“호흡기내과의사를 위한 Respiratory Review of 2026”

COPD

2026.4.18

양산부산대학교병원
손은정

Contents

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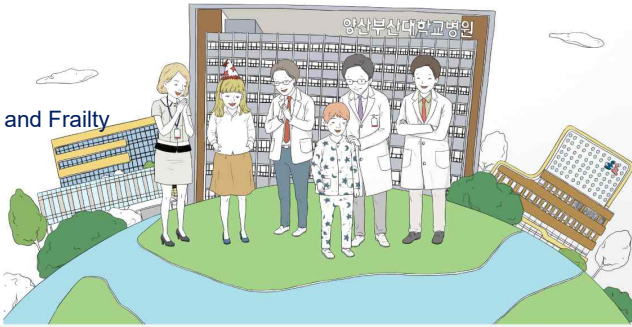
Yangsan National University Hospital

1. Case Finding and Diagnosis
2. New Goals of Management
3. Changing COPD Classification
4. Pharmacological Treatment
5. Clinical Implications: SAO, Mucus, and Frailty



Contents

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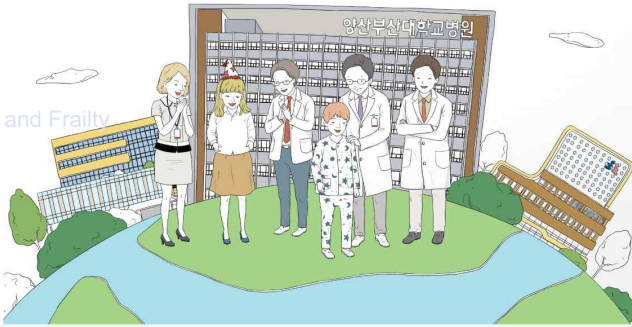
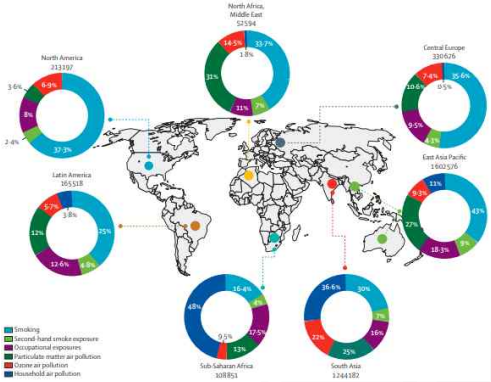


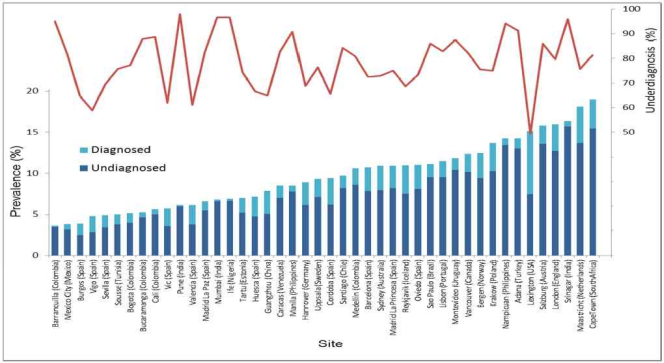
COPD Prevalence



- COPD affects >400 million people and is the third leading cause of death worldwide.
- Prevalence in adults ≥40 years was 10.6% (480 million cases) in 2020, and is projected to rise to ~592 million by 2050.

COPD Prevalence

Figure 2. Prevalence of diagnosed and undiagnosed COPD (post-BD FEV1/FVC<LLN) and relative underdiagnosis by study site

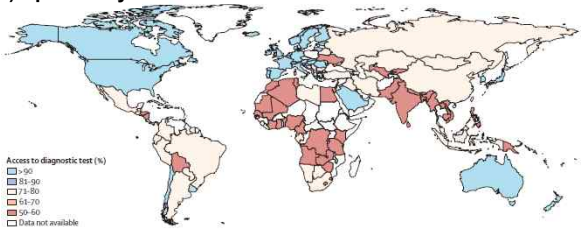


- A 27-country collaborative study found a prevalence of COPD, of 9.7%, with 81% of COPD cases being undiagnosed.
- The problem of COPD underdiagnosis(90–95% of COPD cases) was worse in LMICs.

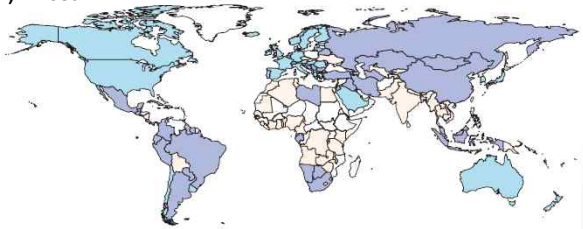
Chest. 2015 Oct;148(4):971-985.

Proportion of global population with access for diagnosis of COPD

(A) Spirometry



(B) Chest CT



	Primary and specialist care	Primary care only	Specialist care only	Limited* availability in primary or specialist care, or both	Not available
Lower-middle-income countries (n=11)					
Spirometry	2 (18%)	0	4 (36%)	5 (45%)	0
Reversibility testing	1 (9%)	0	6 (55%)	4 (36%)	0
Whole body plethysmography	0	0	3 (27%)	5 (45%)	3 (27%)
Diffusion capacity measurement	0	0	3 (27%)	5 (45%)	3 (27%)
Arterial blood gas analysis	0	0	6 (55%)	5 (45%)	0
Chest radiography	6 (55%)	3 (27%)	0	2 (18%)	0
Chest CT	1 (9%)	0	7 (64%)	3 (27%)	0
Upper-middle-income countries (n=15)					
Spirometry	3 (20%)	2 (13%)	6 (40%)	4 (27%)	0
Reversibility testing	2 (13%)	1 (7%)	8 (53%)	4 (27%)	0
Whole body plethysmography	0	0	5 (33%)	9 (60%)	1 (7%)
Diffusion capacity measurement	0	0	6 (40%)	8 (53%)	1 (7%)
Arterial blood gas analysis	1 (7%)	2 (13%)	8 (53%)	4 (27%)	0
Chest radiography	8 (53%)	4 (27%)	3 (20%)	0	0
Chest CT	3 (20%)	0	10 (67%)	2 (13%)	0
High-income countries (n=17)					
Spirometry	12 (71%)	1 (6%)	3 (18%)	1 (6%)	0
Reversibility testing	8 (47%)	0	9 (53%)	0	0
Whole body plethysmography	0	0	16 (94%)	1 (6%)	0
Diffusion capacity measurement	1 (6%)	0	14 (82%)	2 (12%)	0
Arterial blood gas analysis	1 (6%)	0	15 (88%)	1 (6%)	0
Chest radiography	12 (71%)	0	4 (24%)	1 (6%)	0
Chest CT	4 (24%)	0	12 (71%)	1 (6%)	0

Table 1: **Availability of tests considered relevant in the diagnosis of chronic obstructive pulmonary disease, by country income group**

Stolz et al. Lancet. 2022 Sep 17;400(10356):921-972

Proposed diagnostic algorithm for COPD

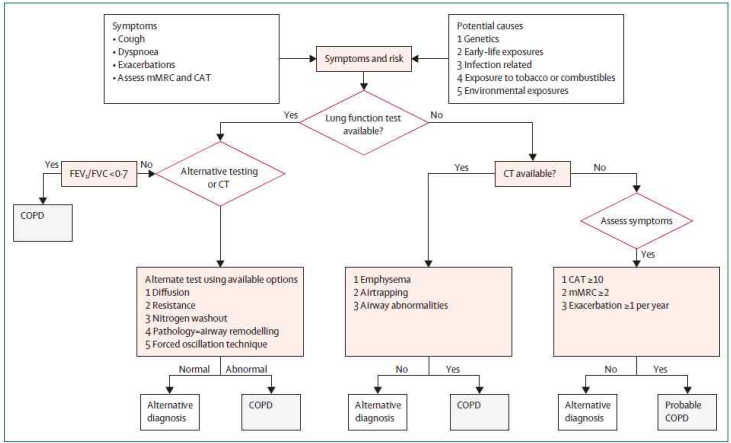
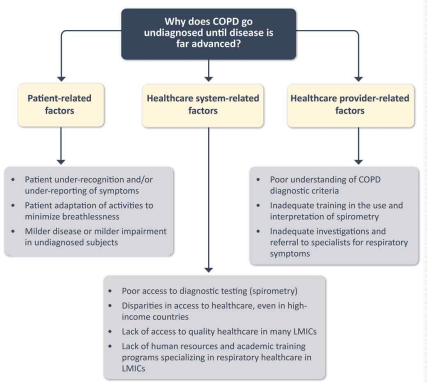


Figure 11: **Proposed diagnostic algorithm for COPD**
COPD=chronic obstructive pulmonary disease. mMRC=modified medical research council scale. CAT=COPD assessment test. FEV_1=forced expiratory volume in 1 s. FVC=forced vital capacity.

Screening and Case-Finding

Factors that May Be Associated with COPD Underdiagnosis

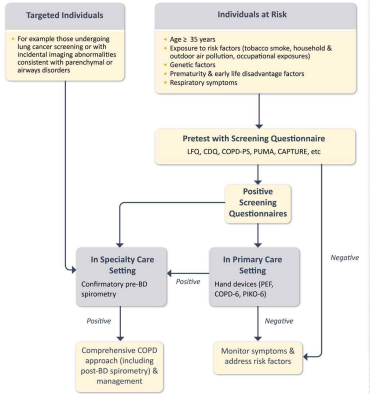
Figure 2.8



Adapted from: Aaron et al. Am J Respir Crit Care Med. 2024 Apr 15;209(8):928-937.

An Algorithm for COPD Case-finding

Figure 2.9



Adapted from: Aaron et al. Am J Respir Crit Care Med. 2024 Apr 15;209(8):928-937.

Population-Based Screening for Chronic Obstructive Pulmonary Disease Using the St. George's Respiratory Questionnaire in Resource-Limited Settings

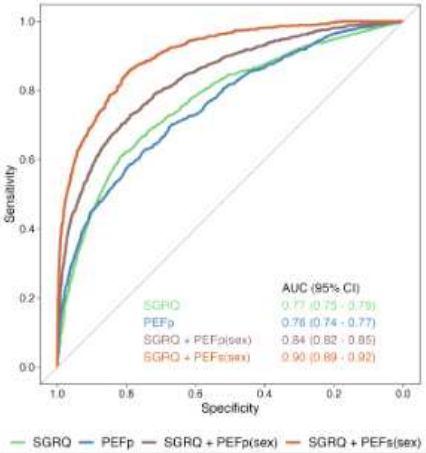
William Checkley[1,2], Mingling Yang[1,2], Nicole M. Robertson[1,2], Arun K. Sharma[3], Ram K. Chandyo[5], Laxman Shrestha[3], Santa K. Das[4], Bruce Kirenga[6], Patricia Alupo[6], Gonzalo Gianella[7], Trishul Siddharthan[2,8], Suzanne L. Pollard[1,2], Shumonta Quaderi[9], Natalie Rykiel[1,2], Oscar Flores-Flores[2,10], John R. Hurst[9], and Robert A. Wise[1]; the Global Excellence in COPD outcomes (GECo) Study Investigators

[1]Division of Pulmonary and Critical Care and [2]Center for Global Non-Communicable Disease Research and Training, School of Medicine, Johns Hopkins University, Baltimore, Maryland; [3]Department of Pediatrics and the Child Health Research Project and [4]Department of Pulmonology and Critical Care, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal; [5]Department of Community Medicine, Kathmandu Medical College, Bhaktapur, Nepal; [6]Makerere Lung Institute, Makerere University, Kampala, Uganda; [7]Facultad de Medicina, Universidad Peruana Cayetano Heredia, Lima, Peru; [8]Division of Pulmonary and Critical Care, Miller School of Medicine, University of Miami, Miami, Florida; [9]UCL Respiratory Medicine, University College London, London, United Kingdom; and [10]Facultad de Medicina Humana, Centro de Investigación del Envejecimiento, Universidad de San Martin de Porres, Lima, Peru

ORCID IDs: 0000-0003-1106-8812 (W.C.); 0000-0003-2139-8321 (N.M.R.); 0000-0001-9914-1839 (T.S.); 0000-0002-7246-6040 (J.R.H.); 0000-0002-8353-2349 (R.A.W.).

Study Design: Population-based COPD screening study
Participants: Adults aged ≥40 years
Screening Tools:
St. George's Respiratory Questionnaire (SGRQ)
Pre-bronchodilator Peak Expiratory Flow (PEF)
COPD Definition: Post BD FEV_1/FVC Z-score < -1.645

ROC curves for combination of SGRQ and PEF



Research

JAMA | Original Investigation

A Multidimensional Diagnostic Approach for Chronic Obstructive Pulmonary Disease

COPDGene 2025 Diagnosis Working Group and CanCOLD Investigators

New Diagnostic Criteria for COPD

Figure 1. Diagnostic Schema for Chronic Obstructive Pulmonary Disease (COPD) Using Major and Minor Criteria

DIAGNOSTIC CRITERIA

Major	Minor: imaging	Minor: symptoms
Airflow obstruction FEV_1/FVC <0.70 *or* FEV_1/FVC <LLN	Emphysema ≥Mild visual emphysema Bronchial wall thickening	Dyspnea mMRC score ≥2 Quality of life SGRQ score ≥25 *or* CAT score ≥10 Chronic bronchitis

DIAGNOSIS

Chronic obstructive pulmonary disease

Major diagnostic category	Minor diagnostic category
Major criterion *plus* ≥1 Minor criterion	≥3 Minor criteria *If symptoms are explained by other diseases, both imaging criteria should be met.*

Figure 2. Reclassification of Participants by New Diagnostic Schema by Global Initiative for Chronic Obstructive Lung Disease (GOLD) Stage

- **15.4% (811/5,250)** without airflow obstruction were newly classified as COPD (minor criteria).
- **6.8% (282/4,166)** with airflow obstruction were classified as non-COPD.

Bhatt et al. JAMA. 2025;333(24):2164-75.

Table 1. Clinical and Imaging Characteristics of Participants in COPDGene by Reclassification Status

	Reclassification overall (N = 9416)			
	COPD by both old and new diagnostic schemas (n = 3884)	No airflow obstruction but COPD present according to new diagnostic schema (n = 811)	Airflow obstruction but no COPD according to new diagnostic schema (n = 282)	No COPD by both old and new diagnostic schemas (n = 4439)
Lung function, mean (SD)				
FEV_1 % predicted	56.1 (22.2)	85.2 (16.4)	81.3 (14.9)	92.8 (15.0)
Questionnaires				
Chronic bronchitis, No. (%)	1073 (27.6)	410 (50.6)	0	306 (6.9)
mMRC dyspnea score, mean (SD)[b]	2.0 (1.4)	2.5 (1.1)	0.2 (0.4)	0.6 (1.1)
mMRC dyspnea score ≥2, No. (%)[b]	2412 (62.1)	690 (85.1)	0	772 (17.4)
SGRQ total score, mean (SD)	38.4 (22.3)	46.7 (17.1)	8.6 (7.1)	14.5 (15.7)
SGRQ score ≥25, No. (%)	2705 (69.6)	765 (94.3)	0	863 (19.4)
Frequent exacerbations, No. (%)	640 (16.5)	87 (10.7)	5 (1.8)	110 (2.5)
Imaging visual estimates, No. (%)				
Emphysema (≥mild)[c]	3150 (81.1)	449 (55.4)	0	946 (21.3)
Bronchial wall thickening[c]	2757 (71.0)	416 (51.3)	0	572 (12.9)
Imaging quantitative estimates, mean (SD)				
Emphysema, % <−950 HU	12.5 (12.5)	1.6 (2.6)	3.8 (4.2)	1.9 (2.7)
Pi10, mm	2.68 (0.59)	2.48 (0.63)	2.12 (0.41)	2.06 (0.47)

Figure 3. Associations Between Clinical Outcomes and Chronic Obstructive Pulmonary Disease (COPD) Status by New Diagnostic Schema in Genetic Epidemiology of COPD

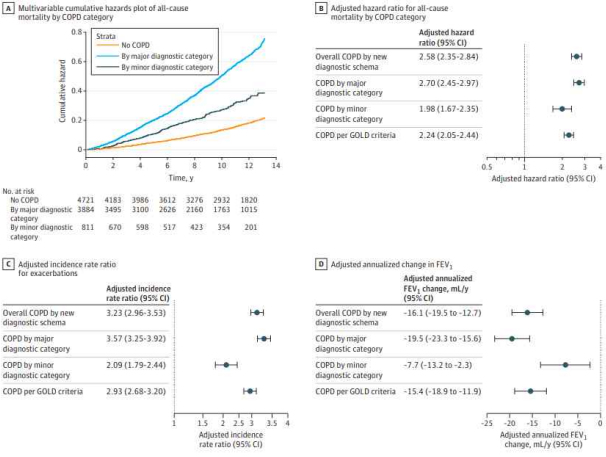
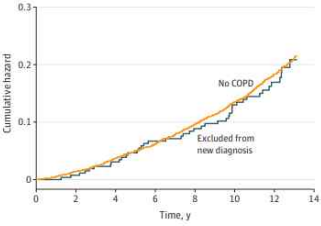


Figure 4. Associations Between the Category Excluded From Chronic Obstructive Pulmonary Disease (COPD) Diagnosis and Clinical Outcomes in the Genetic Epidemiology of COPD Study[a]



No. at risk

No COPD	4439	3920	3731	3370	3048	2721	1682
Excluded from new diagnosis	282	263	255	242	228	211	138

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Original article

Identifying high-risk smokers without airflow limitation using new COPD criteria: pooled analysis of two Japanese cohorts

Naoya Tanabe [a,*,1], Shotaro Chubachi [b,1], Kunihiko Terada [c], Takashi Shimada [b], Yoshinori Seri [a], Hideto shi Nakamura [d], Koichiro Asano [e], Atsuyasu Sato [a], Susumu Sato [a,f], Koichi Fukunaga [b], Toyohiro Hirai [a]

[a] Department of Respiratory Medicine, Kyoto University Graduate School of Medicine, 54 Kawahara-cho, Shogoin, Sakyo-ku, Kyoto, 606-8507, Japan
[b] Division of Pulmonary Medicine, Department of Medicine, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo, 160-8582, Japan
[c] Terada Clinic, Respiratory Medicine and General Practice, Gokonyo-3-6 Jotomachi, Himeji, Hyogo, 670-0849, Japan
[d] Department of Respiratory Medicine, Saitama Medical University, 1397-1 Yamane, Hidaka-City, Saitama, 350-1290, Japan
[e] Division of Pulmonary Medicine, Department of Medicine, Tokai University, School of Medicine, 143 Shimokasuya, Isehara, Kanagawa, 259-1193, Japan
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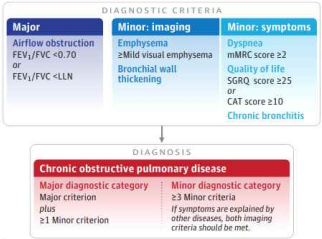
Figure 1. Diagnostic Schema for Chronic Obstructive Pulmonary Disease (COPD) Using Major and Minor Criteria



Methods

- Pooled analysis of two Japanese smoker cohorts (≥40 years).
- COPD was defined by airflow limitation plus ≥1 minor criterion or by ≥3 minor criteria.
- 3-year exacerbation risk was compared across groups.

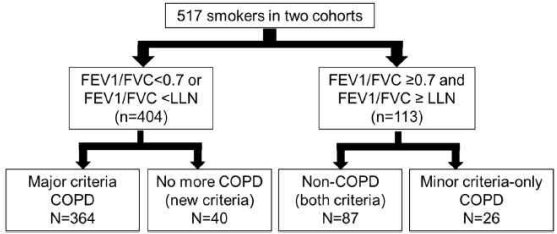
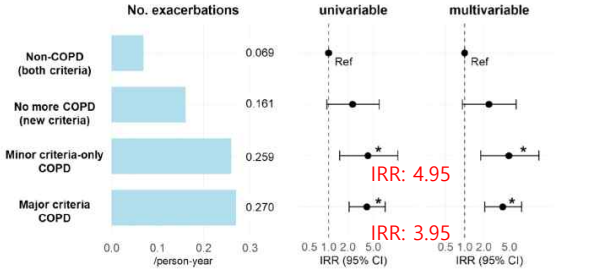


Fig. 1. Subject flow FEV1/FVC = forced expiratory volume in 1 s/forced vital capacity. LLN = lower limit of normal.



Predictors of Exacerbation

Table 2

Negative binomial models for a risk of exacerbation in patients with COPD based on new diagnostic criteria (n = 390).

Variable	IRR (95 % CI)	P value
CAT	1.04 (1.04, 1.07))	0.002
WA%	0.99 (0.99, 1.01)	0.42
LAA%	1.02 (1.01, 1.04)	0.0097
BMI	0.97 (0.90, 1.04)	0.29
age	1.01 (0.98, 1.04)	0.39
Male	1.88 (0.77, 4.57)	0.16
packyear	1.00 (0.99, 1.00)	0.55
Former smokers	0.67 (0.40, 1.11)	0.12

BMI = body mass index. CAT = COPD assessment test. FEV1 = forced expiratory volume in 1 s. FVC = forced vital capacity. LAA% = low attenuation area percentage. WA% = wall area percentage in segmental airway.

Contents

양산부산대학교병원
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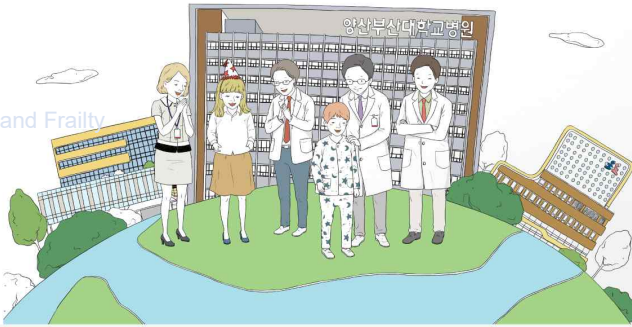
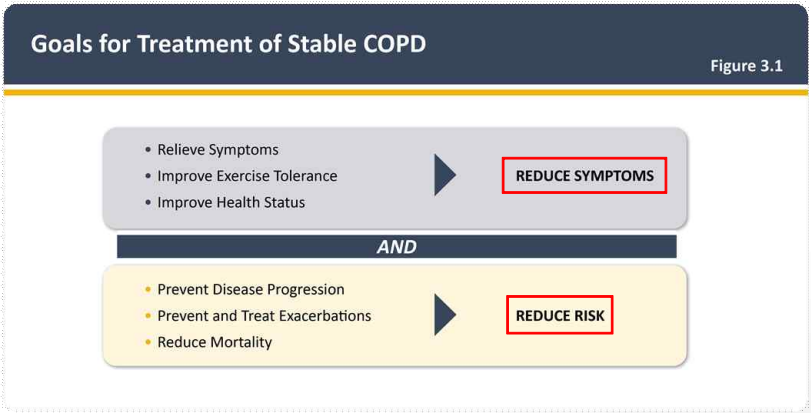


Goals for Treatment of COPD



Disease Activity

- **Disease activity** refers to biological pathways that
  - ① cause the **pathological outcomes** of disease, and
  - ② are **potentially reversible or controllable** with treatment
  - If untreated or treatment is ineffective, disease activity leads to
    - disease progression
    - permanent organ damage and dysfunction

- **A key objective of COPD management** is to **reduce disease activity**, with the aim that patients have:
  - ✓no exacerbations
  - ✓no worsening of symptoms
  - ✓no accelerated loss of lung function

Is Disease Stability an Attainable Chronic Obstructive Pulmonary Disease Treatment Goal?

Dave Singh[1], MeiLan K. Han[2], Surya P. Bhatt[3], Marc Miravitlles[4], Chris Compton[5], Stefanie Kolterer[6], Tharishini Mohan[5], Suneal K. Sreedharan[5], Lee Tombs[7], and David M. G. Halpin[8]

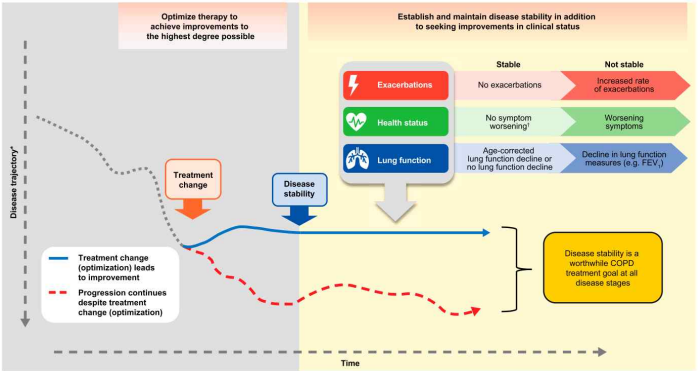


Table 2. Preliminary Definition for Disease Stability

Components	Exacerbations: Frequency	Health Status: SGRQ or CAT	Lung Function: FEV_1
Thresholds*	No exacerbations	No worsening in SGRQ or CAT score; alternatively, no clinically significant worsening	No decrease; consideration of correction for age-related decline
Timeline	• 6–12 months, comprising one or multiple visits in that time • Benchmark current measurements against previous 6–12 months at each visit		
Individual vs. composite assessments	• Stability can be achieved in one or multiple components • Dependent on patient factors, availability of spirometry, and setting		
Context and setting	• Primary care or in-clinic and research settings • All disease severities, phenotypes/etiotypes, and interventions		
Other considerations	• "Clinically significant" worsening will require definition • Biomarkers may be implemented in future components once validated • An expert consensus on the definition of disease stability should be reached among key experts		

Definition of abbreviations: CAT = COPD Assessment Test; COPD = chronic obstructive pulmonary disease; SGRQ = St. George's Respiratory Questionnaire.
*Some patients may experience improvements with treatment optimization and other holistic interventions (e.g., smoking cessation, vaccination); this is also considered to be achieving disease stability.

Clinical Outcomes in Patients With COPD With Disease Stability

Data from the Korea COPD Subgroup Study Cohort

Eunjeong Son, MD, PhD; Hyewon Seo, MD, PhD; Seung Won Ra, MD, PhD; Seoung Ju Park, MD, PhD; Soo-Jung Um, MD, PhD; Seong Yong Lim, MD, PhD; Hyoung Kyu Yoon, MD, PhD; Kwang Ha Yoo, MD, PhD; Joon Young Choi, MD, PhD; and Chin Kook Rhee, MD, PhD

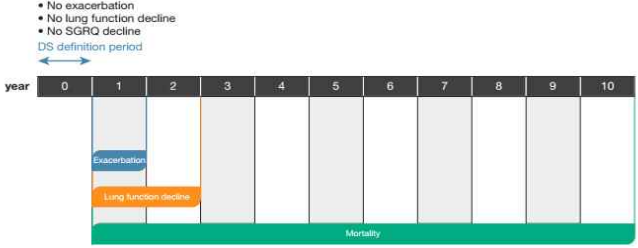


Figure 1 – *Study time frame. This study defined a 1-y DS period, subsequently followed by a 1-y period of acute exacerbation occurrence, 2 y of lung function changes, and mortality rates investigated using national mortality data for up to 10 y. DS = disease stability; SGRQ = St. George's Respiratory questionnaire.*

TABLE 3] Cox Proportional Hazards Regression of All-Cause Mortality According to Disease Stability

	Crude			Multivariate		
	HR	95% CI	*P* Value	HR	95% CI	*P* Value
Disease stability	0.56	0.37-1.09	.096	0.56	0.32-0.96	.036
Age	1.07	1.07-1.11	< .001	1.07	1.05-1.09	< .001
Female sex	0.71	0.34-0.90	.018	0.73	0.32-1.66	.457
BMI	0.87	0.87-0.93	< .001	0.87	0.83-0.91	< .001
Smoking status						
Never		(Reference)			(Reference)	
Prior	1.74	1.12-2.70	.014	1.51	0.73-3.10	.267
Current	1.98	1.25-3.15	.004	2.16	1.02-4.57	.045
HTN	1.27	1.02-1.58	.036	1.49	1.12-2.00	.007
HF	1.78	1.08-2.94	.025	0.70	0.26-1.90	.481
DM	1.00	0.75-1.33	.986			
MI	1.31	0.81-2.10	.269			
CVA	1.27	0.56-2.87	.572			

CVA = cerebrovascular accident; DM = diabetes mellitus; HF = heart failure; HR = hazard ratio; HTN = hypertension; MI = myocardial infarction.

TABLE 2] Comparison of Exacerbation Frequency According to the Presence of Disease Stability

Exacerbations	IRR	95% CI	*P* Value
Moderate-to-severe	0.30	0.20-0.43	.033
Severe	0.26	0.10-0.58	.002

Adjusted variables include age, sex, BMI, smoking status, and post-bronchodilator FEV_1 (L). IRR = incident rate ratio.

Contents

양산부산대학교병원
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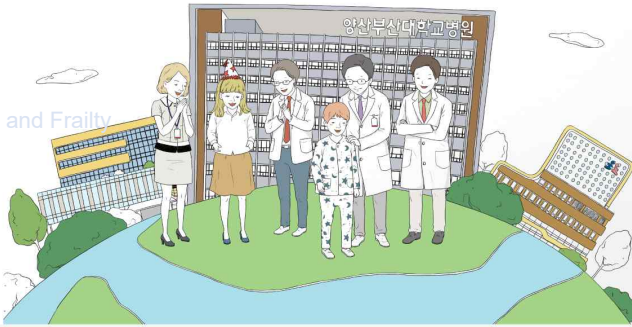
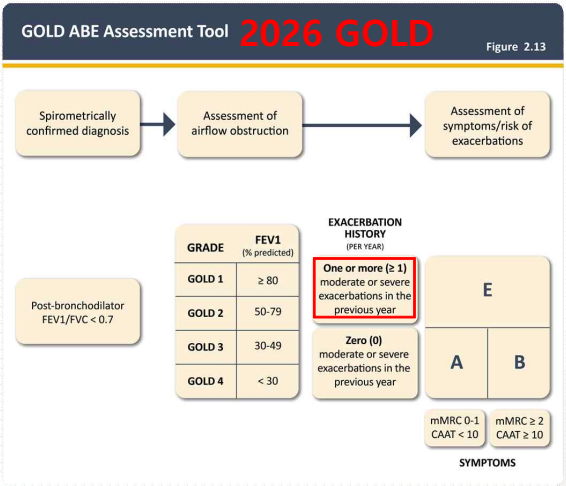


Assessment of COPD

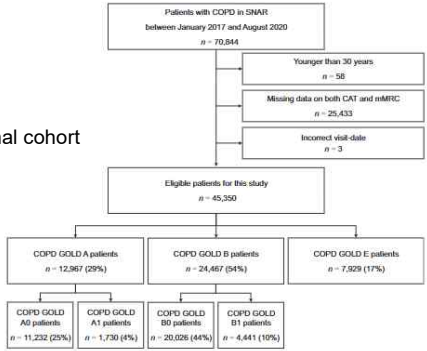


Exacerbation Risk and Mortality in Global Initiative for Chronic Obstructive Lung Disease Group A and B Patients with and without Exacerbation History

Lowie E. G. W. Vanfleteren[1,2], Anne Lindberg[4], Caddie Zhou[5], Fredrik Nyberg[3], and Caroline Stridsman[4]

[1]COPD Center, Department of Respiratory Medicine and Allergology, Sahlgrenska University Hospital, Gothenburg, Sweden; [2]Department of Internal Medicine and Clinical Nutrition and [3]School of Public Health and Community Medicine, Institute of M Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden; [4]Division of Medicine/The OLIN Unit, Department Health and Clinical Medicine, Umeå University, Umeå, Sweden; and [5]Center of Registers Västra Götaland, Gothenburg, Sw

ORCID IDs: 0000-0002-4387-4096 (L.E.G.W.V.); 0000-0002-3292-7471 (A.L.); 0000-0001-6622-3838 (C.S.).



Study Design

- Nationwide retrospective cohort study using the Swedish National cohort

Population

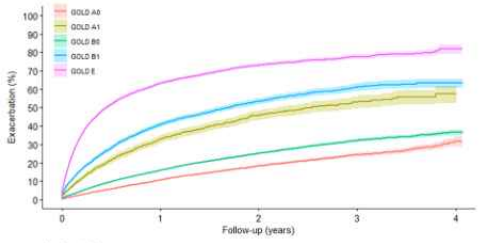
- Included 45,350 COPD patients aged ≥30 years (2017–2020)

Classification

- A0: GOLD A, no exacerbation in previous year
- A1: GOLD A, one moderate exacerbation
- B0: GOLD B, no exacerbation
- B1: GOLD B, one moderate exacerbation
- E: ≥2 moderate or ≥1 severe exacerbation

Risk of Exacerbations and Hospitalization

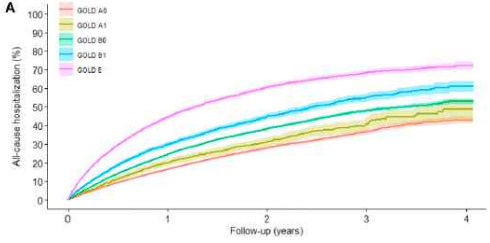
Time to First Exacerbation



Number at risk

GOLD A0	11232	9607	3787	1292	63
GOLD A1	1730	989	378	113	3
GOLD B0	20017	14165	5875	2037	101
GOLD B1	4442	2170	761	228	7
GOLD E	7929	2268	733	207	4
	0	1	2	3	4

Time to Hospitalization

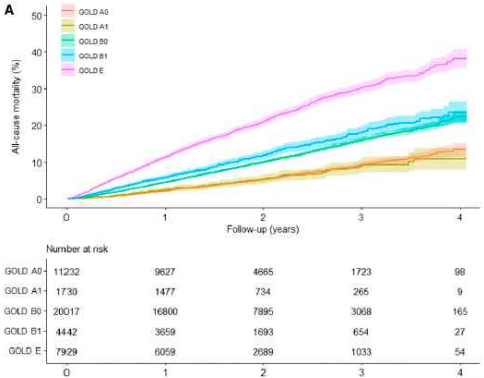


Number at risk

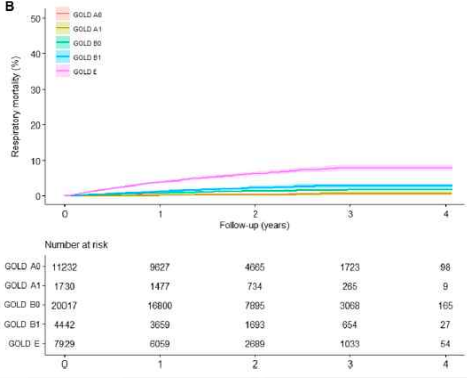
GOLD A0	11232	8124	3410	1142	61
GOLD A1	1730	1194	504	162	5
GOLD B0	20017	13035	5030	1699	74
GOLD B1	4442	2674	985	321	6
GOLD E	7929	3649	1128	363	21
	0	1	2	3	4

Risk of Mortality

Time to death for any cause



Time to death for respiratory cause



Comparison of Clinical Outcomes

Table 5. Crude and Adjusted Hazard Ratios for Moderate Exacerbation and for All-Cause, Respiratory, and Cardiovascular Hospitalization and Mortality for Group B1 versus Group B0

	Moderate Exacerbation	
Group	**Crude HR (95% CI)**	**Adj. HR (95% CI)**
B0	Ref	Ref
B1	2.72 (2.59–2.87)	2.56 (2.40–2.74)

	All-Cause Hospitalization		Respiratory Hospitalization*		Cardiovascular Hospitalization*	
Group	**Crude HR (95% CI)**	**Adj. HR (95% CI)**	**Crude HR (95% CI)**	**Adj. HR (95% CI)**	**Crude HR (95% CI)**	**Adj. HR (95% CI)**
B0	Ref	Ref	Ref	Ref	Ref	Ref
B1	1.24 (1.18–1.31)	1.28 (1.21–1.35)	1.69 (1.55–1.85)	1.44 (1.27–1.62)	1.10 (0.98–1.23)	1.12 (0.96–1.30)

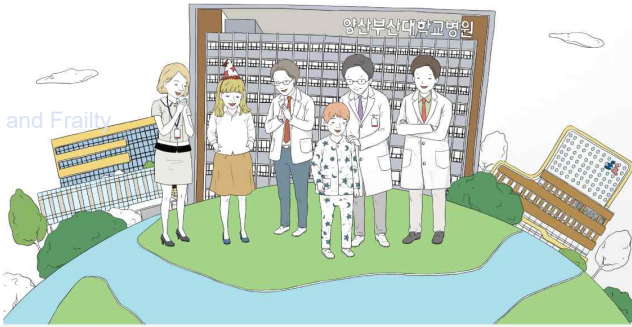
	All-Cause Mortality		Respiratory Mortality*		Cardiovascular Mortality*	
Group	**Crude HR (95% CI)**	**Adj. HR (95% CI)**	**Crude HR (95% CI)**	**Adj. HR (95% CI)**	**Crude HR (95% CI)**	**Adj. HR (95% CI)**
B0	Ref	Ref	Ref	Ref	Ref	Ref
B1	1.19 (1.08–1.31)	1.04 (0.91–1.18)	1.62 (1.26–2.07)	1.13 (0.79–1.64)	1.18 (0.82–1.69)	0.90 (0.53–1.53)

Definition of abbreviations: Adj. = adjustment for age, sex, smoking status, and lung function (FEV_1% predicted); CI = confidence interval; HR = hazard ratio; Ref = reference group.
B0 and B1 groups are Global Initiative for Chronic Obstructive Lung Disease classification B patients without and with an exacerbation in the past year, respectively.
*Death from other cause considered as competing risk.

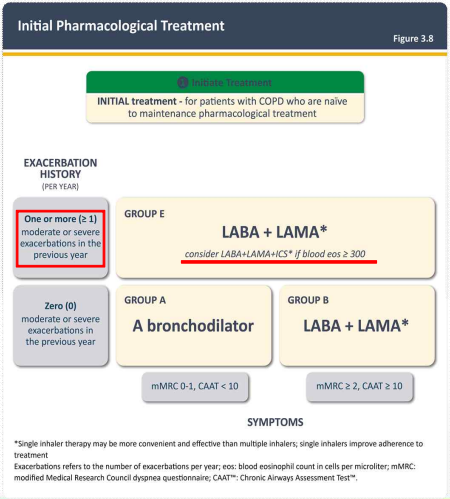
Contents

양산부산대학교병원
Yangsan National University Hospital

1. Case Finding and Diagnosis
2. New Goals of Management
3. Changing COPD Classification
4. Pharmacological Treatment
5. Clinical Implications: SAO, Mucus, and Frailty



Management of COPD



ORIGINAL ARTICLE
COPD

The effect of exacerbation history on outcomes in the IMPACT trial

David M.G. Halpin[1], Mark T. Dransfield[2], MeiLan K. Han[3], C. Elaine Jones[4], Sally Kilbride[5], Peter Lange[6,7], David A. Lipson[8,9], David A. Lomas[10], Fernando J. Martinez[11], Steve Pascoe[8,12], Dave Singh[13], Robert Wise[14] and Gerard J. Criner[15]

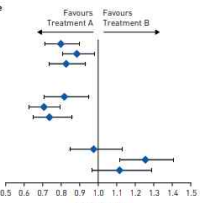
Study design

- Post-hoc subgroup analysis of the 52-week IMPACT trial(N=10,355).
- Included 10,355 symptomatic COPD patients with prior exacerbation history
- Divided by prior 12-month exacerbation history:
  - Single Moderate group: 1 moderate, 0 severe
  - Frequent Moderate group: ≥2 moderate, 0 severe
  - Severe group: ≥1 severe, any moderate
- Randomized (2:2:1) to Once-daily FF/UMEC/VI vs. FF/VI or UMEC/VI

Annual Exacerbation Rates During Treatment

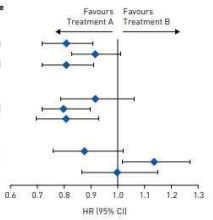
Annual rate of moderate to severe exacerbations

a)	Treatment A FF/UMEC/VI	Treatment B FF/VI	RR (95% CI)	p-value
FF/UMEC/VI *versus* FF/VI				
Single moderate subgroup	0.85 (0.78–0.92)	1.06 (0.97–1.15)	0.80 (0.71–0.90)	<0.001
Frequent moderate subgroup	0.85 (0.80–0.91)	0.96 (0.90–1.03)	0.89 (0.81–0.98)	0.016
Severe subgroup	1.06 (0.98–1.16)	1.28 (1.18–1.39)	0.83 (0.74–0.93)	0.002
FF/UMEC/VI *versus* UMEC/VI	**FF/UMEC/VI**	**UMEC/VI**		
Single moderate subgroup	0.85 (0.78–0.92)	1.03 (0.92–1.16)	0.82 (0.71–0.95)	0.007
Frequent moderate subgroup	0.85 (0.80–0.91)	1.21 (1.10–1.32)	0.71 (0.63–0.79)	<0.001
Severe subgroup	1.06 (0.98–1.16)	1.43 (1.27–1.61)	0.74 (0.65–0.86)	<0.001
UMEC/VI *versus* FF/VI	**UMEC/VI**	**FF/VI**		
Single moderate subgroup	1.03 (0.92–1.16)	1.06 (0.97–1.15)	0.98 (0.85–1.13)	0.782
Frequent moderate subgroup	1.21 (1.10–1.32)	0.96 (0.90–1.03)	1.26 (1.12–1.41)	<0.001
Severe subgroup	1.43 (1.27–1.61)	1.28 (1.18–1.39)	1.12 (0.97–1.29)	0.129



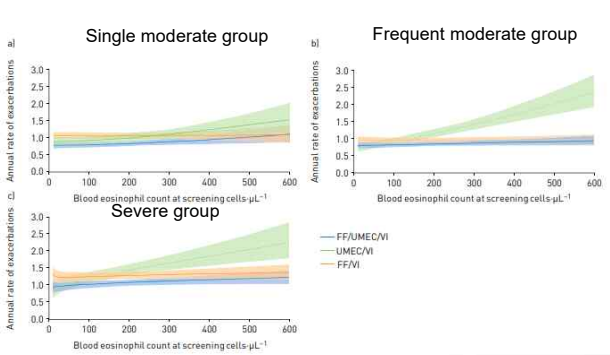
Time-to-first moderate to severe exacerbation

a)	Treatment A FF/UMEC/VI	Treatment B FF/VI	HR (95% CI)	p-value
FF/UMEC/VI *versus* FF/VI				
Single moderate subgroup	545/1198 (45)	605/1242 (49)	0.81 (0.72–0.91)	<0.001
Frequent moderate subgroup	859/1866 (46)	847/1823 (46)	0.92 (0.83–1.01)	0.069
Severe subgroup	555/1087 (51)	587/1069 (55)	0.81 (0.72–0.91)	<0.001
FF/UMEC/VI *versus* UMEC/VI	**FF/UMEC/VI**	**UMEC/VI**		
Single moderate subgroup	545/1198 (45)	281/616 (46)	0.92 (0.79–1.06)	0.246
Frequent moderate subgroup	859/1866 (46)	478/939 (51)	0.80 (0.72–0.90)	<0.001
Severe subgroup	555/1087 (51)	277/515 (54)	0.81 (0.70–0.93)	0.003
UMEC/VI *versus* FF/VI	**UMEC/VI**	**FF/VI**		
Single moderate subgroup	281/616 (46)	605/1242 (49)	0.88 (0.76–1.02)	0.080
Frequent moderate subgroup	478/939 (51)	847/1823 (46)	1.14 (1.02–1.27)	0.023
Severe subgroup	277/515 (54)	587/1069 (55)	1.00 (0.87–1.15)	0.991

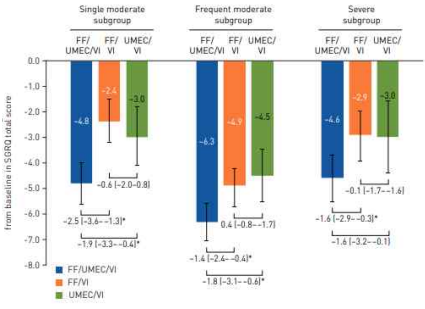


Exacerbation Rates According to BEC

Annual rate of moderate or severe exacerbations

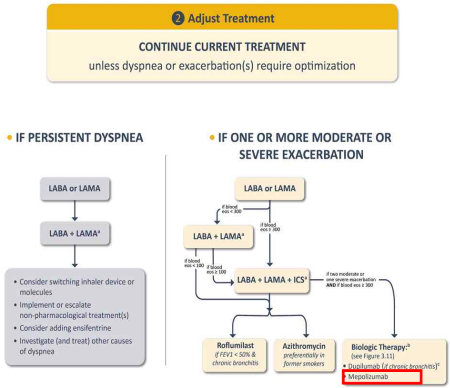


SGRQ Improvement by Inhaled Therapy



Follow-up Pharmacological Treatment

Figure 3.9



[a]Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment.

[b]Listed in order of approval in the US.

[c]Patient-reported history of chronic bronchitis (chronic productive cough) for 3 months in the year up to screening, absent other known causes.

Consider de-escalation of ICS if pneumonia or other considerable side-effects. In case of blood eosinophils ≥ 300 cells/µl de-escalation is more likely to be associated with the development of exacerbations.

The NEW ENGLAND JOURNAL of MEDICINE

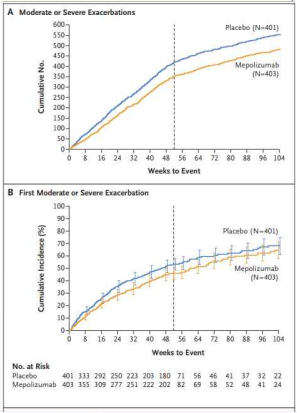
ORIGINAL ARTICLE

Mepolizumab to Prevent Exacerbations of COPD with an Eosinophilic Phenotype

F.C. Sciurba,[1] G.J. Criner,[2] S.A. Christenson,[3] F.J. Martinez,[4] A. Papi,[5] N. Roche,[6] J. Bourbeau,[7] S. Korn,[8] M. Bafadhel,[9] M.L.K. Han,[10] S. Kolterer,[11] K. Miller,[12] D. Mouneimne,[13] J. Fletcher,[13] B. Mayer,[14] J. Min,[15] and I.D. Pavord,[16] for the MATINEE Study Investigators*

Table 2. Primary and Secondary Efficacy End Points.*

End Point	Mepolizumab (N=403)	Placebo (N=401)
Primary end point		
Annualized rate of moderate or severe exacerbations (95% CI) — events/yr	0.80 (0.70–0.91)	1.01 (0.89–1.15)
Rate ratio vs. placebo (95% CI)	0.79 (0.66–0.94)	—
P value	0.01	—



Study Design

- Phase 3, randomized, double-blind, placebo-controlled trial

Study Population

- Patients with COPD
  - History of exacerbations
  - Blood eosinophil count ≥300 cells/μL
  - Receiving triple therapy

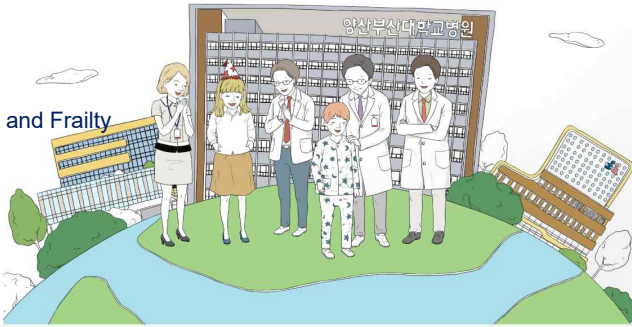
Intervention

- 1:1 ratio, to receive mepolizumab (100 mg, SC) or placebo every 4 weeks for 52 to 104 weeks.

Primary Endpoint

- Annualized rate of moderate or severe COPD exacerbations

Contents



ORIGINAL ARTICLE

Distinct Morphological Types of Small Airway Obstructions in Smokers with Emphysema and End-Stage Chronic Obstructive Pulmonary Disease

Vincent Geudens[1], Charlotte De Fays[1,2], Lynn Willems[1], Astrid Vermaut[1], Gitte Aerts[1], Pieterjan Kerckhof[1], Janne Kaes[1], Charlotte Hooft[1], Xin Jin[1], Hanne Beeckmans[1], Yousry Mohamady[1], Lucia Aversa[1], Tinne Goos[1], Marie Vermant[1], Iwein Gyselinck[1], Janne Verhaegen[1], Jan Van Slambrouck[1], Celine Aelbrecht[1], Andrew Higham[3], Walter Coudyzer[4], Emanuela E. Cortesi[1], Arno Vanstapel[1], John E. McDonough[6], Marianne S. Carlon[1], Rozenn Quarck[1], Matthieu N. Boone[7], Lieven J. Dupont[1], Birgit Weynand[5], Charles Pilette[2], Stephanie Everaerts[1], Dirk E. Van Raemdonck[1], Laurens J. Ceulemans[1], James C. Hogg[8], Tillie-Louise Hackett[8], Robin Vos[1], Wim A. Wuyts[1], Wim Janssens[1], Joseph Jacob[9,10], Bart M. Vanaudenaerde[1], and Ghislaine Gayan-Ramirez[1]

Study design

- Cross-sectional analysis using explanted lungs and donor controls

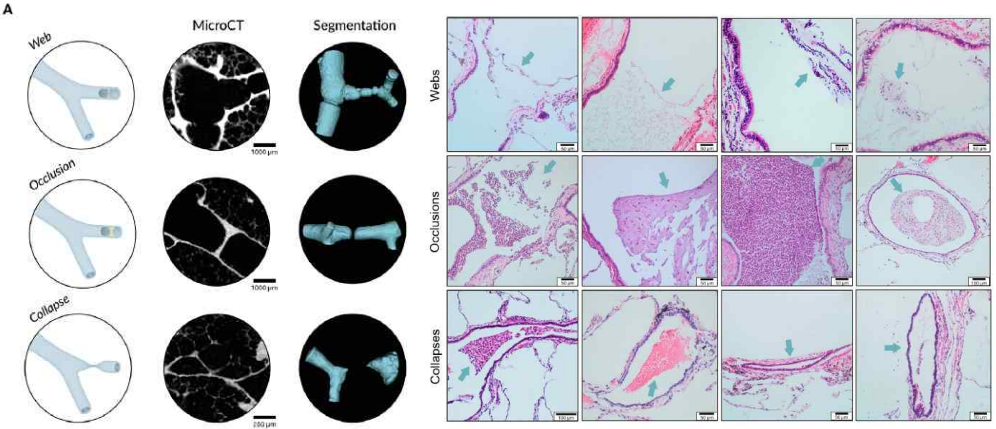
Population

- Non-smokers (control)
- Smokers without emphysema
- Smokers with emphysema
- End-stage COPD

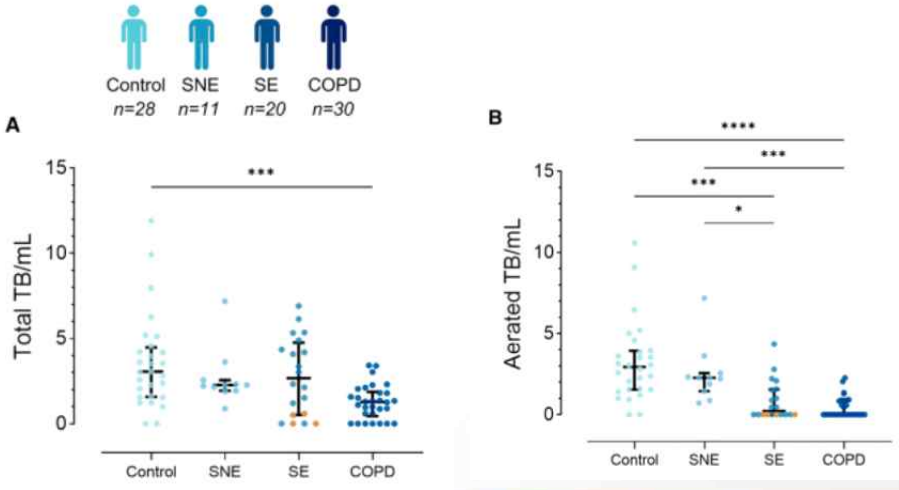
Techniques

- Micro-computed tomography (micro-CT)
- Histological analysis

Multiple types of obstructions in terminal bronchioles

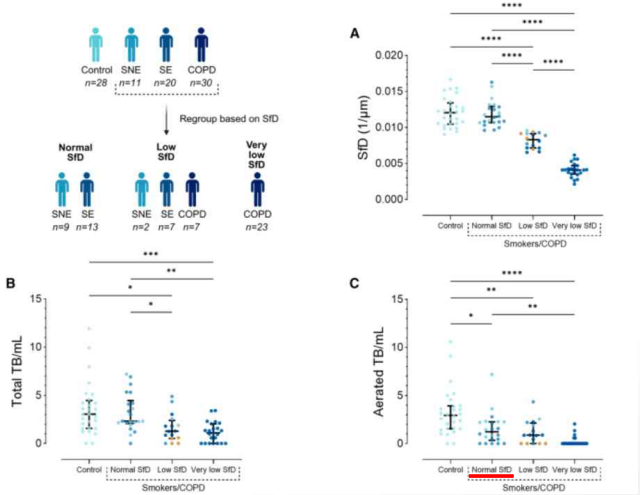


Total and Aerated number of terminal bronchioles



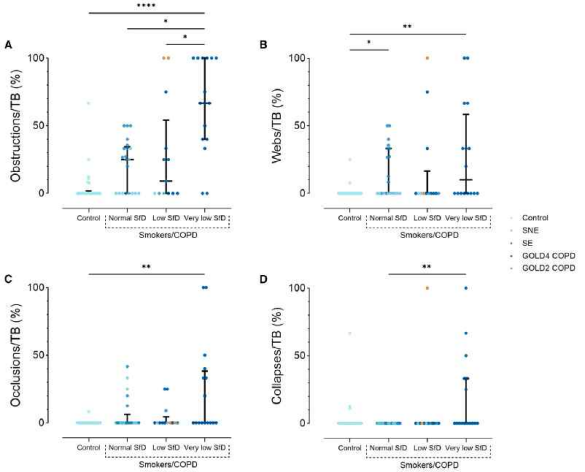
Am J Respir Crit Care Med. 2025 Aug 13;211(12):2307–2317.

Stratification Based on Alveolar Surface Density(SfD)



Am J Respir Crit Care Med. 2025 Aug 13;211(12):2307–2317.

Airway Changes with Disease Progression



ORIGINAL ARTICLE

Oscillometry-defined Small Airway Dysfunction in Tobacco-exposed Adults with Impaired or Preserved Airflow

Mustafa Abdo[1,2,3], Henrik Watz[3,4], Frederik Trinkmann[2,3], Sabine Bohnet[5], Miriam Annabelle Marcella Guess[5], Johannes Roeben[5], Katharina May[6], Martin Reck[1,3], Benjamin-Alexander Bollmann[3,7,9], Susanne Stiebeler[1,10], Sabine Dettmer[8,9], Benjamin Waschki[3,11], Klaus F. Rabe[1,3,12], Klaas Frederik Franzen[3,5*], and Jens Vogel-Claussen[3,6,9*]; on behalf of the HANSE Trial Group

[1]LungenClinic Grosshansdorf, Airway Research Center North, Grosshansdorf, Germany; [2]Department of Pneumology and Critical Care Medicine, Thoraxklinik at Heidelberg University Hospital, Translational Lung Research Center Heidelberg, Heidelberg, Germany; [3]German Center for Lung Research, Gießen, Germany; [4]Velocity Clinical Research Germany GmbH, Ahrensburg, Germany; [5]Department of Respiratory Medicine and [6]Department of Radiology, University Medical Center Schleswig-Holstein, Lübeck, Germany; [7]Department of Respiratory Medicine and Infectious Diseases and [8]Department of Diagnostic and Interventional Radiology, Hannover Medical School, Hannover, Germany; [9]Biomedical Research in End Stage and Obstructive Lung Disease Hannover, Hannover, Germany; [10]Radiologische Allianz, Hamburg, Germany; [11]Itzehoe Hospital, Itzehoe, Germany; and [12]Christian-Albrechts University of Kiel, Kiel, Germany

ORCID IDs: 0000-0002-3300-1398 (M.A.); 0000-0002-1070-3661 (B.W.).

Study design

- Subcohort analysis of the HANSE lung cancer screening trial in Germany

Population

- 1,628 tobacco-exposed adults (55–79 yrs) with ≥10 pack-years

Assessments

- Spirometry, oscillometry, AI-based CT, EQ-5D-5L questionnaires

Groups

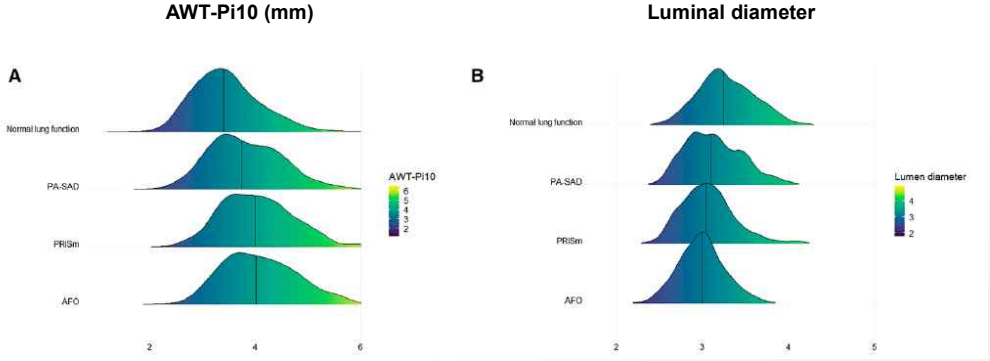
- AFO
- PRISm
- PA-SAD (FDR or AX > ULN)
- Normal

Clinical and Functional Differences Across Groups

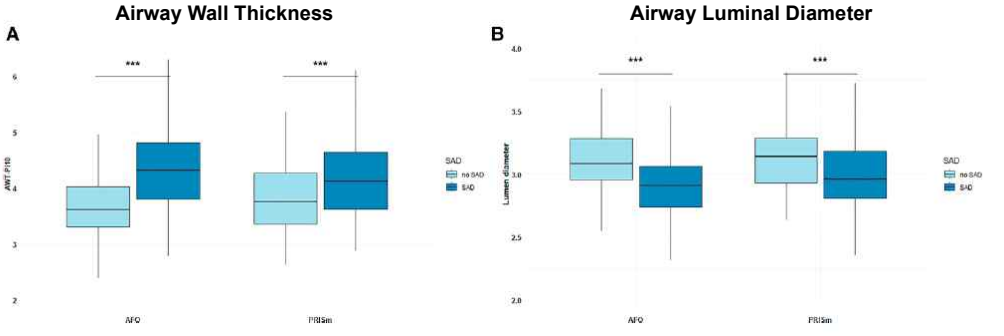
Table 1. Baseline Clinical and Imaging Characteristics According to Study Group

Variable	AFO ($n=353$)	PRISm ($n=245$)	PA-SAD ($n=266$)	Normal Lung Function ($n=758$)	*P* Value	*Post Hoc*
Demographics						
Age, yr	64 ± 6	63 ± 6	65 ± 6	64 ± 6	0.021	*
Sex, male	56	57	53	58	0.62	
BMI, kg/m^2	26.4 ± 4.5	28.8 ± 5.2	29.3 ± 4.9	26.1 ± 3.7	<0.001	†‡§‖
Smoking status, active smokers	60	59	49	51	0.003	*†¶
Smoking quantity, PY	47 ± 19	47 ± 25	41 ± 17	40 ± 17	<0.001	*†¶
Smoking abstinence, yr	3.8 ± 6.9	4.1 ± 7.4	6.3 ± 9.0	5.5 ± 86	<0.001	*¶
Regular physical activity	78	76	81	87	0.003	¶
Symptoms and QoL						
EQ-5D-5L score	0.91 ± 0.14	0.88 ± 0.19	0.89 ± 0.16	0.93 ± 0.12	<0.001	†‡¶
EQ-5D-5L VAS	77.6 ± 16.0	77.1 ± 17.0	78.7 ± 16.0	81.1 ± 15.0	<0.001	†‡¶
mMRC score ⩾1	24.3	14.7	8.5	4.7	<0.001	†‡‖¶
Respiratory disease and cardiometabolic comorbidities						
Respiratory disease	50	26	20	13	<0.001	*†§‖¶
Asthma	15	11	10	6.0	<0.001	†¶
COPD	40	18	7	6	<0.001	*†‡§¶
Metabolic disease	50	61	61	44	<0.001	†‡
CVD	54	65	65	50	<0.001	†‡§‖
Spirometry						
FEV_1% predicted	63 ± 14	68 ± 5	85 ± 8	91 ± 11	<0.001	*†‡§‖¶
FEV_1 *z*-score	−2.27 ± 0.83	−2.05 ± 0.29	−0.90 ± 0.53	−0.54 ± 0.69	<0.001	*†‡§‖¶
FVC% predicted	86 ± 14	73 ± 5	88 ± 9	94 ± 11	<0.001	*†‡§‖¶
FVC *z*-score	−0.9 ± 0.94	−1.75 ± 0.38	−0.77 ± 0.6	−0.4 ± 0.72	<0.001	*†‡§‖¶
FEV_1:FVC	0.57 ± 0.08	0.71 ± 0.05	0.75 ± 0.05	0.75 ± 0.05	<0.001	*†§‖¶
FEV_1:FVC *z*-score	−2.54 ± 0.72	−0.83 ± 0.6	−0.30 ± 0.66	−0.29 ± 0.7	<0.001	*†§‖¶
MEF75% *z*-score	2.4 ± 0.90	3.2 ± 0.50	3.8 ± 0.50	3.9 ± 0.50	<0.001	*†§‖¶
FEF25–75%:FVC	0.27 ± 0.09	0.51 ± 0.14	0.63 ± 0.18	0.63 ± 0.19	<0.001	*†§‖¶
FEF25–75% *z*-score	−2.18 ± 0.58	−1.32 ± 0.47	−0.41 ± 0.59	−0.26 ± 0.69	<0.001	*†§‖¶
Airway oscillometry						
R5, kPa · L^{-1} · s^{-1}	0.41 ± 0.15	0.40 ± 0.14	0.45 ± 0.12	0.27 ± 0.08	<0.001	*†‡§¶
R5, *z*-score	0.67 ± 1.58	0.76 ± 1.62	0.80 ± 1.85	0.03 ± 0.67	<0.001	*†¶
FDR, kPa · L^{-1} · s^{-1}	0.12 ± 0.08	0.11 ± 0.08	0.13 ± 0.06	0.03 ± 0.03	<0.001	*†‡§‖¶
FDR, *z*-score	1.24 ± 1.80	0.80 ± 1.80	1.33 ± 1.43	−0.77 ± 0.79	<0.001	*†‡§‖¶
AX, kPa · L^{-1}	1.94 ± 1.85	1.76 ± 1.72	2.0 ± 1.23	0.43 ± 0.27	<0.001	*†‡§¶
AX, *z*-score	3.9 ± 4.0	3.6 ± 4.0	3.9 ± 2.7	0.31 ± 0.6	<0.001	*†‡§¶
F_{res}	21.2 ± 6.8	20.5 ± 6.3	22.7 ± 4.0	13.4 ± 3.5	<0.001	*†‡§¶
X5, kPa · L^{-1} · s^{-1}	−0.23 ± 0.17	−0.24 ± 0.16	−0.25 ± 0.12	−0.11 ± 0.04	<0.001	*†‡§¶

Airway Structural Changes Across Study Groups



SAD Aggravates Airway Remodeling in AFO and PRISm



Predictors of Small Airway Dysfunction

Table 2. Linear Mixed-Effects Model Demonstrates Predictors of Small Airway Disease

Predictor	Standard Estimate	SE	*P* Value
Predictors of AX			
Age	0.250	0.026	<0.001
Sex, male	−0.410	0.047	<0.001
BMI	0.380	0.023	<0.001
Smoking status, former	−0.056	0.061	0.35
Smoking quantity	0.001	0.023	0.97
Duration of abstinence	−0.120	0.033	<0.001
Physical activity	−0.170	0.061	< 0.01
History of respiratory disease	0.440	0.054	<0.001
Intercept	1.35	0.100	0.24
Predictors of FDR			
Age	0.150	0.027	<0.001
Sex, male	−0.230	0.049	<0.001
BMI	0.350	0.025	<0.001
Smoking status, former	−0.010	0.060	0.90
Smoking quantity	0.036	0.024	0.13
Duration of abstinence	−0.065	0.034	0.058
Physical activity	−0.160	0.063	0.011
History of respiratory disease	0.346	0.056	<0.001
Intercept	−2.70	0.99	<0.001

AX = area under the reactance curve; BMI = body mass index; FDR = frequency dependence of resistance.

CHEST

Association of Physical Frailty With Incidence and Life Expectancy of COPD

A Population-Based Cohort Study

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Study Design
- Population-based cohort study using the UK Biobank

Papulation
- 412,351 adults without COPD at baseline
- 60,584 adults with COPD

Mean follow-up
- 13.5 years

Physical frailty assessed
- using five components; weight loss, exhaustion, low physical activity, slow gait speed, and low grip strength

Classification
- Nonfrailty; 0 components, Prefrailty; 1~2 components, Frailty; ≥3 components.

TABLE 1] Basic Characteristics of Frailty Phenotypes Among Participants With and Without COPD

Variables	Participants Without COPD (n = 412,351; 100.0%)	Frailty Phenotype			Participants With COPD (n = 60,584; 100.0%)	Frailty Phenotype		
		Nonfrailty (n = 243,777; 59.1%)	Prefrailty (n = 155,114; 37.6%)	Frailty (n = 13,460; 3.3%)		Nonfrailty (n = 34,297; 56.6%)	Prefrailty (n = 23,128; 38.2%)	Frailty (n = 3,159; 5.2%)
Age, y	56.1 [8.1]	55.9 [8.1]	56.3 [8.2]	57.4 [7.8]	59.2 [7.4]	58.9 [7.5]	59.5 [7.4]	60.0 [6.7]
BMI, kg/m^2	27.5 [4.8]	26.7 [4.2]	28.4 [5.1]	31.5 [6.6]	26.9 [4.7]	26.0 [3.9]	27.7 [5.1]	30.1 [6.7]
Male	182,641 (44.3)	113,461 (46.5)	64,471 (41.6)	4,709 (35.0)	33,406 (55.1)	19,743 (57.6)	12,196 (52.7)	1,467 (46.4)
White ethnicity	388,601 (94.2)	234,246 (96.1)	142,792 (92.1)	11,563 (85.9)	60,333 (99.6)	34,245 (99.9)	22,980 (99.4)	3,108 (98.4)
Townsend Deprivation Index	−2.2 (−3.7 to 0.4)	−2.5 (−3.8 to −0.2)	−1.9 (−3.5 to 1.0)	0.1 (−2.6 to 3.2)	−1.9 (−3.5 to 1.0)	−2.3 (−3.8 to 0.1)	−1.5 (−3.3 to 1.7)	1.1 (−2.0 to 4.0)
Smoking status								
Does not smoke	235,303 (57.1)	142,418 (58.4)	85,980 (55.4)	6,905 (51.3)	24,228 (40.0)	15,142 (44.2)	8,323 (36.0)	763 (24.2)
Previously smoked	139,543 (33.8)	82,176 (33.7)	52,918 (34.1)	4,449 (33.1)	24,667 (40.7)	13,749 (40.1)	9,656 (41.8)	1,262 (40.0)
Currently smokes	37,505 (9.1)	19,183 (7.9)	16,216 (10.5)	2,106 (15.7)	11,689 (19.3)	5,406 (15.8)	5,149 (22.3)	1,134 (35.9)
Alcohol consumption frequency								
Daily or most days	82,037 (19.9)	54,430 (22.3)	26,301 (17.0)	1,306 (9.7)	14,937 (24.7)	9,377 (27.3)	5,132 (22.2)	428 (13.6)
3-4 times a week	96,425 (23.4)	63,985 (26.3)	31,028 (20.0)	1,412 (10.5)	13,847 (22.9)	8,835 (25.8)	4,617 (20.0)	395 (12.5)
1-2 times a week	107,904 (26.2)	64,456 (26.4)	40,691 (26.2)	2,757 (20.5)	14,622 (24.1)	8,293 (24.2)	5,673 (24.5)	656 (20.8)
1-3 times a month	46,899 (11.4)	25,729 (10.6)	19,477 (12.6)	1,693 (12.6)	5,909 (9.8)	3,092 (9.0)	2,477 (10.7)	340 (10.8)
Never or special occasions only	79,086 (19.2)	35,177 (14.4)	37,617 (24.3)	6,292 (46.8)	11,269 (18.6)	4,700 (13.7)	5,229 (22.6)	1,340 (42.4)
Sedentary behavior, h/d	4.5 [2.6]	4.3 [2.4]	4.7 [2.7]	5.5 [3.3]	4.7 [2.6]	4.3 [2.4]	5.0 [2.7]	5.8 [3.5]
No. of long-term morbidities								
0	146,632 (35.6)	100,993 (41.4)	44,336 (28.6)	1,303 (9.7)	14,192 (23.4)	10,018 (29.2)	4,048 (17.5)	126 (4.0)
1	137,442 (33.3)	83,654 (34.3)	51,016 (32.9)	2,772 (20.6)	18,860 (31.1)	11,895 (34.7)	6,588 (28.5)	377 (11.9)
2	77,233 (18.7)	39,945 (16.4)	33,897 (21.9)	3,391 (25.2)	13,857 (22.9)	7,474 (21.8)	5,723 (24.7)	660 (20.9)
3	33,219 (8.1)	14,004 (5.7)	16,379 (10.6)	2,836 (21.1)	7,624 (12.6)	3,297 (9.6)	3,635 (15.7)	692 (21.9)
4	12,036 (2.9)	3,892 (1.6)	6,407 (4.1)	1,737 (12.9)	3,532 (5.8)	1,132 (3.3)	1,849 (8.0)	551 (17.4)
≥ 5	5,789 (1.4)	1,289 (0.5)	3,079 (2.0)	1,421 (10.6)	2,519 (4.2)	481 (1.4)	1,285 (5.6)	753 (23.8)

Data are presented as No. (%), mean [SD], or median (interquartile range).

TABLE 2] Association Between Physical Frailty and Incident COPD

Characteristic	No.	Cases/Person-Years	Model 1	Model 2	Model 3
Physical frailty phenotype					
Nonfrailty	24,3777	4,084/3,222,704	1.00 (reference)	1.00 (reference)	1.00 (reference)
Prefrailty	155,114	5,301/2,010,021	1.92 (1.85-2.01)	1.45 (1.39-1.51)	1.45 (1.39-1.51)
Frailty	13,460	1,310/164,261	4.96 (4.65-5.28)	2.23 (2.08-2.39)	2.21 (2.06-2.37)
Components of frailty					
Weight loss	61,999	1,858/806,275	1.22 (1.16-1.29)	1.03 (0.98-1.08)	1.04 (0.98-1.09)
Exhaustion	49,476	2,232/637,701	2.16 (2.06-2.27)	1.39 (1.33-1.46)	1.24 (1.18-1.31)
Low physical activity	35,685	2,125/45,4460	2.44 (2.33-2.57)	1.54 (1.47-1.62)	1.32 (1.25-1.39)
Slow gait speed	29,457	2,559/363,388	3.32 (3.17-3.48)	1.86 (1.77-1.95)	1.63 (1.54-1.71)
Low grip strength	57,372	2,751/727,324	1.66 (1.59-1.74)	1.31 (1.25-1.38)	1.19 (1.14-1.25)

Analysis of incident COPD risk according to frailty

Subgroup	N	Case/person-years	HR (95% CI)	HR (95% CI)
Normal lung fuction				
Nonfrailty	130,803	1,470/17,36,201	1.00 (reference)	1.00 (reference)
Prefrailty	71,398	1,555/934,777	1.40 (1.30, 1.50)	1.37 (1.27, 1.48)
Frailty	4,245	287/53,283	2.23 (1.95, 2.56)	2.09 (1.82, 2.40)
PRISm				
Nonfrailty	9,512	392/123,910	2.66 (2.37, 2.97)	1.00 (reference)
Prefrailty	8,012	598/101,303	3.18 (2.87, 3.52)	1.25 (1.10, 1.43)
Frailty	1,123	189/12,970	4.36 (3.70, 5.13)	1.87 (1.54, 2.28)

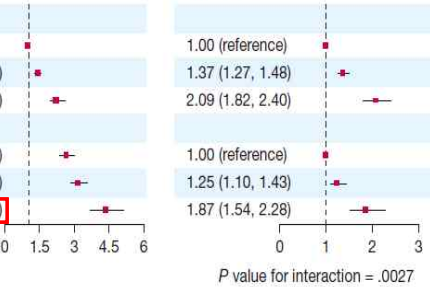
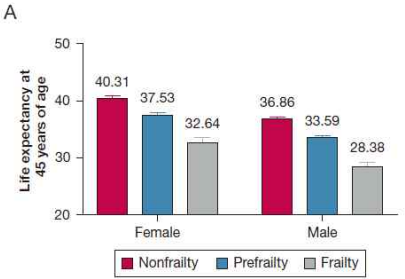
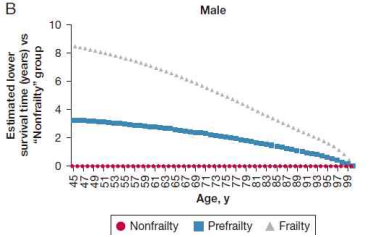
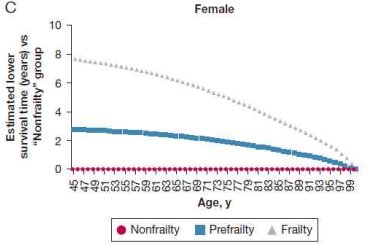


Figure 2 – *Joint and stratified analysis of incident COPD risk according to frailty phenotype in PRISm and normal lung function. Model adjusted for age, sex, race, Townsend Deprivation Index, and assessment centers, sedentary behavior, smoking status, alcohol consumption, BMI, number of long-*

Life Expectancy by Frailty







- COPD at 45 years of age, frailty was associated with a reduction in life expectancy of 8.49 years for male individuals and 7.67 years for female individuals compared with their nonfrail counterparts.

ORIGINAL ARTICLE

Airway Mucus Plugs on Chest Computed Tomography Are Associated with Exacerbations in Chronic Obstructive Pulmonary Disease

Emily Wan[1,5,6], Andrew Yen[7], Rim Elalami[2], Scott Grumley[8], Hrudaya P. Nath[8], Wei Wang[3,6], Sharon Brouha[7], Padma P. Manapragada[8], Mostafa Abozeed[8], Muhammad Usman Aziz[8], Mohd Zahid[8], Asmaa N. Ahmed[8], Nina L. Terry[8], Pietro Nardelli[4,6], James C. Ross[4,6], Victor Kim[9], Sushilkumar Sonavane[10], Seth J. Kligerman[11], Jørgen Vestbo[12], Alvar Agusti[13,14,15,16], Kangjin Kim[1], Raúl San José Estépar[4,6], Edwin K. Silverman[1,2,6], Michael H. Cho[1,2,6], and Alejandro A. Diaz[2,6]

Study design

- Multicenter prospective cohort study

Population

- GOLD 2–4 COPD from two cohorts
- COPDGene (n=3,250), ECLIPSE (n=1,716)

Assessment

- Baseline chest CT → mucus plug score (0, 1–2, ≥3)

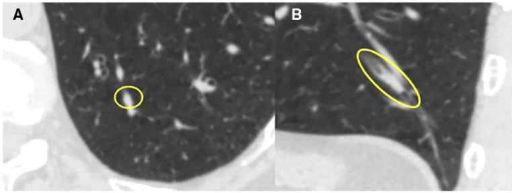


Figure 1. Example of a mucus plug on chest computed tomography imaging. Computed tomography axial (*A*) and sagittal (*B*) sections showing a mucus plug (encircled) occluding the lumen of an airway in the left lower lobe of a COPDGene (Genetic Epidemiology of COPD) participant with COPD. COPD = chronic obstructive pulmonary disease.

Association Between Mucus Plug Score and Exacerbation

Table 2. Association between Ordinal Mucus Plug Score Groups and AEs

	COPDGene			ECLIPSE		
	0	1–2	≥3	0	1–2	≥3
No. of patients	1,808	753	689	926	373	417
Moderate to severe AEs	Ref.	1.070 (1.048–1.093)	1.145 (1.098–1.195)	Ref.	1.056 (1.019–1.094)	1.115 (1.039–1.197)
Severe AEs	Ref.	1.045 (1.008–1.084)	1.092 (1.016–1.175)	Ref.	1.169 (1.072–1.273)	1.365 (1.15–1.622)

Summary

1. 2026 GOLD에서는 **COPD 선별을 위한 screening 및 case-finding**에 대한 보다 구체적인 접근 전략이 제시되었습니다.

2. 또한 **중등도 급성 악화가 1회 이상인 경우부터 E 그룹으로 분류**되며, 치료 옵션으로 **biologics인 mepolizumab**이 새롭게 포함되었습니다.

3. COPD의 새로운 치료 목표로 악화, 증상 악화, 폐기능 저하가 없는 상태인 **Disease stability**개념이 제시되었습니다.

4. **Small airway dysfuntion**는 spirometry가 정상이어도 이미 존재할 수 있는 임상적으로 중요한 병변이다.

5. **Frailty와 mucus plug**는 **COPD 예후**와 관련된 중요한 인자입니다.

양산부산대학교병원

환자 내몸

경청해 주셔서 감사합니다.

Thank you for your attention