Acute exacerbation of COPD

Anton Litvin, assistant professor

Eugenia Golubkina, assistant professor

V. N. Karazin Kharkiv National University

School of Medicine

Department of Internal Medicine

Introduction

- **Bronchoobstructive syndrome** is the leading syndrome and pathogenetical mechanism of the group of **obstructive pulmonary diseases**, which includes:
- Chronic obstructive pulmonary disease (COPD)
- Asthma
- Bronchiectasis
- Bronchitis

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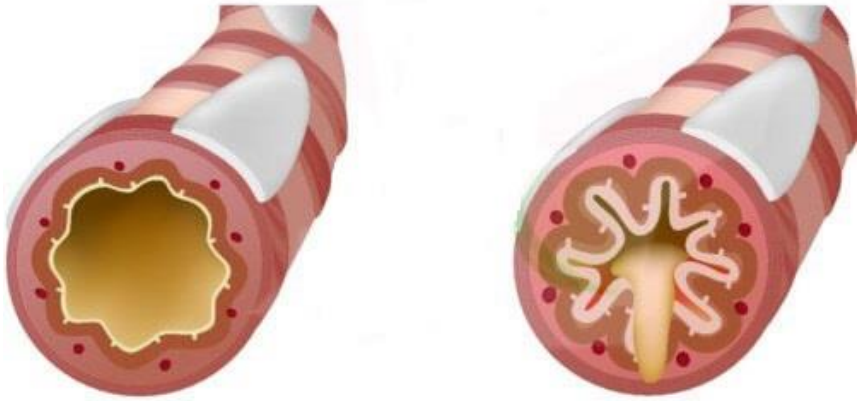
https://metrouk2.files.wordpress.com/2015/02/ad_160254843.jpg?w=748&h=514&crop=1

Bronchoobstructive syndrome

- **Bronchoobstructive syndrome** is the complex of symptoms that includes:

- **Expiratory dyspnea**
- **Cough**
- **Shortness of breath**



https://steptohealth.co.kr/wp-content/uploads/2016/02/Bronchitis.jpg

Obstructive pulmonary disease

- **Obstructive lung disease** is a category of respiratory disease characterized by airway obstruction.

- **Reversible** – asthma
- **Irreversible** – COPD, bronchiectasis

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Definition

- **Chronic obstructive pulmonary disease (COPD)** is the set of progressive lung diseases that characterized by irreversible airway obstruction.

http://pngimg.com/uploads/cigarette/cigarette_PNG4763.png

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Definition

COPD includes:

- **Chronic Bronchitis** is characterized by
  - Chronic inflammation and excess mucus production
  - Presence of chronic productive cough for 3 months in each of 2 successive years
- **Emphysema** is characterized by
  - Damage and permanent enlargement of the airspaces distal to the terminal bronchioles, accompanied by destruction of their walls
  - Chronic cough

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COPD (GOLD, 2015)

- **Chronic obstructive pulmonary disease (COPD)** is a common *preventable* and *treatable* disease, is characterized by persistent airflow limitation that is usually *progressive, irreversible* and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases.

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- This definition does not use the terms chronic bronchitis and emphysema and excludes asthma
- Chronic bronchitis and emphysema are the components of COPD
- Exacerbations and comorbidities contribute to the overall severity in individual patients

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Epidemiology

- COPD is a leading cause of morbidity and mortality worldwide (5% of all deaths globally)
- Almost 90% of COPD deaths occur in low- and middle-income countries
- More common among men

https://previews.123rf.com/images/forestpath/forestpath0905/forestpath090500005/4933417-photo-of-dead-body-covered-with-a-sheet-on-a-gurney-feet-toward-camera-with-blank-tag-on-the-big-toe.jpg

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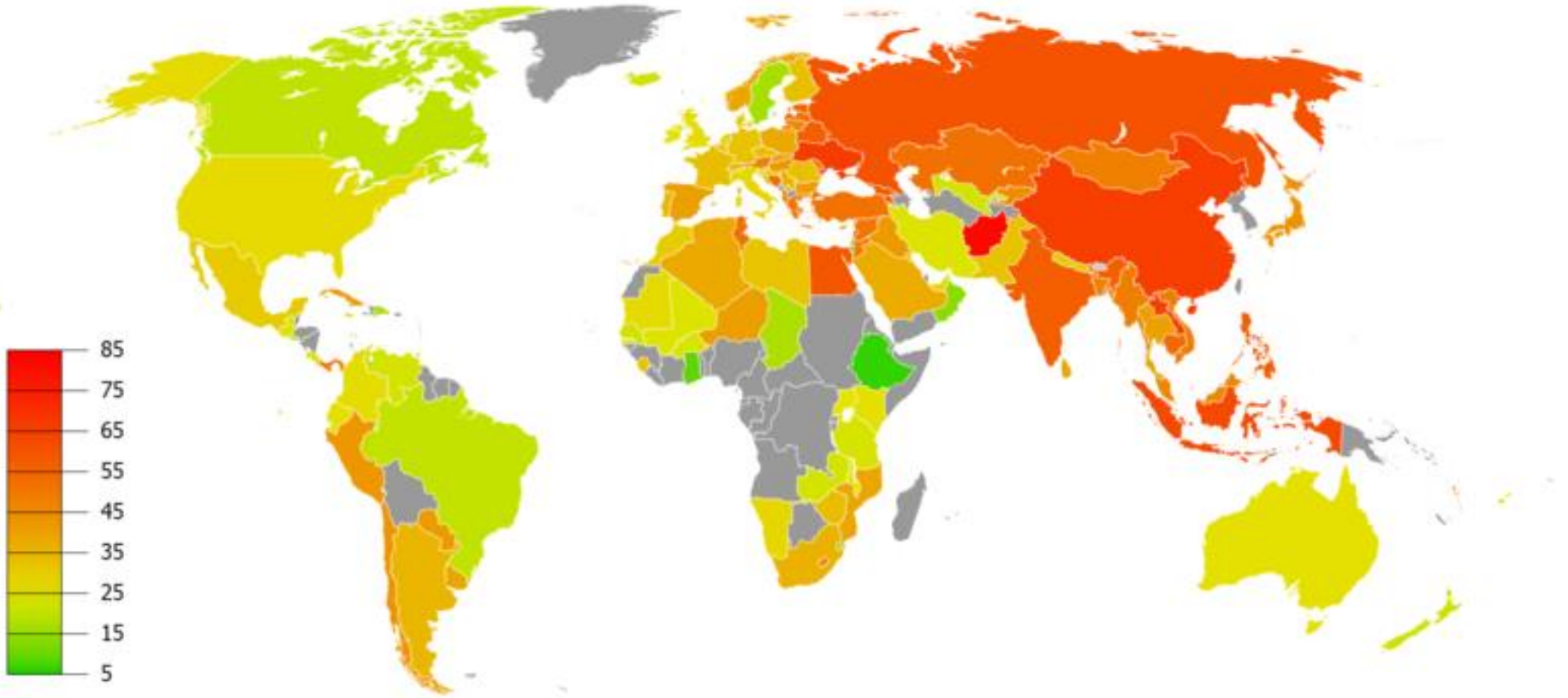
Epidemiology



Male-smokers in the World (% of total population of the country)

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https://upload.wikimedia.org/wikipedia/commons/2/2a/Female_Smoking_by_Country.png

Pack-years

Pack-years = (cigarettes per day X years of smoking)/20

Pack-years > 10 => reliable risk factor of COPD

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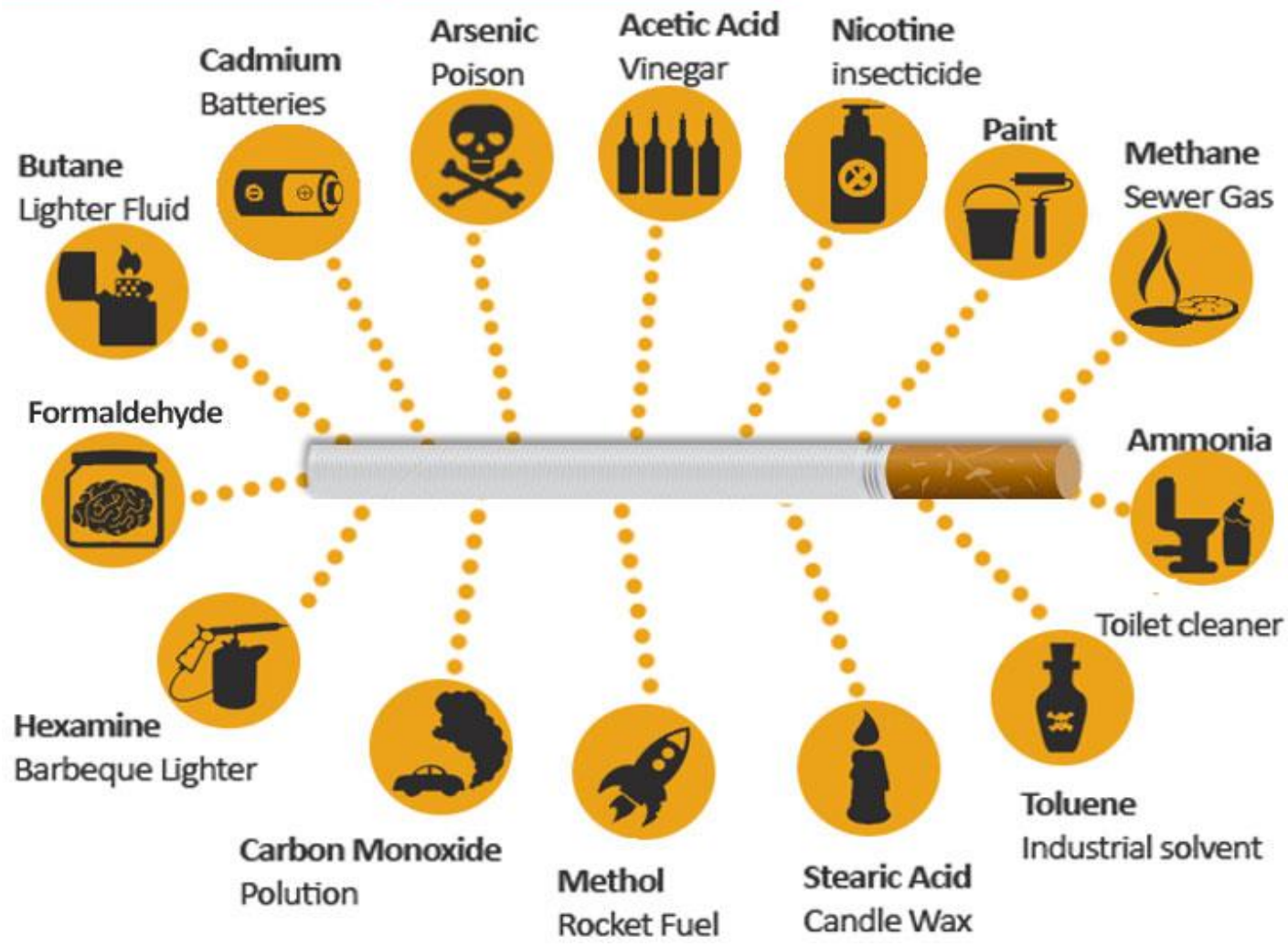
https://media.istockphoto.com/photos/cigarette-pack-picture-id537515196?k=6&m=537515196&s=612x612&w=0&h=BGDEKxiVCJBqkPsOfXbUsq6X2qK9Ku9w4rx5efeYJmQ=

Cigarette contents



https://spinerf.org/wp-content/uploads/2015/04/Figure-4-Chemicals-found-in-a-cigarette.jpg

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Risk factors

- **Smoking is the primary risk factor**
  - Long-term smoking is responsible for 80-90 % of cases
  - Smoker, compared to non-smoker, is 10 times more likely to die of COPD

- **Prolonged exposures to harmful particles and gases from:**
  - Second-hand smoke,
  - Industrial smoke,
  - Chemical gases, vapors, mists & fumes
  - Dusts from grains, minerals & other materials

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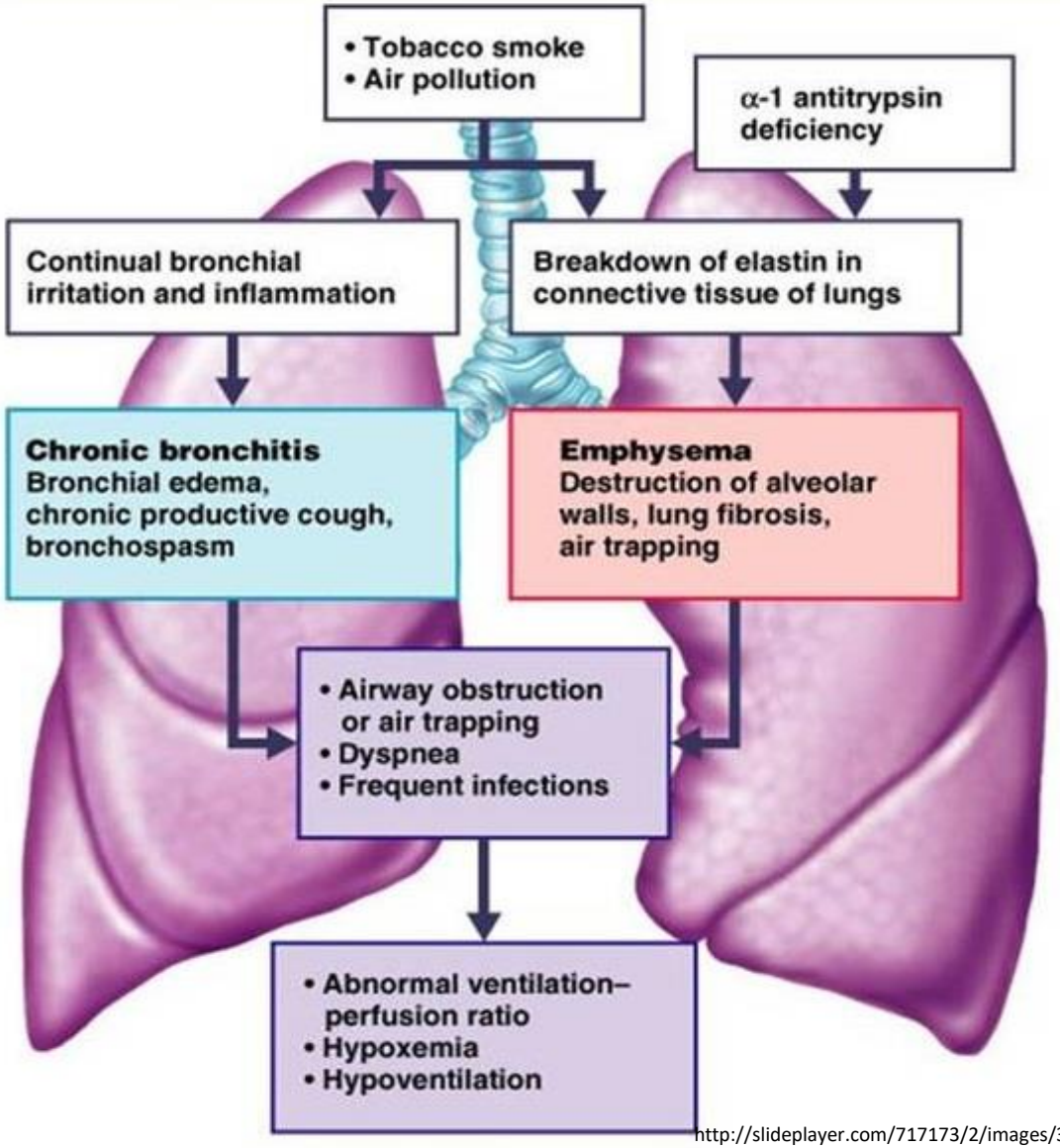
Pathogenesis



http://slideplayer.com/717173/2/images/39/Pathogenesis+of+COPD+Figure+22.28.jpg

Complications

- Hypoxemia
- Pulmonary hypertension
- Respiratory failure
- Cor pulmonale
- Heart failure

http://c8.alamy.com/comp/AKJ5AW/stressed-doctor-surgeon-in-green-scrubs-hand-on-head-AKJ5AW.jpg

Symptoms

- **Chronic cough**:
- Earliest sign of COPD
- Poorly productive
- **Wash-up cough**

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https://www.plumbingoverstock.com/diztinct/images/subcat-bathroom-sink.png

Symptoms

- **Sputum:**
- Small amount
- Hardly expectorates

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Symptoms

- **Dyspnea**:
- Expiratory
- Progressive
- Persistent
- Worse with exercise.

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Symptoms

- **Hypercapnia** (>CO2 in blood):
- Headache
- Insomnia
- Muscle tremor
- Sweating
- Bad appetite

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Objective examination

- There are no specific findings on examination, although signs of hyperinflation of the chest are highly suggestive of emphysema.
- These include a **barrel shaped chest** (increased antero-posterior diameter), **use of accessory muscles of respiration**, paradoxical indrawing of the lower ribs on inspiration (**Hoover's sign**), intercostal recession, hollowing out of the supraclavicular fossae, pursed lip breathing and reduced expansion.

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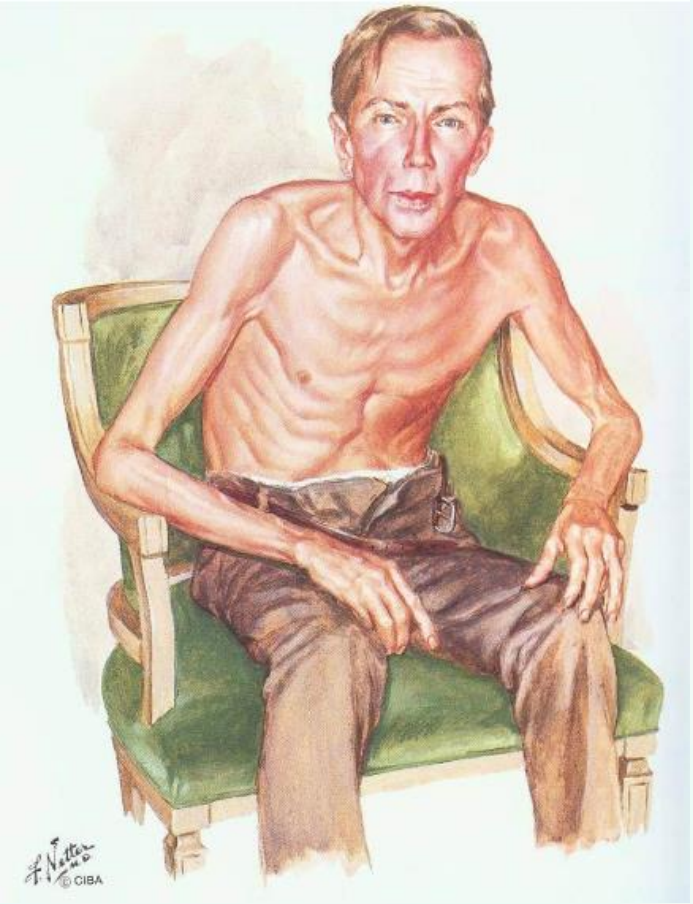
Types of COPD patients



Pink Puffer
Emphysema type
Hypoxemia

Blue Bloater
Bronchitis type
Right-sided heart failure

https://image.slidesharecdn.com/part3copdcourse-130405040904-phpapp01/95/eci-copd-course-lecture-3-7-638.jpg?cb=1365137724

Spirometry

- **Spirometry** is a lung function test which measures the amount (volume) and speed (flow) of air that can be inhaled or exhaled from the lungs. An important tool for assessing conditions such as asthma, COPD and cystic fibrosis.

https://static.praxisdienst.com/out/pictures/generated/product/3/800_800_90/vitalograph_micro_spirometer_132735_3.jpg

Spirometry

- **Forced vital capacity (FVC)** is the volume of air that can forcibly be blown out after full inspiration, measured in liters. FVC is the most basic maneuver in spirometry tests.
- **Forced expiratory volume in 1 second (FEV1)** is the volume of air that can forcibly be blown out in one second, after full inspiration.

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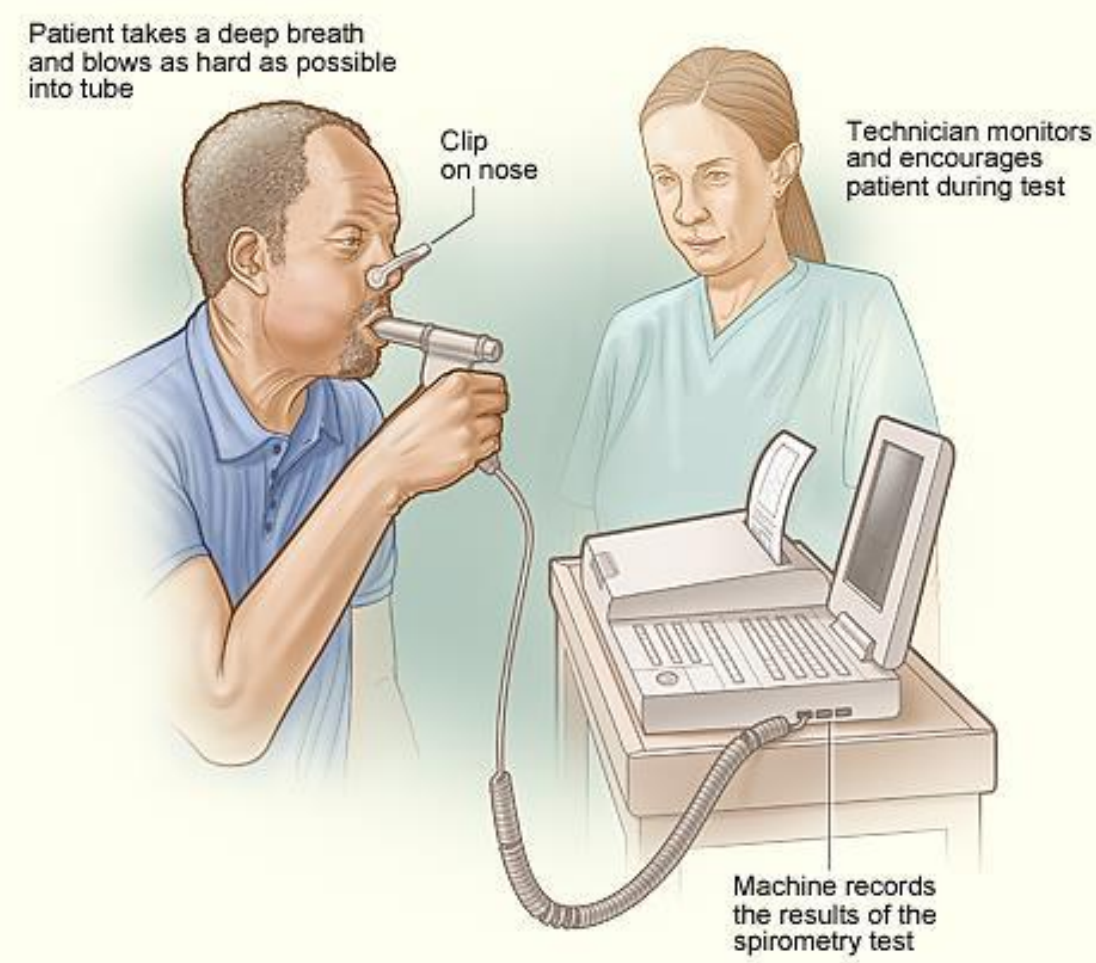
Spirometry

- **FEV_1/FVC (FEV1%, Tiffeneau index)** is the ratio of FEV_1 to FVC. In healthy adults this should be approximately 75–80%.



https://upload.wikimedia.org/wikipedia/commons/thumb/0/05/Spirometry_NIH.jpg/220px-Spirometry_NIH.jpg

Post bronchodilator test

- **Post bronchodilator test** – is a performing of spirometry for 2 times: before and after inhaling bronchodilator.
- If the forced vital capacity after inhaling (FVC_2) is 15% > than FVC_1 before inhaling
  => Ds: Asthma

http://www.dx-health.com/193-thickbox_default/berodual-n-aerosol.jpg

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Airflow limitation severity

In patients with $FEV_1/FVC < 70\%$:

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

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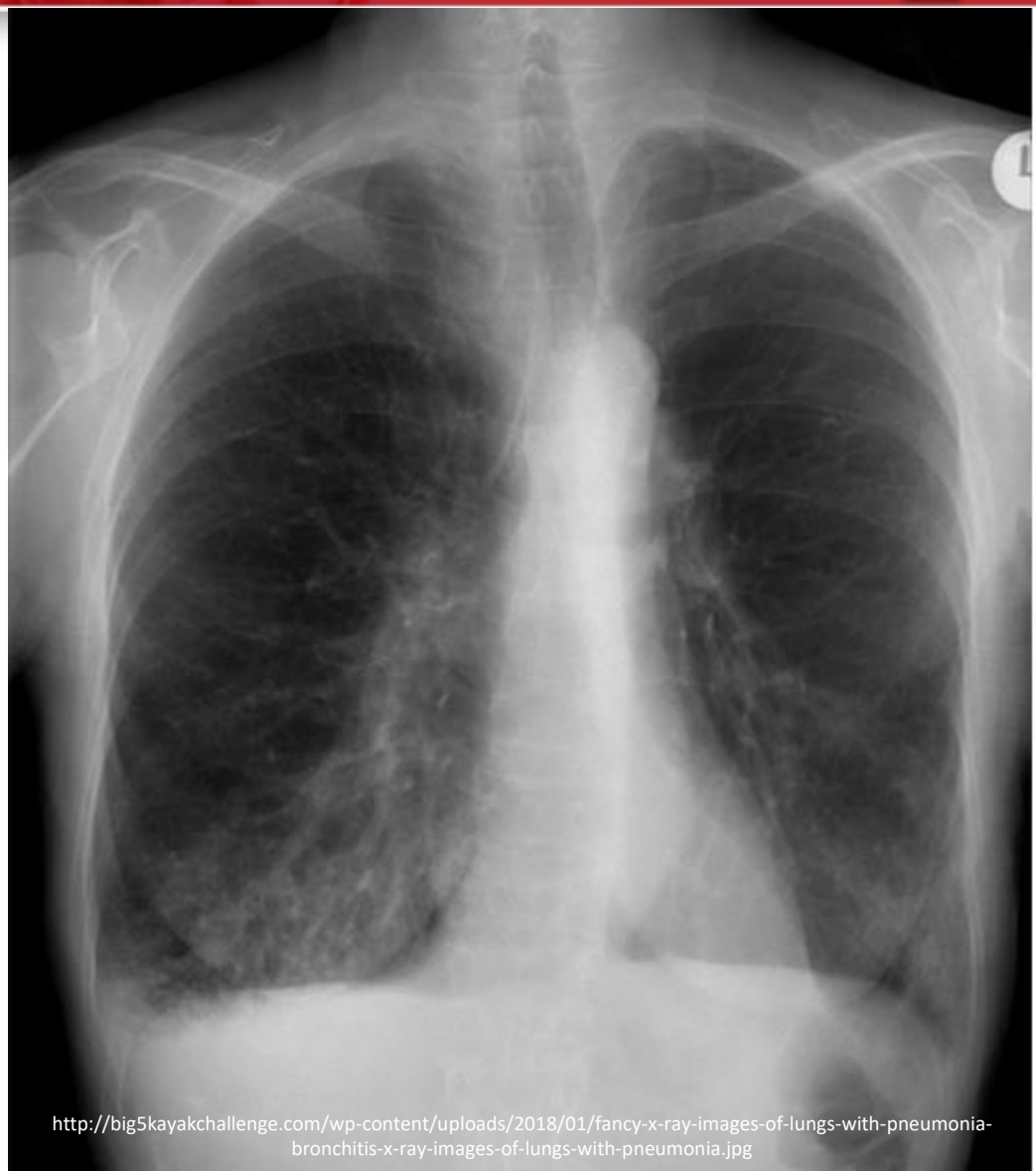
Chest X-ray

- The diaphragm should be intersected by the 5th to 7th anterior ribs in the mid-clavicular line.
- **Hyperexpansion** is diagnosted by counting ribs and by checking for **flattening of the hemidiaphragms**.



http://big5kayakchallenge.com/wp-content/uploads/2018/01/fancy-x-ray-images-of-lungs-with-pneumonia-bronchitis-x-ray-images-of-lungs-with-pneumonia.jpg

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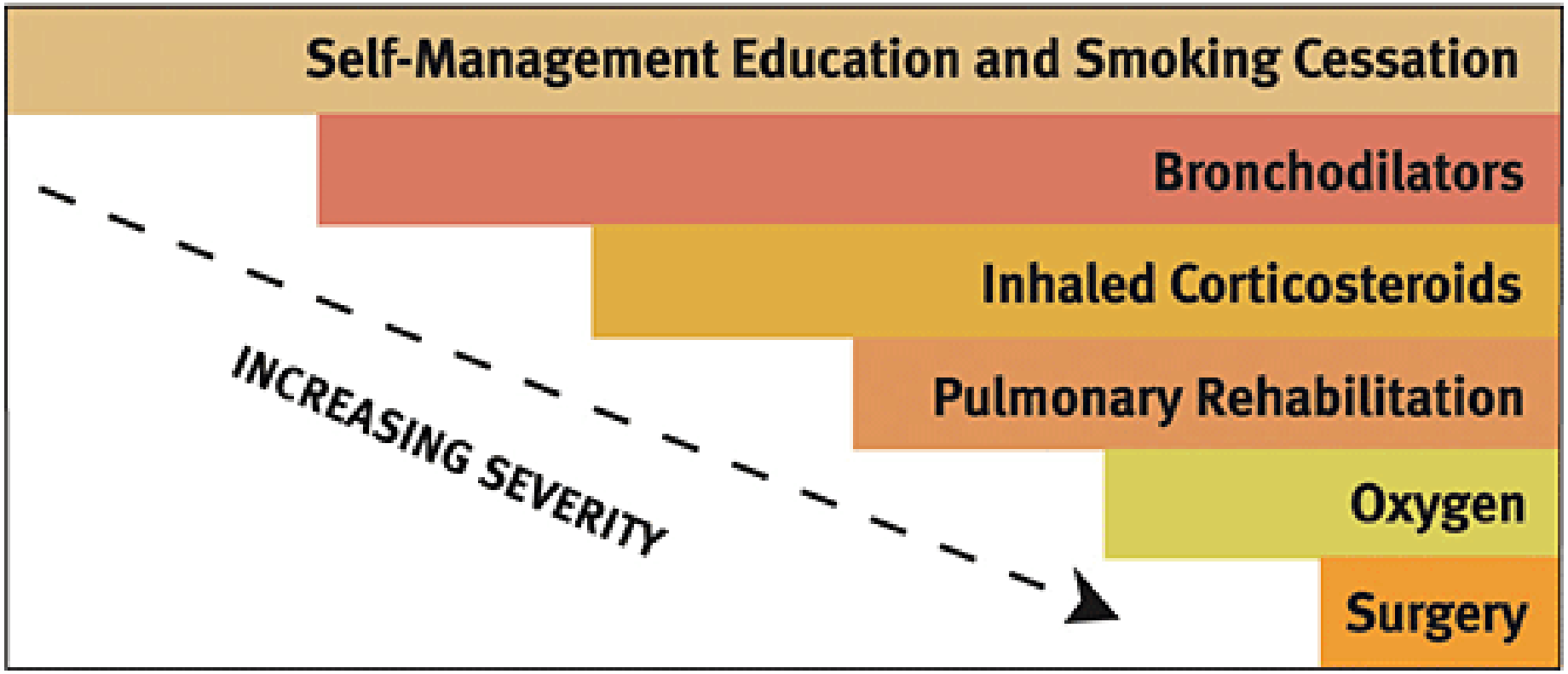
Treatment of COPD



https://www.nhlbi.nih.gov/health/educational/copd/images/diagram/treatment-chart.gif

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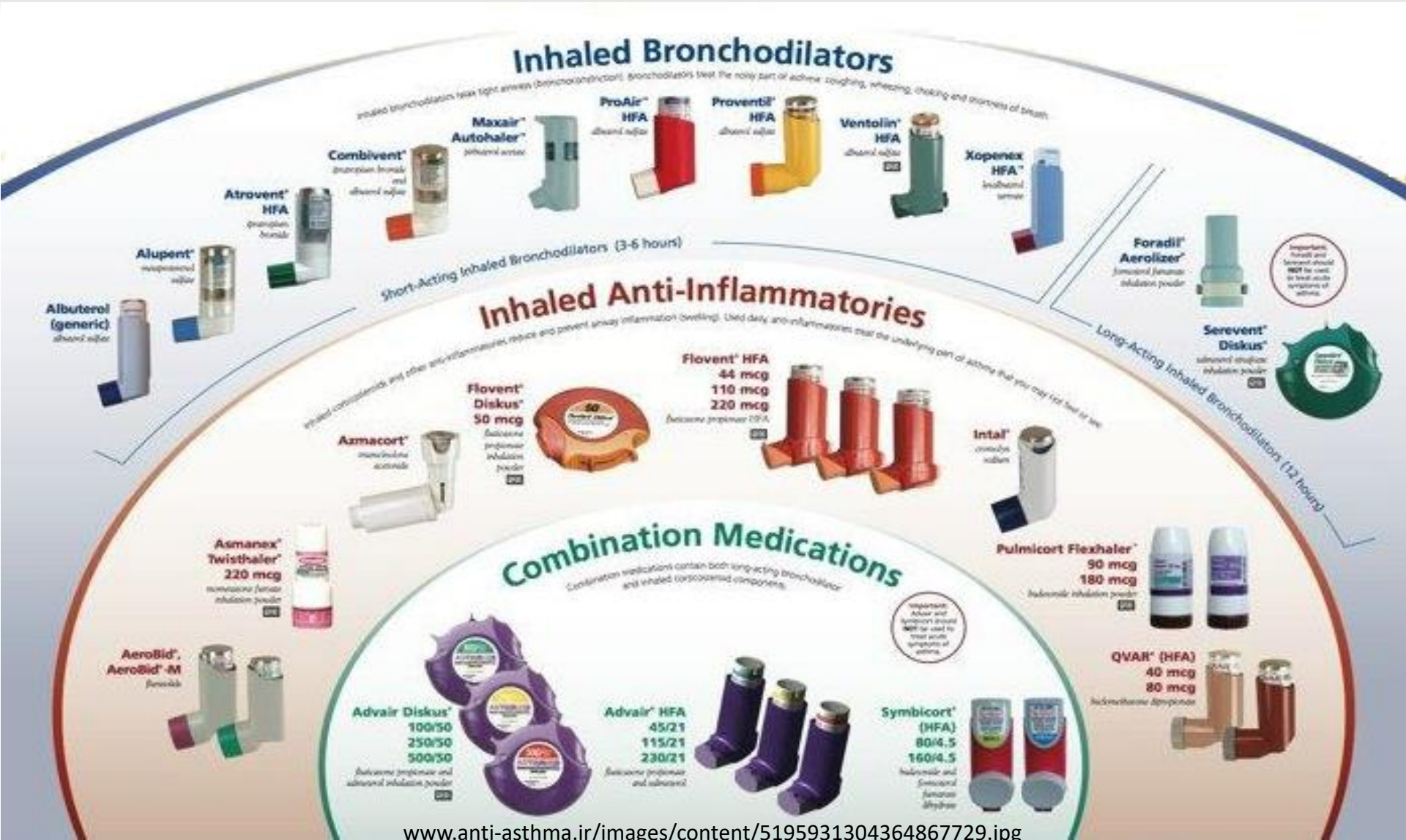
Drug therapy



www.anti-asthma.ir/images/content/5195931304364867729.jpg

Exacerbation

Exacerbation of COPD is an acute event characterized by a worsening of the patient's respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication.

http://static.prsa.pl/images/e310b556-5520-4413-ae12-087528f5e7ec.jpg

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Exacerbation

- The most common causes are viral upper respiratory tract infections and infection of the tracheobronchial tree.
- Diagnosis relies on the clinical presentation of the patient complaining of an acute change of symptoms that is beyond normal day-to-day variation.
- The goal of treatment is to minimize the impact of the current exacerbation and to prevent the development of subsequent exacerbations.

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Management of exacerbation

- **Short-acting inhaled β_2-agonists with/without short-acting anticholinergics**
- **Systemic corticosteroids**
- **Antibiotics**
- **Non-invasive ventilation**
- **Prevention**

https://image.freepik.com/fotos-gratis/feliz-medico-pensando-contra-um-fundo-branco_1459-3843.jpg

AB-therapy

- **Antibiotics** should be given to patients with:
- **Confirmed acute respiratory bacterial infection**
- **Three cardinal symptoms:**
- increased dyspnea
- increased sputum volume
- increased sputum purulence
- **Who requires mechanical ventilation**

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Non-invasive ventilation

- **Non-invasive ventilation (NIV)** for patients hospitalized for acute exacerbations of COPD:

- Improves respiratory acidosis, decreases respiratory rate, severity of dyspnea, complications and length of hospital stay.

- Decreases mortality and needs for intubation

http://www.bostonsp.com/wordpress1/wp-content/uploads/2017/03/Non-Invasive-Ventilation.jpg

Indications for hospital admission

- Marked increase in intensity of symptoms
- Severe underlying COPD
- Onset of new physical signs
- Failure of an exacerbation to respond to initial medical management
- Presence of serious comorbidities (CV pathologies: pulmonary hypertension, right heart failure, Cor pulmonale)
- Frequent exacerbations
- Older age
- Insufficient home support

http://doctorkb.com/DoctorKB%20Healthcare/hms/admin/Hospital/Maatoshree%20Hospital/hospital.png

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Common comorbidities

- **Cardiovascular diseases** are the major comorbidity in COPD and the most frequent and most important diseases coexisting with COPD.
- Benefits of cardioselective beta-blocker treatment in heart failure outweigh potential risk even in patients with severe COPD.

https://3c1703fe8d.site.internapcdn.net/newman/gfx/news/2018/canyoudieofa.jpg

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Thank you!

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AND
STUDY
MEDICINE

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