CHRONIC OBSTRUCTIVE AIRWAY DISEASE

c

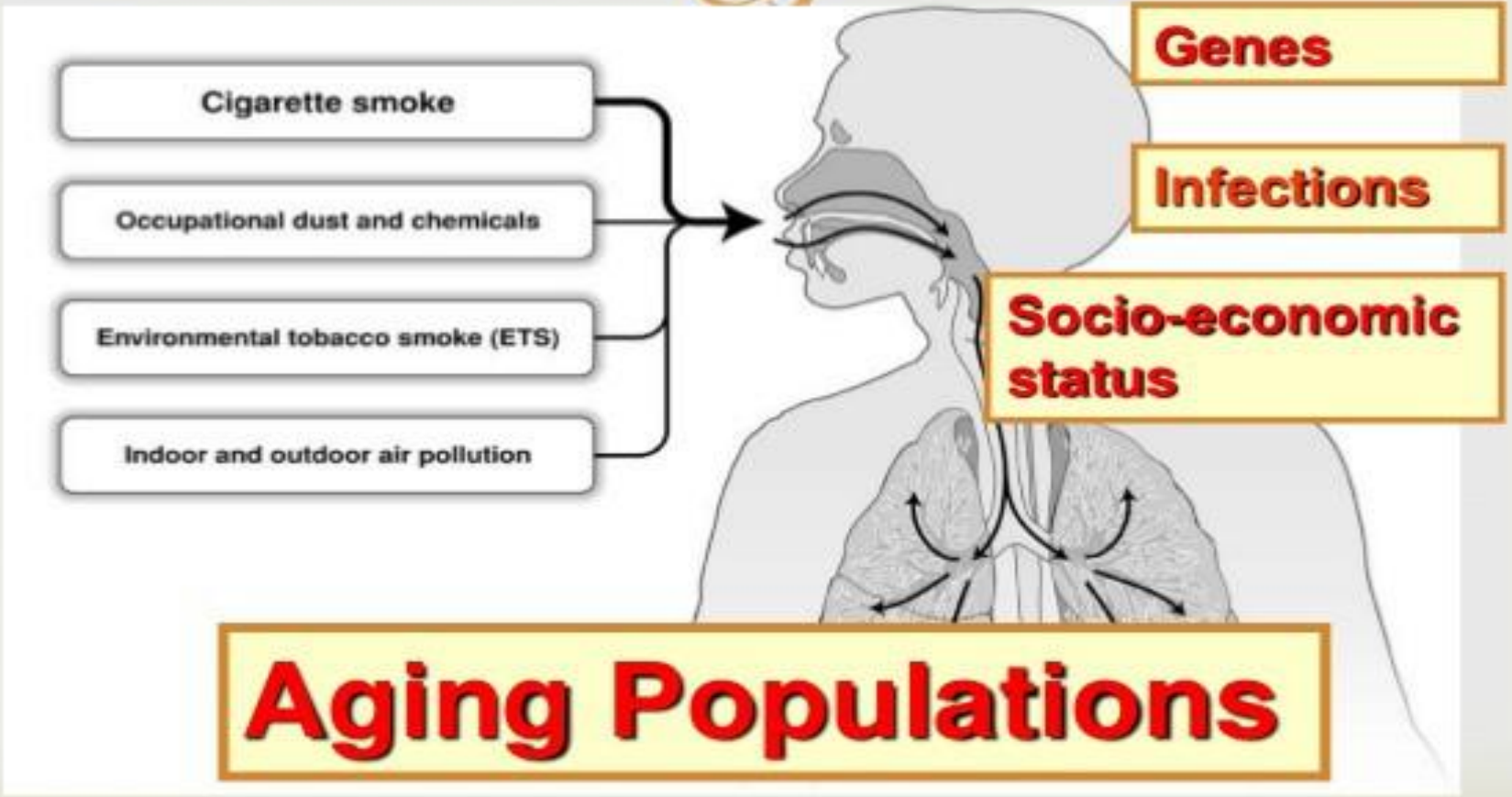
Definition:

- A common preventable and treatable disease,
- Characterized by persistent airflow limitation
- Usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases.

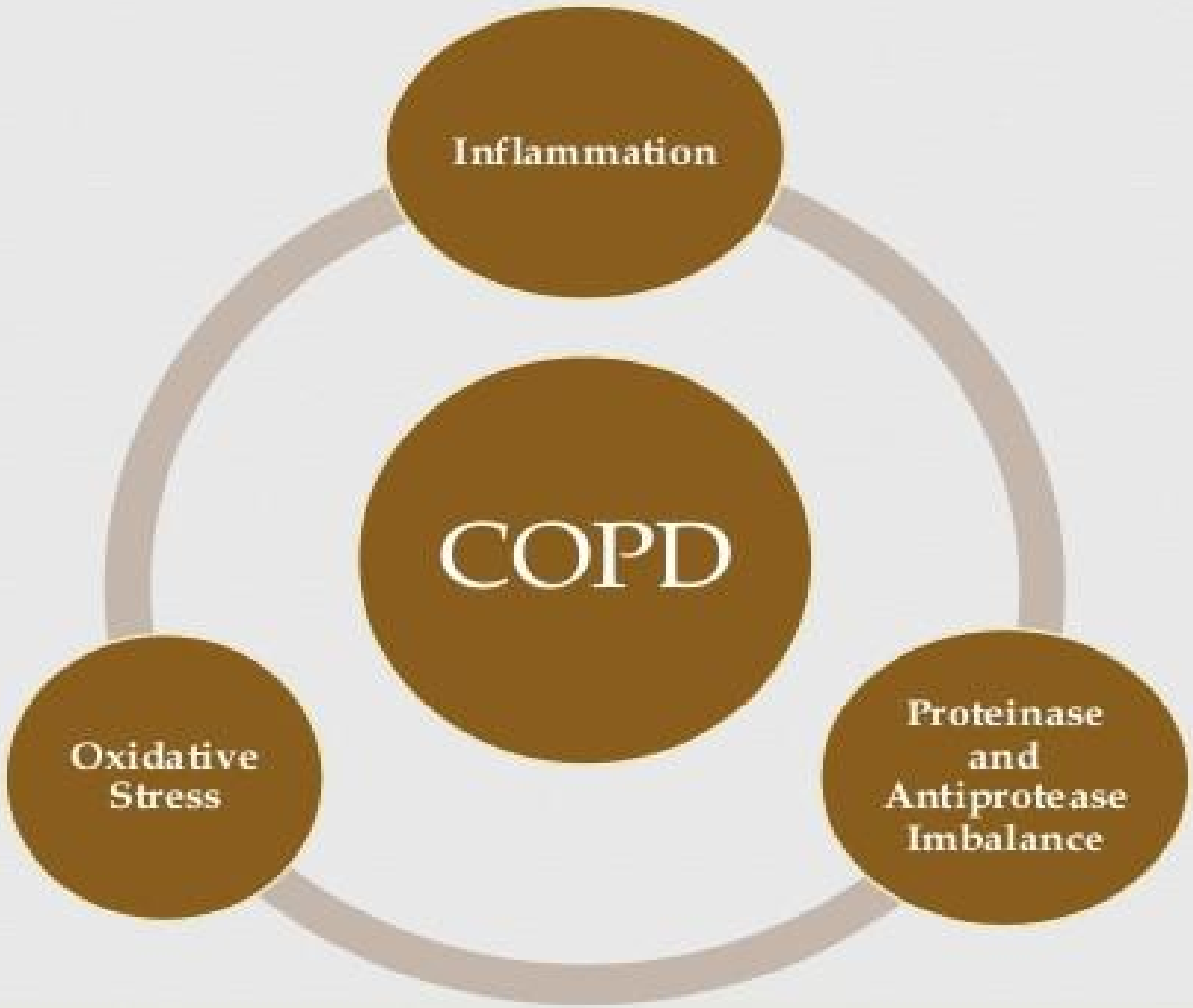
Epidemiology:

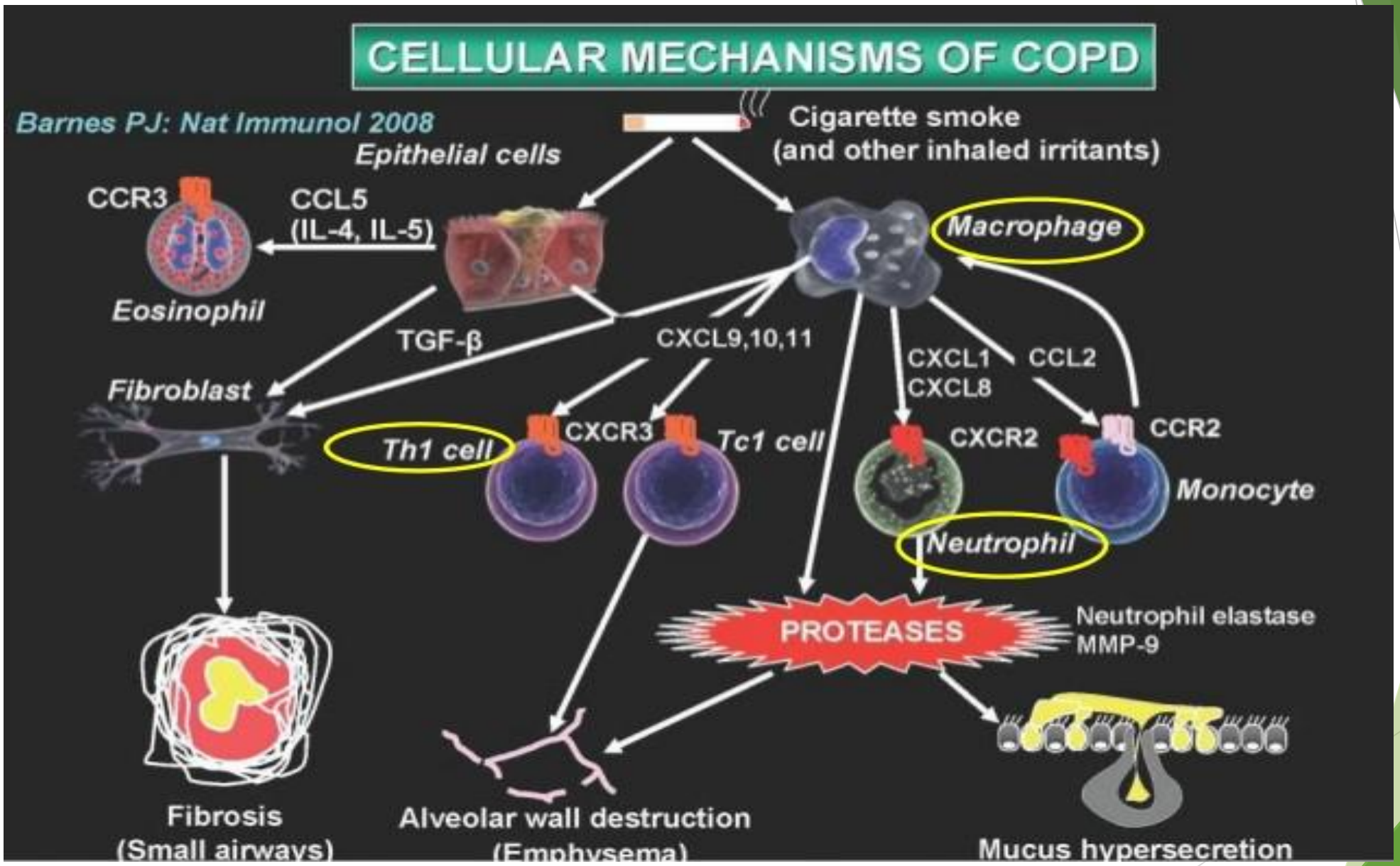
- Chronic respiratory disease including COPD is responsible for 7% of the total Disability-Adjusted Life Years (DALYs) in Malaysia and is ranked fifth as the leading cause of disease burden.
- In a survey by the SEATCA in Malaysia in 2006, 77% of the health economy burden among the three major tobacco-related diseases in Malaysia is contributed by COPD. (CPG,2009)
- The Global Burden of Disease Study has projected that COPD, which ranked 6th as the COD in 1990, will become 3rd leading COD worldwide by 2020 (Murray & Lopez, 1997)

Risk factors:



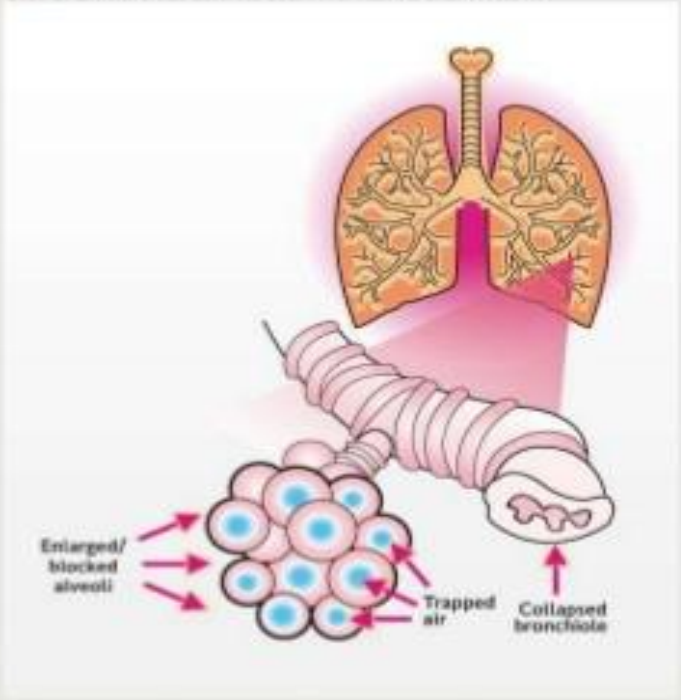
Pathogenesis:



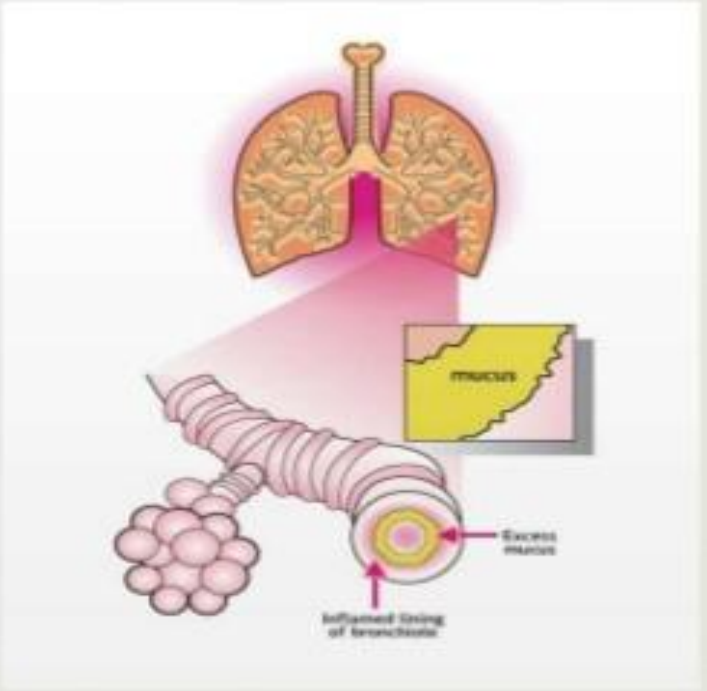

CELLULAR MECHANISMS OF COPD
Barnes PJ: Nat Immunol 2008
Cigarette smoke
(and other inhaled irritants)
Epithelial cells
CCR3
CCL5
(IL-4, IL-5)
Eosinophil
Macrophage
TGF-β
CXCL9,10,11
CXCL1
CXCL8
CCL2
Fibroblast
Th1 cell
CXCR3
Tc1 cell
CXCR2
CCR2
Monocyte
Neutrophil
PROTEASES
Neutrophil elastase
MMP-9
Fibrosis
(Small airways)
Alveolar wall destruction
(Emphysema)
Mucus hypersecretion

Pathophysiology:

- Structural changes



- Mucociliary Dysfunction



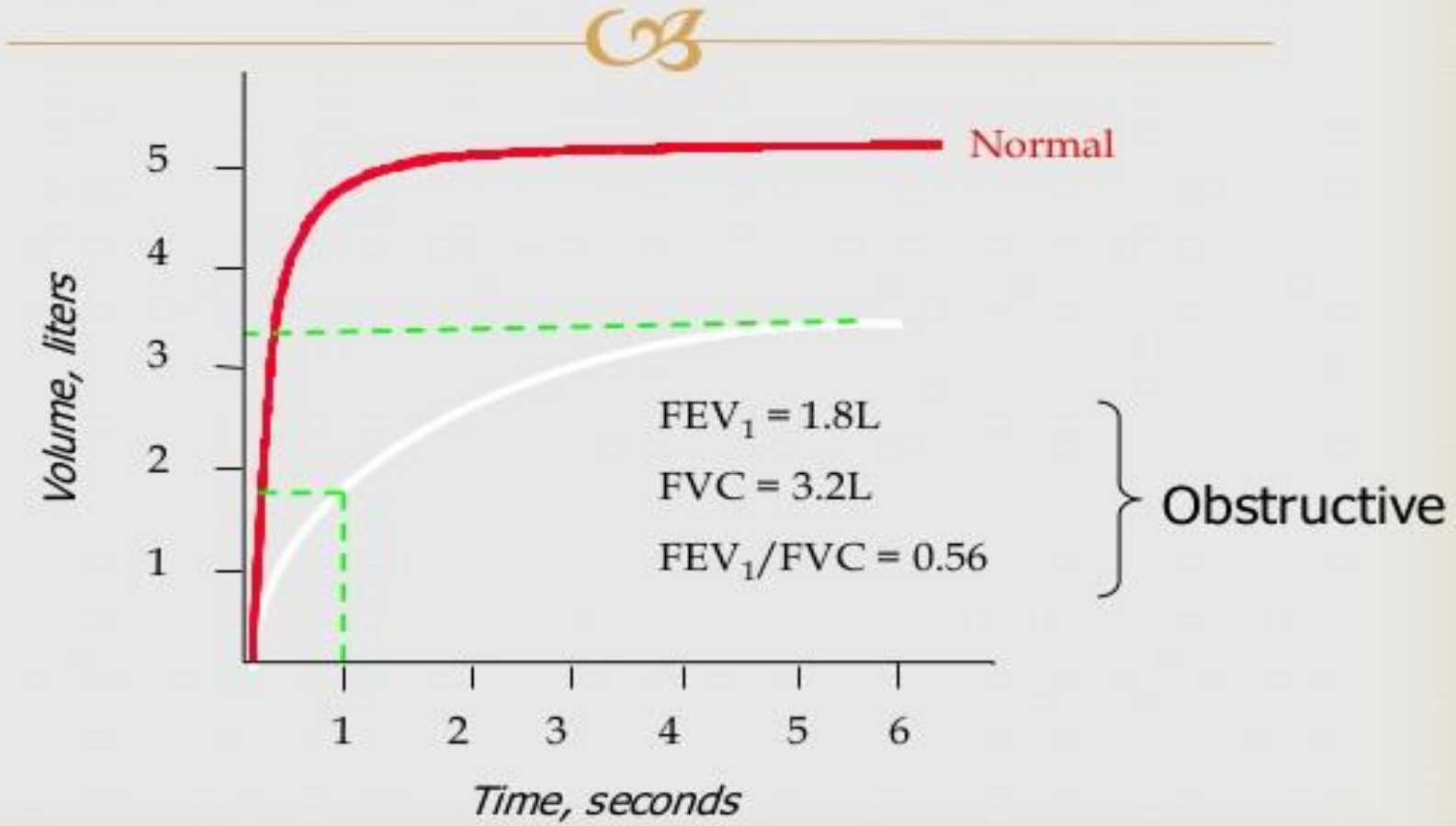
Clinical Manifestation:

SYMPTOMS
shortness of breath
chronic cough
sputum

EXPOSURE TO RISK FACTORS
tobacco
occupation
indoor/outdoor pollution

SPIROMETRY: Required to establish diagnosis

Spirometry (post-bronchodilator usage)



Additional Investigations

Chest X-ray: Seldom diagnostic but valuable to exclude alternative diagnoses and establish presence of significant comorbidities.

Lung Volumes and Diffusing Capacity: Help to characterize severity, but not essential to patient management.

Oximetry and Arterial Blood Gases: Pulse oximetry can be used to evaluate a patient's oxygen saturation and need for supplemental oxygen therapy.

Alpha-1 Antitrypsin Deficiency Screening: Perform when COPD develops in patients of Caucasian descent under 45 years or with a strong family history of COPD.

CXR

"This case demonstrates unequivocal and marked hyperinflation secondary to emphysema.

Contributed by: Dr Frank Gaillard, on February 7, 2010 (Radiopaedia.org)

Assessment of COPD severity

Consider the following aspects of the disease separately:

- current level of patient's symptoms
- severity of the spirometric abnormality
- frequency of exacerbations
- presence of comorbidities.

1. Assess symptoms

Use the COPD Assessment Test(CAT)

or

mMRC Breathlessness scale

Modified MRC (mMRC)Questionnaire

PLEASE TICK IN THE BOX THAT APPLIES TO YOU
(ONE BOX ONLY)

mMRC Grade 0. I only get breathless with strenuous exercise. ☐

mMRC Grade 1. I get short of breath when hurrying on the level or walking up a slight hill. ☐

mMRC Grade 2. I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level. ☐

mMRC Grade 3. I stop for breath after walking about 100 meters or after a few minutes on the level. ☐

mMRC Grade 4. I am too breathless to leave the house or I am breathless when dressing or undressing. ☐

2. Severity of Airflow Limitation in COPD*

In patients with $FEV_1/FVC < 0.70$:

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

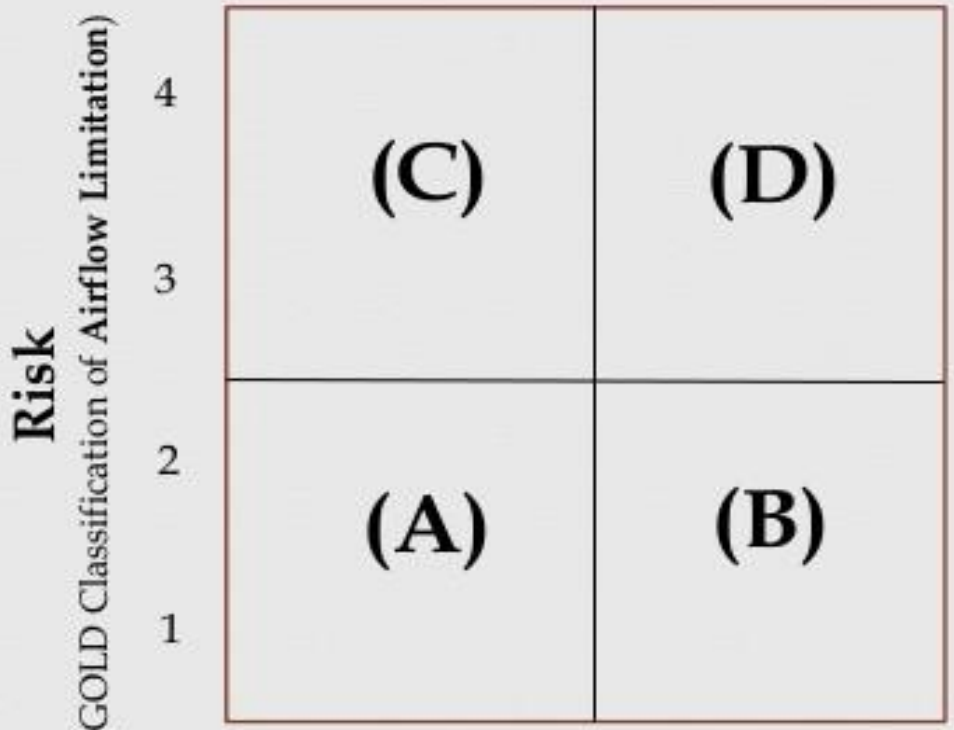
**Based on Post-Bronchodilator FEV_1*

3. Assess Risk of Exacerbations

To assess risk of exacerbations use history of exacerbations and spirometry:

- **Two or more exacerbations within the last year *or* an FEV_1 < 50 % of predicted value are indicators of high risk.**

Combined Assessment of COPD



*When assessing risk, choose the **highest** risk according to GOLD grade or exacerbation history*

4. Assess COPD Comorbidities

COPD patients are at increased risk for:

- Cardiovascular diseases
- Osteoporosis
- Respiratory infections
- Anxiety and Depression
- Diabetes
- Lung cancer

These comorbid conditions may influence mortality and hospitalizations and should be looked for routinely, and treated appropriately.

Difference between Asthma & COPD

Clinical features	Asthma	COPD
Age of onset	Usually early childhood, but may have onset at any age	Usually > 40 years old
Smoking history	May be non-, ex- or current smoker	Usually > 10 pack-years
Atopy	Often	Infrequent
Family history	Asthma or other atopic disorders commonly present	Not a usual feature
Clinical symptoms	Intermittent and variable	Persistent and gradually progressive worsening
Cough	Nocturnal cough or on exertion	Morning cough with sputum
Sputum production	Infrequent	Often
Reversibility of airflow obstruction	Characteristic of asthma	Airflow limitation may improve but never normalises
Exacerbations	Common at all levels of severity except in mild disease	Increase in frequency with increasing severity of disease

Extracted from: CPG Management of COPD 2nd edition, 2009)

Manage Stable COPD: Goals of Therapy

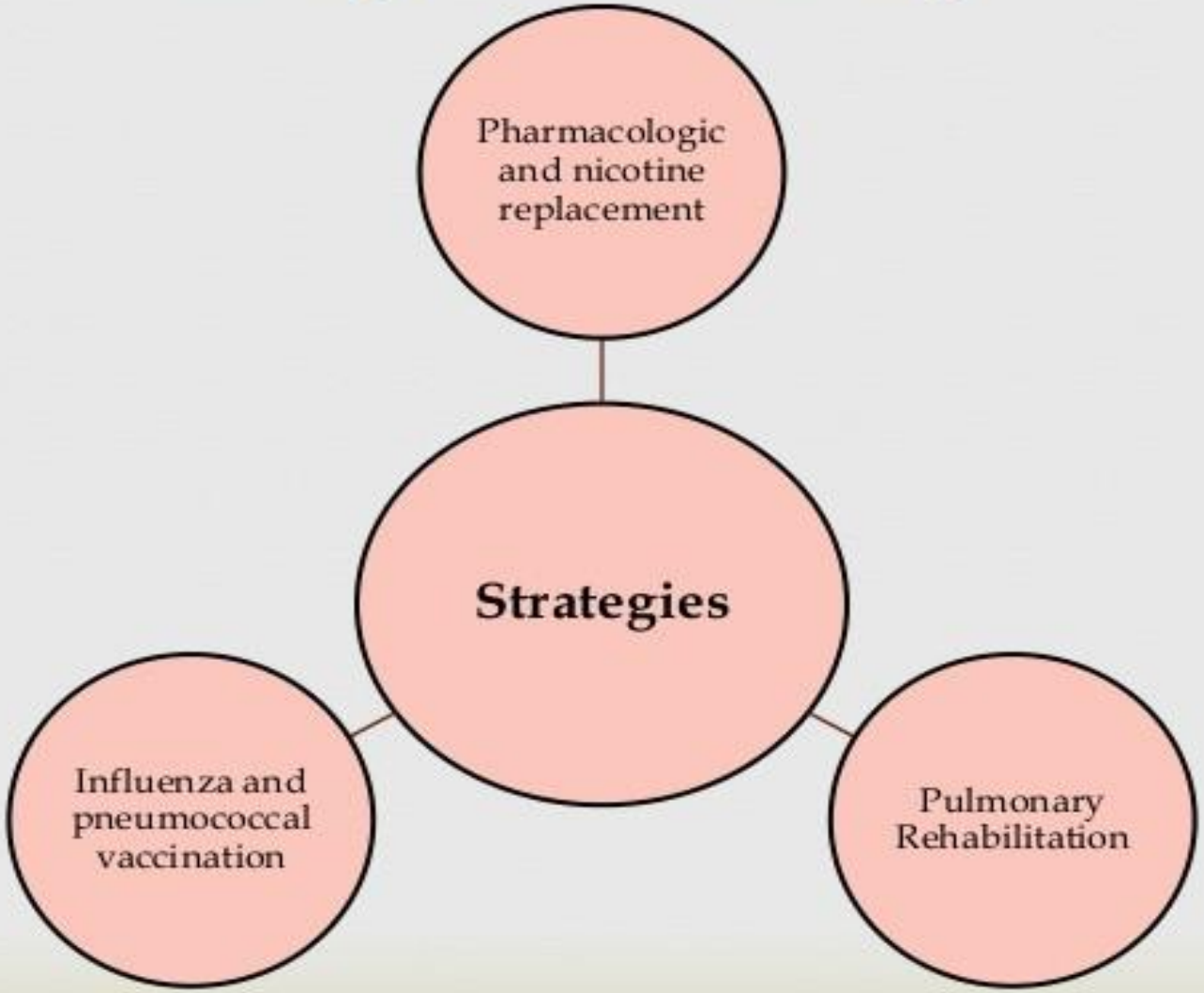
- Relieve symptoms
- Improve exercise tolerance
- Improve health status

Reduce symptoms

- Prevent disease progression
- Prevent and treat exacerbations
- Reduce mortality

Reduce risk

Management Strategies



Pulmonary Rehabilitation

- **Exercise training**

-10 to 45 minutes per session, at least 6 weeks.

- **Smoking cessation**

-ASK,ADVICE,ASSESS,ASSIST,ARRANGE

- **Nutrition counseling**

-Patient show reduction in body mass index and fat free mass. Independent risk factor for mortality in COPD cases.

-Advice to increase calorie intake with exercise regimen that have nonspecific anabolic action.

- **Education**

-Basic information on COPD, general approach to management, & when to seek help

Manage Stable COPD: Non-pharmacologic

Patient	Essential	Recommended	Depending on local guidelines
A	Smoking cessation (can include pharmacologic treatment)	Physical activity	Flu vaccination Pneumococcal vaccination
B, C, D	Smoking cessation (can include pharmacologic treatment) Pulmonary rehabilitation	Physical activity	Flu vaccination Pneumococcal vaccination

COPD Medication

Manage Stable COPD: Pharmacologic Therapy

Patient	First choice	Second choice	Alternative Choices
A	SAMA prn *or* SABA prn	LAMA *or* LABA *or* SABA and SAMA	Theophylline
B	LAMA *or* LABA	LAMA and LABA	SABA *and/or* SAMA Theophylline
C	ICS + LABA *or* LAMA	LAMA and LABA	PDE4-inh. SABA and/*or* SAMA Theophylline
D	ICS + LABA *or* LAMA	ICS and LAMA *or* ICS + LABA and LAMA *or* ICS+LABA and PDE4-inh. *or* LAMA and LABA *or* LAMA and PDE4-inh.	Carbocysteine SABA and/*or* SAMA Theophylline

Complications:

- Cor pulmonale
- Acute exacerbation of COPD
- Pulmonary Hypertension
- Pneumothorax
- Secondary polycythemia
- Respiratory failure

Aknowledgement

References

1) Textbook of Clinical Pharmacology and Therapeutics,fifth edition,James M Ritter,Pg 231-233.
2)Text book of Pathology ,Sixth edition,Harsh Mohan,Pg 477-482.