도 염증	호산구 그리고/혹은 호중구	객담 호중구 ± 호산구, 기도 림프구, 전신적 염증 있을 수 있음	객담에서 호산구 그리고/혹은 호중구		

기도질환의 증후군적 진단: 감별표 사용법

천식과 COPD를 가장 잘 감별해 주는 특징을 나열함.
한 환자에 대해 해당사항에 대해 박스에 체크했을 때 천식이나 COPD에 대해 3가지 이상 해당하면, 그 진단을 시사함.
양쪽 수가 비슷하다면, Asthma+COPD를 고려해야 함

Non-Asthmatic Eosinophilic Bronchitis

- **10-30%** of **chronic cough** cases referred for specialist investigation
- **Diagnosis***:* Chronic cough + Absent airway obstruction + Sputum eosinophilia
- **Eosinophilic airway inflammation (induced sputum)** : 30-50% of chronic cough



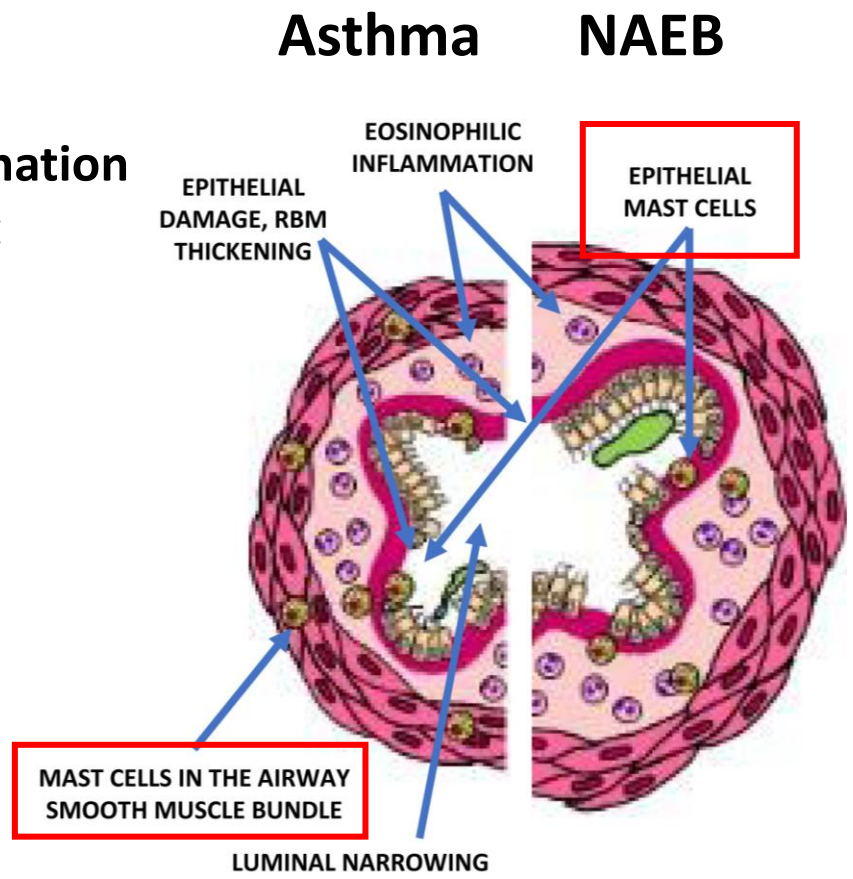
UAHR = upper airway hyperresponsiveness
BHR = bronchial hyperresponsiveness
Eos = sputum eosinophils > 3.2%

Chest 129.1 (2006): 116S-121S
Am J Respir Crit Care Med 156.1 (1997): 211-216

Asthma vs NAEB

Shared features:

- **Eosinophilic inflammation**
- Thickened basement membrane
- ↑Leukotrienes, ECP



Distinct features:

- **Epithelial infiltration of mast cells**
- Mast cell activation
- Histamine, PGD2 release

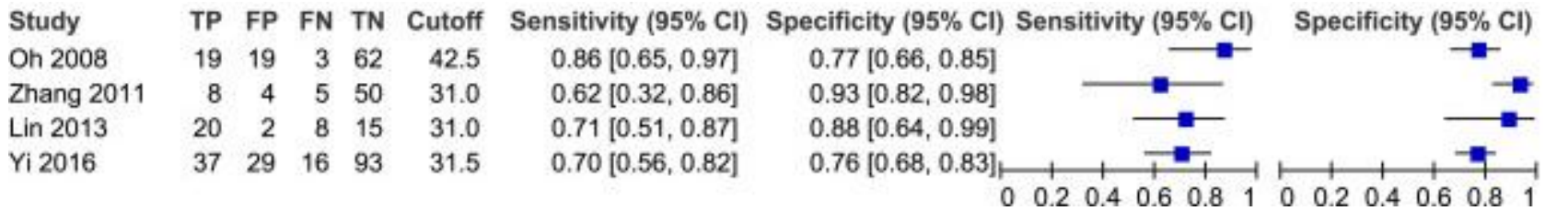
- **No variable airflow obstruction**
- **No lower airway hyperresponsiveness**
- No luminal narrowing on CT scan

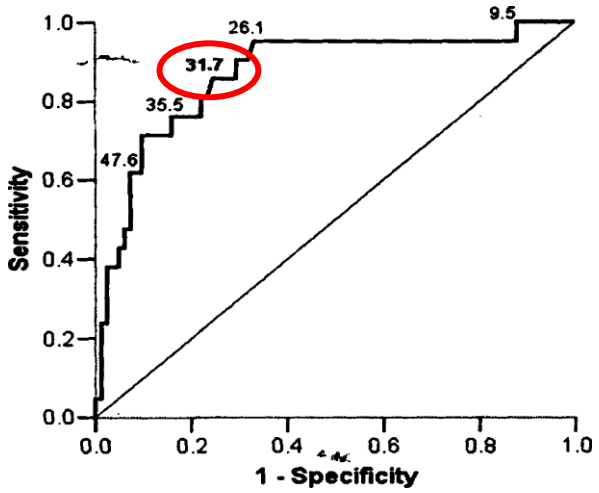
J Allergy Clin Immunol Pract 7.6 (2019): 1740-1747

FeNO is Surrogate Marker

- **Sputum eosinophilia**: Gold standard
- Chronic cough with asthma ruled out (MBPT), 4 cross-sectional studies
  - FeNO cutoff 22.5-31.7ppb (Sensitivity 0.72, Specificity 0.83, AUC 0.81, **High heterogeneity**)

Study	TP	FP	FN	TN	Cutoff	Sensitivity (95% CI)	Specificity (95% CI)
Oh 2008	19	19	3	62	42.5	0.86 [0.65, 0.97]	0.77 [0.66, 0.85]
Zhang 2011	8	4	5	50	31.0	0.62 [0.32, 0.86]	0.93 [0.82, 0.98]
Lin 2013	20	2	8	15	31.0	0.71 [0.51, 0.87]	0.88 [0.64, 0.99]
Yi 2016	37	29	16	93	31.5	0.70 [0.56, 0.82]	0.76 [0.68, 0.83]





FeNO < 31.7ppb in Korean cohort

Sensitivity 86%, Specificity 76%, PPV 47%, NPV 95%

→ **Rule-out** strategy (induced sputum unavailable)

Chest 129.1 (2006): 116S-121S
Chest 134.5 (2008): 990-995

Cardiac Asthma

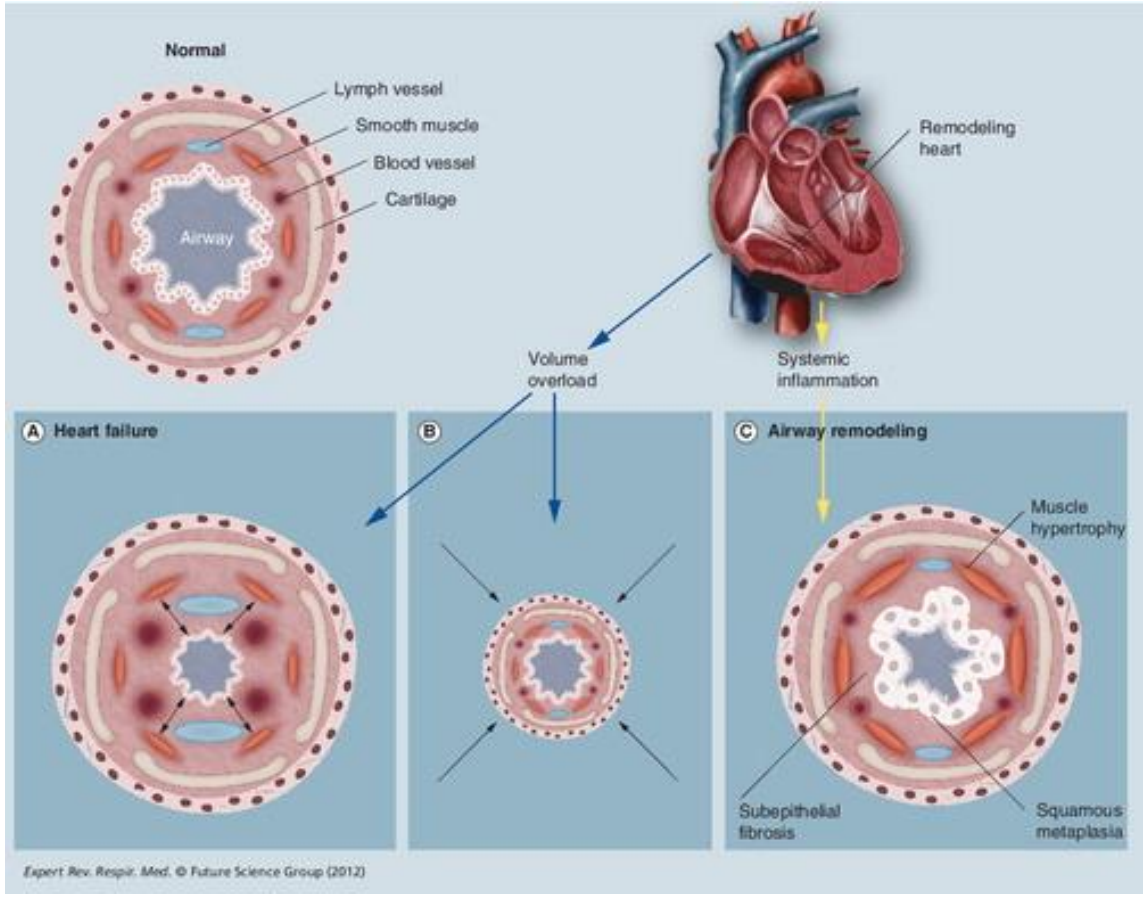
- Breathing difficulty from cardiogenic pulmonary edema due to **pulmonary venous hypertension**

- Shared symptoms: Wheeze, cough, dyspnea (exertional, paroxysmal nocturnal)
  - **~10%** of dyspnea referred to pulmonology traced to a **cardiac cause**
  - Cardiac wheezing: **Elderly** AD-HF patients (**one-third**); **Non-elderly** patients (**10–15%**)

- Clues that favor cardiac asthma
  - Orthopnea, paroxysmal nocturnal dyspnea
  - Bibasilar rales, S3 gallop, JVD, edema
  - Cardiac history/risk factors (CAD, HTN, valve disease)
  - Poor response to bronchodilators/ICS

Immunol Allergy Clin North Am 2013;33:35–44
BMC Cardiovasc Disord 7.1 (2007): 16

Pathophysiology of Cardiac Asthma



- **PVH**
  → Interstitial & Peri-bronchial edema
  → Reflex bronchoconstriction
- **Reduced lung volumes**
  → Airway/mucosal edema narrow airway
- **Systemic inflammation**
  → Airway remodeling

Not allergic inflammation

Variable, largely non-obstructive airflow limitation

Expert Rev Respir Med 6.6 (2012): 705-714
Immunol Allergy Clin N Am 33.1 (2013): 35-44

Blood tests & Functional Tests in Cardiac Asthma

- Echocardiogram: **most direct**, systolic/diastolic function, valve disease
- BNP/ NT-proBNP: **high negative predictive** value
- CXR: cardiomegaly or vascular congestion
- Spirometry: usually restrictive, can normalize once HF is treated

- **HFpEF**
  - BNP rises less, normal BNP is less re-assuaring
  - **Diastolic dysfunction**: E/e' >14, TR velocity >2.8 m/s, LAVI >34 mL/m²
  - Diuretic trial

Immunol Allergy Clin North Am 33.1 (2013): 35-44
Eur J Echocardiogr 17.12 (2016): 1321-1360

Vocal Cord Dysfunction (VCD)

- **Inappropriate vocal cord adduction**, usually on inhalation, from laryngeal hyperresponsiveness

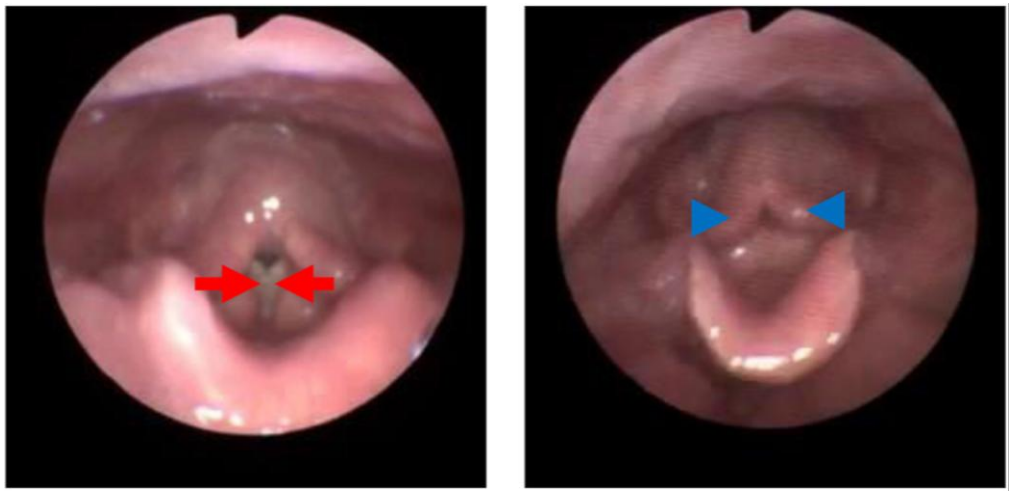
- Shared triggers with asthma
  - Exercise, cold air, URI, stress, odors, reflux
  - **44% of VCD** misdiagnosed as **asthma** (average 4.8 years)

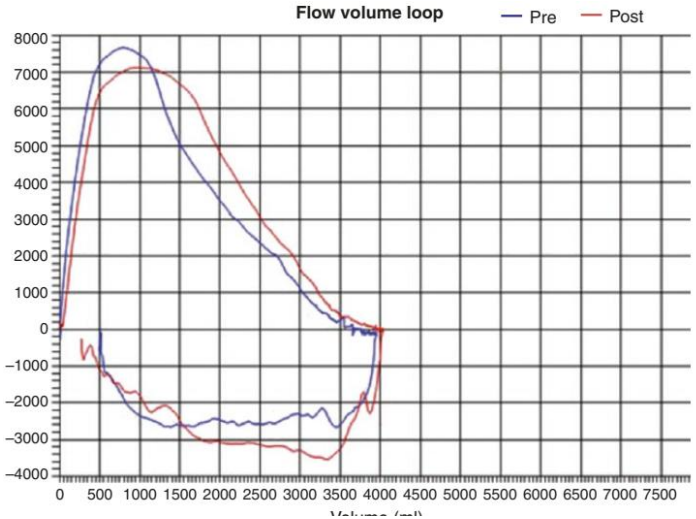
- Clues that favor VCD
  - **Inspiratory stridor/wheeze**, no expiratory wheeze
  - Throat-localized symptoms (voice change)
  - Abrupt onset (sec–min)

J Allergy Clin Immunol 152.4 (2023): 899-906

Laryngoscopy Confirms, Spirometry Supports

- Gold standard: **laryngoscopy ± provocation**
- **Paradoxical** vocal cord closure on **inspiration** (>50% closure = abnormal)
- Expiration is relatively spared



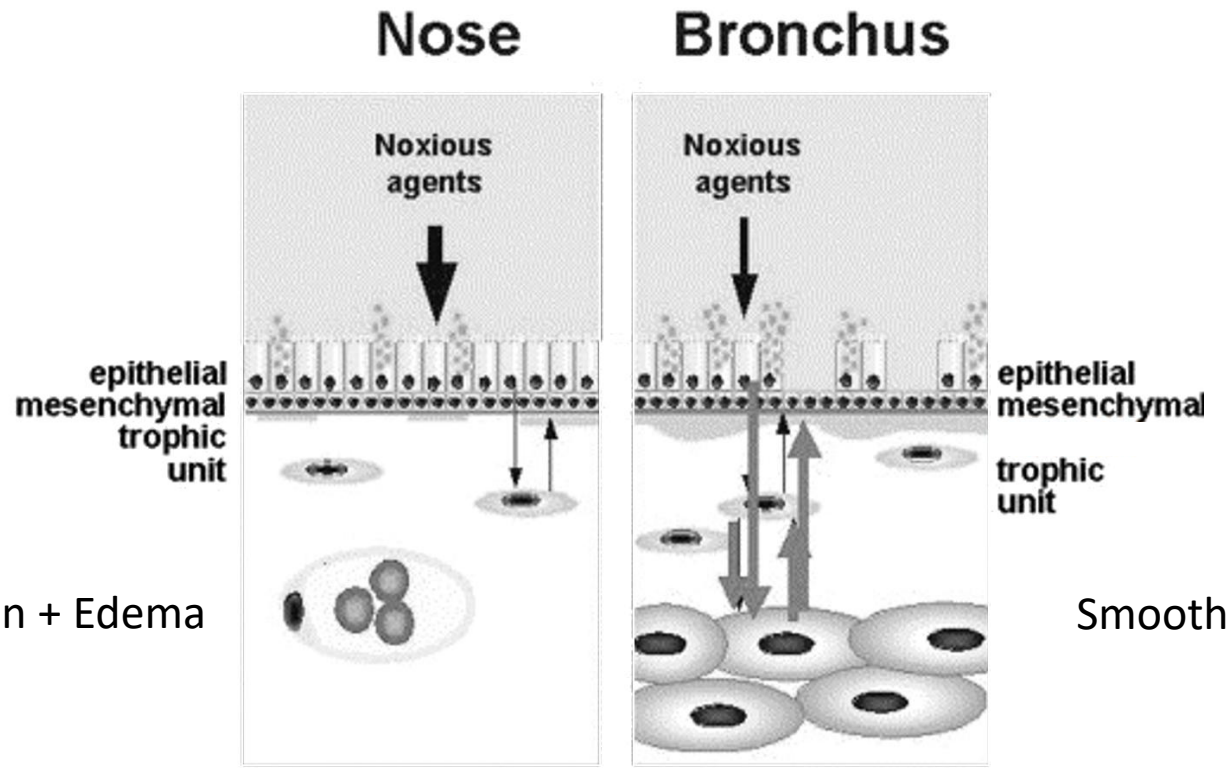


- Management is **behavioral**, not inhaler-based — breathing retraining improves ~76% of cases

J Allergy Clin Immunol 152.4 (2023): 899-906

United Airway : Asthma, AR, and CRS

- Continuous epithelium, shared systemic inflammation : **co-morbid**, **risk factors** for one another
- AR: > 80% of Asthma | Asthma : 10–40% of AR
- CRS: 22-45% of Asthma | Asthma: 10-12% of CRS



Allergy 63 (2008): 8-160
J Asthma Allergy (2016): 93-100
Immunol Allergy Clinic 24.1 (2004): 19-43

Asthma-like Presentations of AR and CRS

- AR
  - Dyspnea from nasal mucosal vasodilation; cough from PND
  - Night predominant cough : confused as "cough-variant" asthma

- CRS
  - Dyspnea from turbinate edema; cough from PND
  - Disease severity and intensity: eosinophilic inflammation

Poor response to asthma treatment?

Evaluate the **nose** and **sinuses**

J Asthma Allergy (2016): 93-100

GERD and Asthma Frequently Co-occur

- GERD can resemble asthma through its **extraesophageal manifestations**
- In some asthmatics, reflux may trigger or contribute to asthma

- Meta-analysis (28 studies)

Prevalence of	Study group	Control	Overall OR (95% CI)
GERD symptoms in asthma patients	**59.2%**	38.1%	**5.5 (1.9–15.8)**
Asthma in individuals with GERD	**4.6%**	3.9%	**2.3 (1.8–2.8)**

J Allergy Clin Immunol 104.2 (1999): 251-259
Gut 56.12 (2007): 1654-1664

Why GERD Resembles Asthma

Reason	Evidence
Extraesophageal presentation	Cough or wheeze **without heartburn** (16% of surgical GER patients: respiratory symptoms only)
Shared night-time pattern	One third of asthmatics wake at night with cough or wheeze after heartburn

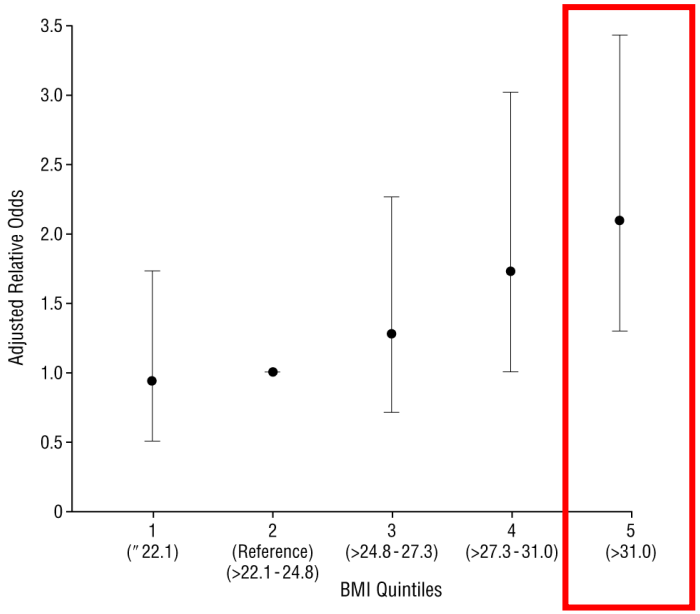
- Reflux can be silent
- **No single test** can confirm reflux as the cause of **respiratory symptoms**
  — differentiation relies on **clinical judgment**, not a specific test.

Asthma: comorbidities, coexisting conditions, and differential diagnosis. Oxford University Press, 2014
World Allergy Organ J 11.1 (2018): 29
Clin Gastroenterol Hepatol 21.6 (2023): 1414-1421

Obesity: More Symptoms, Less Obstruction

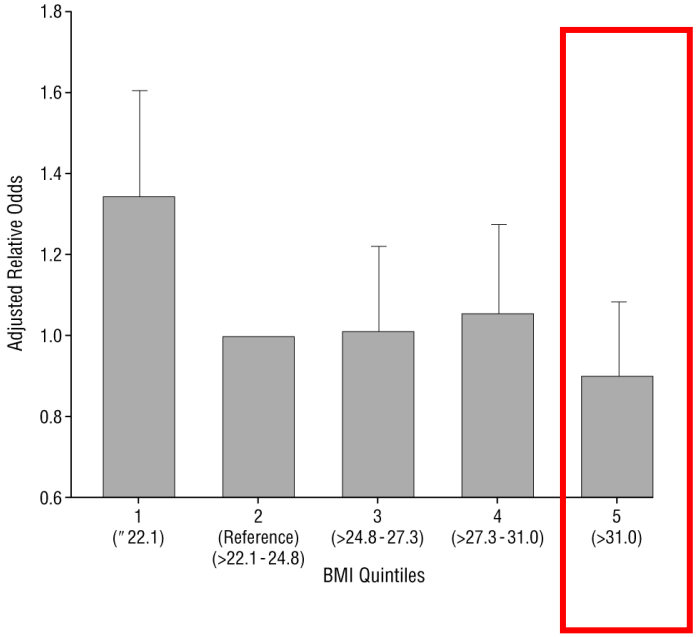
↑ Use of Bronchodilator

NHANES III (n = 16,171)



- Self-reported asthma (OR, 1.50; 95% CI, 1.24-1.81)
- Bronchodilator use (OR, 1.94; 95% CI, 1.38-2.72)
- Dyspnea with exertion (OR, 2.66; 95% CI, 2.35-3.00)

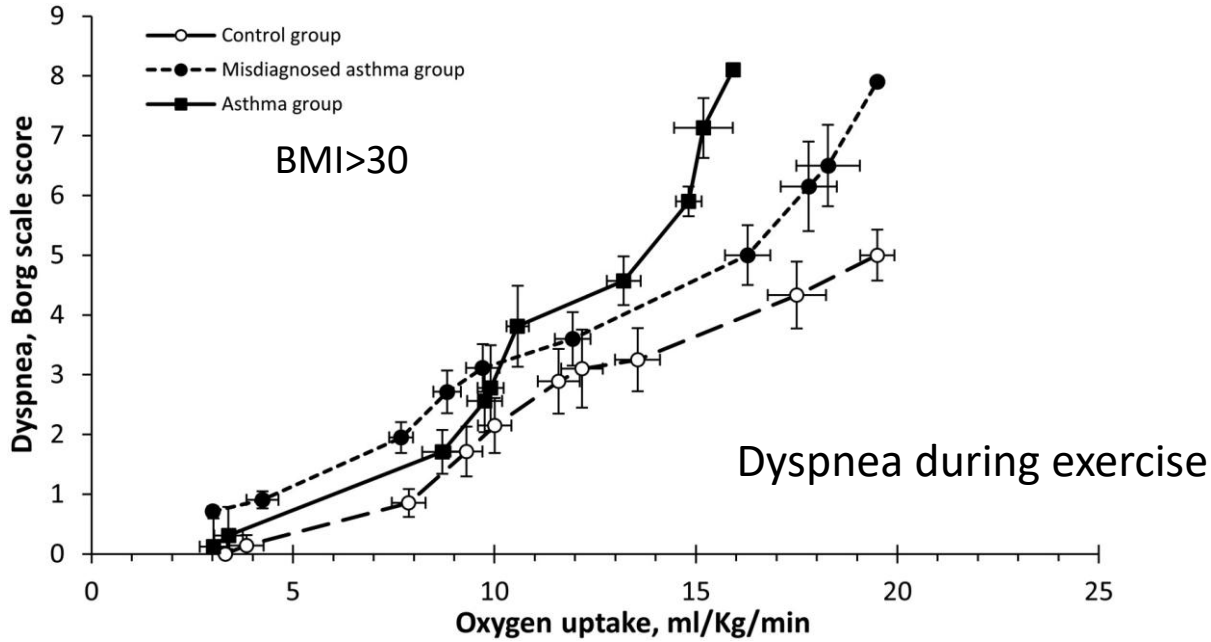
↓Airflow Obstruction



JAMA Intern Med 162.13 (2002): 1477-1481

Dyspnea Perception

- Misdiagnosed & true asthma: similar dyspnea, both tests
- IL-1β levels — acts on **brainstem respiratory center**, amplifies dyspnea signal
- **Two drivers: inflammation + over-ventilation** ($r^2 = 0.853$, $P < .001$)

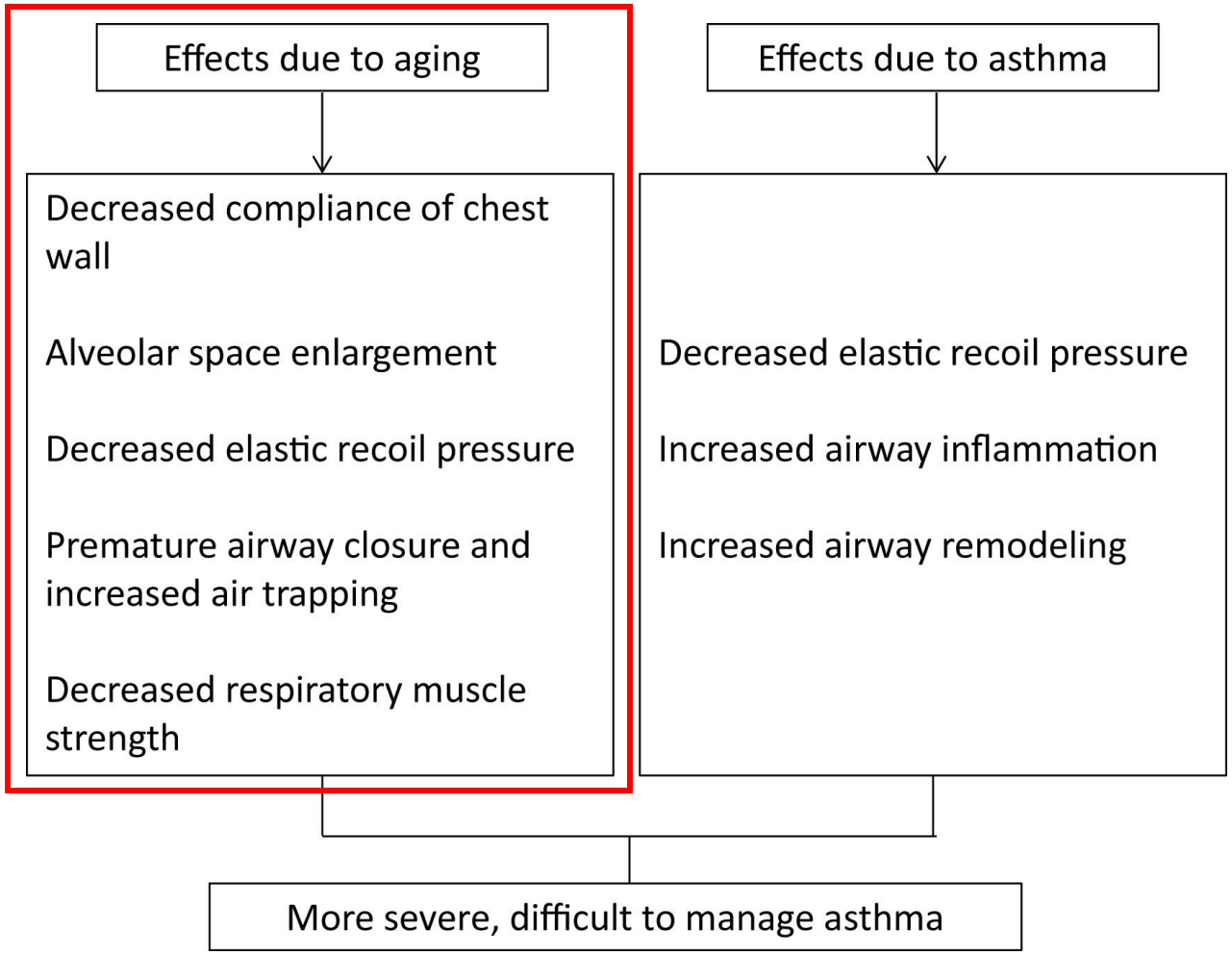


J Allergy Clin Immunol 137.3 (2016): 718-726

Obesity vs Asthma

Feature	Obesity	Asthma
Airway inflammation	Non-eosinophilic / mixed pattern	Eosinophilic, Th2-driven
Common comorbidities	Obstructive sleep apnea, GERD	Allergic rhinitis, atopy
Mechanical effect	Chest wall & diaphragm restricted by fat	Airway smooth-muscle bronchocon striction
Main driver of symptoms	Deconditioning + reduced lung volume (dyspnea)	Airway inflammation Bronchospasm (wheeze)
Response to ICS Bronchodilators	Often reduced	Typically good

Elderly: Hard to Tell Asthma Apart



Pulm Pharmacol Ther 52 (2018): 52-56

Elderly vs Younger Patients With Asthma

	Elderly	Younger
Spirometry	May be less useful in frail patients; reference standards not widely available	Generally useful tool to assess asthma severity
Bronchodilator responsiveness	May be less pronounced	Variable but generally greater
FeNO	May be useful	May be useful
Methacholine challenge	Less often used because of more frequent contraindications (e.g., cardiovascular disease)	Useful; overall fewer contraindications
Atopy	Less common	Common
Comorbidities	COPD, heart disease more common	Allergic rhinitis more common
Phenotypes	Limited knowledge, but late-onset asthma, long-standing asthma, and ACOS	Multiple phenotypes described
Sputum cellularity	Generally more neutrophilic	Generally more eosinophilic

Ann Am Thorac Soc 13.11 (2016): 2064-2077

Take Home Messages

- **Typical asthma symptoms shared with other conditions**
- **Differential diagnosis by clue**
  - Pulmonary: COPD, NAEB
  - Cardiac: Cardiac asthma
  - Upper airway: VCD, AR, CRS
  - Gastrointestinal: GERD
  - Metabolic: Obesity
  - Special population: The elderly
- **Can co-exist with asthma**
- **Confirm with objective evidence**

Think about the differential from the very beginning

감사합니다