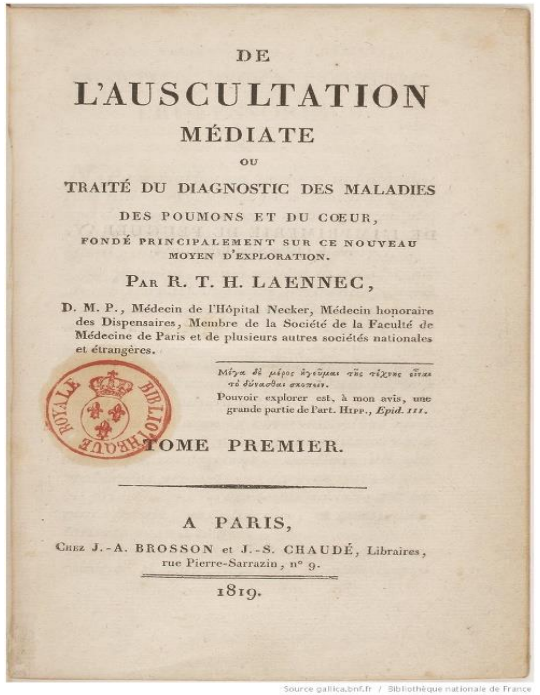
بیماری انسدادی مزمن ریه
مقدمات
محمد رضا غفاری

Chronic Obstructive Pulmonary Disease

In 1819, over 200 years ago Rene Laennec published his treatise



DE

L'AUSCULTATION

MÉDIATE

OU

TRAITÉ DU DIAGNOSTIC DES MALADIES

DES POUMONS ET DU CŒUR,

FONDÉ PRINCIPALEMENT SUR CE NOUVEAU MOYEN D'EXPLORATION.

PAR R. T. H. LAENNEC,

D. M. P., Médecin de l'Hôpital Necker, Médecin honoraire des Dispensaires, Membre de la Société de la Faculté de Médecine de Paris et de plusieurs autres sociétés nationales et étrangères.

Μέγα δὲ μέρος ἡγεῦμαι τῆς τέχνης εἶναι τὸ δύνασθαι ἀκούειν.

Pouvoir explorer est, à mon avis, une grande partie de l'art. HIPP., *Epid.* III.

TOME PREMIER.

A PARIS,

CHEZ J.-A. BROSSON et J.-S. CHAUDÉ, Libraires, rue Pierre-Sarrazin, n° 9.

1819.

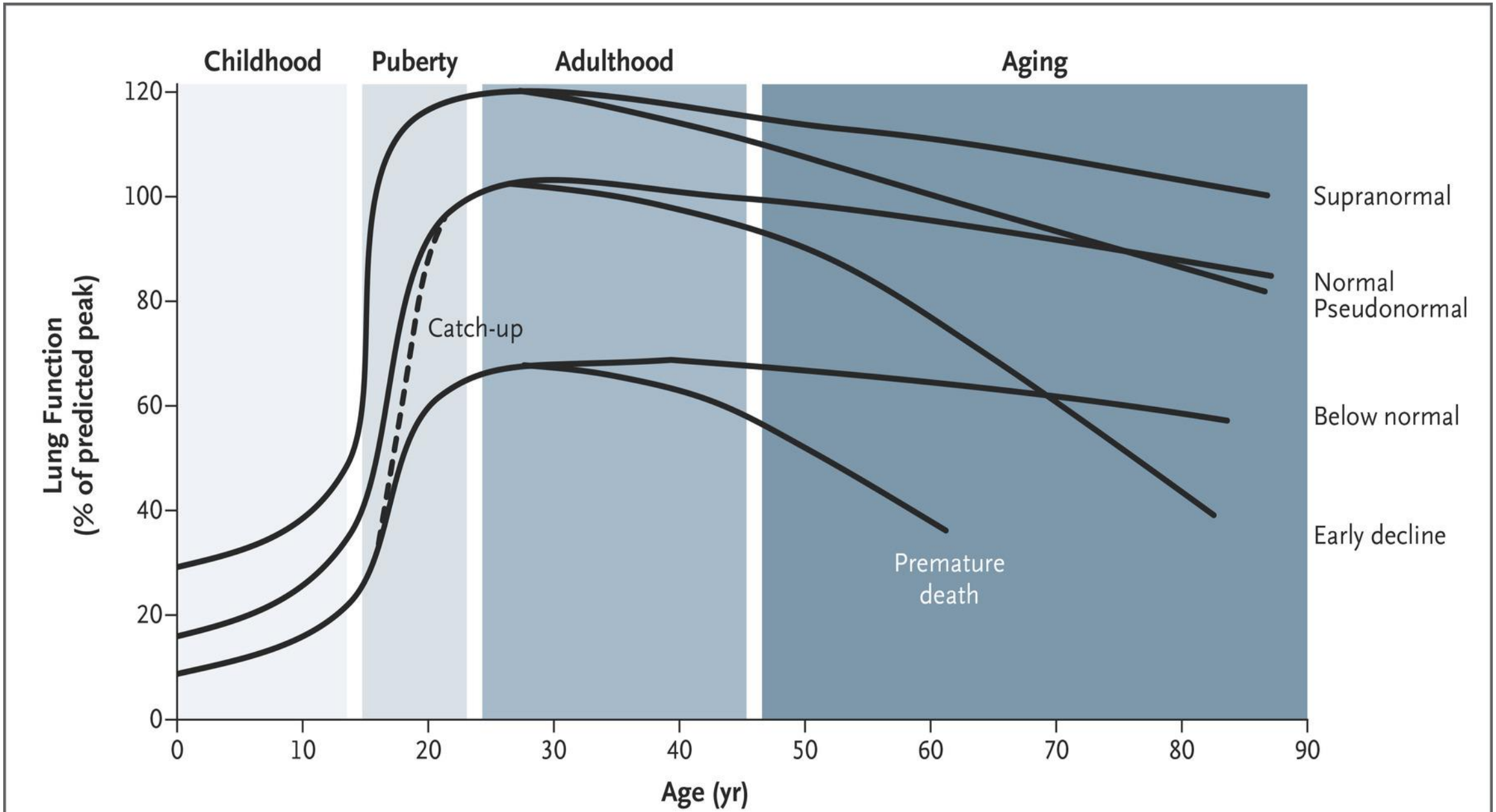
ROYALE BIBLIOTHÈQUE

Source gallica.bnf.fr / Bibliothèque nationale de France

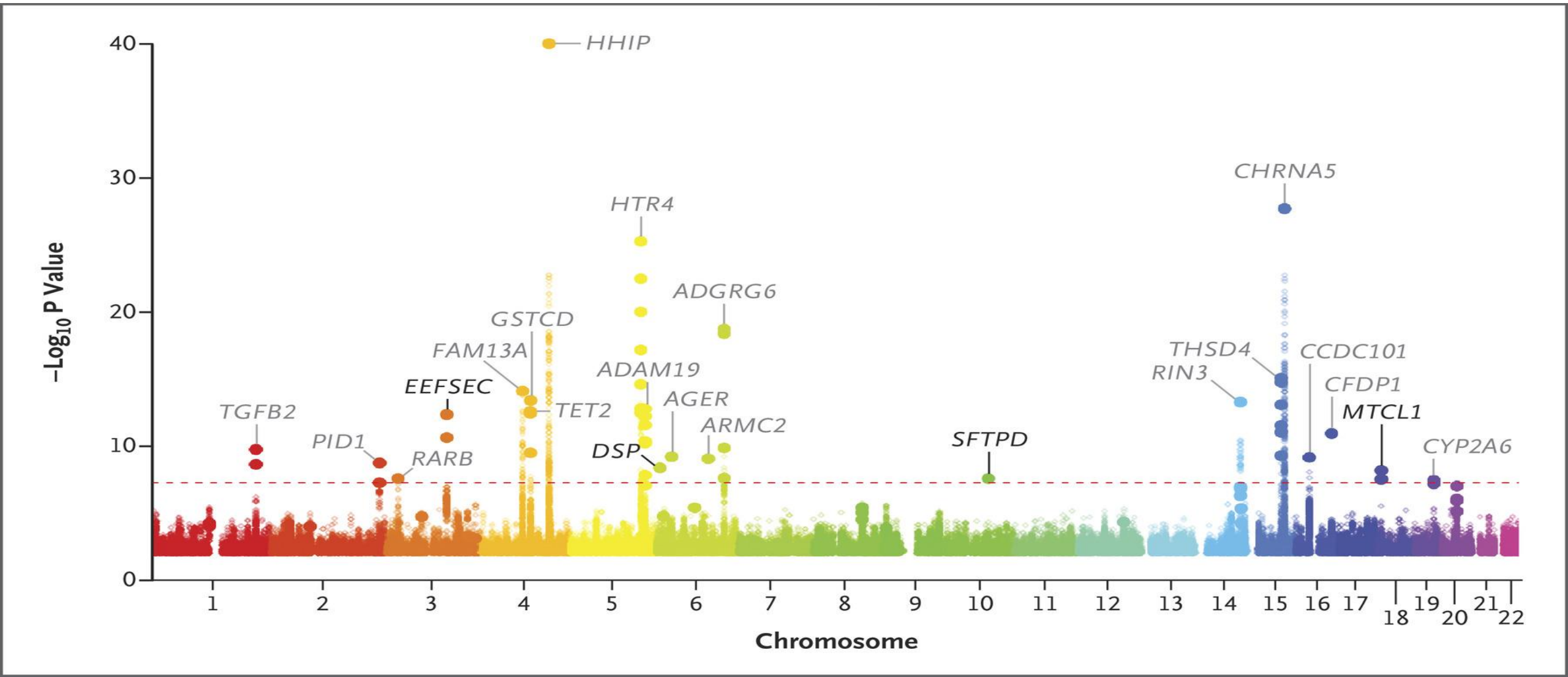
HE PROPHETICALLY STATED

- The disease can begin in infancy and continue for many years. More often cough with mucous catarrh, worsens in the winter and in the mornings. It is often accompanied by difficult respiration, which might end fatally with ‘suffocative catarrh.’ Once present, dyspnea is constant, worsened by anxiety and exercise and additionally by acute catarrh.


DURING THESE 2
CENTURIES AND JUST AS
LAENNEC HAD PREDICTED


Childhood
Puberty
Adulthood
Aging
Lung Function
(% of predicted peak)
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
Age (yr)
Catch-up
Premature
death
Supranormal
Normal
Pseudonormal
Below normal
Early decline

COPD has an important genetic origin



Cigar smoking is not safe.

Regular cigar smoking causes lung diseases such as COPD, emphysema and chronic bronchitis.

ATS We keep the world breathe

#ATSLungFact

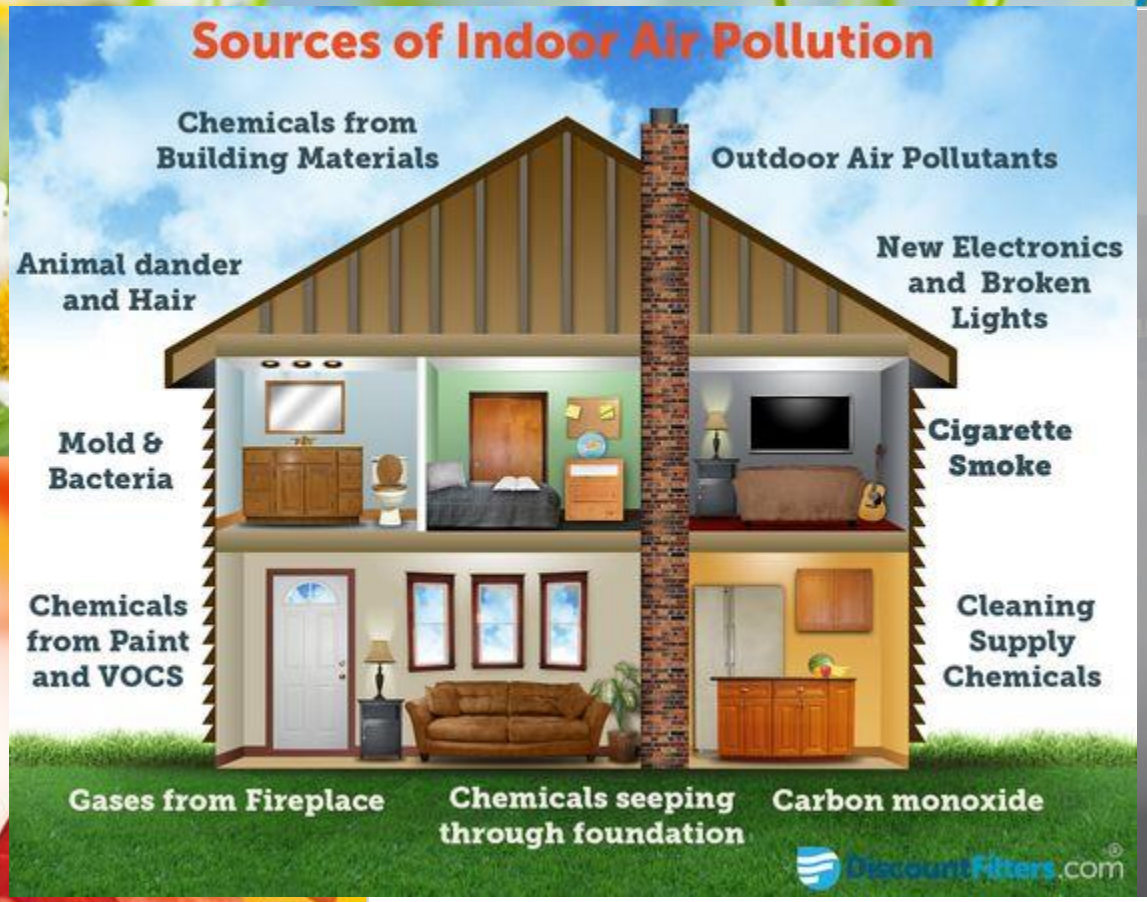

Sources of Indoor Air Pollution
Chemicals from Building Materials
Outdoor Air Pollutants
Animal dander and Hair
New Electronics and Broken Lights
Mold & Bacteria
Cigarette Smoke
Chemicals from Paint and VOCS
Cleaning Supply Chemicals
Gases from Fireplace
Chemicals seeping through foundation
Carbon monoxide
DiscountFilters.com

Figure 1S

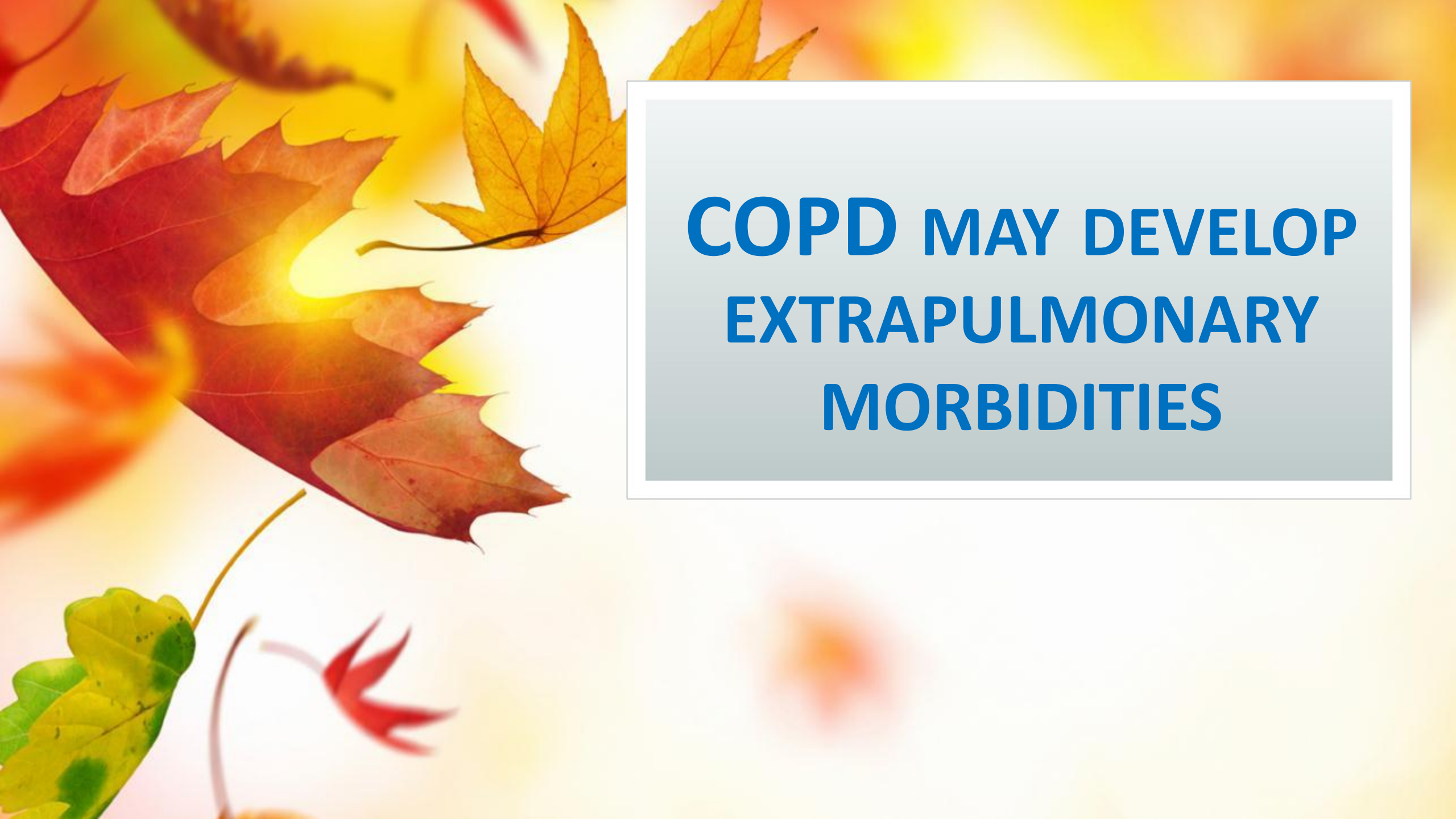
Genes Environmental exposure

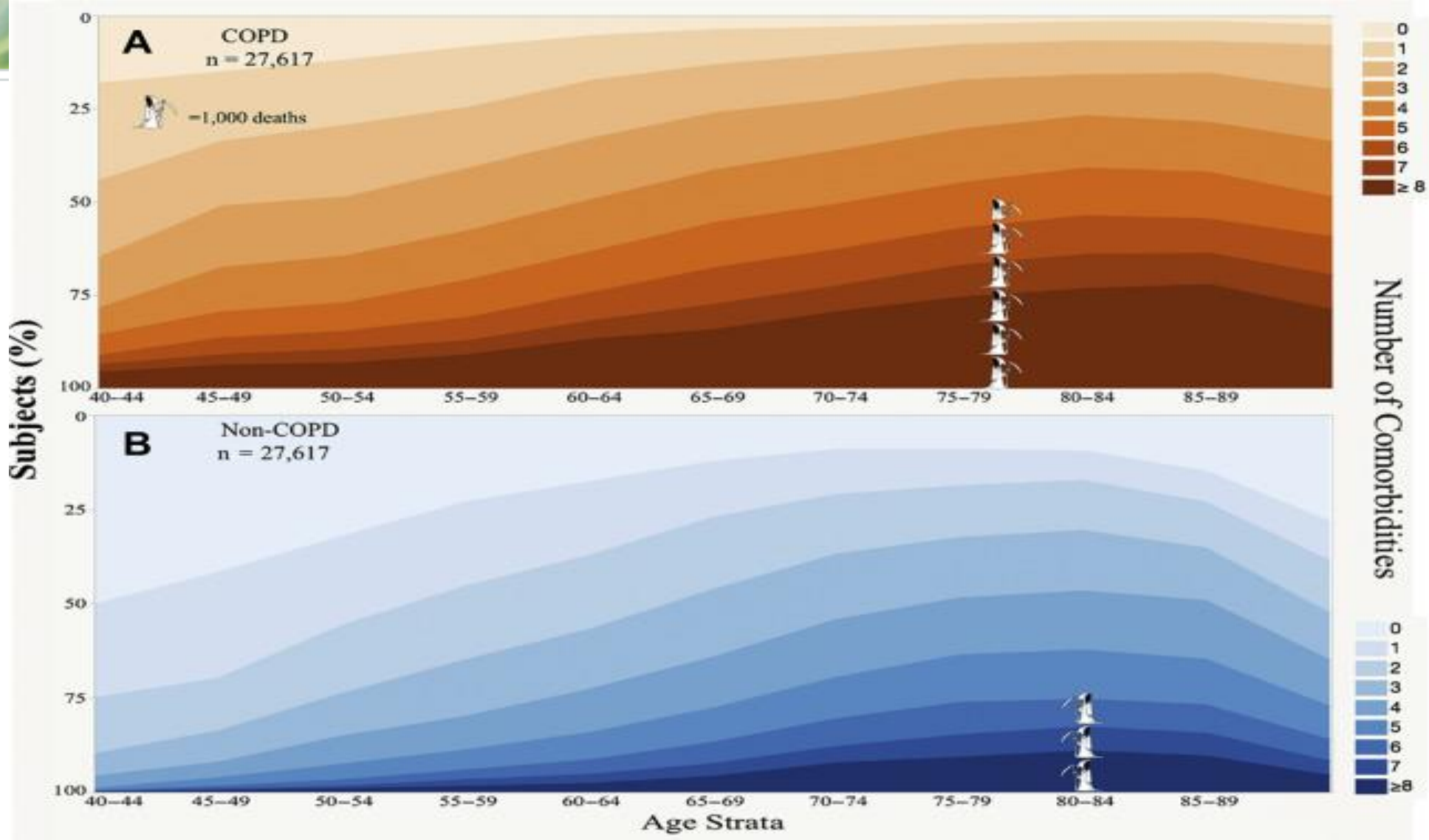
Causes
Cigarette smoke
Biomass, pollution
Infections
Genetic (AAT and others)
Asthma
Developmental
Unknown

PRE COPD	
Lung Function	No airflow limitation Low DLCO Rapid rate of FEV_1 decline
Symptoms	Cough, sputum, dyspnea
Structure	Emphysema Abnormal airways Vascular remodeling

COPD
Airflow limitation Abnormal lung functions Altered gas exchange
Dyspnea, cough, sputum, fatigue depression
More: Emphysema, airways and vascular remodeling Comorbidities

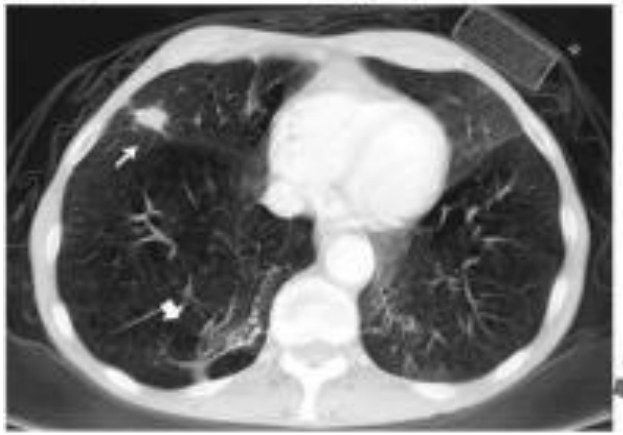
Disease progression


COPD MAY DEVELOP EXTRAPULMONARY MORBIDITIES

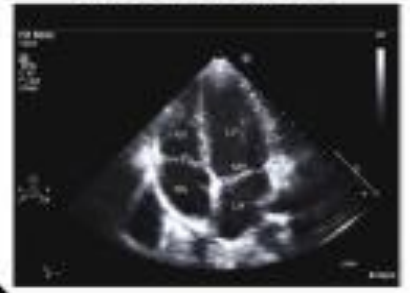


Number of comorbidities per individual by age bracket and total mortality. Each band represent the number of comorbidities per patient and the width the proportion of individuals with that number of comorbidities at different age brackets (X axis). (*A*) Represent those patients carrying the diagnosis of COPD and (*B*) those without COPD.

Computerized tomography of the chest



Echocardiogram



CHF

Pulmonary Fibrosis

CAD

Lung Cancer

A. Fibrillation

Anxiety*

Esophageal Cancer

Breast Cancer*

Pancreatic Cancer

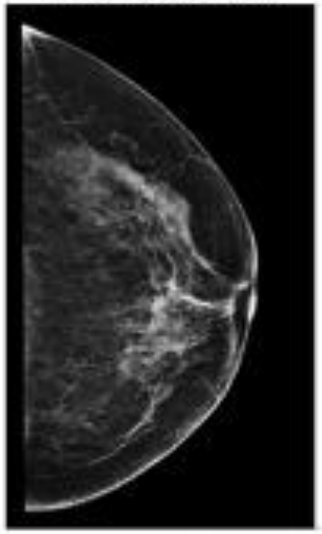
Electrocardiogram

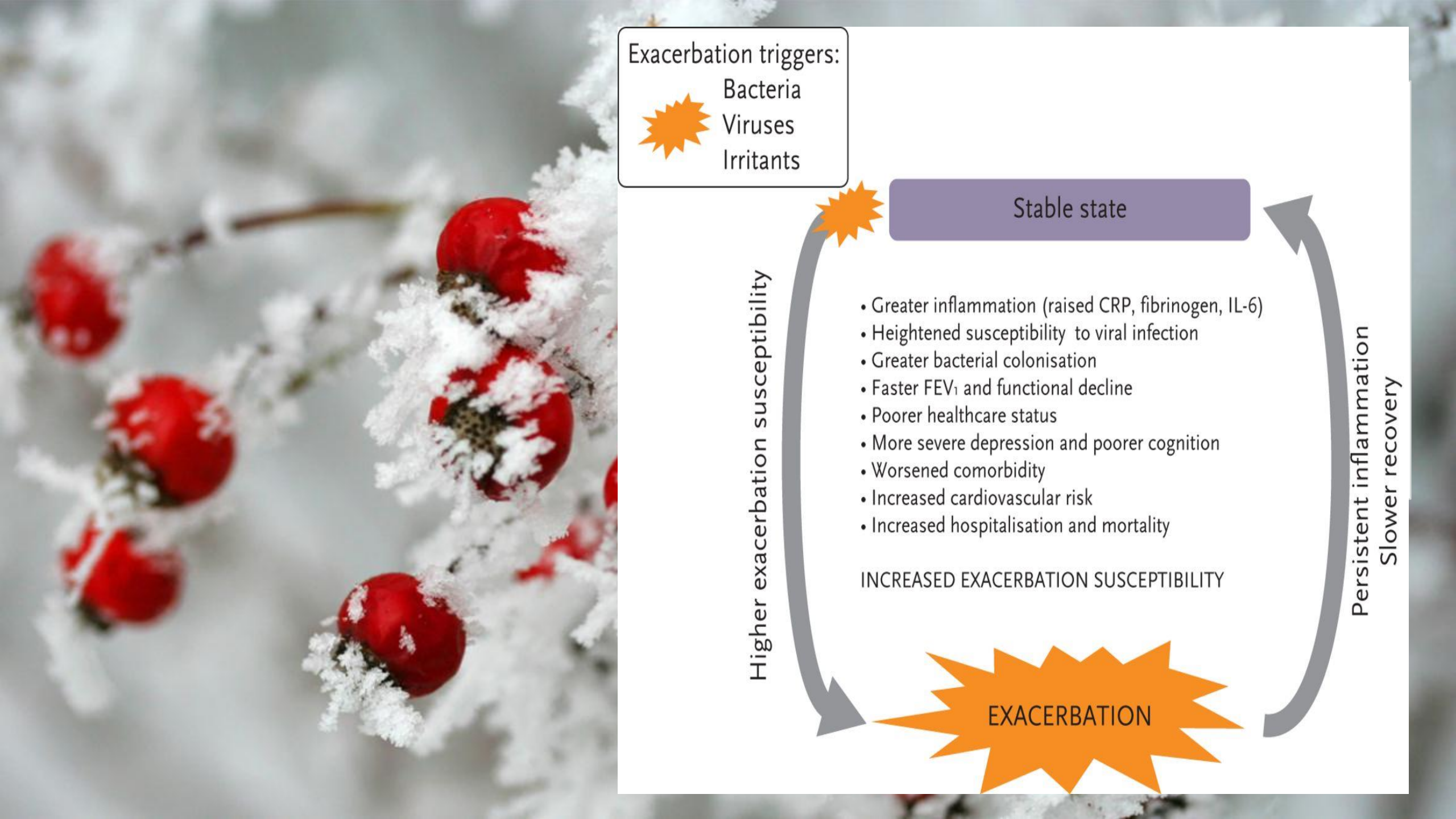
Diabetes w/
Neuropathy

Liver Cirrhosis

Gastric
Duodenal Ulcer

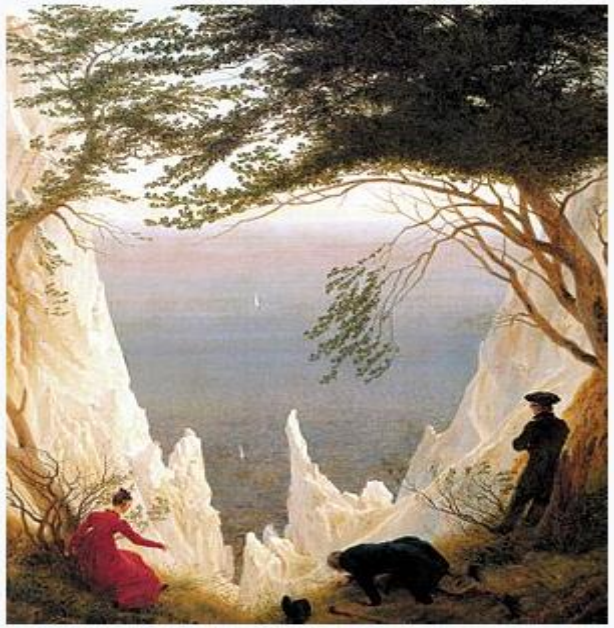
Mammography




Exacerbation triggers:
Bacteria
Viruses
Irritants
Stable state
• Greater inflammation (raised CRP, fibrinogen, IL-6)
• Heightened susceptibility to viral infection
• Greater bacterial colonisation
• Faster FEV_1 and functional decline
• Poorer healthcare status
• More severe depression and poorer cognition
• Worsened comorbidity
• Increased cardiovascular risk
• Increased hospitalisation and mortality
INCREASED EXACERBATION SUSCEPTIBILITY
EXACERBATION
Higher exacerbation susceptibility
Persistent inflammation
Slower recovery

Chalk Cliffs on Rügen

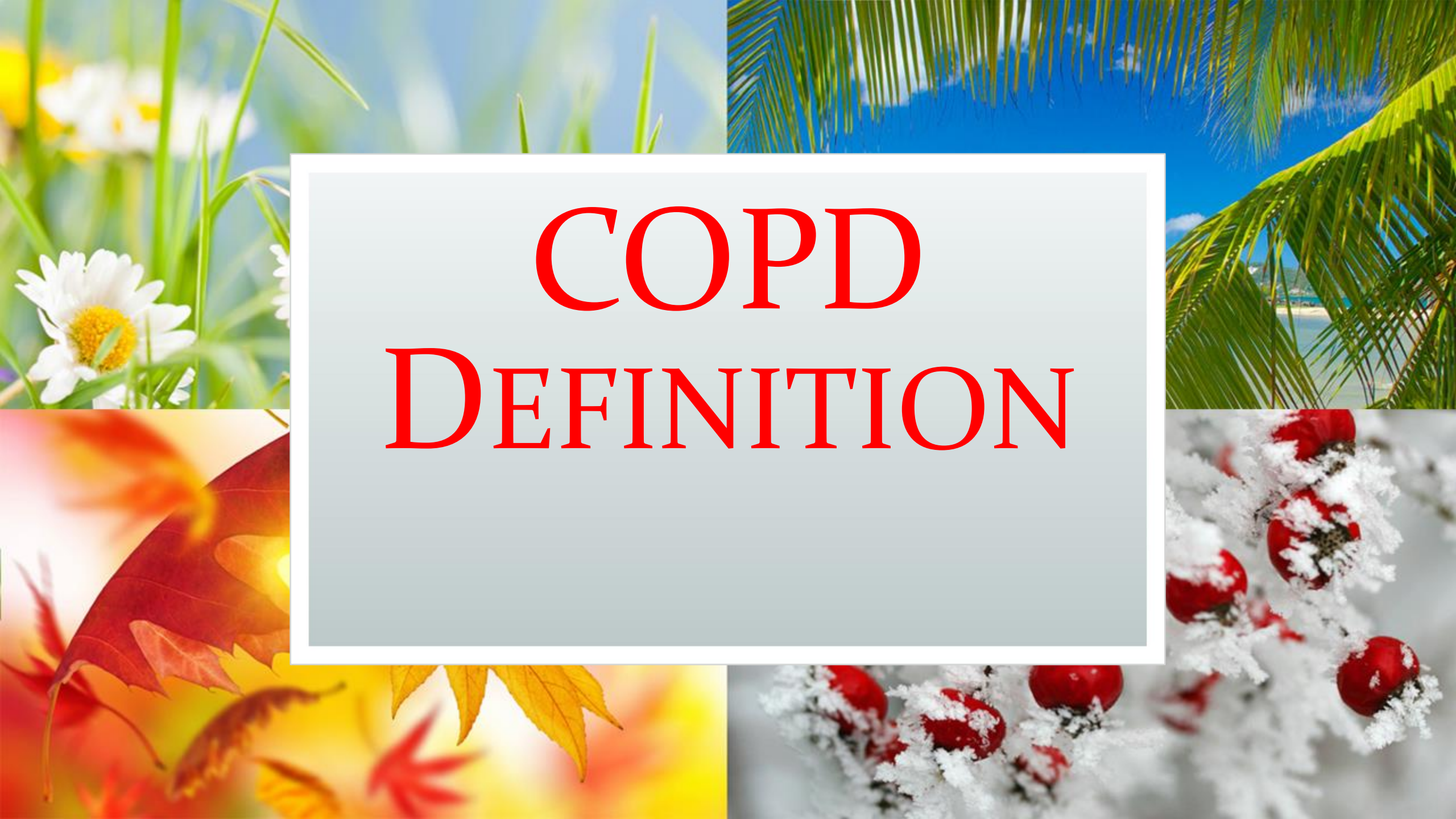
German: *Kreidefelsen auf Rügen*



Artist	Caspar David Friedrich
Year	1818
Medium	Oil on canvas
Dimensions	90.5 cm × 71 cm (35.6 in × 27.9 in)
Location	Kunst Museum Winterthur – Reinhart am Stadtgarten, Winterthur

IF RENE´ LAENNEC COULD RETURN, HE WOULD BE VERY PROUD

the fact that although COPD is currently the third leading cause of death worldwide, its overall impact has been decreasing over the last decade. It is our hope that with more emphasis on prevention, and better implementation of pharmacologic and nonpharmacologic therapies, we may be able to eradicate COPD’s impact on society



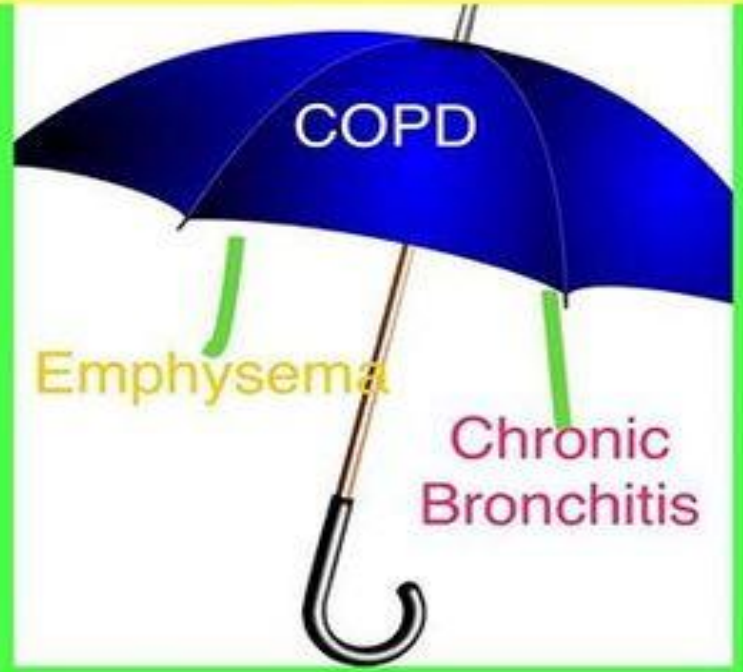
COPD
Definition

WHAT IS THE DIFFERENCE?

COPD -vs- EMPHYSEMA

COPD:

Is an umbrella term
that includes
the diagnoses
emphysema
and chronic
bronchitis



EMPHYSEMA:

This is a type of COPD.
Emphysema is when the
alveoli (air sacs in the lungs)
are overinflated and damaged.
This results in a lose of their
elasticity and ability to recoil.
Air gets trapped in these sacs.
This causes issues with the
exchange of oxygen and C02.

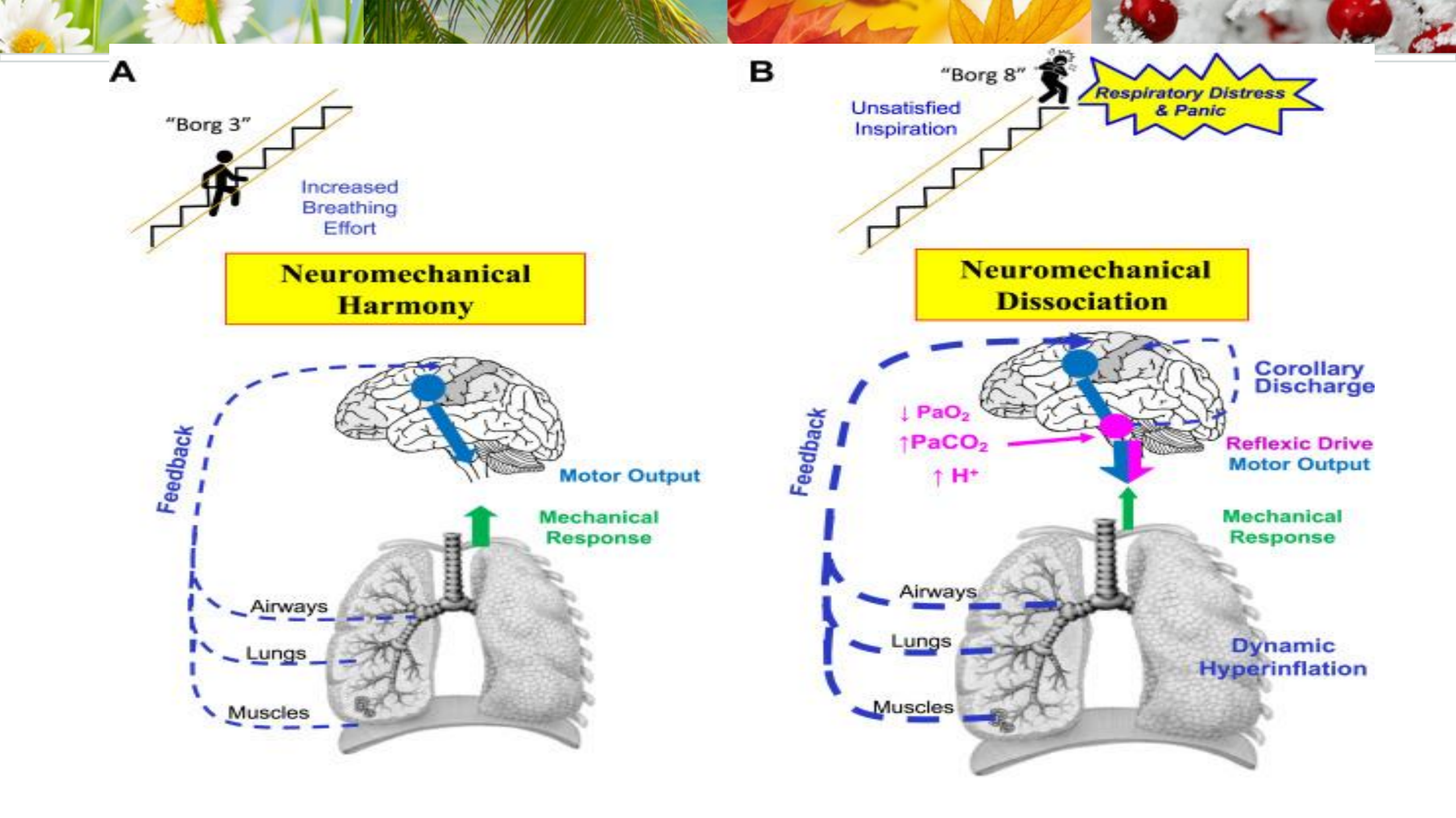
WHY ARE COPD &
EMPHYSEMA USED
INTERCHANGEABLY?

Healthcare providers most
often use the term COPD
because individuals with
emphysema usually
have a combination
of both emphysema
and chronic bronchitis.

DEFINITION

- COPD is better defined as a clinical syndrome characterized by chronic respiratory symptoms, structural pulmonary abnormalities (airways disease, emphysema, or both), lung function impairment (primarily airflow limitation that is poorly reversible), or any combination of these. Patients with COPD are at a higher risk than patients without COPD for the development of coexisting conditions that are associated with poor outcomes, including death

Pathophysiology of Dyspnea and Exercise Intolerance in COPD


A
"Borg 3"
Increased Breathing Effort
Neuromechanical Harmony
Feedback
Motor Output
Mechanical Response
Airways
Lungs
Muscles
B
"Borg 8"
Unsatisfied Inspiration
Respiratory Distress & Panic
Neuromechanical Dissociation
Corollary Discharge
↓ PaO2
↑PaCO2
↑ H+
Reflexic Drive
Motor Output
Feedback
Mechanical Response
Airways
Lungs
Muscles
Dynamic Hyperinflation

BOX 2

Management of dyspnea in COPD

1. Increased inspiratory capacity:
   - Bronchodilators
   - Surgical/endoscopic lung volume resection
   - Oxygen/heliox/exercise training
2. Reduce IND:
   - Oxygen
   - Exercise training
   - Opiates/anxiolytics
3. Increase ventilatory muscle strength:
   - Exercise training
   - Specific inspiratory muscle training
4. Alter affective dimension:
   - Opiates/anxiolytics/oxygen/exercise training/counseling/behavioral modification

Abbreviation : IND, inspiratory neural drive.

In individuals with
COPD who experience advanced refractory dyspnea despite otherwise optimal therapy, we suggest that opioid-based therapy be considered for dyspnea management within a personalized shared decision-making approach (conditional recommendation, very low certainty evidence).

Bronchoalveolar lavage

- **Bronchoalveolar lavage fluid contains roughly five times as many macrophages as lavage from nonsmokers.**
- **In smokers' lavage fluid, macrophages comprise >95% of the total cell count.**
- **T lymphocytes, particularly CD8+ cells, are also increased in the alveolar space of smokers.**

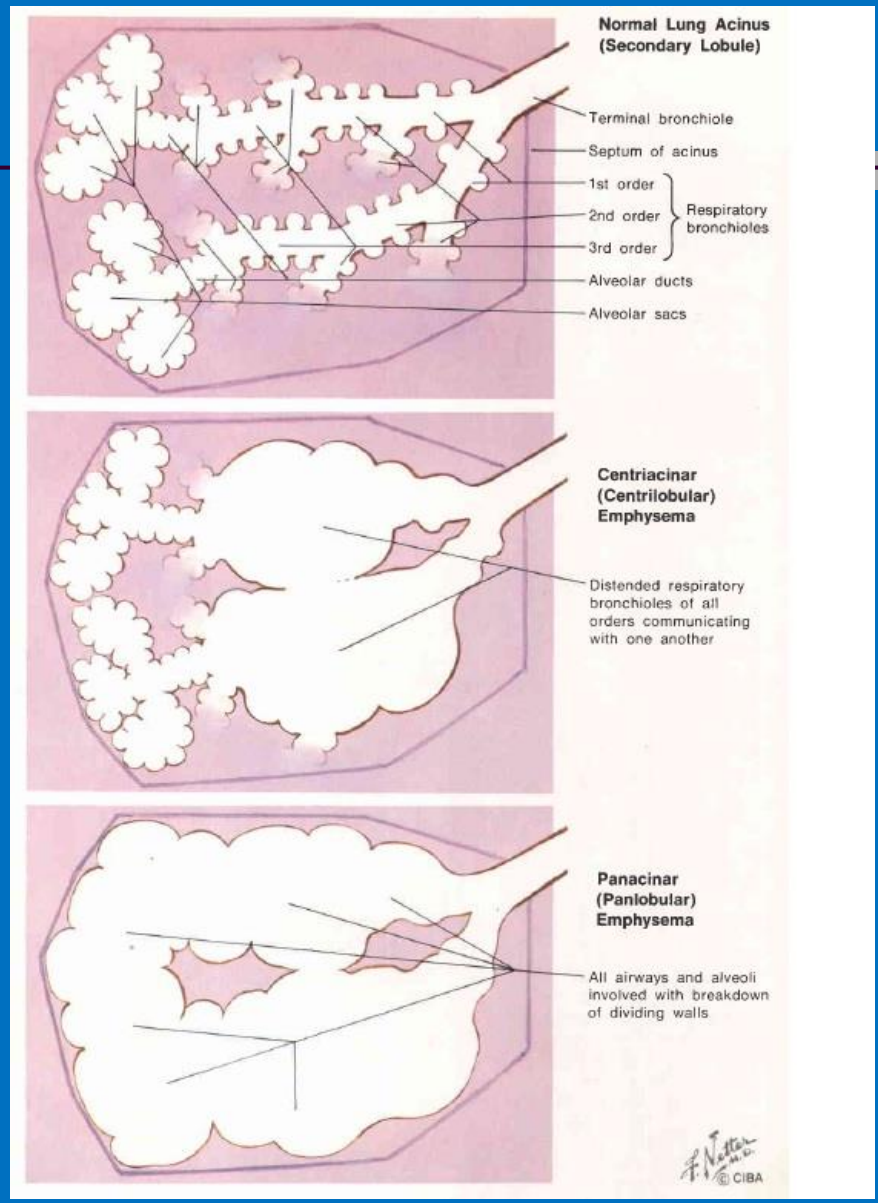
Emphysema: Centriacinar Panacinar

1- Centriacinar emphysema, the type most frequently associated with cigarette smoking, is characterized by enlarged airspaces found (initially) in association with respiratory bronchioles.

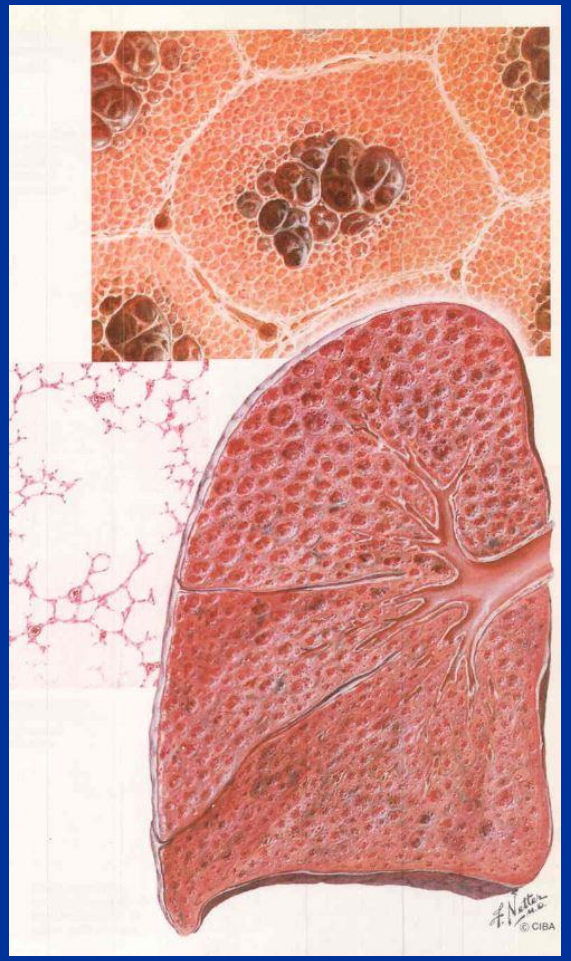
- **Centriacinar emphysema is most prominent in the upper lobes and superior segments of lower lobes and is often quite focal.**

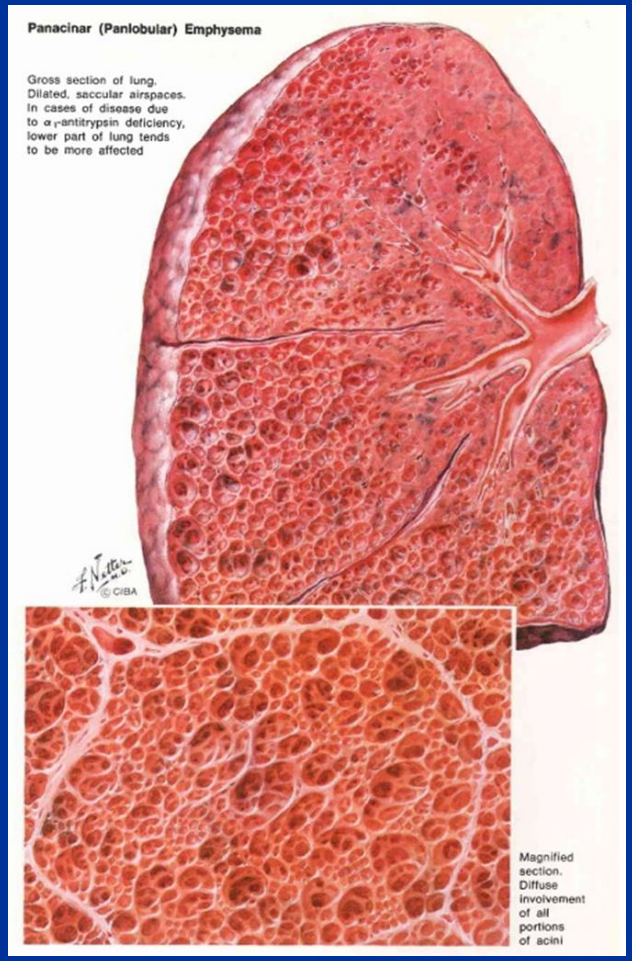
2- Panacinar emphysema refers to abnormally large airspaces evenly distributed within and across acinar units.

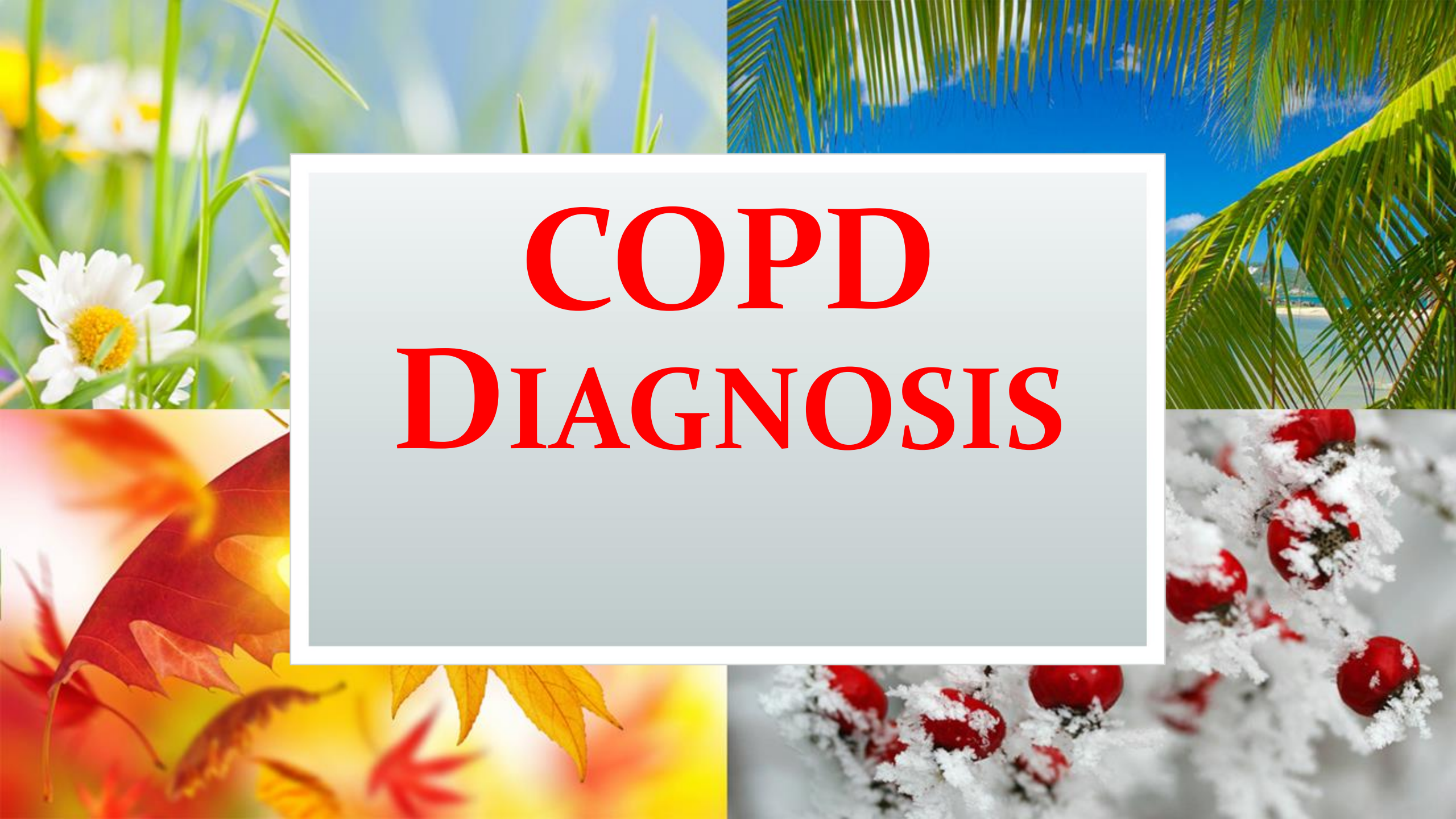
- **Panacinar emphysema is usually observed in patients with 1AT deficiency, which has a predilection for the lower lobes.**


Normal Lung Acinus
(Secondary Lobule)
Terminal bronchiole
Septum of acinus
1st order
2nd order
3rd order
Respiratory bronchioles
Alveolar ducts
Alveolar sacs
Centriacinar
(Centrilobular)
Emphysema
Distended respiratory bronchioles of all orders communicating with one another
Panacinar
(Panlobular)
Emphysema
All airways and alveoli involved with breakdown of dividing walls
© CIBA

Centriacinar vs. panacinar






COPD
DIAGNOSIS

PATHWAYS TO THE DIAGNOSIS OF COPD

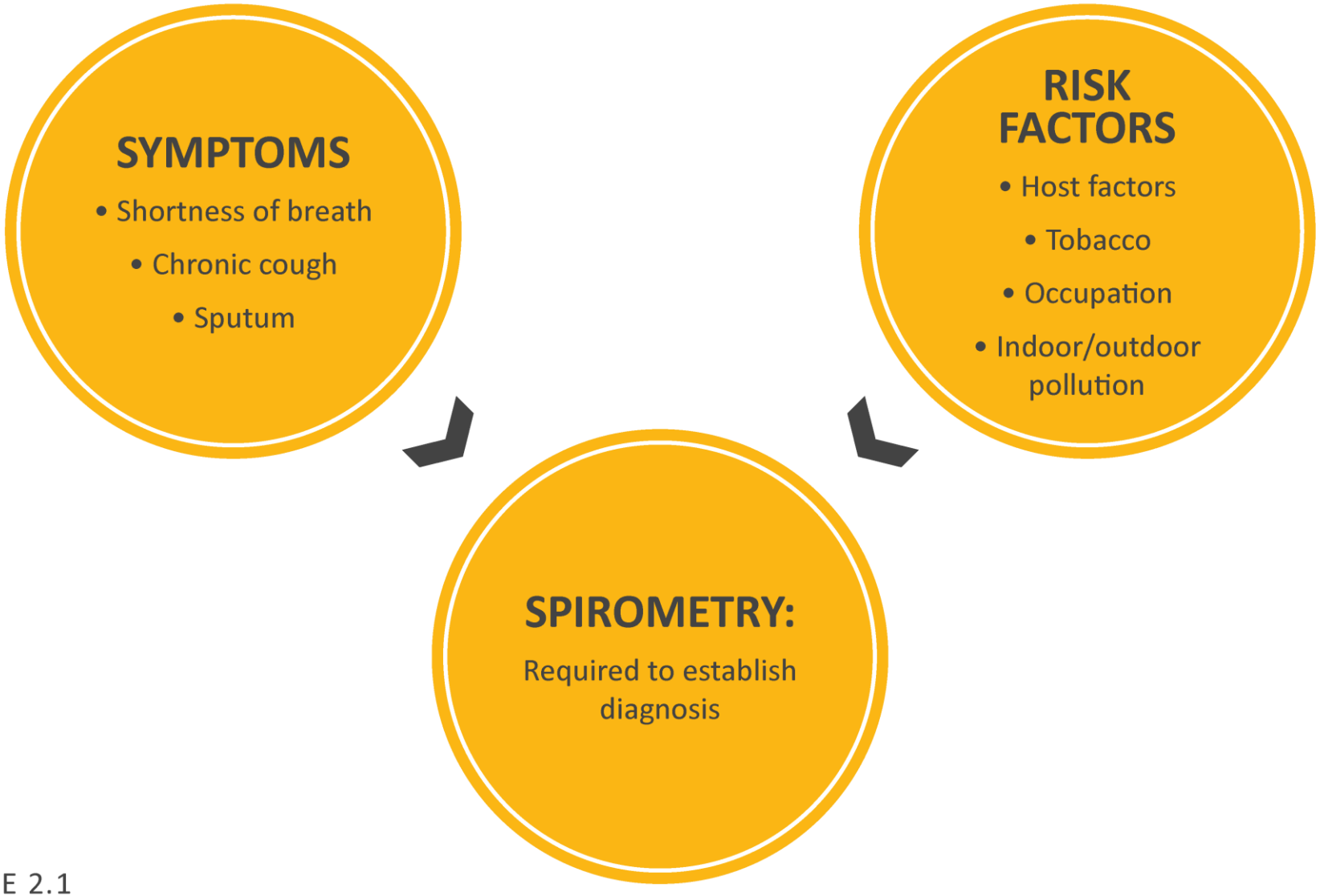


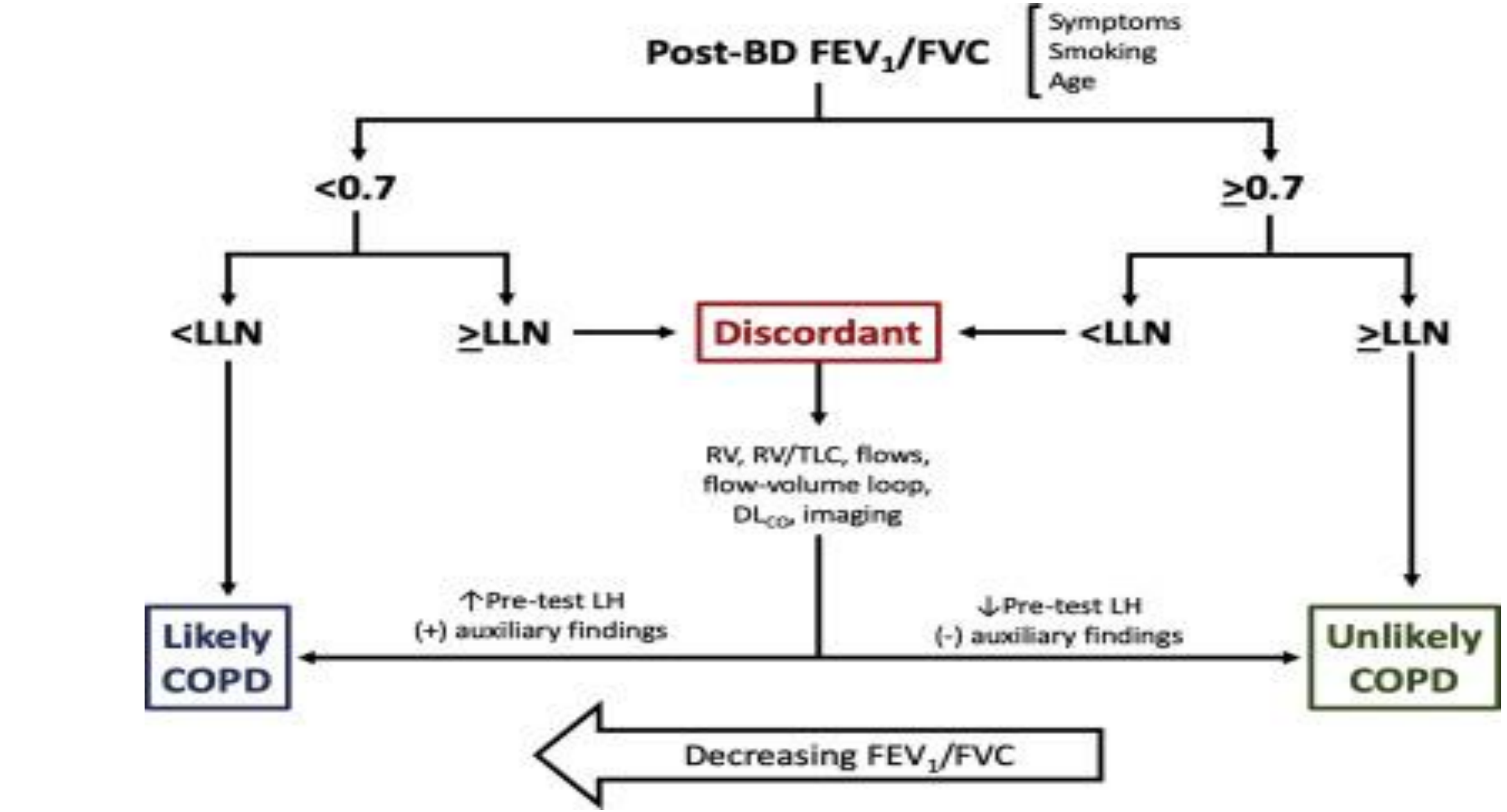
FIGURE 2.1

KEY INDICATORS FOR CONSIDERING A DIAGNOSIS OF COPD

Consider COPD, and perform spirometry, if any of these indicators are present in an individual over age 40. These indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of a diagnosis of COPD. Spirometry is required to establish a diagnosis of COPD.

Dyspnea that is:	Progressive over time. Characteristically worse with exercise. Persistent.
Chronic Cough:	May be intermittent and may be unproductive. Recurrent wheeze.
Chronic Sputum Production:	Any pattern of chronic sputum production may indicate COPD.
Recurrent Lower Respiratory Tract Infections	
History of Risk Factors:	Host factors (such as genetic factors, congenital/developmental abnormalities etc.). Tobacco smoke (including popular local preparations). Smoke from home cooking and heating fuels. Occupational dusts, vapors, fumes, gases and other chemicals.
Family History of COPD and/or Childhood Factors:	For example low birthweight, childhood respiratory infections etc.

TABLE 2.1


Post-BD FEV1/FVC
Symptoms
Smoking
Age
<0.7
≥0.7
<LLN
≥LLN
Discordant
<LLN
≥LLN
RV, RV/TLC, flows,
flow-volume loop,
DLCO, imaging
↑Pre-test LH
(+) auxiliary findings
↓Pre-test LH
(-) auxiliary findings
Likely COPD
Unlikely COPD
Decreasing FEV1/FVC

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

In patients with FEV1/FVC < 0.70:

GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

ROLE OF SPIROMETRY

- **Diagnosis**
- **Assessment of severity of airflow obstruction (for prognosis)**
- **Follow-up assessment**
  - » Therapeutic decisions.
    - – Pharmacological in selected circumstances (e.g., discrepancy between spirometry and level of symptoms).
    - – Consider alternative diagnoses when symptoms are disproportionate to degree of airflow obstruction.
    - – Non-pharmacological (e.g., interventional procedures).
  - » Identification of rapid decline.

TABLE 2.6

پایان
با آرزوی سلامتی