LA BPCO ET LE COEUR GAUCHE

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Professeur Zied Moatemri

Colonel médecin

Chef de service de pneumologie HMPIT

Service de pneumologie
Hôpital Militaire de Tunis

INTRODUCTION

showeet

Prévalence des maladies CV chez les BPCO

Risque d'accidents cardio vasculaires majeurs majoré de 25% (Comme le diabète)

Evènement CV , et ce après correction des facteurs communs

Etudes faites chez des patients sévères à graves
Sous estimation dans la population BPCO légère à modérée
Sur mortalité chez les BPCO légers à modérés

Cardiovascular disease and COPD: dangerous liaisons?

Klaus F. Rabe[1,2], John R. Hurst[3] and Samy Suissa[4,5]

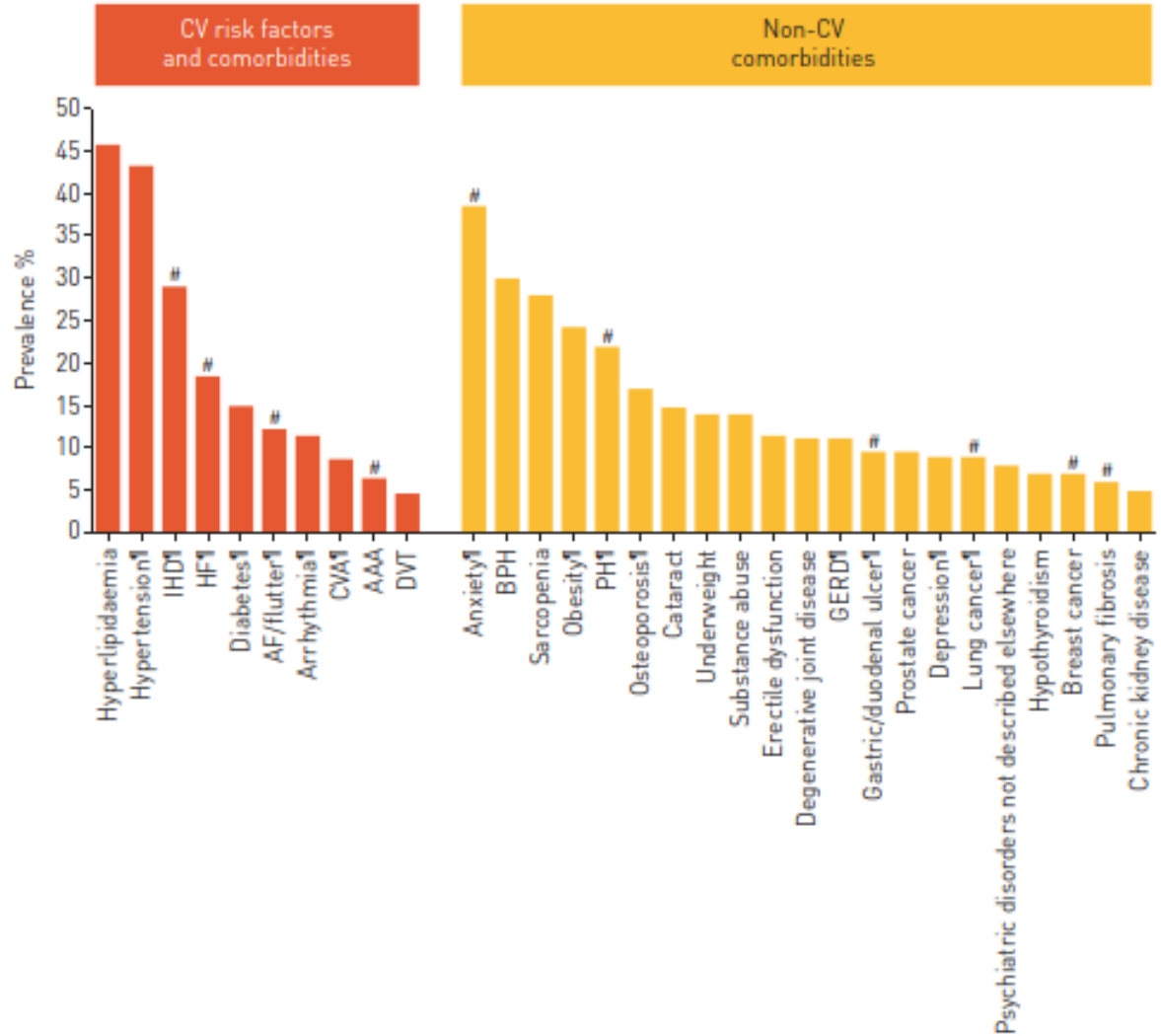
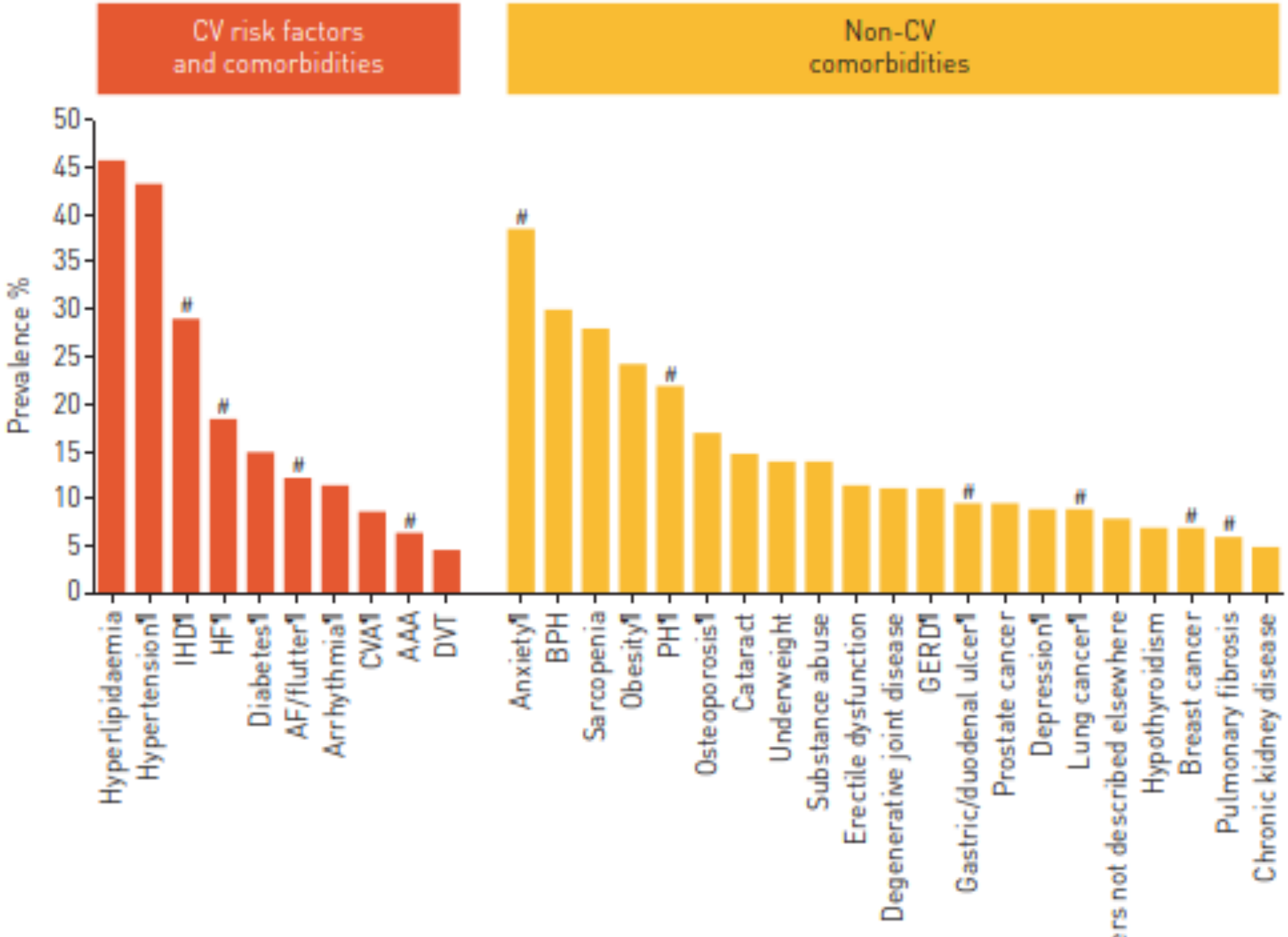
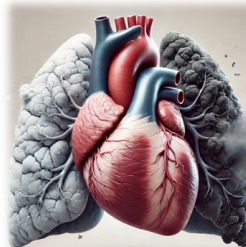


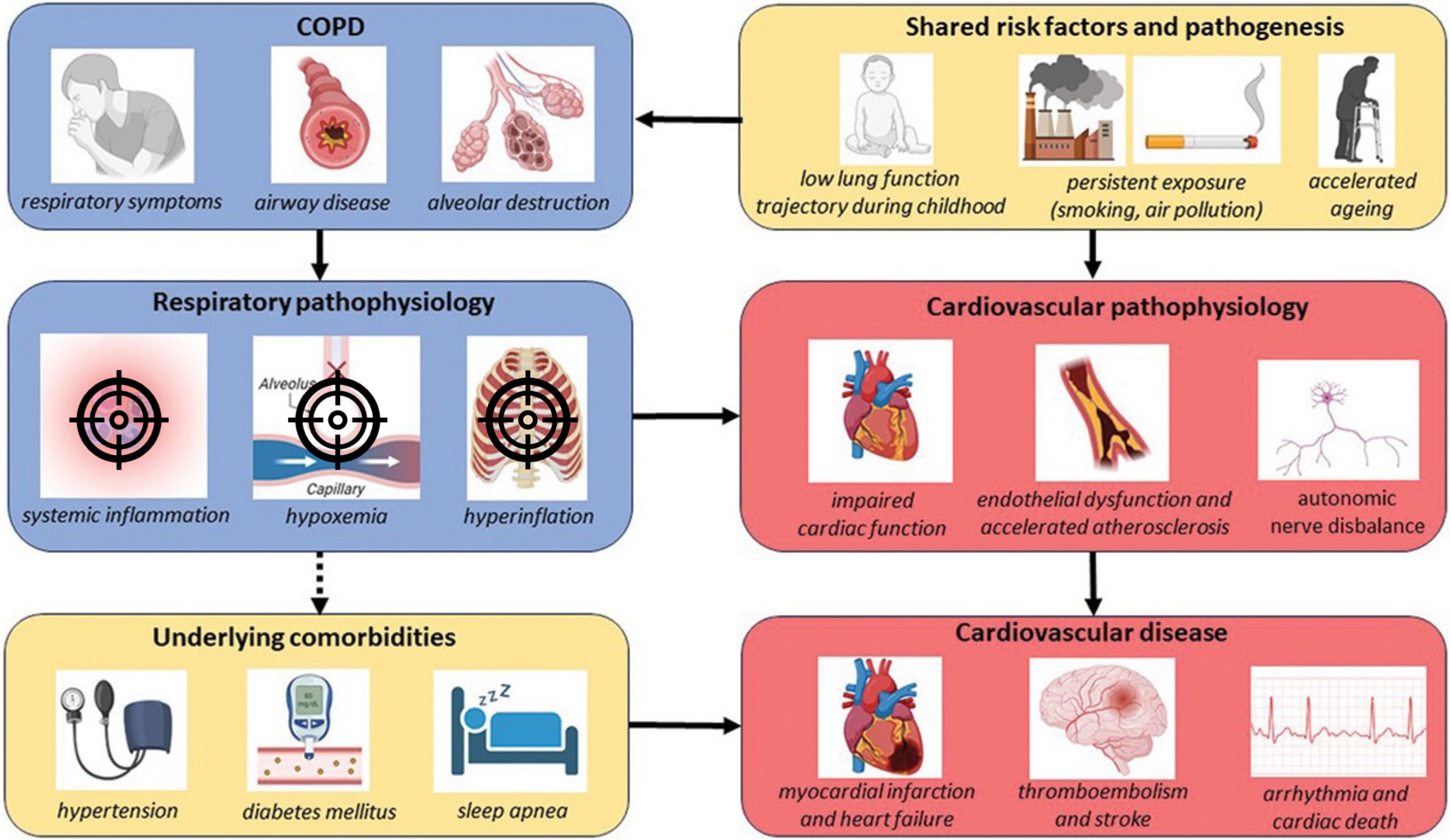
FIGURE 1 Prevalence of comorbidities in pooled studies of patients with chronic obstructive pulmonary disease (COPD). Cardiovascular (CV) conditions and comorbidities are highlighted as orange bars and other comorbidities as yellow bars. Data are pooled from numerous studies and comorbidities with a prevalence (calculated as a weighted average based on study sample size) >5% are shown. IHD: ischaemic heart disease; HF: heart failure; AF: atrial fibrillation; CVA: cerebrovascular accident; AAA: abdominal aortic aneurysm; DVT: deep vein thrombosis; BPH: benign prostatic hypertrophy; PH: pulmonary hypertension; GERD: gastro-oesophageal reflux disease. #: comorbidities with a significant increase in mortality risk compared to patients with COPD without the comorbidity; ¶: comorbidities with a significantly increased prevalence in patients with COPD compared with the general population. Reproduced and modified with permission from [3].


CV risk factors and comorbidities
Non-CV comorbidities
Prevalence %
50
45
40
35
30
25
20
15
10
5
0
Hyperlipidaemia
Hypertension¶
IHD¶
HF¶
Diabetes¶
AF/flutter¶
Arrhythmia¶
CVA¶
AAA
DVT
Anxiety¶
BPH
Sarcopenia
Obesity¶
PH¶
Osteoporosis¶
Cataract
Underweight
Substance abuse
Erectile dysfunction
Degenerative joint disease
GERD¶
Gastric/duodenal ulcer¶
Prostate cancer
Depression¶
Lung cancer¶
Hypothyroidism
Breast cancer
Pulmonary fibrosis
Chronic kidney disease

Mécanismes d’interaction:

- Facteurs de risque communs (environnementaux, génétiques…)
- Voies physiopathologiques communes
- Co-association due à une prévalence élevée des deux maladies
- Impacte directe de la BPCO (notamment **exacerbations**)
- Médicaments des maladies CV aggravent la BPCO et inversement




COPD
respiratory symptoms
airway disease
alveolar destruction
Shared risk factors and pathogenesis
low lung function trajectory during childhood
persistent exposure (smoking, air pollution)
accelerated ageing
Respiratory pathophysiology
systemic inflammation
Alveolus
Capillary
hypoxemia
hyperinflation
Cardiovascular pathophysiology
impaired cardiac function
endothelial dysfunction and accelerated atherosclerosis
autonomic nerve disbalance
Underlying comorbidities
hypertension
diabetes mellitus
sleep apnea
Cardiovascular disease
myocardial infarction and heart failure
thromboembolism and stroke
arrhythmia and cardiac death

International Journal of COPD

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ORIGINAL RESEARCH

Hyperinflated lungs compress the heart during expiration in COPD patients: a new finding on dynamic-ventilation computed tomography

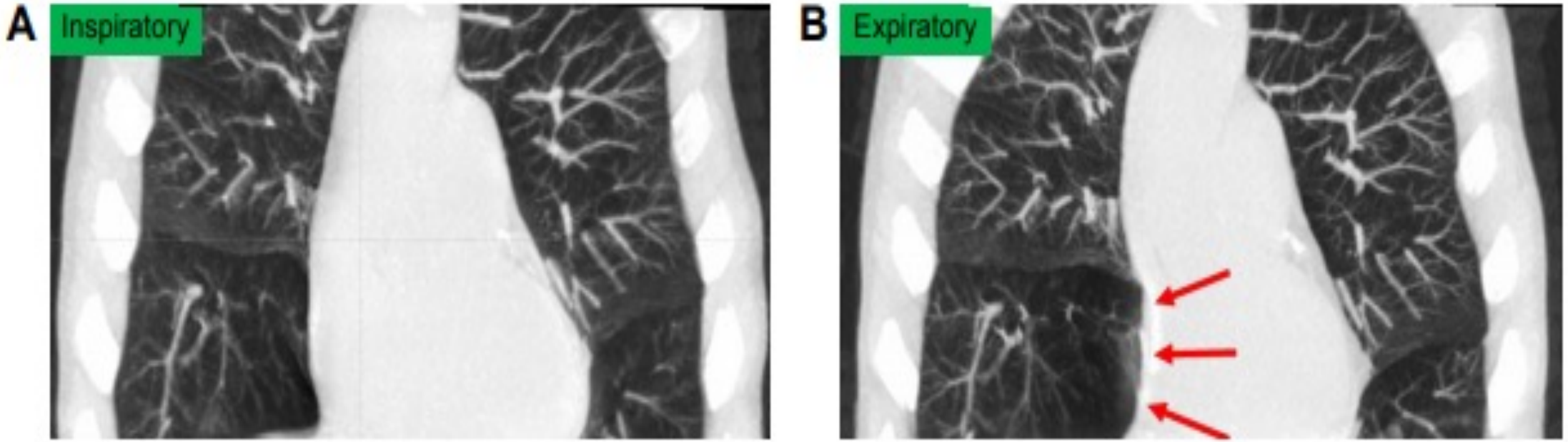
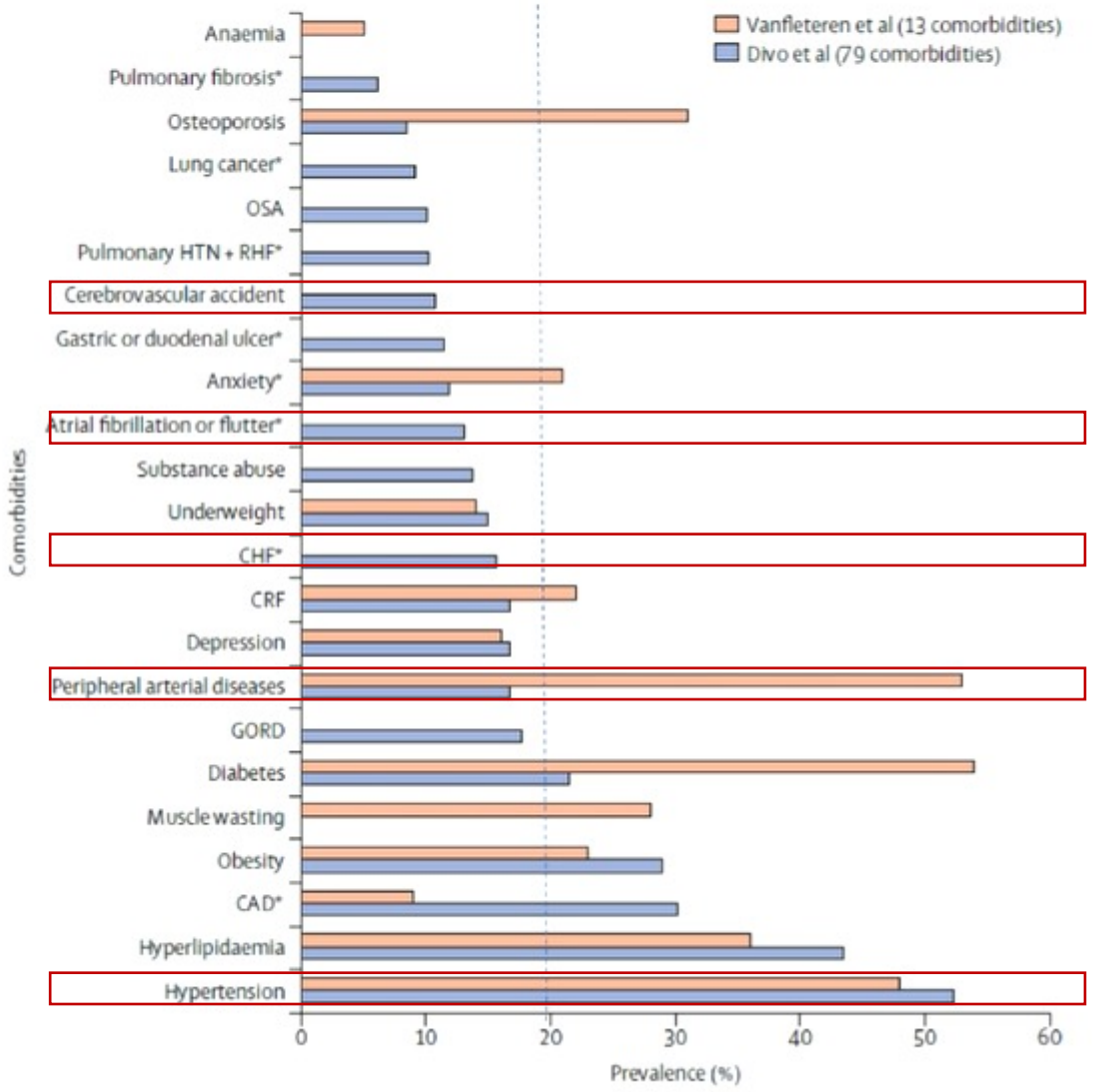


Figure 2 A 70-year-old male with COPD underwent dynamic-ventilation CT to evaluate central airway abnormalities.
Notes: His $FEV_{1.0}$/FVC was 0.55. The shape of the right atrium was normal during the inspiratory phase (**A**) but was severely compressed (arrows) during the expiratory phase, probably due to the emphysematous right middle lobe (**B**).
Abbreviations: CT, computed tomography; $FEV_{1.0}$, forced expiratory volume in 1 s; FVC, forced vital capacity.

Prevalence des MCV dans la BPCO



	COPD in other chronic diseases	Chronic diseases in COPD*
Chronic heart failure	11–52%[16]	19% vs 2%[12,18]
Ischaemic heart disease	30%[19]	20% vs 6%[17,20]
Previous myocardial infarction	7–30%[21]	9% vs 2%[17]
Atrial fibrillation	13%[17]	7% vs 2%[17]
Stroke	7%[22,23]	5% vs 2%[17]
Diabetes	20%[24]	20% vs 9%[17]
Osteoporosis	12%[25]	38%[26]†
Anxiety and depression	9%[27]‡	10–60%[28]†

Reported prevalence of COPD in patients with other chronic diseases and of other individual chronic diseases in patients with COPD. COPD=chronic obstructive pulmonary disease. *Compared with a non-COPD control group. †No control group. ‡In the group aged >60 years with depression and anxiety.

***Table 1*: Co-occurrence of COPD with other chronic diseases**

Fabbri L et al. Lancet Respir Med 2023; 11:1020–34

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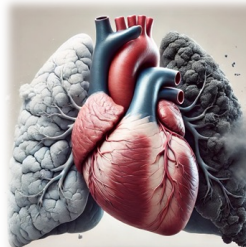
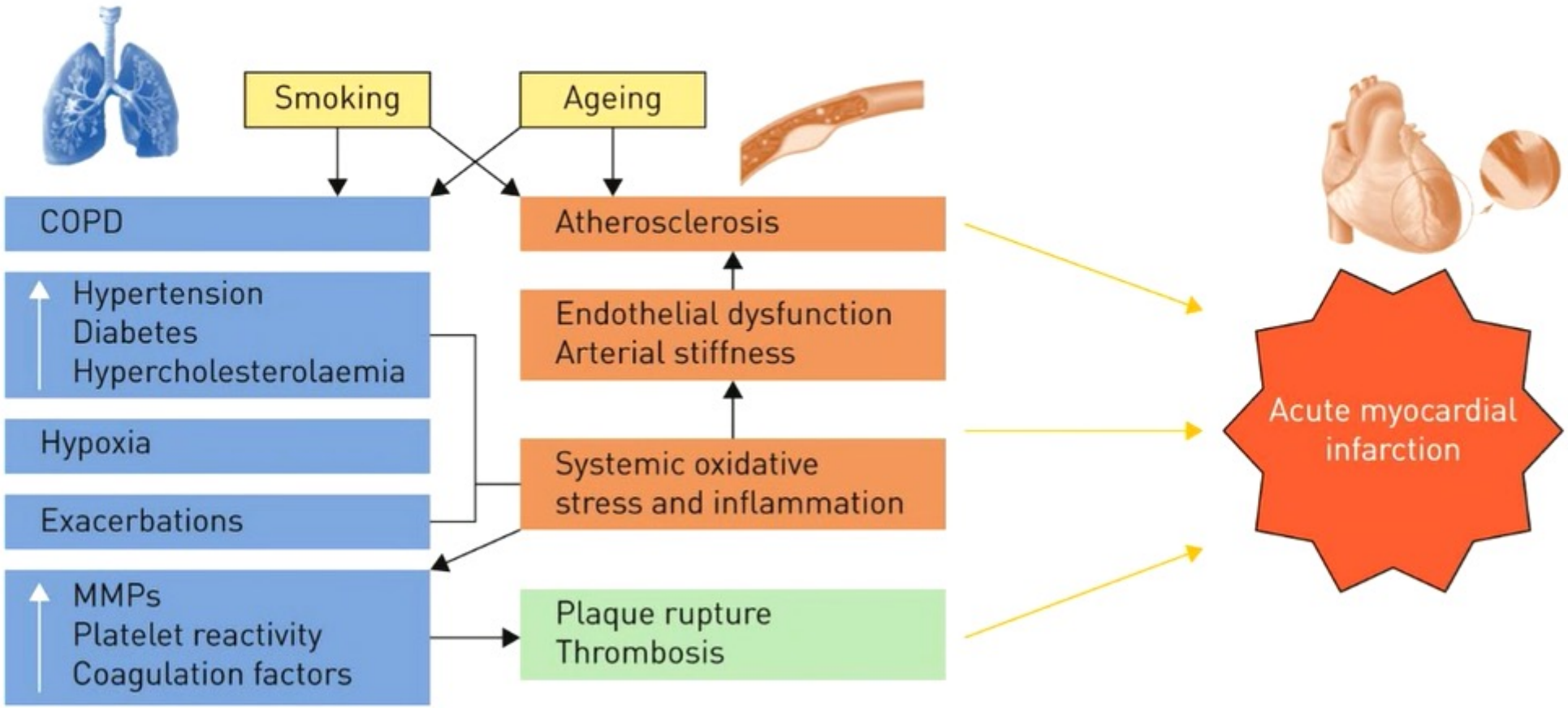
Table 1: **Co-occurrence of COPD with other chronic diseases**

BPCO – MCV: Le concept syndrémique

- Le terme « syndrémique » désigne la cooccurrence de maladies partageant des mécanismes et des facteurs de risque communs.
- Ce nouveau concept, explique le regroupement de certaines morbidités chez les patients BPCO.



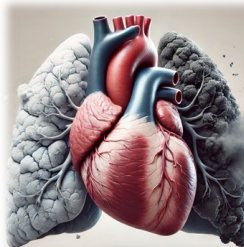
BPCO et IDM



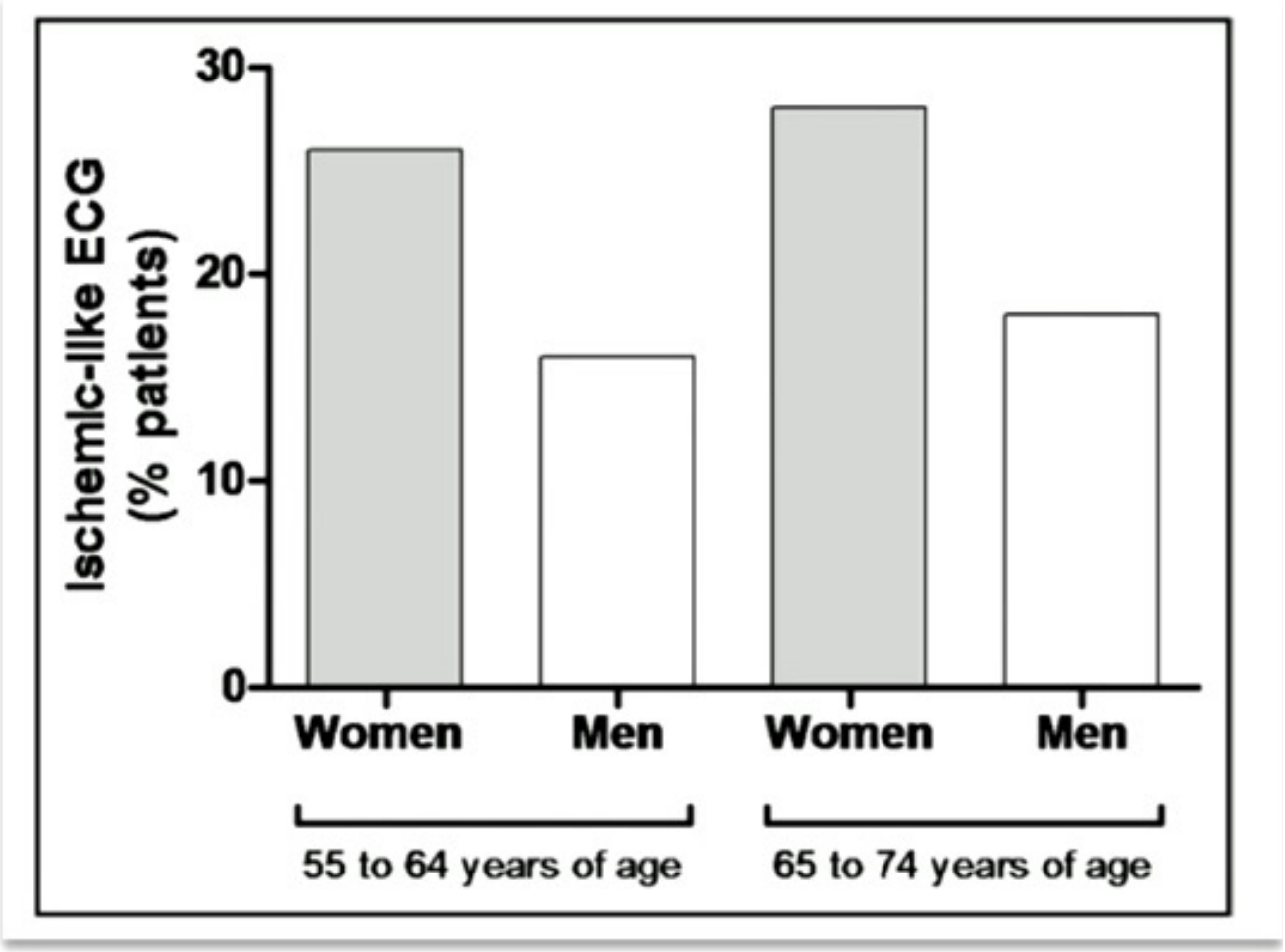
Laurien Goedemans et al. Eur Respir Rev 2020;29:190139

BPCO et cardiopathie ischémique

- La cardiopathie ischémique la plus fréquente chez les personnes atteintes de BPCO.
- La prévalence de la BPCO varie entre **7 et 28 %** chez les patients présentant un IDM
- RR d'IDM est **1,4** fois plus élevé chez les BPCO
- Ce RR passe à **3** dans la BPCO sévère.
- **1/3** des décès étant imputables à une cardiopathie ischémique, chez les BPCO (> IR).
- L'algorithme COPDCoRi a démontré une précision de 81 % dans la prédiction de la présence d'une coronaropathie dans la BPCO
- Les BPCO de phénotype emphysémateux (centrolobulaire) ont plus de calcifications coronaires. (Rôle de l'hyperinflation?).



Fréquence des signes ECG d'ischémie chez les BPCO



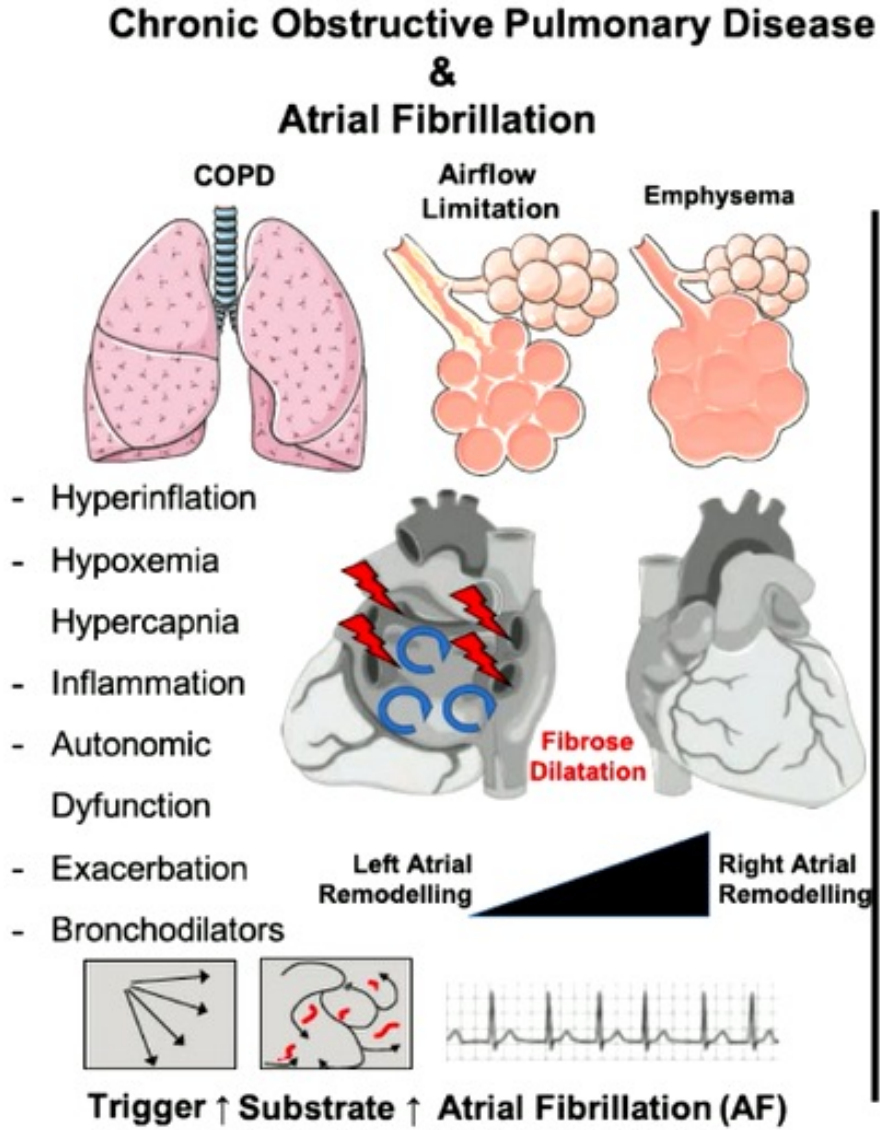
Ischemic ECG was present in:

-**21%** of all patients with COPD,

- and in **14%** COPD patients without reported cardiovascular comorbidity

Vanfleteren LEGW. Am J Cardiol 2011

BPCO et FA



Clinical Facts

Prevalence of COPD in AF patients

→ Approximately 25%.

Observational data suggest that COPD

→ Promotes AF progression

→ Increases AF recurrence after cardioversion

→ Reduces the efficacy of catheter ablation

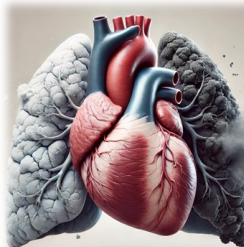
Diagnosis and treatment

→ Interdisciplinary integrated care approach

Simons et al. European Heart Journal (2021) 42, 532–540

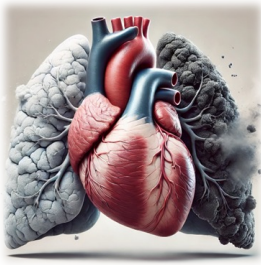
BPCO et FA

- La prévalence chez les BPCO, estimée à environ 25 %.
- En présence des deux maladies, les patients présentent une charge symptomatique plus importante, une qualité de vie moins bonne et des conséquences cardiovasculaires et hémorragiques plus graves.
- La comorbidité augmente également le nombre d'hospitalisations et mortalité toutes causes confondues.
- La mortalité toutes causes confondues chez les patients présentant une combinaison BPCO-FA est de 50 % à 5 ans.
- Relation temporelle: les patients diagnostiqués avec une BPCO avant FA présentent un pronostic plus sombre que les patients diagnostiqués avec une BPCO après la FA.
- Il existe un sous-traitement des deux maladies (pharmacothérapie inhalée et bêtabloquants).



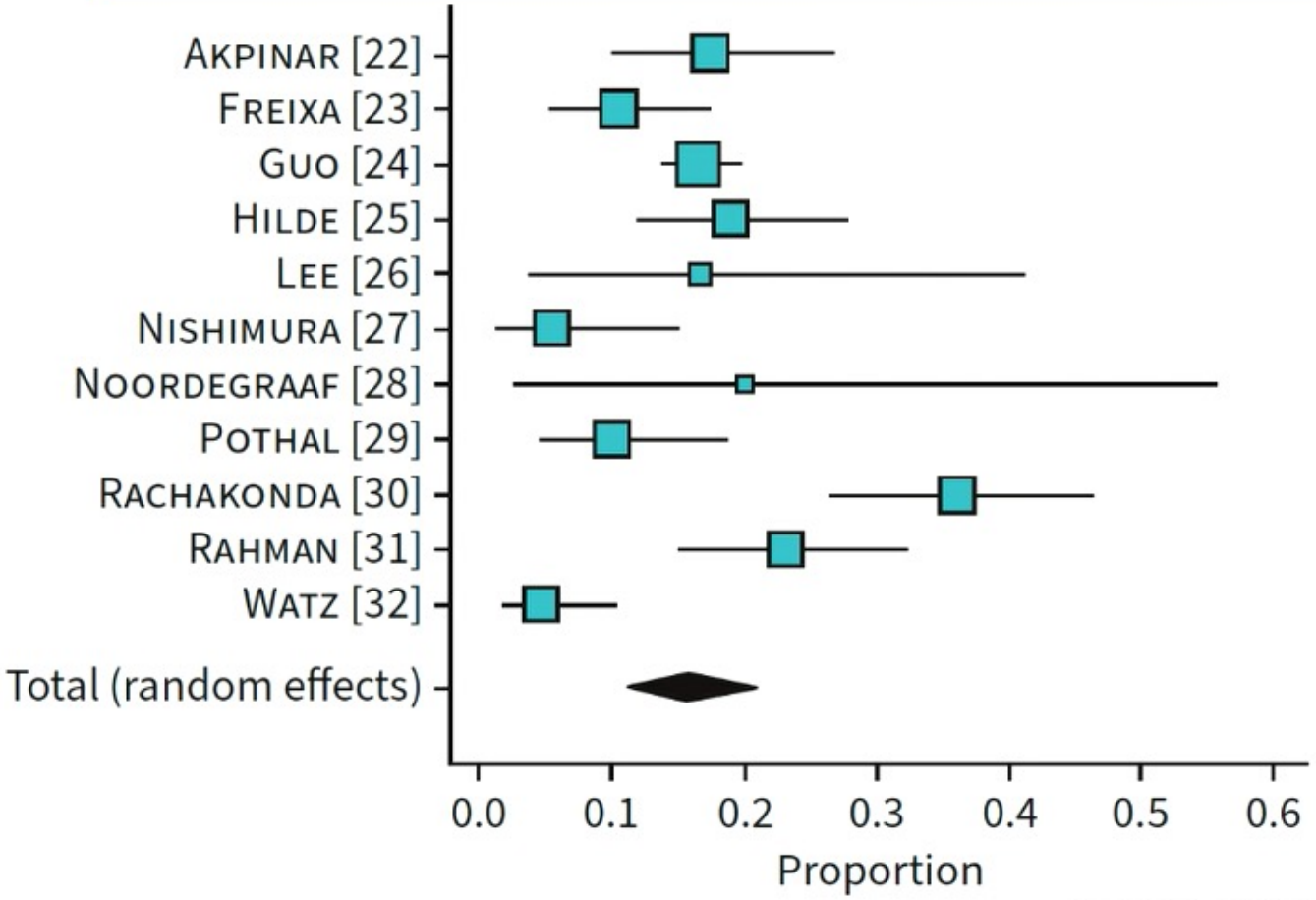
BPCO et IC

- La prévalence de la BPCO **9 à 41 %** chez les IC.
- La prévalence de l'insuffisance cardiaque augmente chez les patients hospitalisés pour BPCO, atteignant **70 %** chez les patients atteints de BPCO sous ventilation mécanique.
- BPCO + IC: plus d'hospitalisations et de réhospitalisation
- BPCO +ICFEp risque **1,5** fois plus élevé de (ré)hospitalisation et un risque **1,42** fois plus élevé de mortalité.

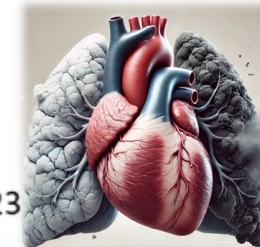


Sous diagnostic de l'IVG dans la BPCO

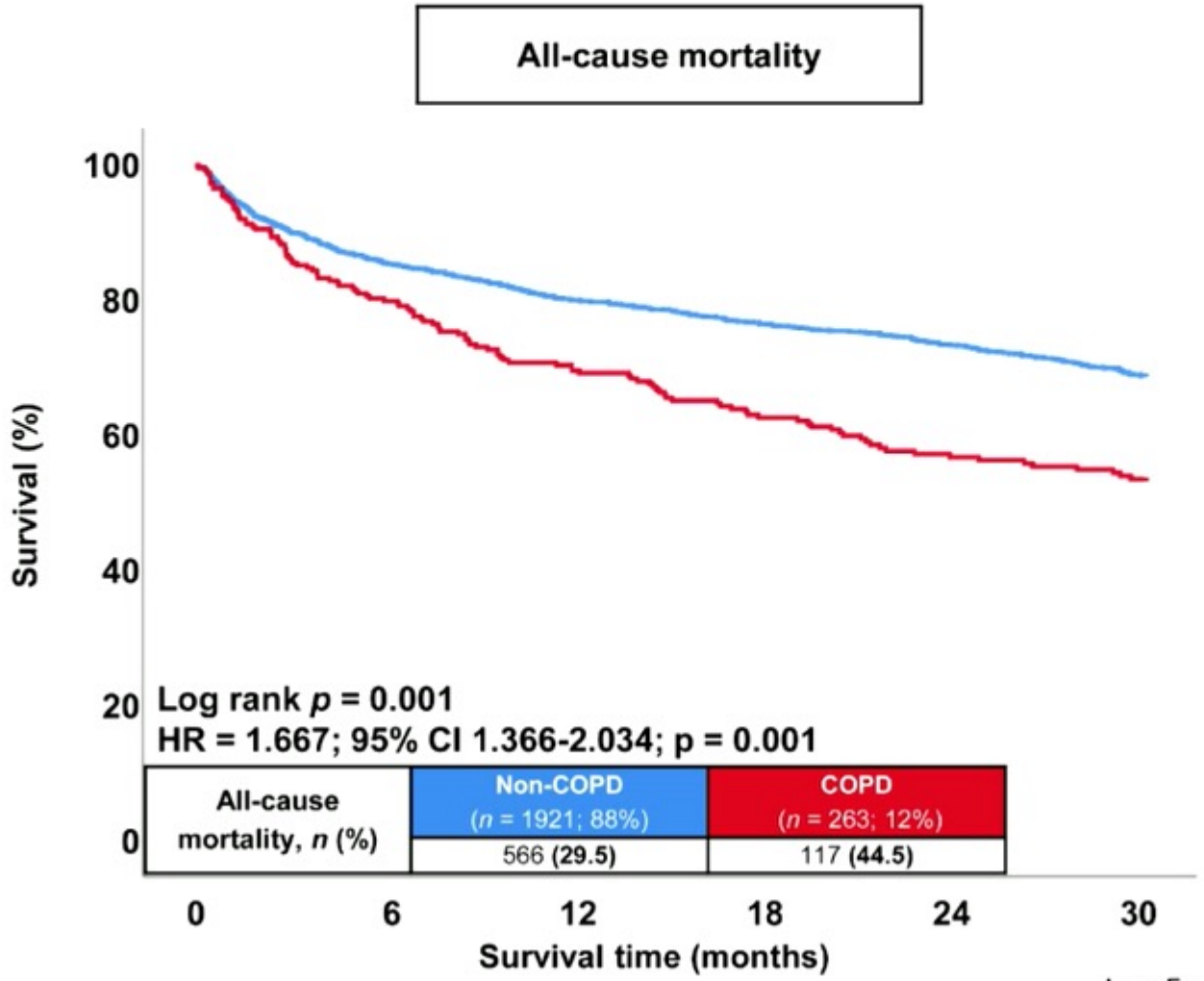
Prevalence of undiagnosed left ventricular systolic dysfunction in patients with COPD (defined as left ventricular ejection fraction <50%). Pooled prevalence 15.8% (95% CI 11.1–21.1%).



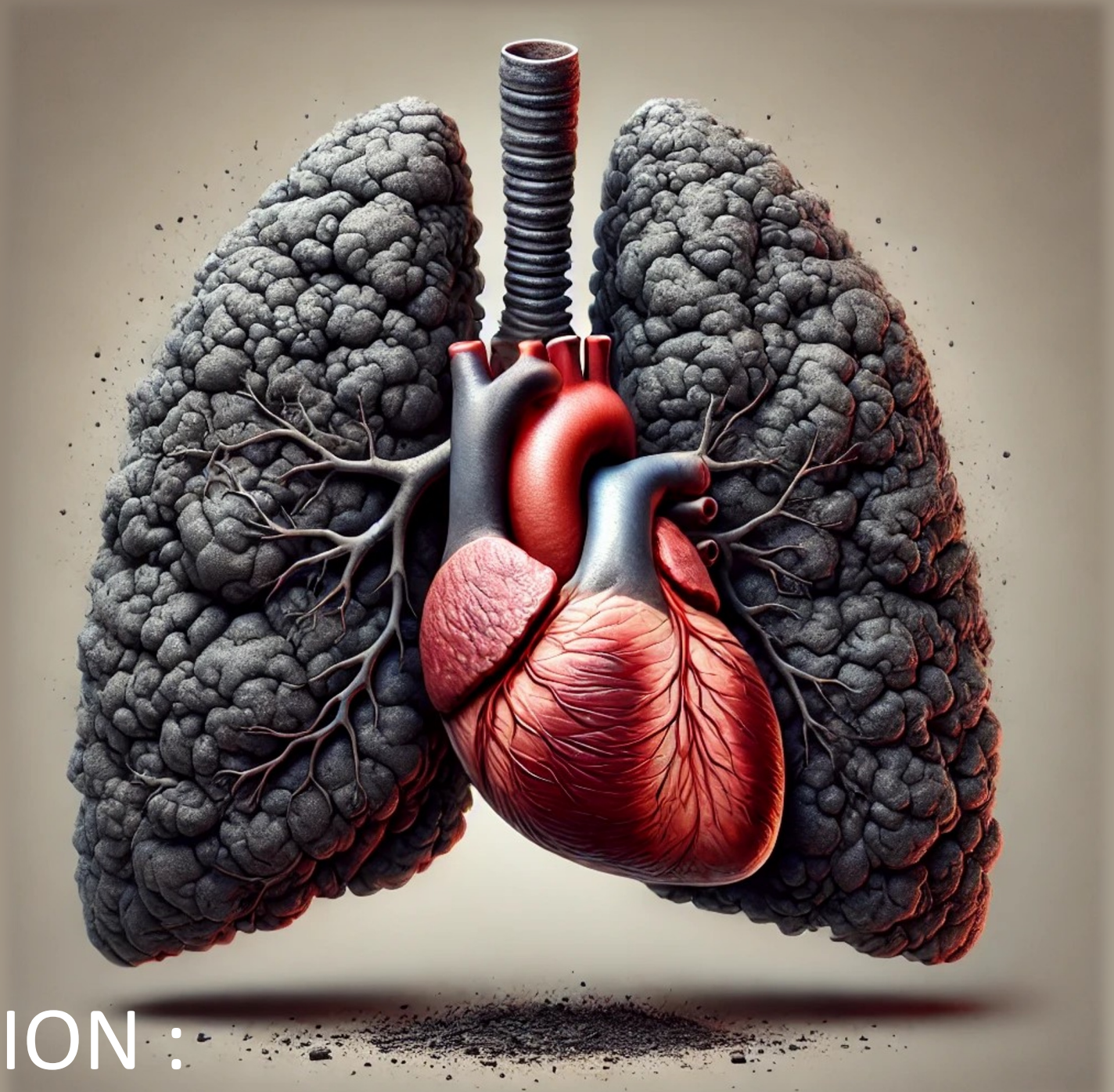
Kibbler J, et al. ERJ Open Res. 2023;9(6):00548–02023



Impact de la BPCO sur la mortalité chez IC avec une fraction d'éjection moyennement réduite

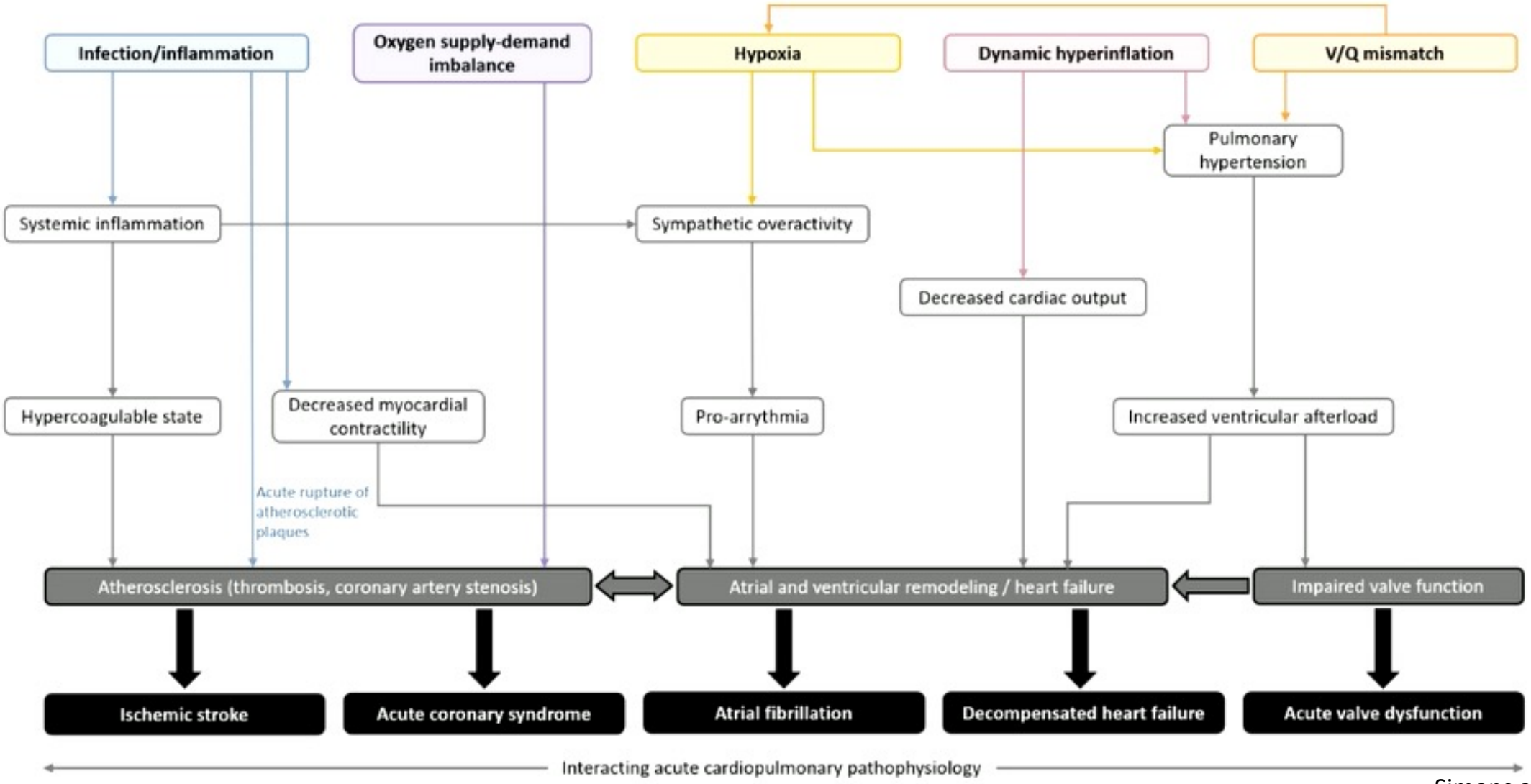


Lau F, et al. Respir Med. 2024 Mar;223:107536



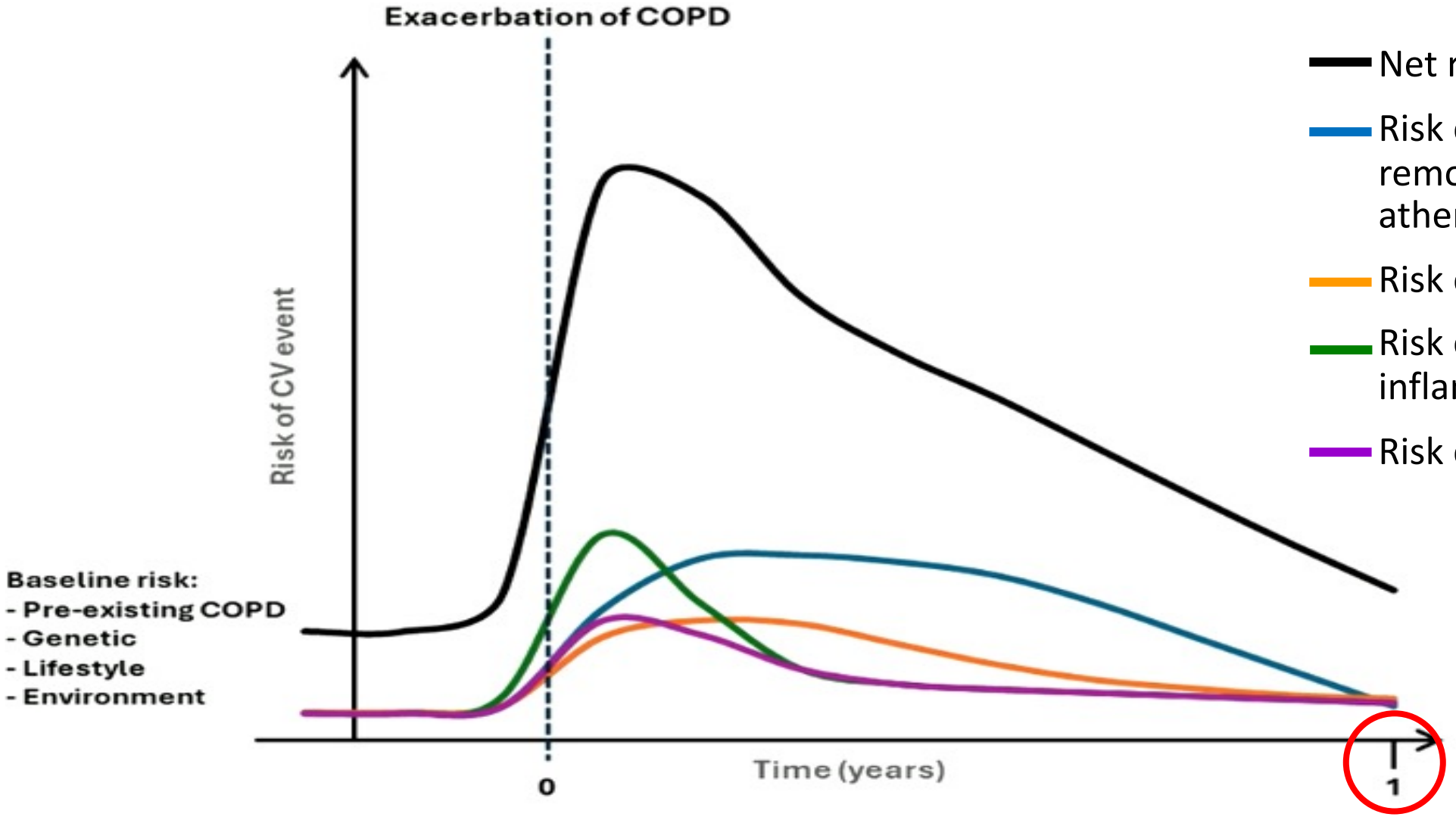
EXACERBATION :

Accidents CV après exacerbation de BPCO

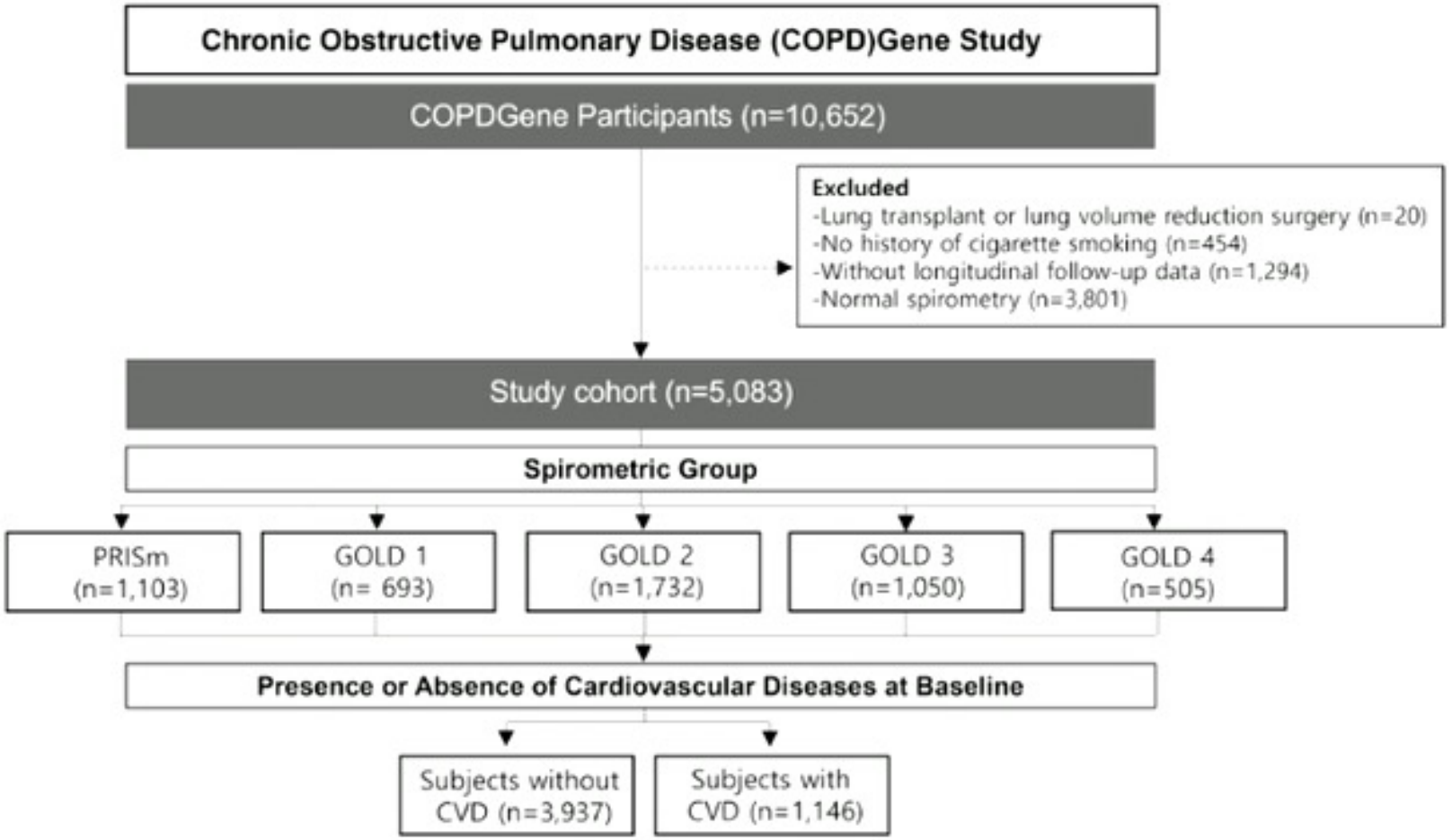


Simons and al. IJCOPD

Dynamique temporelle du risque CV après une exacerbation



Risque d'évènement CV chez les BPCO sans ATCDs



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Risque d'évènement CV chez les BPCO sans ATCDs

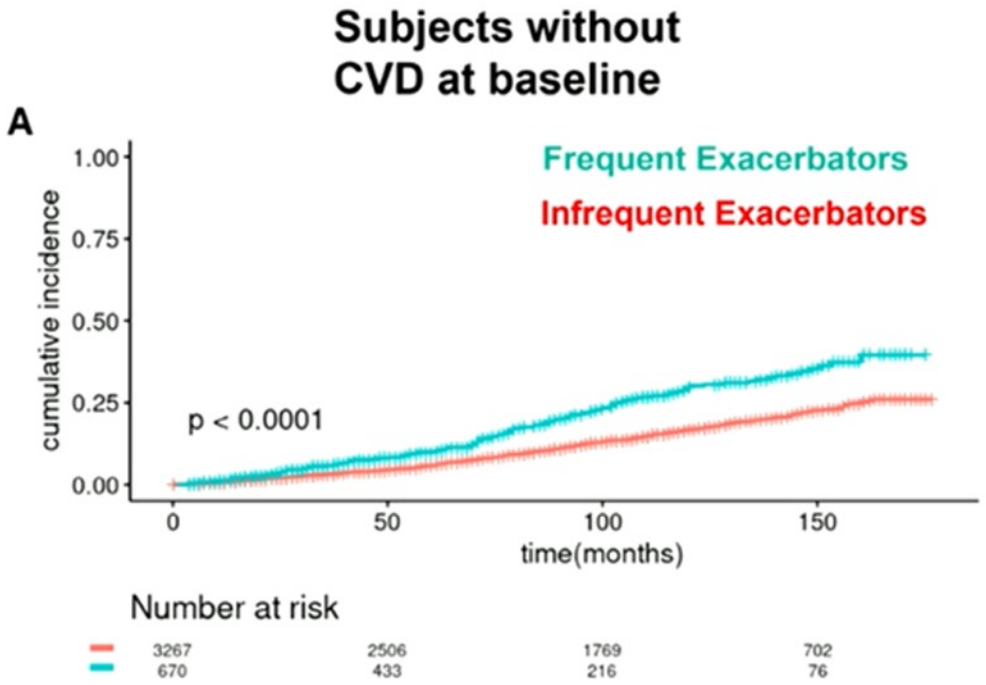

Table 2. Association of Chronic Obstructive Pulmonary Disease Exacerbation Frequency With a Composite of Cardiovascular Events Among Participants Stratified by Lung Function Abnormality Without CVD at Baseline

Groups	N	Univariable analysis			Multivariable analysis		
		HR	95% CI	*P* value	HR	95% CI	*P* value
Without CVD at baseline							
GOLD 1–4+PRISm	3937	1.79	1.47–2.17	<0.001	1.81	1.47–2.22	<0.001
GOLD 2–4	2494	1.77	1.41–2.21	<0.001	1.87	1.48–2.37	<0.001
GOLD 1	575	1.86	0.86–4.02	0.12	1.78	0.80–3.96	0.2
PRISm	868	1.81	1.06–3.09	0.030	1.93	1.12–3.35	0.018

Covariates include age, sex, race, body mass index, current smoking status, pack-years of cigarette smoking, self-reported diabetes, baseline postbronchodilator forced expiratory volume in 1 second as a percentage of predicted, self-reported hypertension, and self-reported hypercholesterolemia. HRs in the table indicate the ratio of hazard rate of the composite of cardiovascular events comparing frequent to infrequent exacerbators. The reference group was the infrequent exacerbators in each model. CVD indicates cardiovascular disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease; HR, hazard ratio; and PRISm, preserved ratio impaired spirometry.

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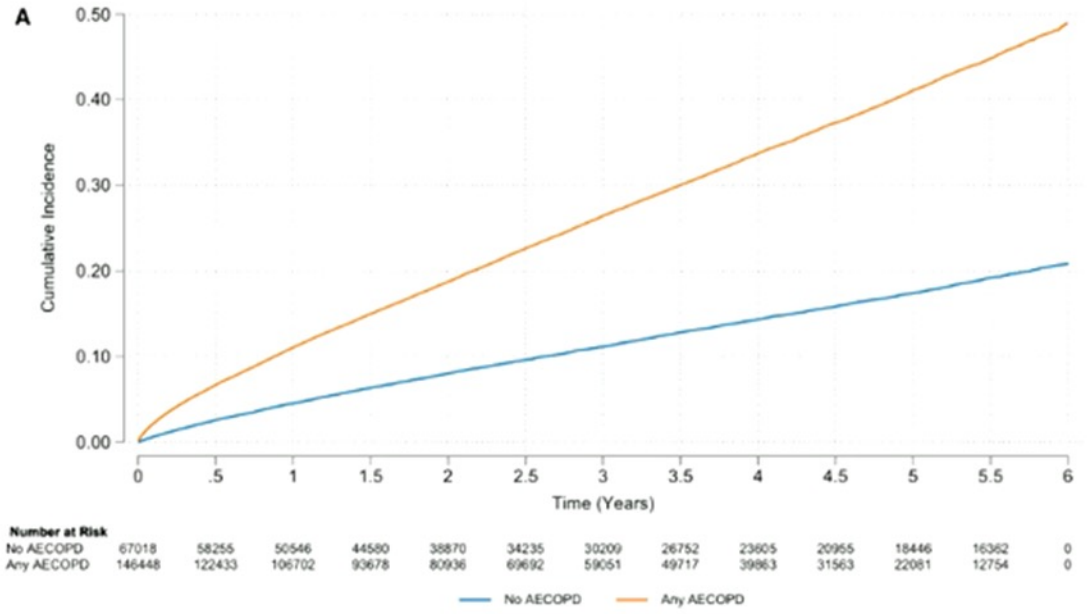
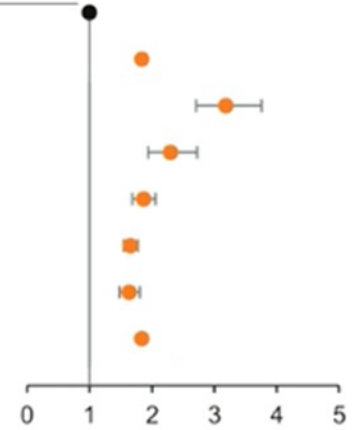
Risque CV après un épisode d'exacerbation

- 213466 COPD cases, median of FU 2,4 years : 68,4% ECOPD



Follow-up period	N	Composite CVD (adj. HR,95%CI) **
Reference*		1.00 (reference)
All (2014-2020)	198,205	1.84 (1.79-1.90)
1-14 days	198,205	3.19 (2.71-3.76)
14-30 days	193,863	2.30 (1.94-2.73)
30 days-3 mo.	190,008	1.87 (1.69-2.06)
3-9 mo.	179,441	1.66 (1.55-1.78)
9-12 mo.	157,623	1.64 (1.48-1.81)
Year 1-end	146,448	1.84 (1.78-1.91)



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Risque CV après un épisode d'exacerbation

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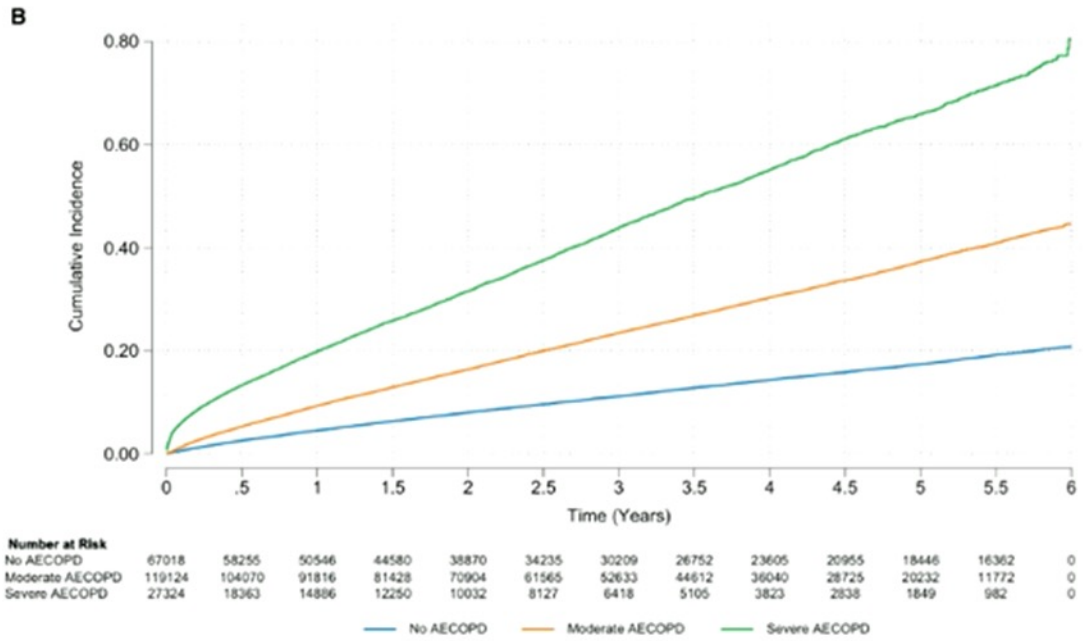
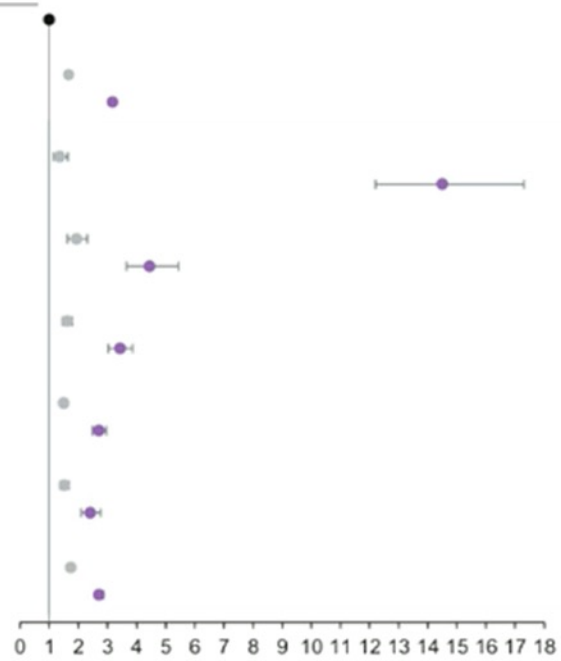


Follow-up period	Severity	N	Composite CVD (adj. HR,95%CI) **
Reference*			1.00 (reference)
All (2014-2020)	Moderate	198,205	1.67 (1.62-1.72)
	Severe		3.18 (3.06-3.29)
1-14 days	Moderate	198,205	1.37 (1.14-1.64)
	Severe		14.5 (12.2-17.3)
14-30 days	Moderate	193,863	1.94 (1.63-2.31)
	Severe		4.45 (3.65-5.43)
30 days-3 mo.	Moderate	190,008	1.62 (1.46-1.79)
	Severe		3.43 (3.04-3.86)
3-9 mo.	Moderate	179,441	1.50 (1.40-1.61)
	Severe		2.71 (2.49-2.96)
9-12 mo.	Moderate	157,623	1.52 (1.37-1.69)
	Severe		2.41 (2.11-2.76)
Year 1-end	Moderate	146,448	1.74 (1.67-1.80)
	Severe		2.71 (2.59-2.86)



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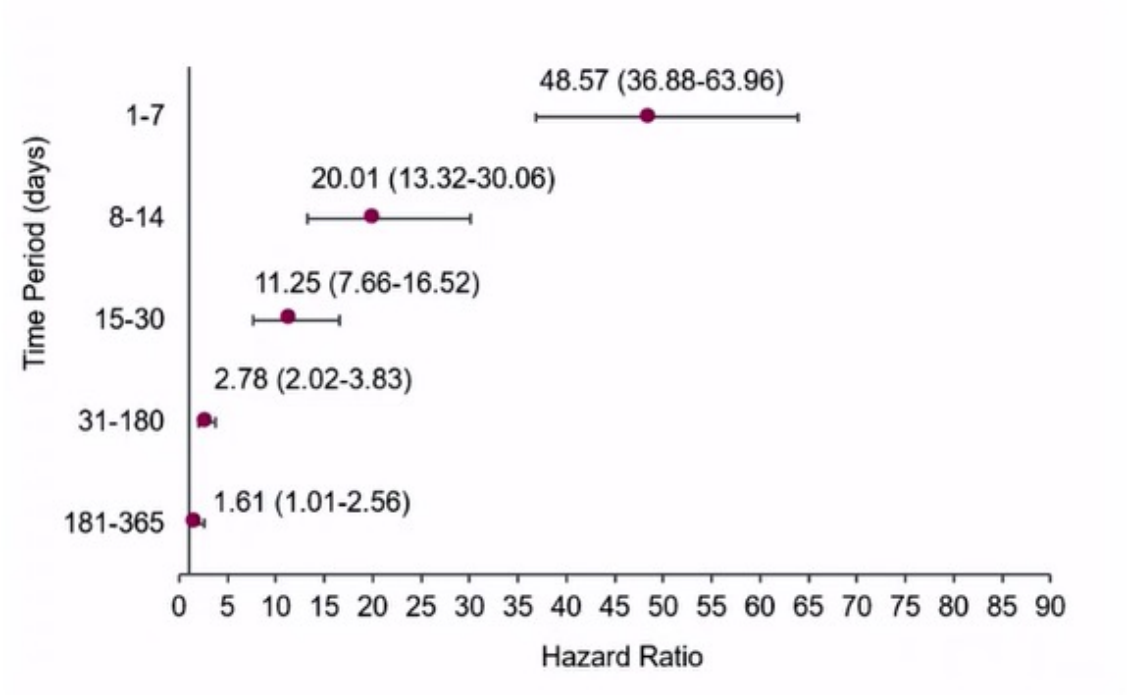
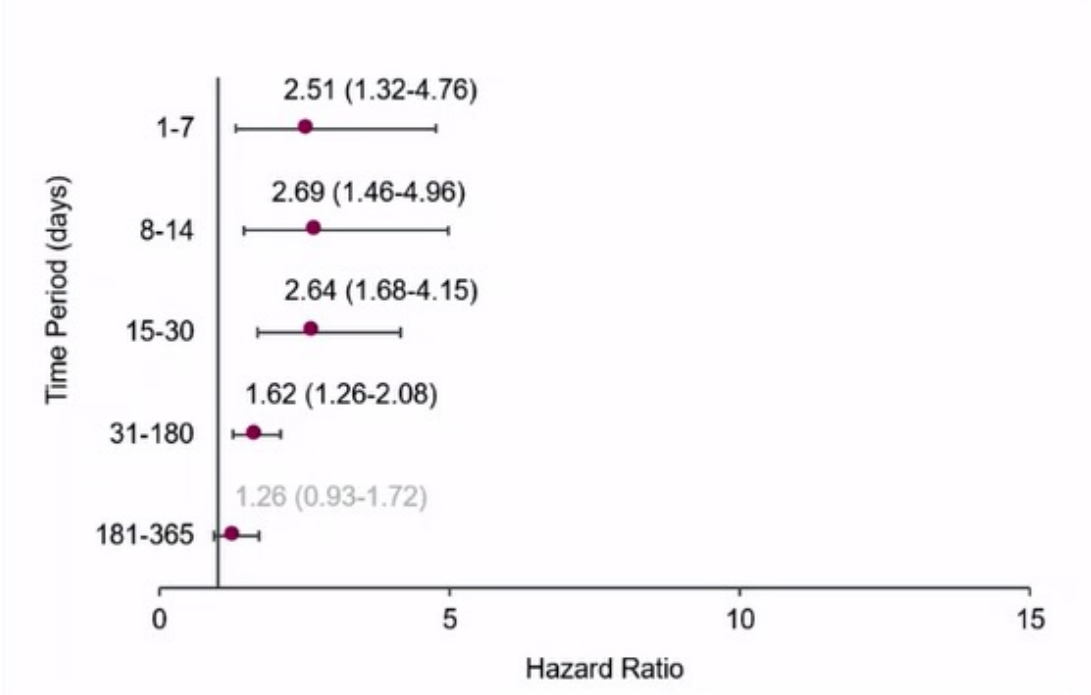
Risque accru dés la 1ere exacerbation de BPCO

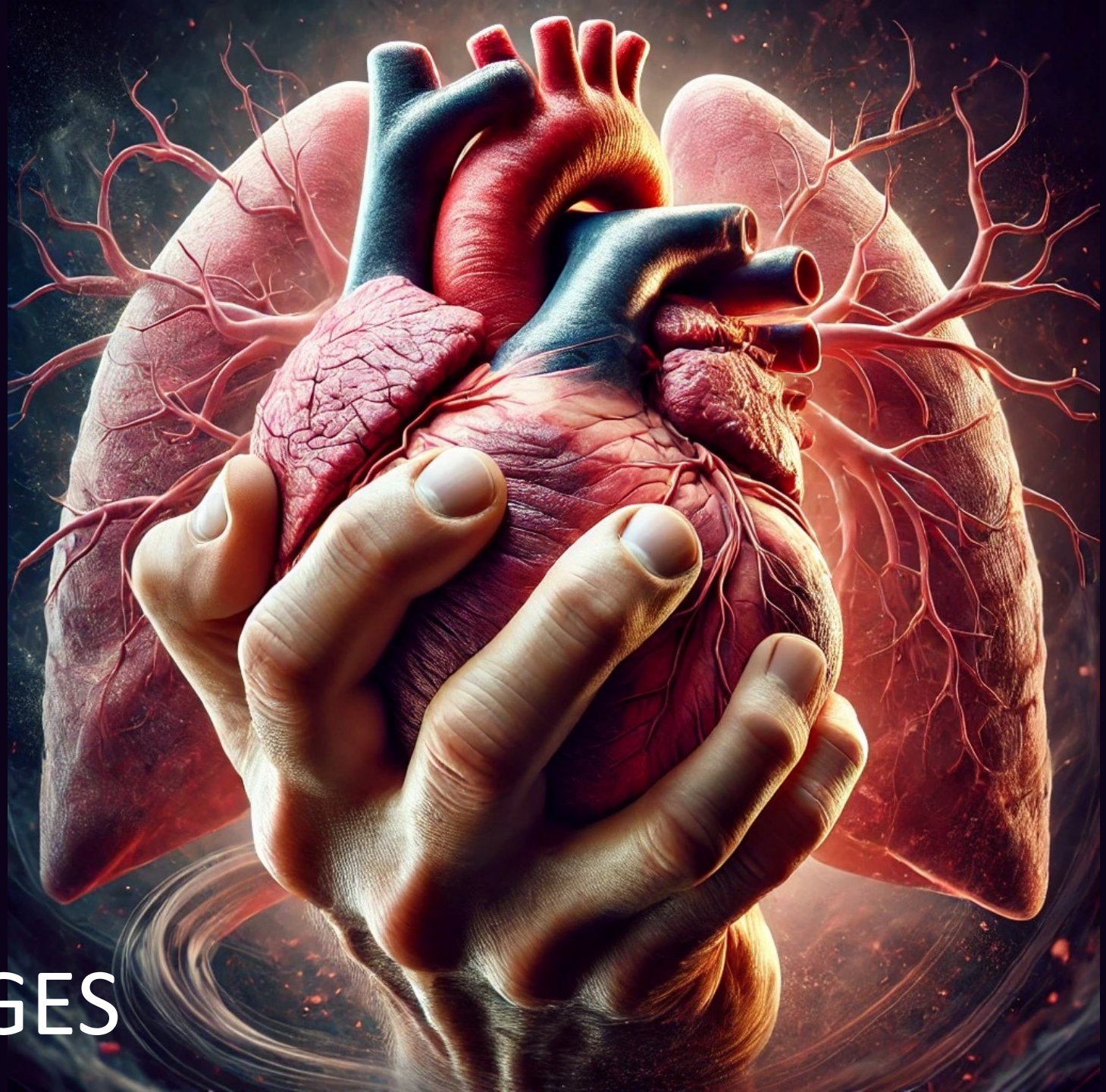


Risk of severe CVEs(*) or death following a first severe ECOPD



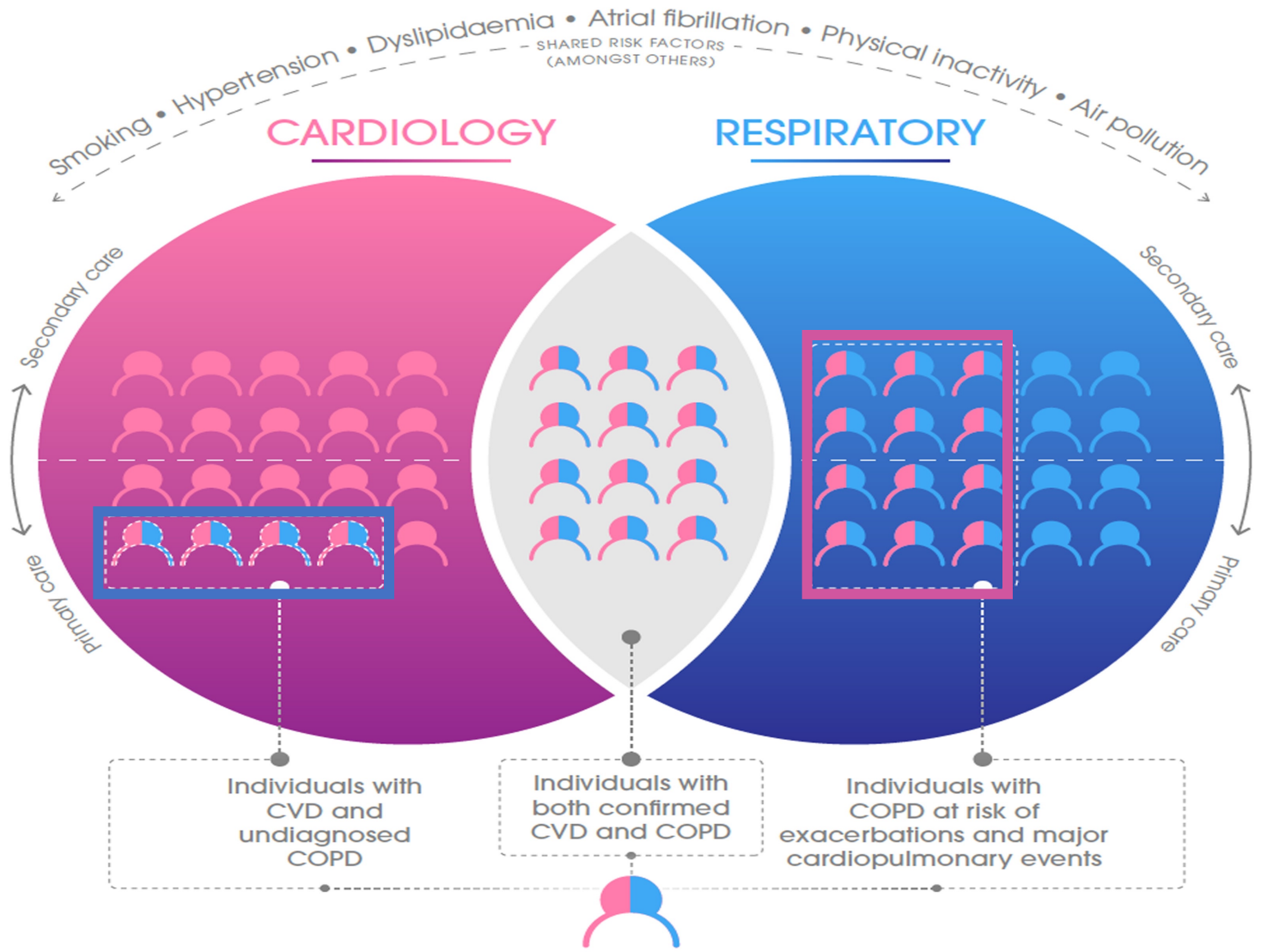
Risk of severe CVEs(*) or death following a first moderate ECOPD

(*) Severe CVEs: hospitalisation for arrhythmias, heart failure, stroke, acute coronary syndrome



CHALLENGES

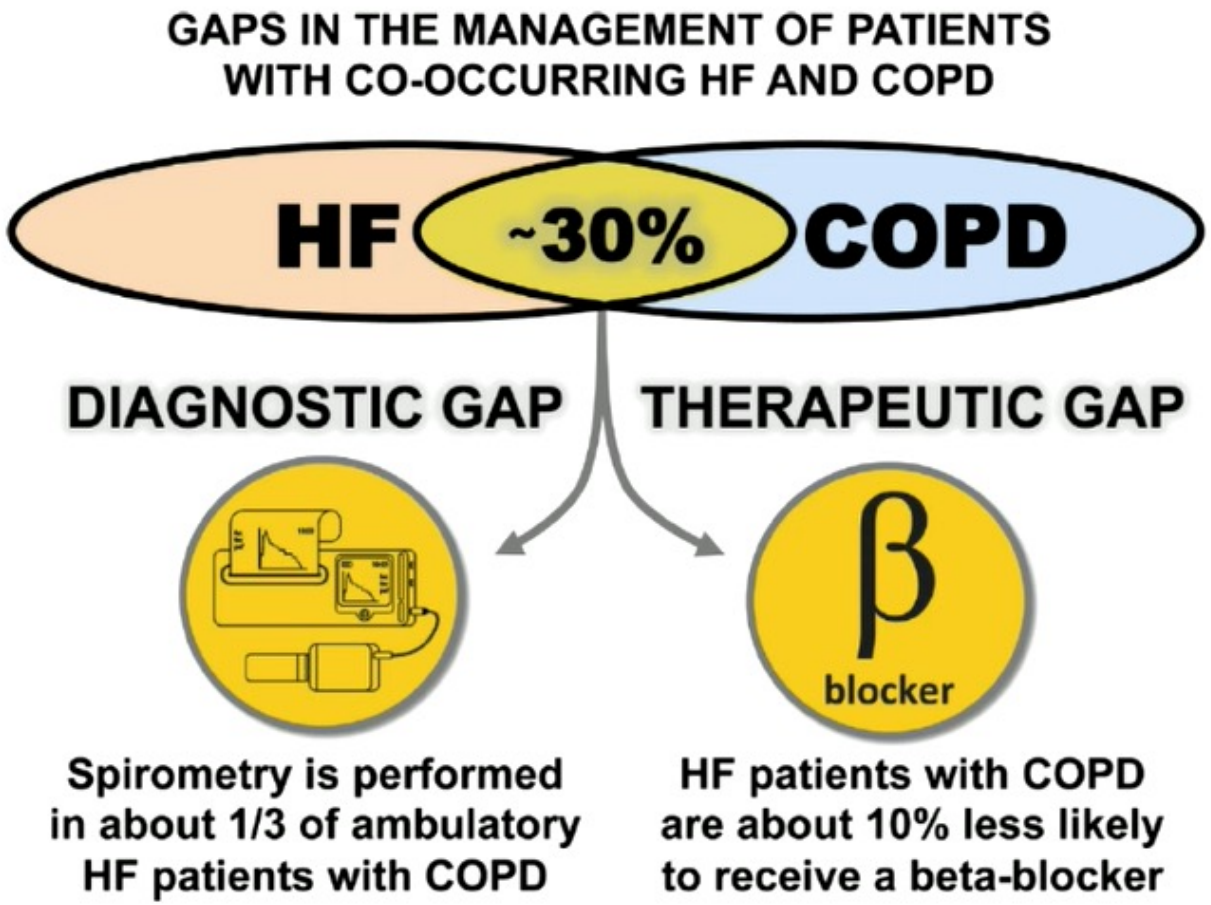
Chevauchement Cardiopathie et BPCO



ESC European Society of Cardiology

OXFORD UNIVERSITY PRESS

Les lacunes de PEC BPCO - IC



Canepa M, Franssen FME, et al. JACC Heart Fail. 2019;7(10):823–833.

DIAGNOSIS

- La clinique se chevauche.
- L'hyperinflation sur La RX thorax ne permet pas de détecter les signes d’IC (estimation erronée du rapport cardiothoracique).
- L'inflation pulmonaire rend difficile l’ETT et la dysfonction diastolique n'est pas toujours vérifiée.
- Des signes de congestion pulmonaire peuvent être observés de manière permanente sur la radiographie pulmonaire chez les personnes atteintes de BPCO sévère.
- Les taux de NT-proBNP sont normaux à moyennement élevés chez les patients atteints de BPCO stable, mais sont utiles en cas d'insuffisance cardiaque.

Quelle populations BPCO est à risque de PCV?

- Outils d'évaluation du risque MCV dans la BPCO
- Les preuves directes des bénéfices de leur mise en œuvre restent floues
- Algorithme QRISK3 UK inclut certaines maladies inflammatoires systémiques Lupus et PR, mais pas la BPCO
- À l'inverse, les cliniciens respiratoires n'utilisent peut-être pas toutes les informations à leur disposition pour évaluer et gérer le risque cardiaque. (calcification coronaires sur TDM, épaississement de la paroi des bronches et sa corrélation avec les cardiopathies.)

Difficulté du diagnostic de la BPCO en cardiologie

- Le diagnostic passe par la case spirométrie.
- Malgré la forte prévalence de la BPCO en cardiopathie les recommandations sur la manière et les personnes à dépister pour la BPCO sont rares.
- La recommandation de la Société européenne de cardiologie (ESC) sur l'insuffisance cardiaque indique uniquement que le dépistage « peut être envisagé chez les patients suspectés de BPCO » ➔ **Systématique**
- Aucune indication similaire dans les recommandations sur les cardiopathies ischémiques et la fibrillation auriculaire
- Par conséquent, la spirométrie reste sous-utilisée, et présence de piège de sur diagnostique (20% de sur diag dans une étude)

Diagnostic yield of a proactive strategy for early detection of cardiovascular disease versus usual care in adults with type 2 diabetes or chronic obstructive pulmonary disease in primary care in the Netherlands (RED-CVD): a multicentre, pragmatic, cluster-randomised, controlled trial

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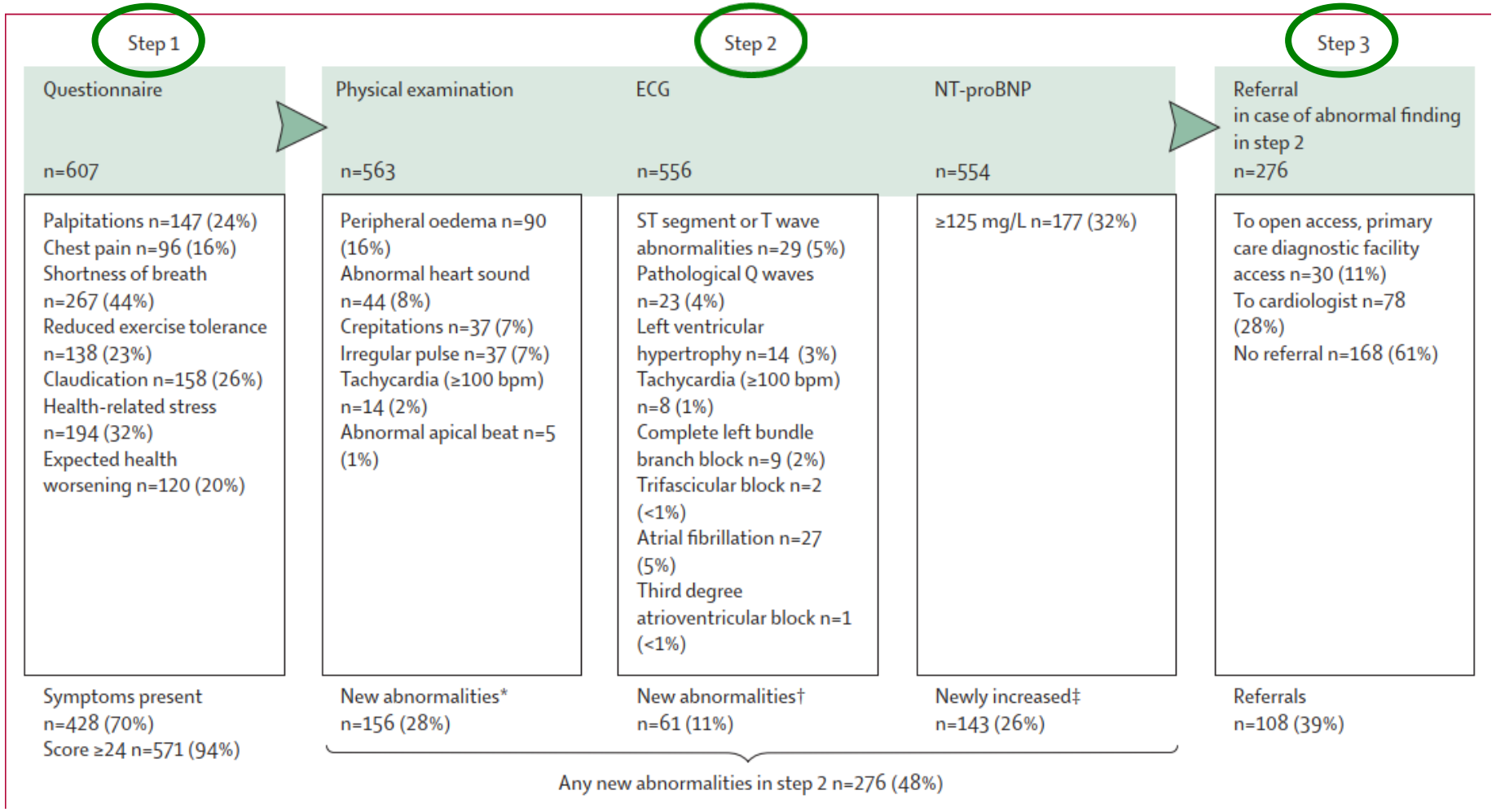

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	Intervention n=624 n (%; 95% CI)	Usual care n=592 n (%; 95% CI)
Heart failure	**28 (4·5%; 3·1–6·4)**	**9 (1·5%; 0·8–2·9)**
Heart failure with preserved ejection fraction	20 (3·2%; 2·1–4·9)	4 (0·7%; 0·2–1·8)
Heart failure with mildly reduced ejection fraction	5 (0·8%; 0·3–1·9)	4 (0·7%; 0·2–1·8)
Heart failure with reduced ejection fraction	3 (0·5%; 0·1–1·4)	1 (0·2%; 0·0–1·1)
Atrial fibrillation	**13 (2·1%; 1·2–3·6)**	**5 (0·8%; 0·3–2·0)**
New coronary artery dissease, all types	**16 (2·6%; 1·6–4·2)**	**8 (1·4%; 0·6–2·7)**
Obstructive coronary artery disease	8 (1·3%; 0·6–2·6)	7 (1·2%; 0·5–2·5)
Relevant, non-obstructive coronary artery disease	8 (1·3%; 0·6–2·6)	1 (0·2%; 0·0–1·1)
Any new cardiovascular diagnosis*	**50 (8·0%; 6·1–10·4)**	**18 (3·0%; 1·9–4·8)**

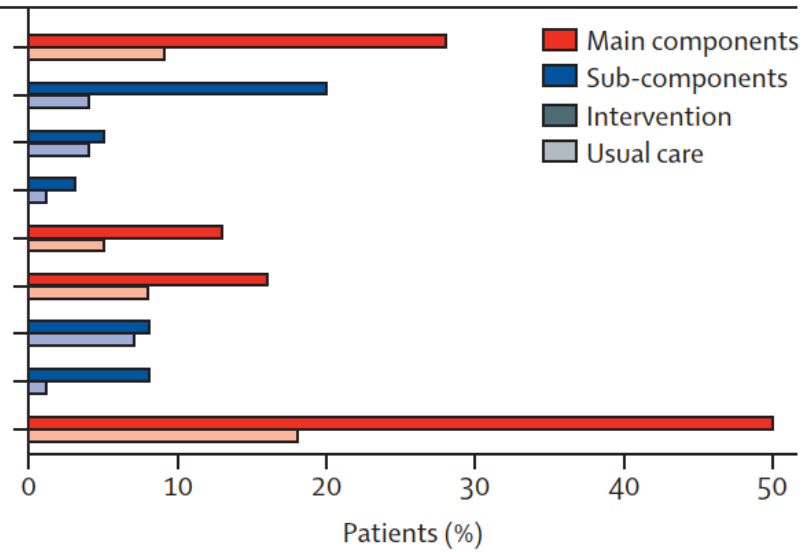

Figure 3: **Numbers of new cardiovascular diagnoses per group at 1 year of follow-up**

*The total number of patients with a new diagnosis is lower than the combination of the individual components because some patients received a double diagnosis. In the intervention group, 50 patients received 57 diagnoses and in the control group, 18 patients received 22 diagnoses.

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	Events		Odds ratio (95% CI)
	Control	Intervention	
Crude			
Coronary artery disease, atrial fibrillation, or heart failure	18	50	2·48 (1·35–4·55)
Adjusted*			
Coronary artery disease, atrial fibrillation, or heart failure	18	50	2·97 (1·66–5·33)
Adjusted*, obstructive coronary artery disease only			
Coronary artery disease, atrial fibrillation, or heart failure	18	44	2·74 (1·54–4·89)

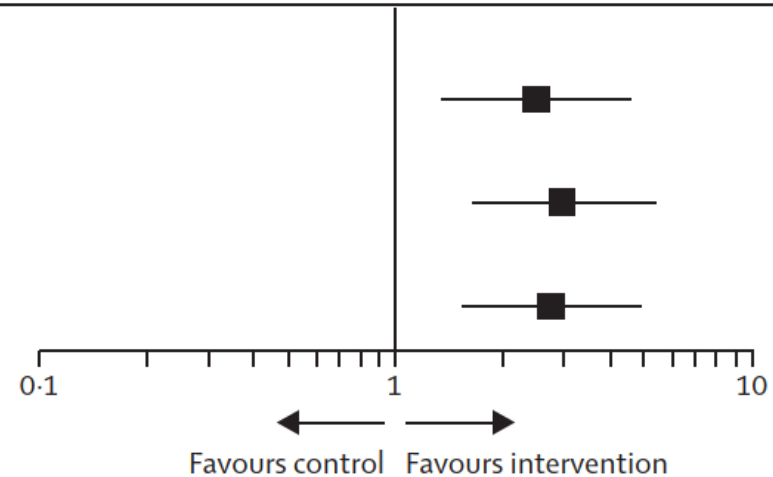
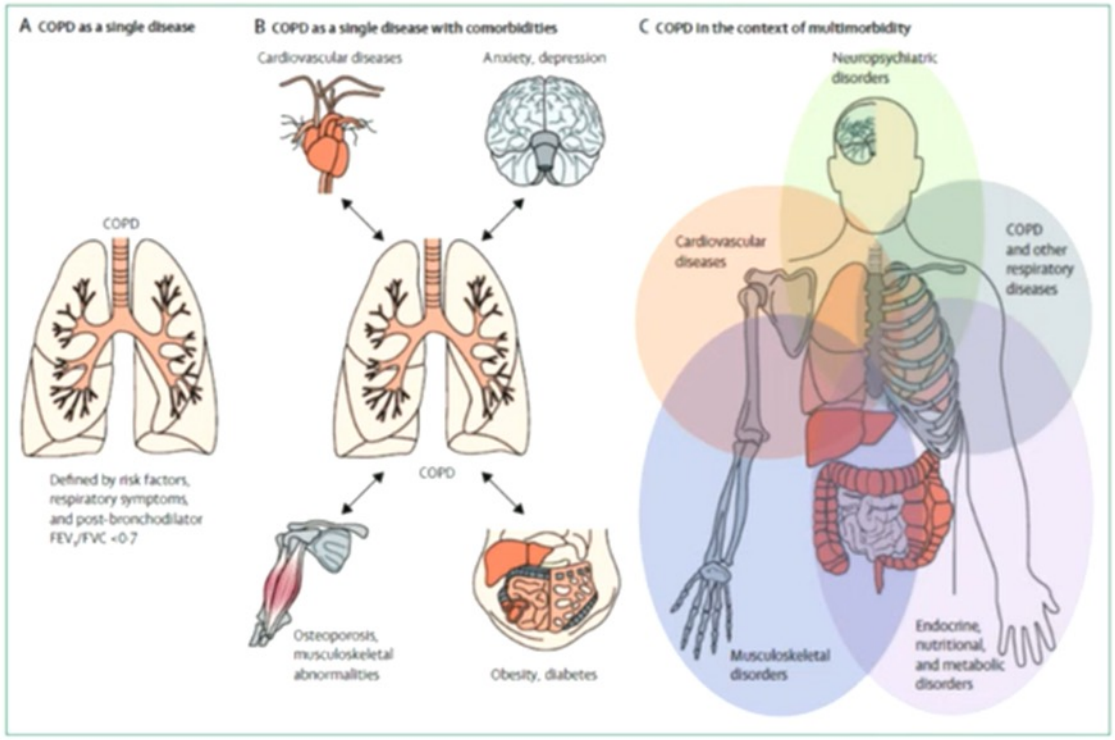
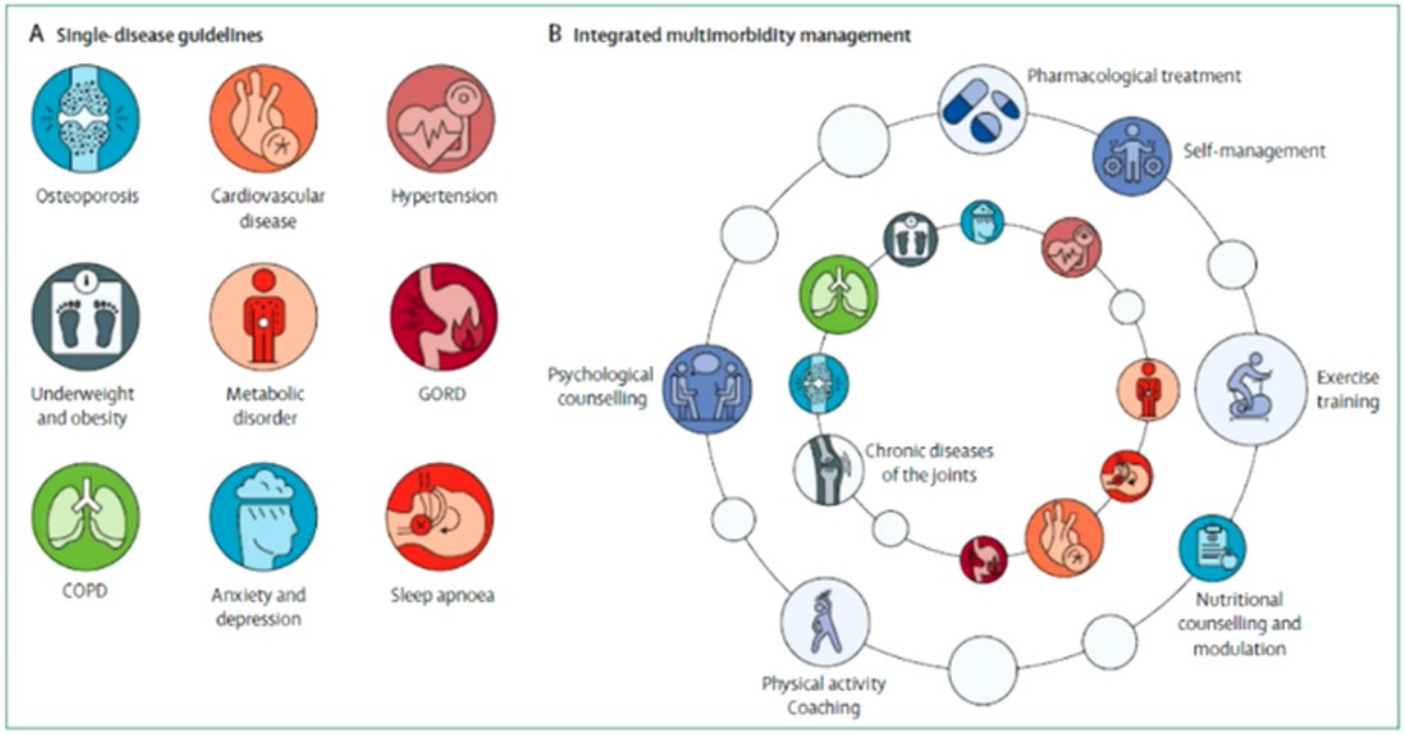


Figure 4: **Forest plot of odds ratios for new diagnoses between the comparative groups**

*Adjusted for age, sex, hypertension, hypercholesterolaemia, smoking status, and cardiovascular disease (coronary artery disease, atrial fibrillation, or heart failure) at baseline.

Prise en charge





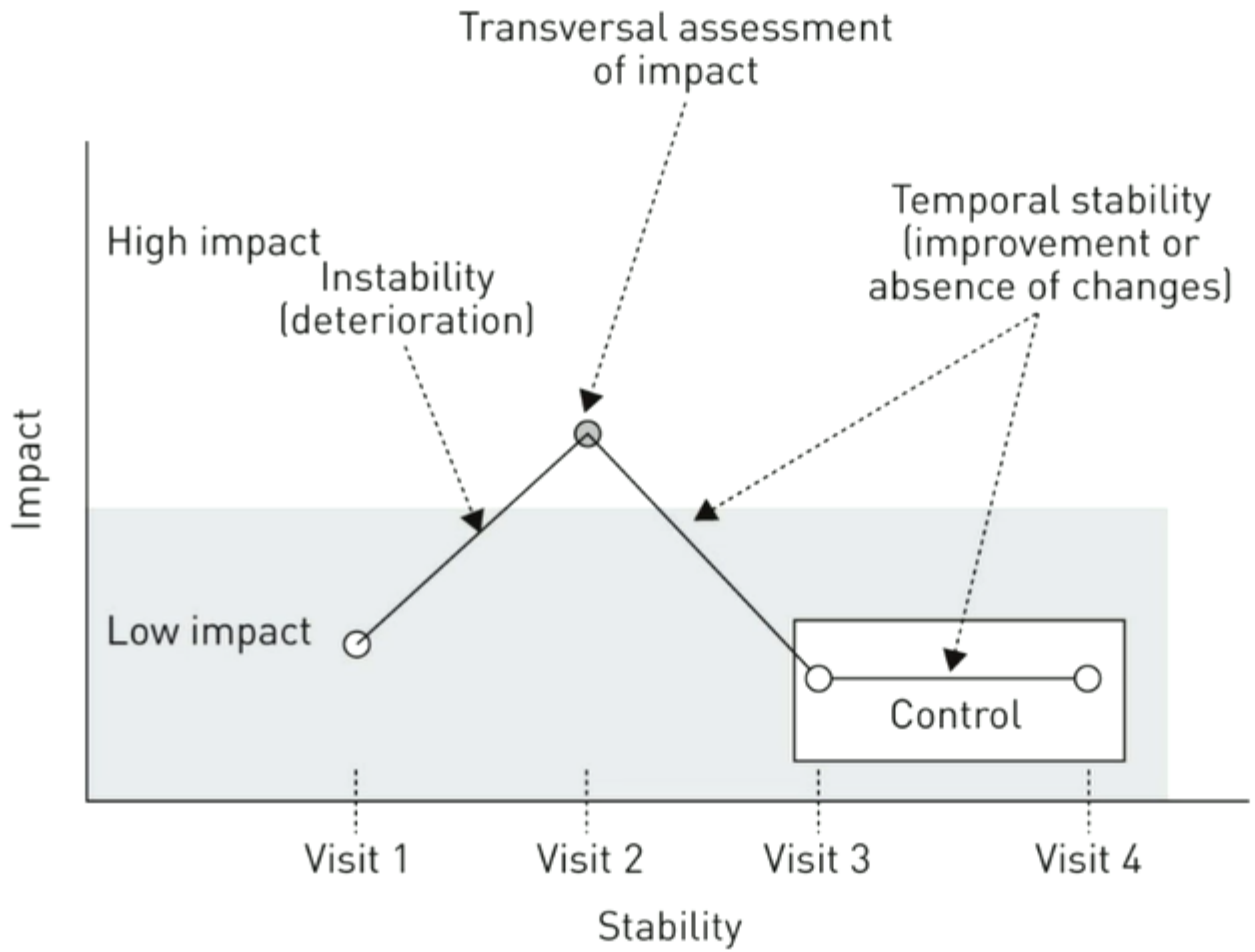
Fabri and all. Lancet 2024

Controle Clinique de la BPCO comme objectif

- Le contrôle clinique doit être l'objectif principal
- Les moins bien contrôlés sont ceux qui font le plus de pathologies CVD
- Le traitement à la carte doit prendre en consideration : Exacerbations , QDV, Comorbidities, factures psychologies..
- Guidelines doivent suivre pour une PEC globale du patients

Contrôle clinique ?

Clinical control of COPD has been defined as “a condition of low clinical impact maintained over a long period of time”.



J.J. Soler-Cataluña, B. Alcazar-Navarrete, M. Miravitlles. Eur Respir J, 44 (2014), pp. 1072-1075

Effect of lung deflation with indacaterol plus glycopyrronium on ventricular filling in patients with hyperinflation and COPD (CLAIM): a double-blind, randomised, crossover, placebo-controlled, single-centre trial

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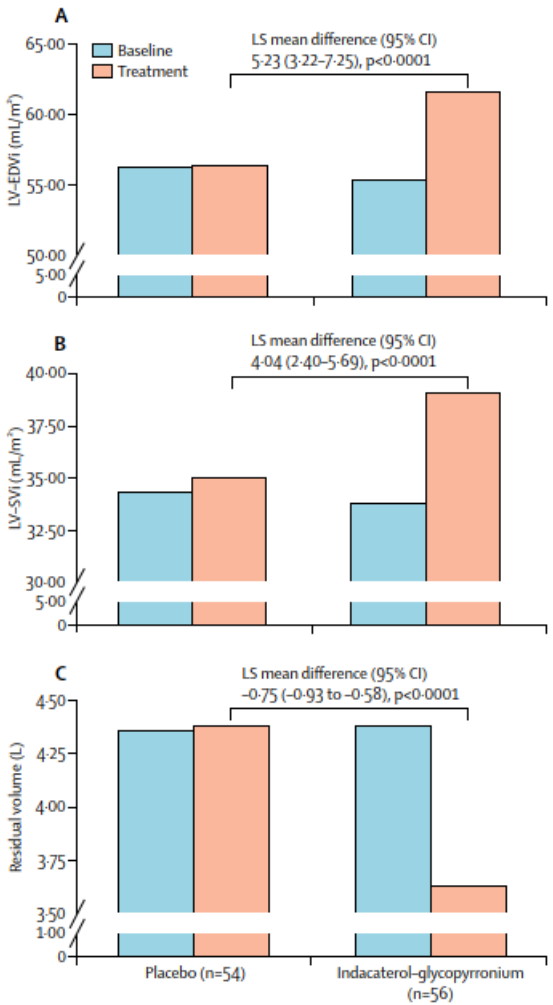
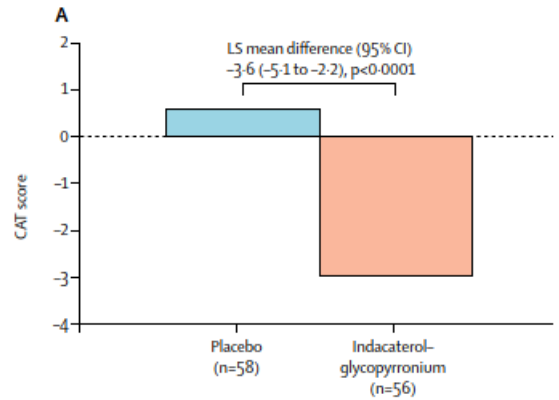
volume du VG à la fin de la diastole

VG reporté du BMI

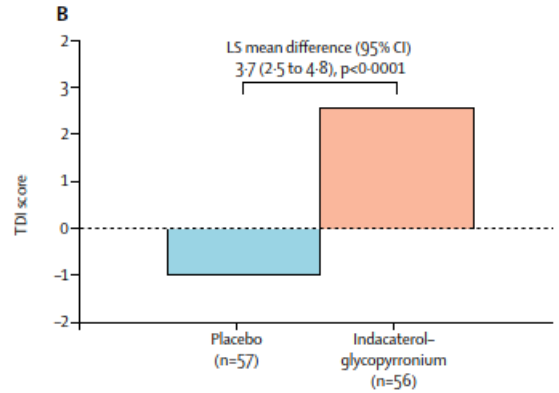
Volume résiduel



CAT score



TDI dyspnea index



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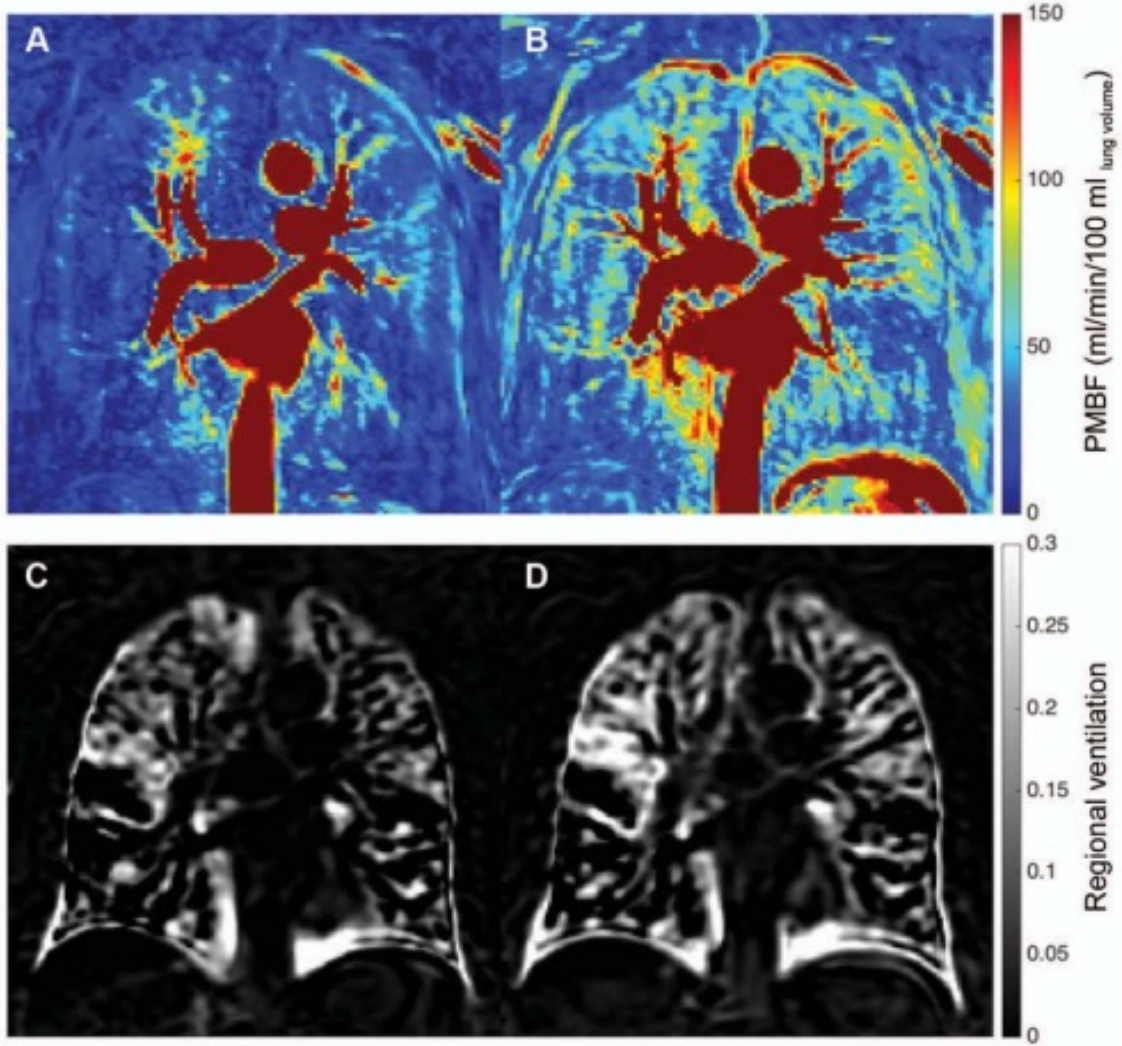
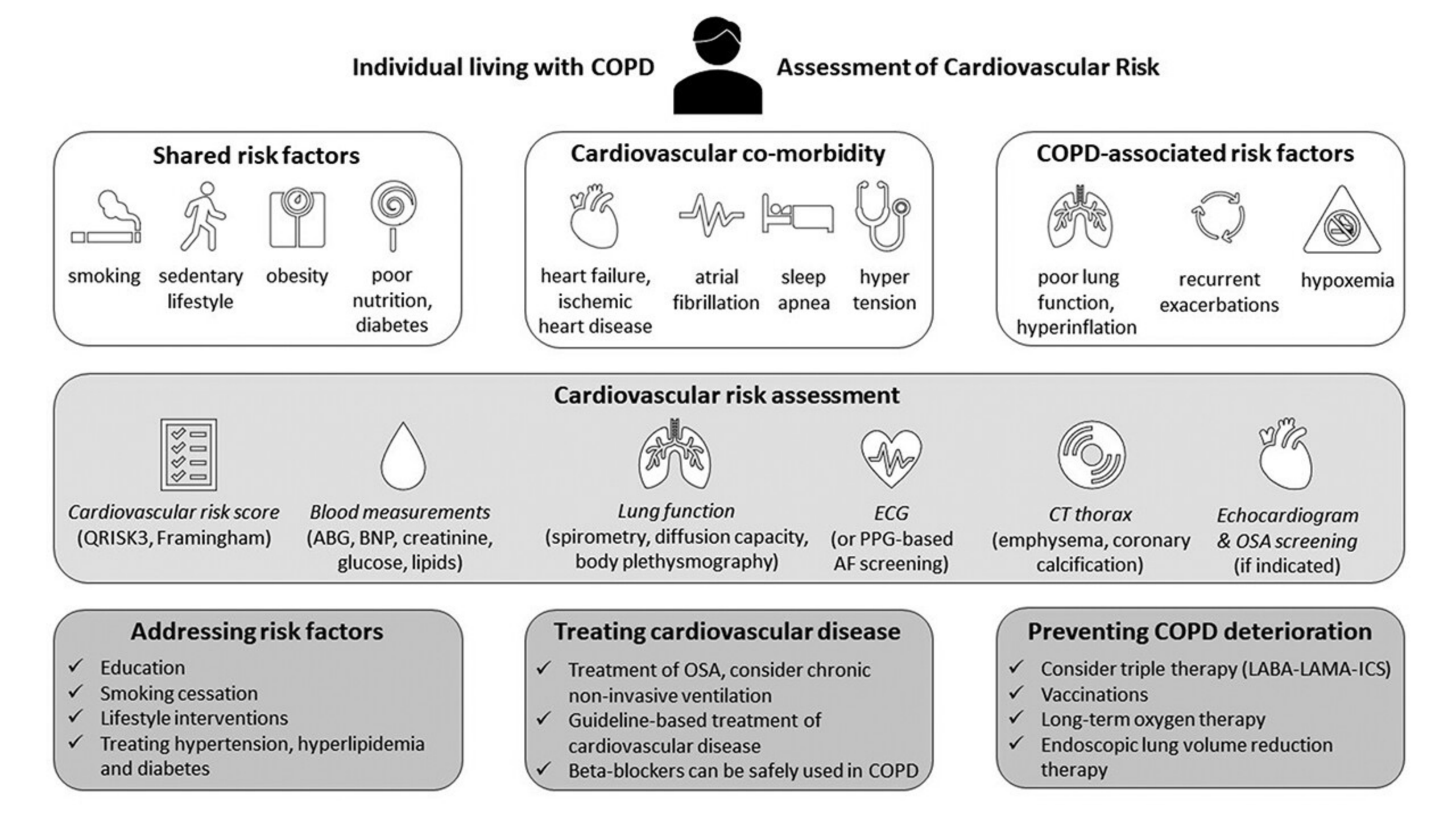
PULMONARY MICROVASCULAR BLOOD FLOW



CONCLUSION


Individual living with COPD
Assessment of Cardiovascular Risk
Shared risk factors
smoking
sedentary lifestyle
obesity
poor nutrition, diabetes
Cardiovascular co-morbidity
heart failure, ischemic heart disease
atrial fibrillation
sleep apnea
hyper tension
COPD-associated risk factors
poor lung function, hyperinflation
recurrent exacerbations
hypoxemia
Cardiovascular risk assessment
Cardiovascular risk score (QRISK3, Framingham)
Blood measurements (ABG, BNP, creatinine, glucose, lipids)
Lung function (spirometry, diffusion capacity, body plethysmography)
ECG (or PPG-based AF screening)
CT thorax (emphysema, coronary calcification)
Echocardiogram & OSA screening (if indicated)
Addressing risk factors
✓ Education
✓ Smoking cessation
✓ Lifestyle interventions
✓ Treating hypertension, hyperlipidemia and diabetes
Treating cardiovascular disease
✓ Treatment of OSA, consider chronic non-invasive ventilation
✓ Guideline-based treatment of cardiovascular disease
✓ Beta-blockers can be safely used in COPD
Preventing COPD deterioration
✓ Consider triple therapy (LABA-LAMA-ICS)
✓ Vaccinations
✓ Long-term oxygen therapy
✓ Endoscopic lung volume reduction therapy

MERCI

Professeur Zied Moatemri

Colonel médecin
Chef de service de pneumologie HMPIT

SERVICE DE PNEUMOLOGIE
H.M.P.I.T