COPD
AAPA 2022

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Allergy, Asthma and Immunology

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Big Goals

Review the three categories of medications available to treat COPD

Key in on the diagnosis and treatment, why PFT numbers should not guide treatment

Best practices and personalizing COPD treatment

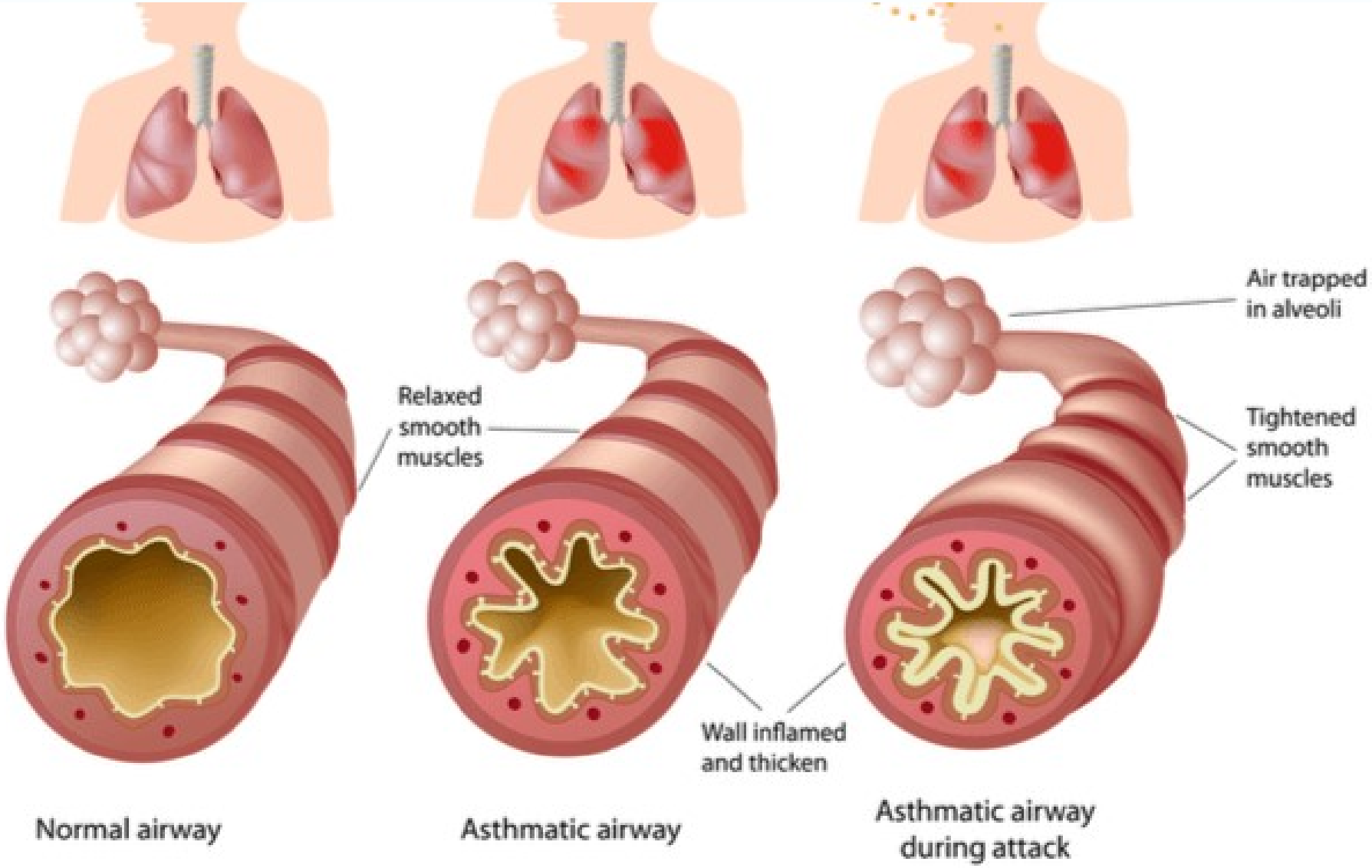
Asthma vs COPD

Asthma and COPD

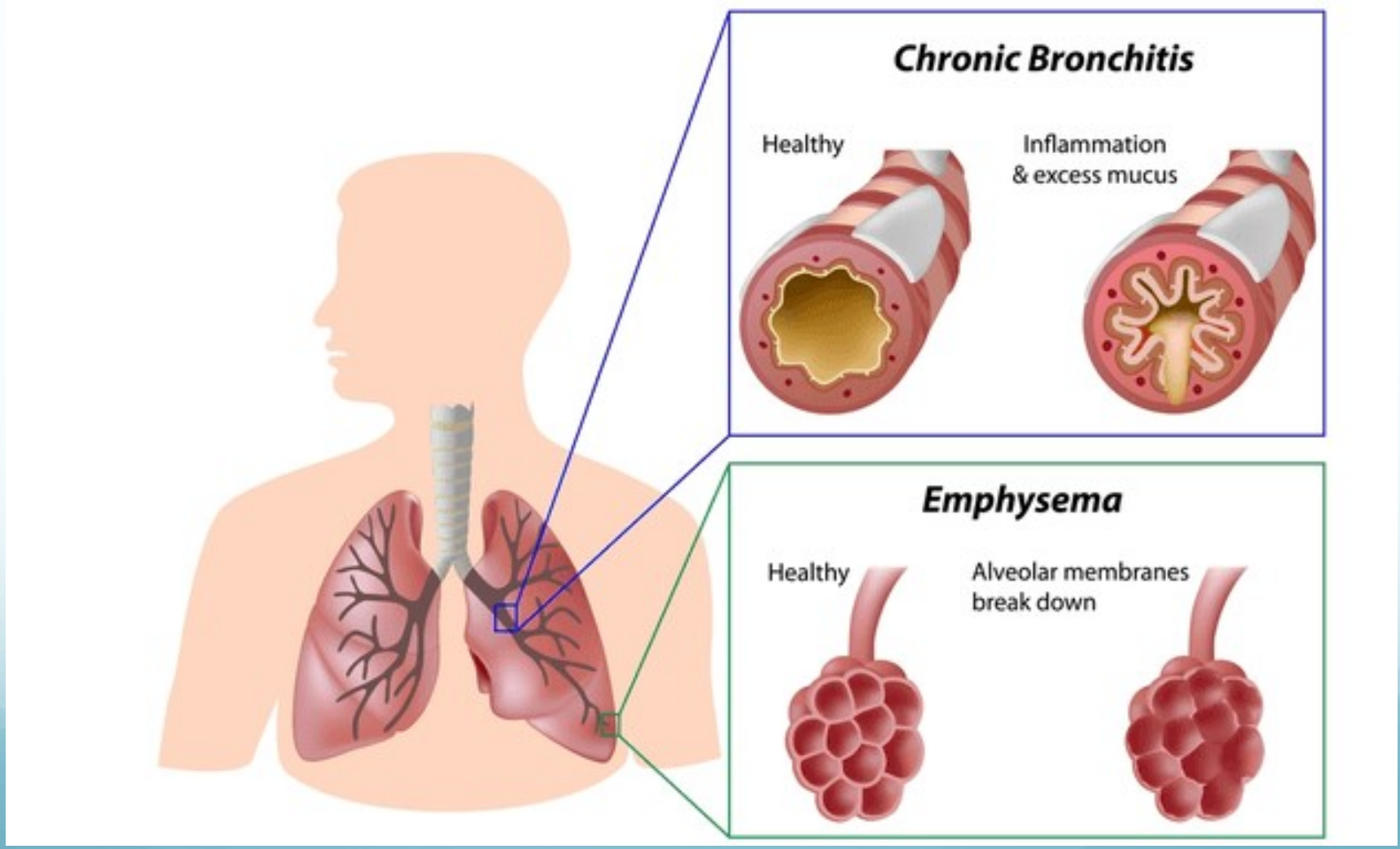
Asthma – bronchoconstriction, airway inflammation, mucous production

COPD – Tissue destruction, chronic cough, due to exposure

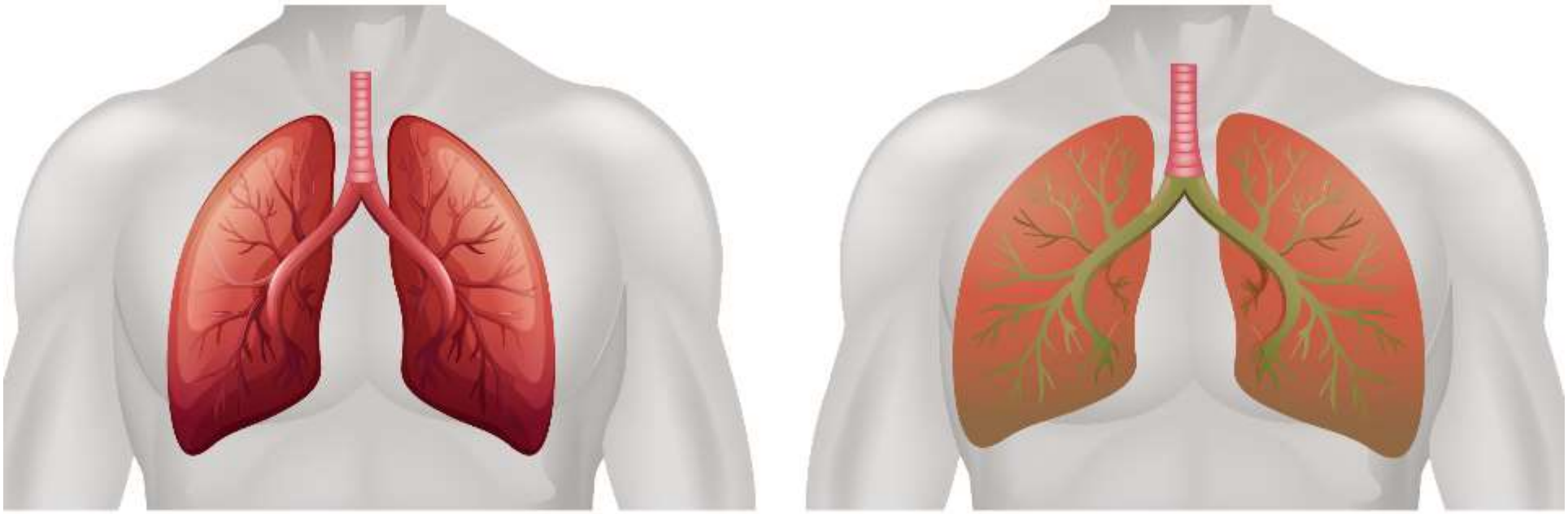
Asthma – Three key features: bronchoconstriction, airway inflammation and mucous production.



COPD – Chronic (long term, you get this over time), Obstructive (elasticity is gone, things get floppy and weak, alveoli break down)

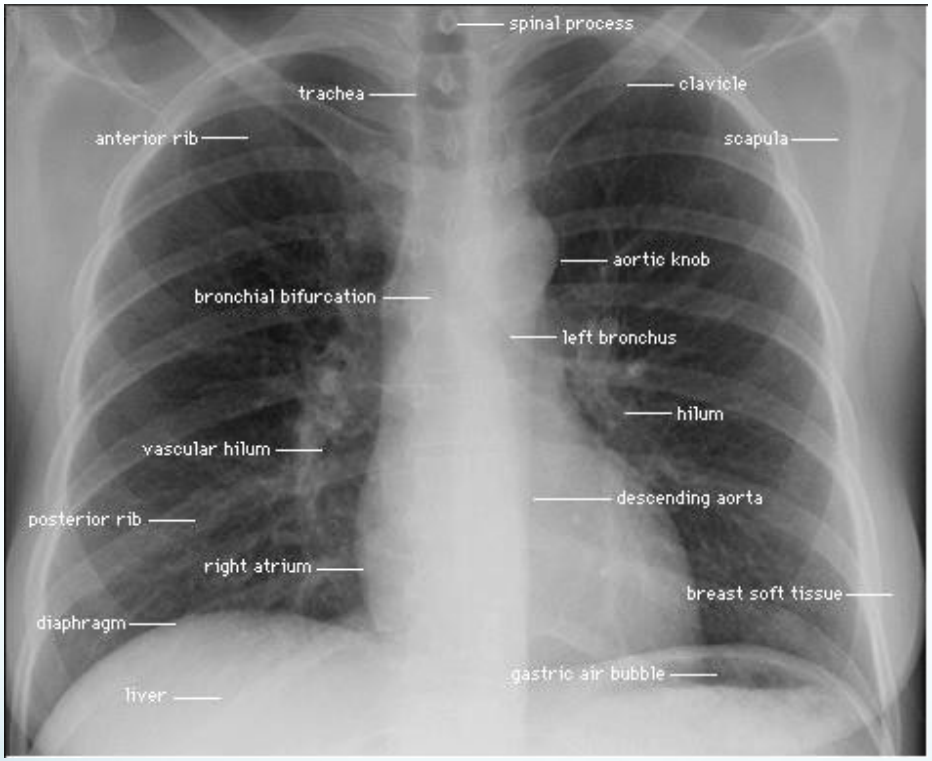


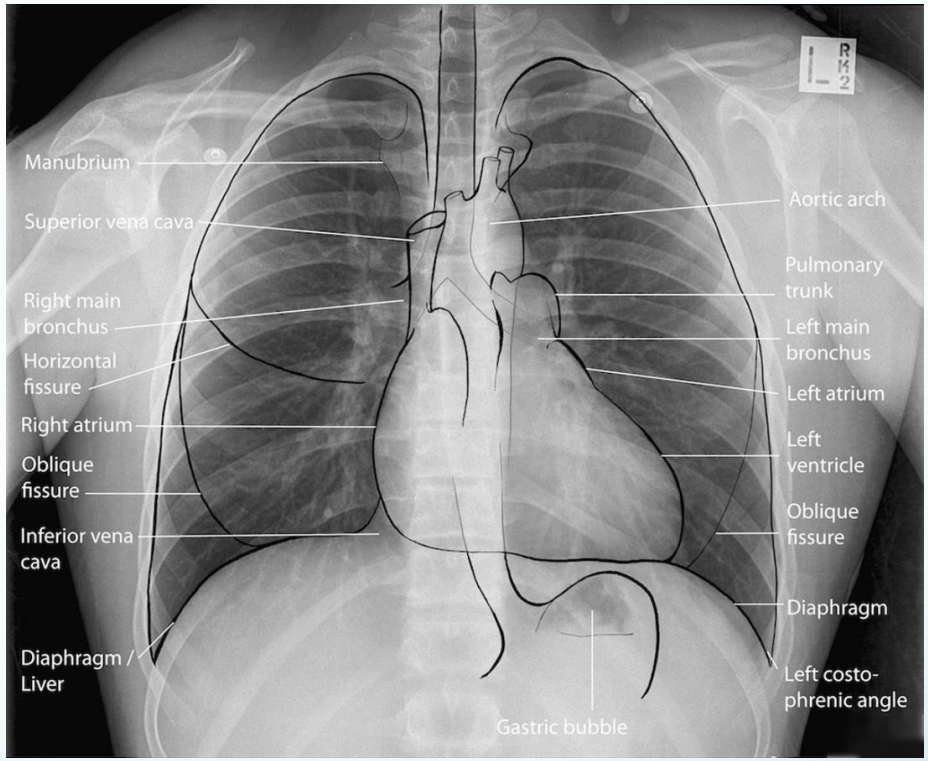
COPD – Big, floppy lungs. Flattened diaphragm. Harder to inhaler but MUCH hard to exhale, air is trapped, stale.

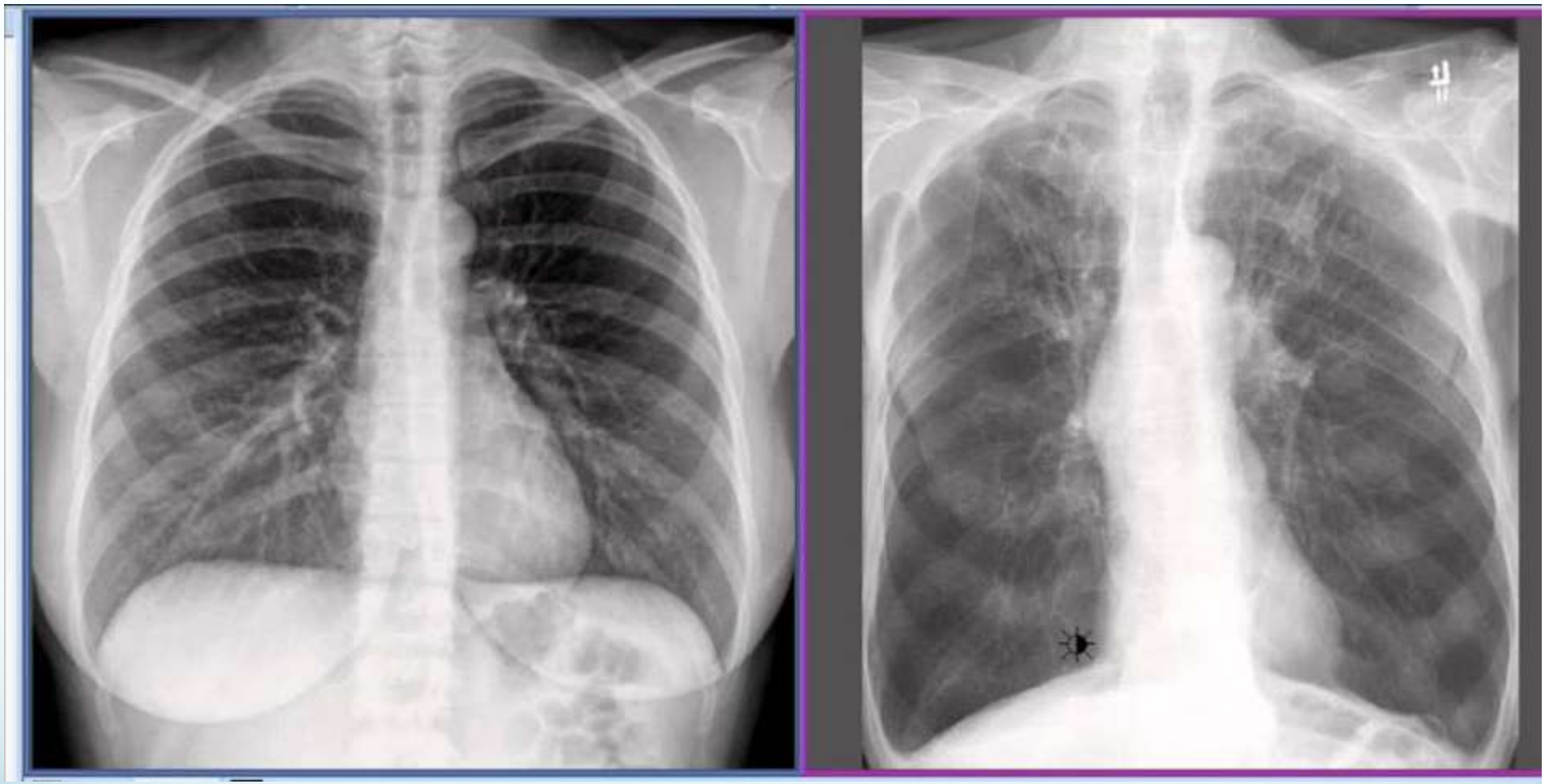


Normal Lungs

Hyperinflated Lungs


spinal process
trachea
clavicle
anterior rib
scapula
aortic knob
bronchial bifurcation
left bronchus
hilum
vascular hilum
descending aorta
posterior rib
right atrium
breast soft tissue
diaphragm
gastric air bubble
liver


Manubrium
Aortic arch
Superior vena cava
Pulmonary trunk
Right main bronchus
Left main bronchus
Horizontal fissure
Left atrium
Right atrium
Left ventricle
Oblique fissure
Oblique fissure
Inferior vena cava
Diaphragm
Diaphragm / Liver
Left costo-phrenic angle
Gastric bubble



COPD Medication Terms

- SABA = Short Acting Beta-Agonist = Albuterol = rescue inhaler = puffer, Proair, Ventolin, Proventil
- LABA = Long Acting Beta-Agonist, Serevent, Salmeterol
- ICS = Inhaled Corticosteroid, Flovent, fluticasone, QVAR, Pulmicort
- SAMA= Short Acting Muscarinic Antagonist, ipratropium bromide
- LAMA = Long Acting Muscarinic Antagonist, Spiriva, tiotropium
- MDI = Metered Dose Inhaler
- DPI = Dry Powdered Inhaler – Advair, Breo, Trelegy

COPD: Part 1

We have three categories of medications

Albuterol

Short – SABA
Long – LABA

Bronchodilators

COPD Medication Categories

Albuterol – short acting bronchodilator, relaxes smooth muscle. Binds to beta receptors on smooth muscle, causing about a billion things to happen that drop the calcium in the cell and it relaxes.

Salmeterol/formoterol/vilanterol – Same thing as above but lasts 12 or 24 hours

Respiratory Treatments

Allergy & Asthma Network

American College of Allergy, Asthma & Immunology

CHEST FOUNDATION

2021

AllergyAsthmaNetwork.org
800.878.4403

SHORT-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

- **ProAir® Digihaler™** 90 mcg albuterol sulfate inhalation powder — DSB A
- **ProAir® HFA** 90 mcg albuterol sulfate — DSB A G
- **ProAir RespiClick®** 90 mcg albuterol sulfate inhalation powder — DSB A
- **Proventil® HFA** 90 mcg albuterol sulfate — DSB A G
- **Ventolin® HFA** 90 mcg albuterol sulfate — DSB A G
- **Xopenex HFA®** 45 mcg levalbuterol tartrate — A G

LONG-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

- **Serevent® Diskus®** 50 mcg salmeterol xinafoate inhalation powder — DSB A C
- **Striverdi® Respimat®** 2.5 mcg olodaterol hydrochloride — DSB C

INHALED CORTICOSTEROIDS

reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

- **Alvesco® HFA** 80, 160 mcg ciclesonide — DSB A
- **ArmonAir® Digihaler™** 55, 113, 232 mcg fluticasone propionate inhalation powder — DSB A
- **Arnuity® Ellipta®** 50, 100, 200 mcg fluticasone furoate inhalation powder — DSB A
- **Asmanex® HFA** 50, 100, 200 mcg mometasone furoate — DSB A
- **Asmanex® Twisthaler®** 110, 220 mcg mometasone furoate inhalation powder — DSB A
- **Flovent® Diskus®** 50, 100, 250 mcg fluticasone propionate inhalation powder — DSB A
- **Flovent® HFA** 44, 110, 220 mcg fluticasone propionate — DSB A
- **Pulmicort Flexhaler®** 90, 180 mcg budesonide inhalation powder — DSB A
- **QVAR® Redihaler™** 40, 80 mcg beclomethasone dipropionate — DSB A

MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

Short-acting

- **Atrovent® HFA** 17 mcg ipratropium bromide — DSB C

Long-acting

- **Incruse® Ellipta®** 62.5 mcg umeclidinium inhalation powder — DSB C
- **Spiriva® HandiHaler®** 18 mcg tiotropium bromide inhalation powder — C
- **Spiriva® Respimat®** 1.25, 2.5 mcg tiotropium bromide — DSB A C
- **Tudorza™ Pressair™** 400 mcg aclidinium bromide inhalation powder — DSB C

COMBINATION MEDICATIONS

contain both short-acting beta$_2$-agonist and short-acting muscarinic antagonist

- **Combivent® Respimat®** 20/100 mcg ipratropium bromide and albuterol — DSB C

COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta$_2$-agonist (LABA)

- **Advair Diskus®** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder — DSB A C G
- **Advair® HFA** 45/21, 115/21, 230/21 mcg fluticasone propionate and salmeterol xinafoate — DSB A G
- **AirDuo® Digihaler™** 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder — DSB A
- **AirDuo® RespiClick®** 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder — DSB A G
- **Breo® Ellipta®** 100/25, 200/25 mcg fluticasone furoate and vilanterol inhalation powder — DSB A C
- **Dulera®** 50/5, 100/5, 200/5 mcg mometasone furoate and formoterol fumarate dihydrate — DSB A
- **Symbicort®** 80/4.5, 160/4.5 mcg budesonide and formoterol fumarate dihydrate — DSB A C G
- **Wixela™ Inhub™** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol xinafoate — DSB A C

Contain both long-acting beta$_2$-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

- **Anoro® Ellipta®** 62.5/25 mcg umeclidinium and vilanterol inhalation powder — DSB C
- **Bevespi Aerosphere®** 9/4.8 mcg glycopyrrolate and formoterol fumarate — DSB C
- **Duaklir® Pressair®** 400, 12 mcg aclidinium bromide and formoterol fumarate — DSB C
- **Stiolto™ Respimat®** 2.5/2.5 mcg tiotropium bromide and olodaterol — DSB C

Contain inhaled corticosteroid, long-acting beta$_2$-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

- **Trelegy® Ellipta®** 200/62.5/25 mcg, 100/62.5/25 mcg fluticasone furoate, umeclidinium and vilanterol inhalation powder — DSB A C
- **Breztri Aerosphere™** 160/9/4.8 mcg budesonide, glycopyrrolate and formoterol fumarate — C

BIOLOGICS

target cells and pathways that cause airway inflammation; delivered by injection or IV

- **Cinqair®** reslizumab — A
- **Dupixent®** dupilumab — A
- **Fasenra™** benralizumab — A
- **Nucala®** mepolizumab — A
- **Xolair®** omalizumab — A

BRONCHIAL THERMOPLASTY

A minimally invasive procedure that uses heat to reduce airway smooth muscle, leading to fewer severe asthma flares, ER visits, and days lost from activities. www.btxasthma.com — A

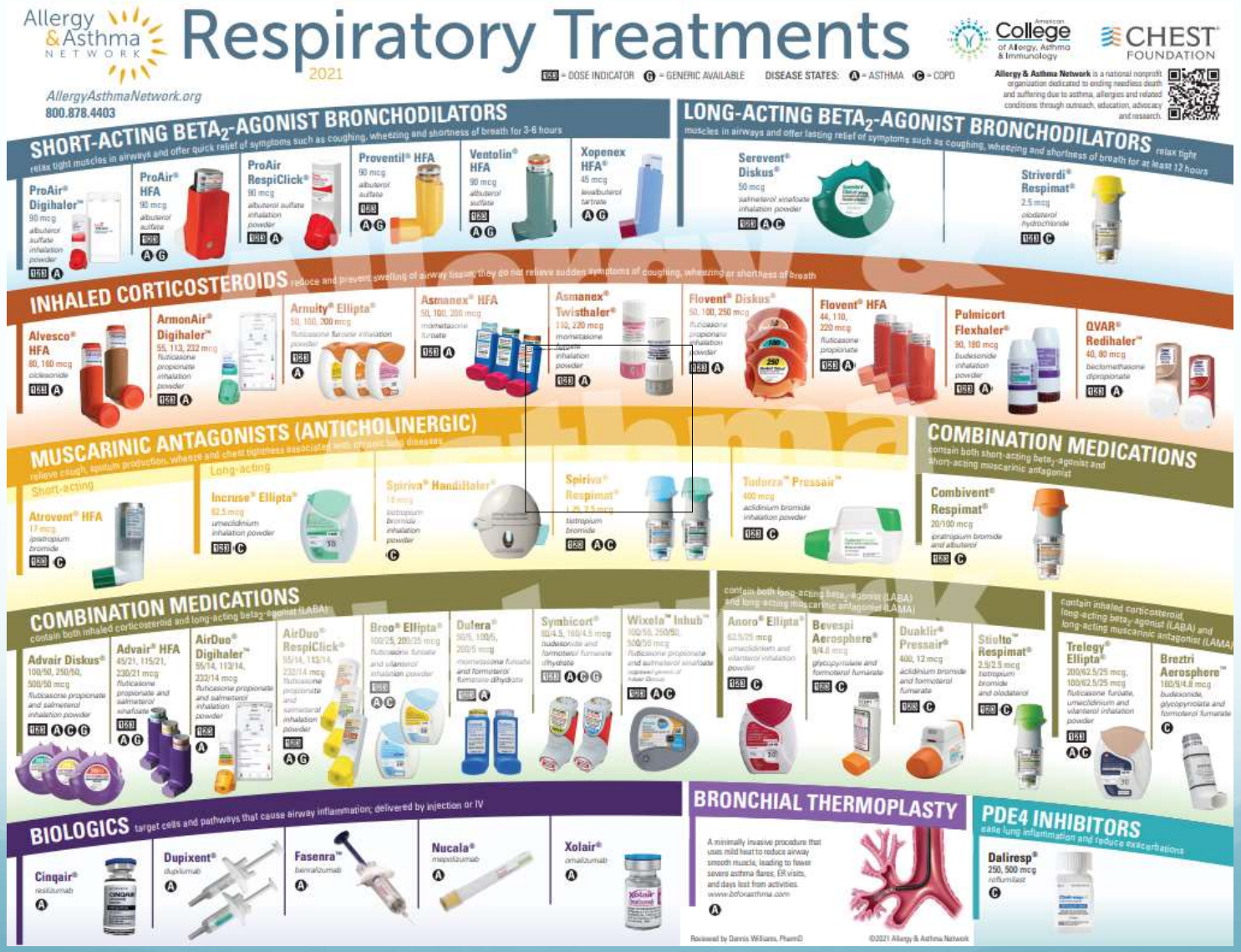
PDE4 INHIBITORS

ease lung inflammation and reduce exacerbations

- **Daliresp®** 250, 500 mcg roflumilast — C

Reviewed by Dennis Williams, PharmD

https://members.allergyasthmanetwork.org/store/viewproduct.aspx?id=16386141



COPD: Part 1

We have three categories of medications

Steroids

All long acting

Reduce most every aspect of inflammation

COPD Medication Categories: Steroids

Prednisone is metabolized by the liver to prednisolone. A glucocorticoid agonist corticosteroid

One of the first effects is to decreased the leukocyte migration to sites of Inflammation.

Corticosteroids then bind to the glucocorticoid receptor mediates changes in gene expression that lead to multiple downstream effects
over hours to days.

COPD Medication Categories: Steroids

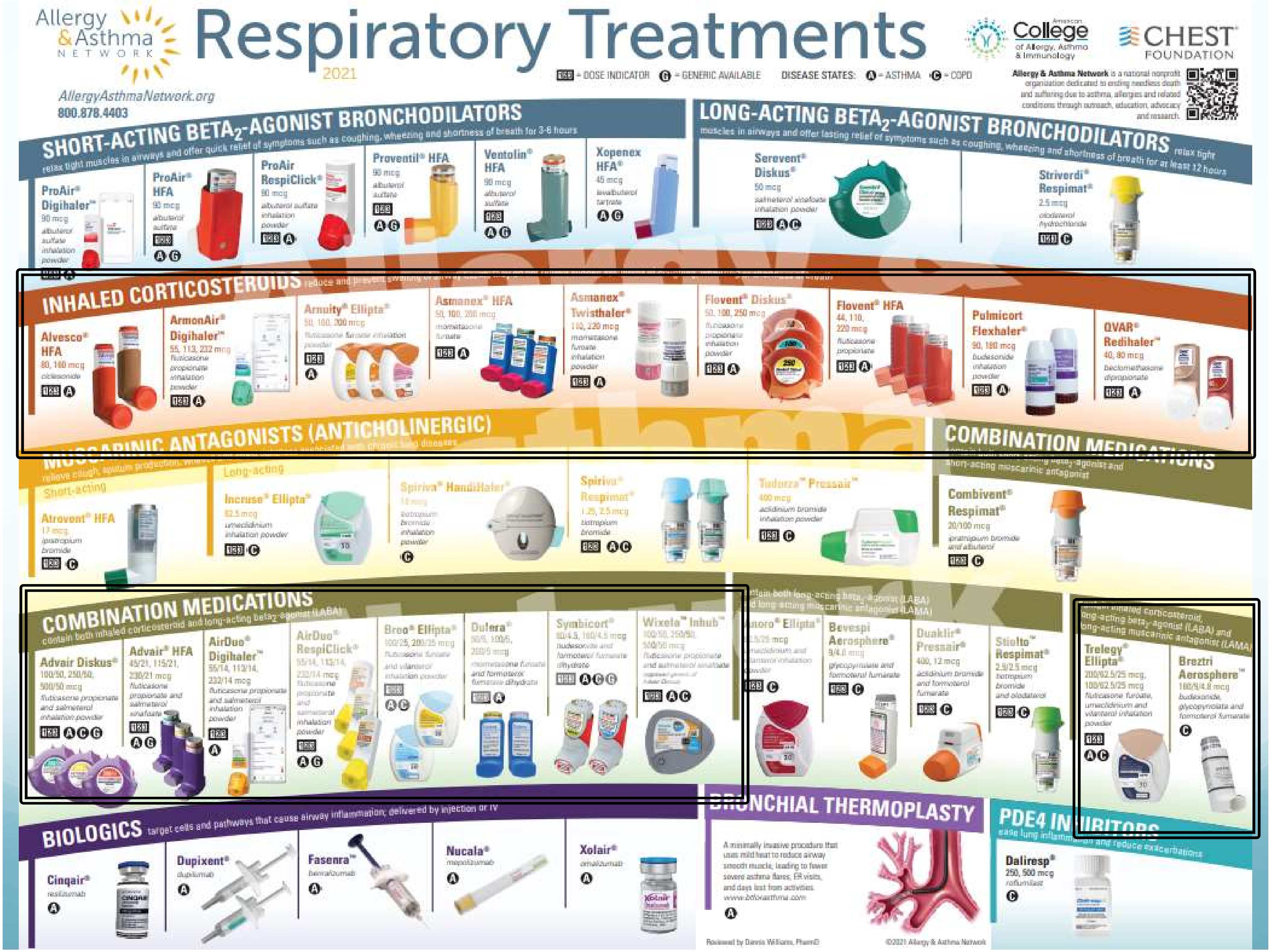
Glucocorticoids inhibit WBC movement by slowing demargination; they inhibit phospholipase A2, which decreases the formation of arachidonic acid derivatives; they inhibit NF-Kappa B and other inflammatory transcription factors; they promote anti-inflammatory genes like interleukin.

Much of this happening in the nucleus

COPD Medication Categories: Steroids

Many actions, all with a central goal of reducing inflammation at the source, most aspects of inflammation are affected

Steroids are a true two edged sword



Allergy & Asthma Network
Respiratory Treatments
2021
AllergyAsthmaNetwork.org
800.878.4403
American College of Allergy, Asthma & Immunology
CHEST FOUNDATION
= DOSE INDICATOR
G = GENERIC AVAILABLE
DISEASE STATES: A = ASTHMA C = COPD
Allergy & Asthma Network is a national nonprofit organization dedicated to ending needless death and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research.
SHORT-ACTING BETA2-AGONIST BRONCHODILATORS relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours
ProAir® Digihaler™ 90 mcg albuterol sulfate inhalation powder A
ProAir® HFA 90 mcg albuterol sulfate A G
ProAir RespiClick® 90 mcg albuterol sulfate inhalation powder A
Proventil® HFA 90 mcg albuterol sulfate A G
Ventolin® HFA 90 mcg albuterol sulfate A G
Xopenex HFA® 45 mcg levalbuterol tartrate A G
LONG-ACTING BETA2-AGONIST BRONCHODILATORS relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours
Serevent® Diskus® 50 mcg salmeterol xinafoate inhalation powder A C
Striverdi® Respimat® 2.5 mcg olodaterol hydrochloride C
INHALED CORTICOSTEROIDS reduce and prevent swelling of airway
Alvesco® HFA 80, 160 mcg ciclesonide A
ArmonAir® Digihaler™ 55, 113, 232 mcg fluticasone propionate inhalation powder A
Arnuity® Ellipta® 50, 100, 200 mcg fluticasone furoate inhalation powder A
Asmanex® HFA 50, 100, 200 mcg mometasone furoate A
Asmanex® Twisthaler® 110, 220 mcg mometasone furoate inhalation powder A
Flovent® Diskus® 50, 100, 250 mcg fluticasone propionate inhalation powder A
Flovent® HFA 44, 110, 220 mcg fluticasone propionate A
Pulmicort Flexhaler® 90, 180 mcg budesonide inhalation powder A
QVAR® Redihaler™ 40, 80 mcg beclomethasone dipropionate A
MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC) relieve cough, sputum production, wheezing ... associated with chronic lung diseases
Short-acting
Atrovent® HFA 17 mcg ipratropium bromide C
Long-acting
Incruse® Ellipta® 62.5 mcg umeclidinium inhalation powder C
Spiriva® HandiHaler® 18 mcg tiotropium bromide inhalation powder C
Spiriva® Respimat® 1.25, 2.5 mcg tiotropium bromide A C
Tudorza™ Pressair™ 400 mcg aclidinium bromide inhalation powder C
COMBINATION MEDICATIONS contain both long-acting beta2-agonist and short-acting muscarinic antagonist
Combivent® Respimat® 20/100 mcg ipratropium bromide and albuterol C
COMBINATION MEDICATIONS contain both inhaled corticosteroid and long-acting beta2-agonist (LABA)
Advair Diskus® 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder A C G
Advair® HFA 45/21, 115/21, 230/21 mcg fluticasone propionate and salmeterol xinafoate A G
AirDuo® Digihaler™ 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder A
AirDuo® RespiClick® 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder A G
Breo® Ellipta® 100/25, 200/25 mcg fluticasone furoate and vilanterol inhalation powder A C
Dulera® 50/5, 100/5, 200/5 mcg mometasone furoate and formoterol fumarate dihydrate A
Symbicort® 80/4.5, 160/4.5 mcg budesonide and formoterol fumarate dihydrate A C G
Wixela™ Inhub™ 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol xinafoate A C
contain both long-acting beta2-agonist (LABA) and long-acting muscarinic antagonist (LAMA)
Anoro® Ellipta® 62.5/25 mcg umeclidinium and vilanterol inhalation powder C
Bevespi Aerosphere® 9/4.8 mcg glycopyrrolate and formoterol fumarate C
Duaklir® Pressair® 400, 12 mcg aclidinium bromide and formoterol fumarate C
Stiolto™ Respimat® 2.5/2.5 mcg tiotropium bromide and olodaterol C
contain inhaled corticosteroid, long-acting beta2-agonist (LABA) and long-acting muscarinic antagonist (LAMA)
Trelegy® Ellipta® 200/62.5/25 mcg, 100/62.5/25 mcg fluticasone furoate, umeclidinium and vilanterol inhalation powder A C
Breztri Aerosphere™ 160/9/4.8 mcg budesonide, glycopyrrolate and formoterol fumarate C
BIOLOGICS target cells and pathways that cause airway inflammation; delivered by injection or IV
Cinqair® reslizumab A
Dupixent® dupilumab A
Fasenra™ benralizumab A
Nucala® mepolizumab A
Xolair® omalizumab A
BRONCHIAL THERMOPLASTY
A minimally invasive procedure that uses mild heat to reduce airway smooth muscle, leading to fewer severe asthma flares, ER visits, and days lost from activities. www.btforasthma.com A
PDE4 INHIBITORS ease lung inflammation and reduce exacerbations
Daliresp® 250, 500 mcg roflumilast C
Reviewed by Dennis Williams, PharmD
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COPD: Part 1

We have three categories of medications

SAMA/LAMA

Short – SAMA
Long – LAMA

Anticholinergic and constriction prevention

COPD Medication Categories: SAMA/LAMA

Ipratropium bromide (and other short and long-acting muscarinic antagonists) are often listed as bronchodilators?

Are they? The exert minimal direct effect on smooth muscle. . . .

COPD Medication Categories: SAMA/LAMA

Ipratropium bromide

1. Made from the combination of Isopropyl alcohol and atropine. The name comes from these two words. Isopropyl alcohol and atropine
2. Works by INCREASING the degradation of cGMP and by DECREASING Ca2+ in the cells, thus blocking contraction. They don't dilate anything really.
3. Onset of action . . . 20 minutes or so. Ipratropium half life is 2 hours.

COPD Medication Categories: SAMA/LAMA

Why helpful if minimal bronchoconstriction?

These help block contraction but also reduce RESTING TONE.

So even if not overly constricted, can be helpful.

Minimal systemic absorption

Respiratory Treatments

2021

Allergy & Asthma Network

AllergyAsthmaNetwork.org

800.878.4403

American College of Allergy, Asthma & Immunology

CHEST FOUNDATION

DOSE INDICATOR · G = GENERIC AVAILABLE · DISEASE STATES: A = ASTHMA · C = COPD

Allergy & Asthma Network is a national nonprofit organization dedicated to ending needless death and suffering due to asthma, allergies and related conditions through outreach, education, advocacy and research.

SHORT-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

- **ProAir® Digihaler™** 90 mcg albuterol sulfate inhalation powder — A
- **ProAir® HFA** 90 mcg albuterol sulfate — A, G
- **ProAir RespiClick®** 90 mcg albuterol sulfate inhalation powder — A
- **Proventil® HFA** 90 mcg albuterol sulfate — A, G
- **Ventolin® HFA** 90 mcg albuterol sulfate — A, G
- **Xopenex HFA®** 45 mcg levalbuterol tartrate — A, G

LONG-ACTING BETA$_2$-AGONIST BRONCHODILATORS

relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

- **Serevent® Diskus®** 50 mcg salmeterol xinafoate inhalation powder — A, C
- **Striverdi® Respimat®** 2.5 mcg olodaterol hydrochloride — C

INHALED CORTICOSTEROIDS

reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

- **Alvesco® HFA** 80, 160 mcg ciclesonide — A
- **ArmonAir® Digihaler™** 55, 113, 232 mcg fluticasone propionate inhalation powder — A
- **Arnuity® Ellipta®** 50, 100, 200 mcg fluticasone furoate inhalation powder — A
- **Asmanex® HFA** 50, 100, 200 mcg mometasone furoate — A
- **Asmanex® Twisthaler®** 110, 220 mcg mometasone furoate inhalation powder — A
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- **QVAR® Redihaler™** 40, 80 mcg beclomethasone dipropionate — A

MUSCARINIC ANTAGONISTS (ANTICHOLINERGIC)

relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

Short-acting

- **Atrovent® HFA** 17 mcg ipratropium bromide — C

Long-acting

- **Incruse® Ellipta®** 62.5 mcg umeclidinium inhalation powder — C
- **Spiriva® HandiHaler®** 18 mcg tiotropium bromide inhalation powder — C
- **Spiriva® Respimat®** 1.25, 2.5 mcg tiotropium bromide — A, C
- **Tudorza™ Pressair™** 400 mcg aclidinium bromide inhalation powder — C

COMBINATION MEDICATIONS

contain both short-acting beta$_2$-agonist and short-acting muscarinic antagonist

- **Combivent® Respimat®** 20/100 mcg ipratropium bromide and albuterol — C

COMBINATION MEDICATIONS

contain both inhaled corticosteroid and long-acting beta$_2$-agonist (LABA)

- **Advair Diskus®** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol inhalation powder — A, C, G
- **Advair® HFA** 45/21, 115/21, 230/21 mcg fluticasone propionate and salmeterol xinafoate — A, G
- **AirDuo® Digihaler™** 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder — A
- **AirDuo® RespiClick®** 55/14, 113/14, 232/14 mcg fluticasone propionate and salmeterol inhalation powder — A, G
- **Breo® Ellipta®** 100/25, 200/25 mcg fluticasone furoate and vilanterol inhalation powder — A, C
- **Dulera®** 50/5, 100/5, 200/5 mcg mometasone furoate and formoterol fumarate dihydrate — A
- **Symbicort®** 80/4.5, 160/4.5 mcg budesonide and formoterol fumarate dihydrate — A, C, G
- **Wixela™ Inhub™** 100/50, 250/50, 500/50 mcg fluticasone propionate and salmeterol xinafoate (generic of Advair Diskus) — A, C

contain both long-acting beta$_2$-agonist and long-acting muscarinic antagonist (LABA/LAMA)

- **Anoro® Ellipta®** 62.5/25 mcg umeclidinium and vilanterol inhalation powder — C
- **Bevespi Aerosphere®** 9/4.8 mcg glycopyrrolate and formoterol fumarate — C
- **Duaklir® Pressair®** 400, 12 mcg aclidinium bromide and formoterol fumarate — C
- **Stiolto™ Respimat®** 2.5/2.5 mcg tiotropium bromide and olodaterol — C

contain inhaled corticosteroid, long-acting beta$_2$-agonist (LABA) and long-acting muscarinic antagonist (LAMA)

- **Trelegy® Ellipta®** 200/62.5/25 mcg, 100/62.5/25 mcg fluticasone furoate, umeclidinium and vilanterol inhalation powder — A, C
- **Breztri Aerosphere™** 160/9/4.8 mcg budesonide, glycopyrrolate and formoterol fumarate — C

BIOLOGICS

target cells and pathways that cause airway inflammation; delivered by injection or IV

- **Cinqair®** reslizumab — A
- **Dupixent®** dupilumab — A
- **Fasenra™** benralizumab — A
- **Nucala®** mepolizumab — A
- **Xolair®** omalizumab — A

BRONCHIAL THERMOPLASTY

A minimally invasive procedure that uses mild heat to reduce airway smooth muscle, leading to fewer severe asthma flares, ER visits, and days lost from activities. www.btxasthma.com — A

PDE4 INHIBITORS

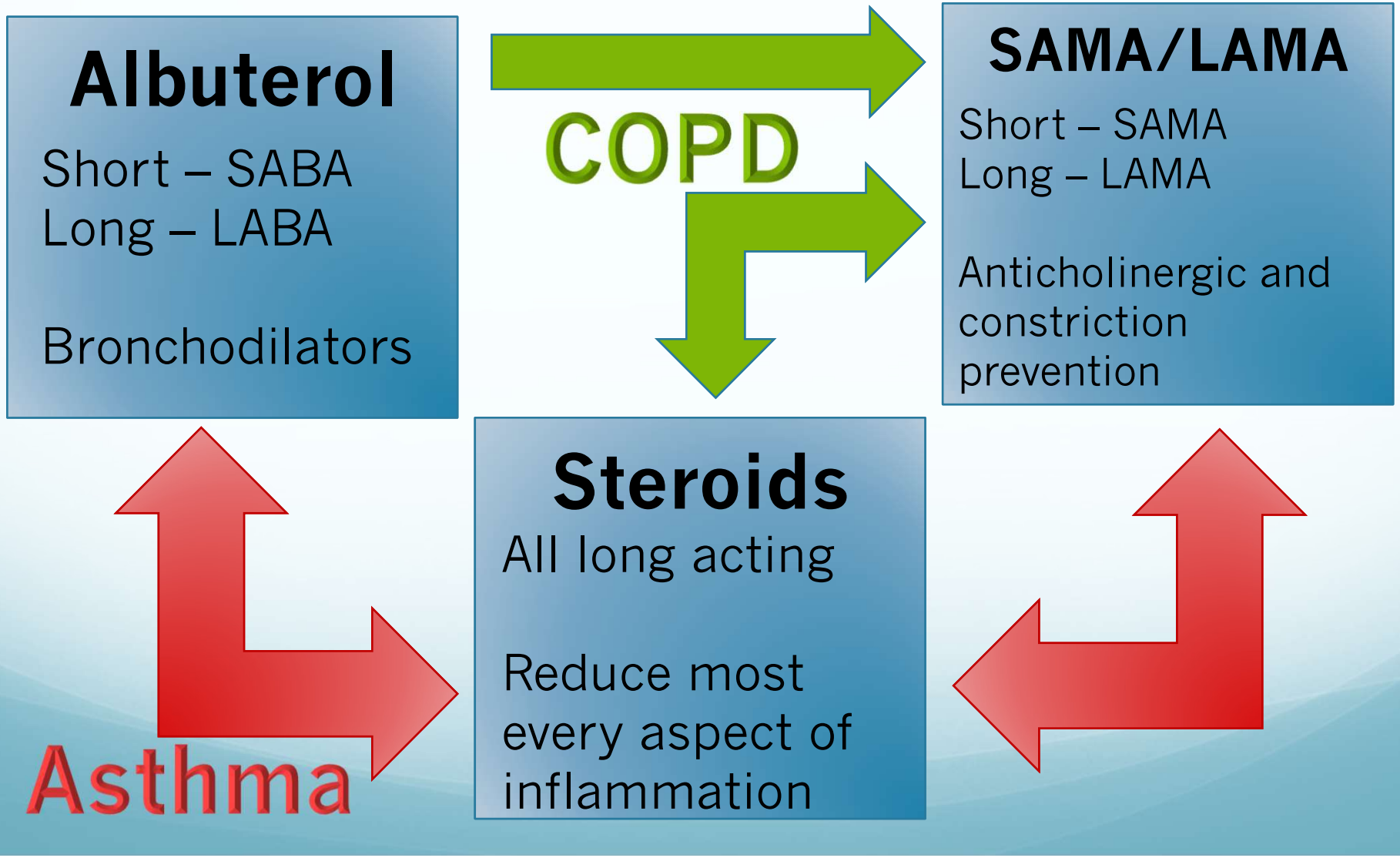
ease lung inflammation and reduce exacerbations

- **Daliresp®** 250, 500 mcg roflumilast — C

Reviewed by Dennis Williams, PharmD

COPD: Part 2

We have three categories of medications



BRONCHODILATORS IN STABLE COPD

- Inhaled bronchodilators in COPD are central to symptom management and commonly given on a regular basis to prevent or reduce symptoms **(Evidence A)**.
- Regular and as-needed use of SABA or SAMA improves FEV_1 and symptoms **(Evidence A)**.
- Combinations of SABA and SAMA are superior compared to either medication alone in improving FEV_1 and symptoms **(Evidence A)**.
- LABAs and LAMAs significantly improve lung function, dyspnea, health status, and reduce exacerbation rates **(Evidence A)**.
- LAMAs have a greater effect on exacerbation reduction compared with LABAs **(Evidence A)** and decrease hospitalizations **(Evidence B)**.
- Combination treatment with a LABA and LAMA increases FEV_1 and reduces symptoms compared to monotherapy **(Evidence A)**.
- Combination treatment with a LABA/LAMA reduces exacerbations compared to monotherapy **(Evidence B)**.
- Tiotropium improves the effectiveness of pulmonary rehabilitation in increasing exercise performance **(Evidence B)**.
- Theophylline exerts a small bronchodilator effect in stable COPD **(Evidence A)** and that is associated with modest symptomatic benefits **(Evidence B)**.

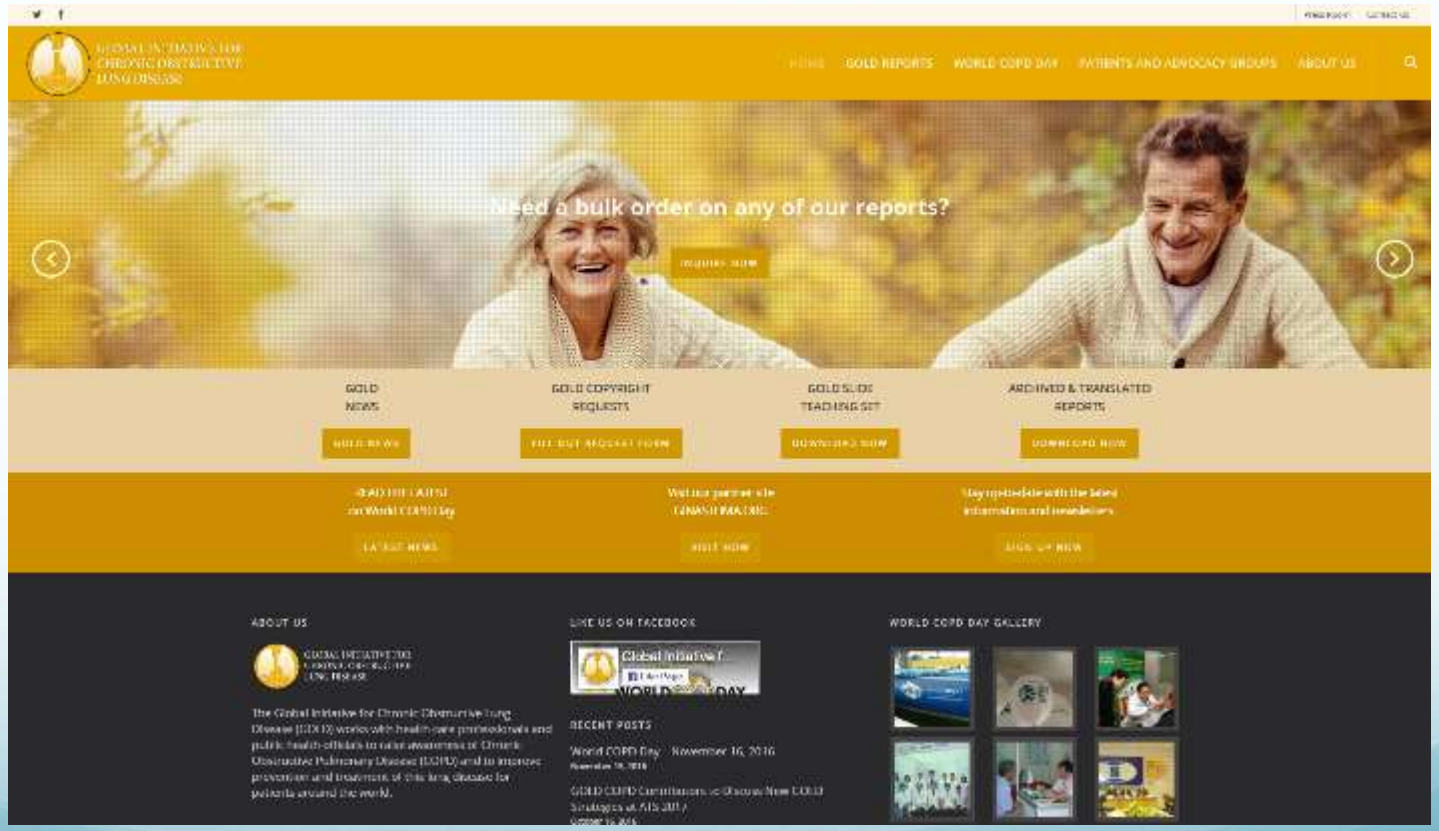
DESCRIPTION OF LEVELS OF EVIDENCE

EVIDENCE CATEGORY	SOURCES OF EVIDENCE	DEFINITION
A	Randomized controlled trials (RCTs)	Evidence is from endpoints of well-designed RCTs that provide consistent findings in the population for which the recommendation is made without any important limitations.
	Rich body of high quality evidence without any significant limitation or bias	Requires high quality evidence from ≥ 2 clinical trials involving a substantial number of subjects, or a single high quality RCT involving substantial numbers of patient without any bias.
B	Randomized controlled trials (RCTs) with important limitations	Evidence is from RCTs that include only a limited number of patients, post hoc or subgroup analyses of RCTs or meta analyses of RCTs.
	Limited Body of Evidence	Also pertains when few RCTs exist, or important limitations are evident (methodologic flaws, small numbers, short duration, undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent).
C	Non-randomized trials Observational studies	Evidence is from outcomes of uncontrolled or non-randomized trials or from observational studies.
D	Panel consensus judgment	Provision of guidance is deemed valuable but clinical literature addressing the subject is insufficient. Panel consensus is based on clinical experience or knowledge that does not meet the above stated criteria.

GLOBAL INITIATIVE FOR CHRONIC OBSTRUCTIVE LUNG DISEASE (GOLD):

GOLD Website Address

www.goldcopd.org



COPD Defined

'A **common preventable** and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients.'

COPD Defined

- Chronic bronchitis: chronic productive cough for 3 months in each of two successive years (other causes excluded)

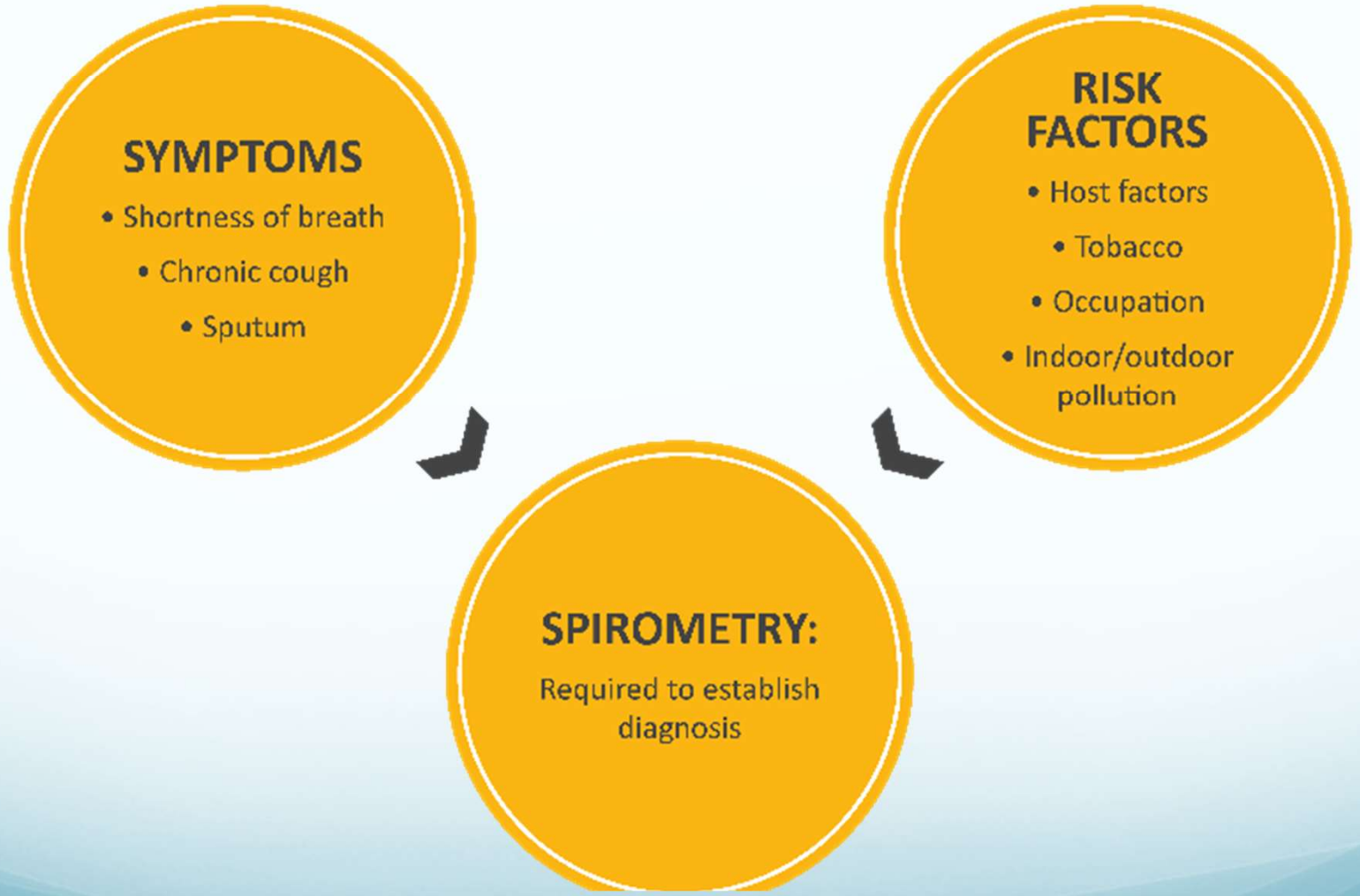
  Emphysema: abnormal and permanent enlargement of the airspaces distal to the terminal bronchioles that is accompanied by destruction of the airspace walls

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.

PATHWAYS TO THE DIAGNOSIS OF COPD



COPD Diagnosis and Treatment

In a patient with the right history and symptoms (or a previous assumed dx of COPD) get the testing done.

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

In patients with FEV1/FVC < 0.70:

This is comparing the patient to themselves

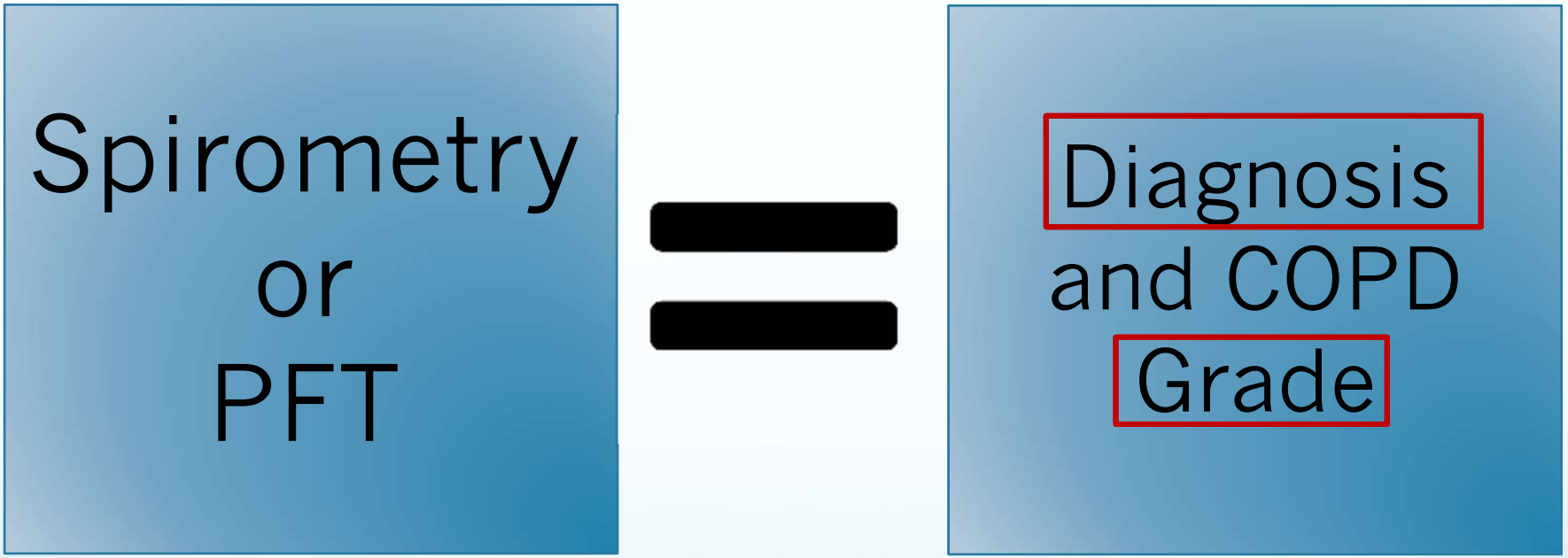
CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)

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

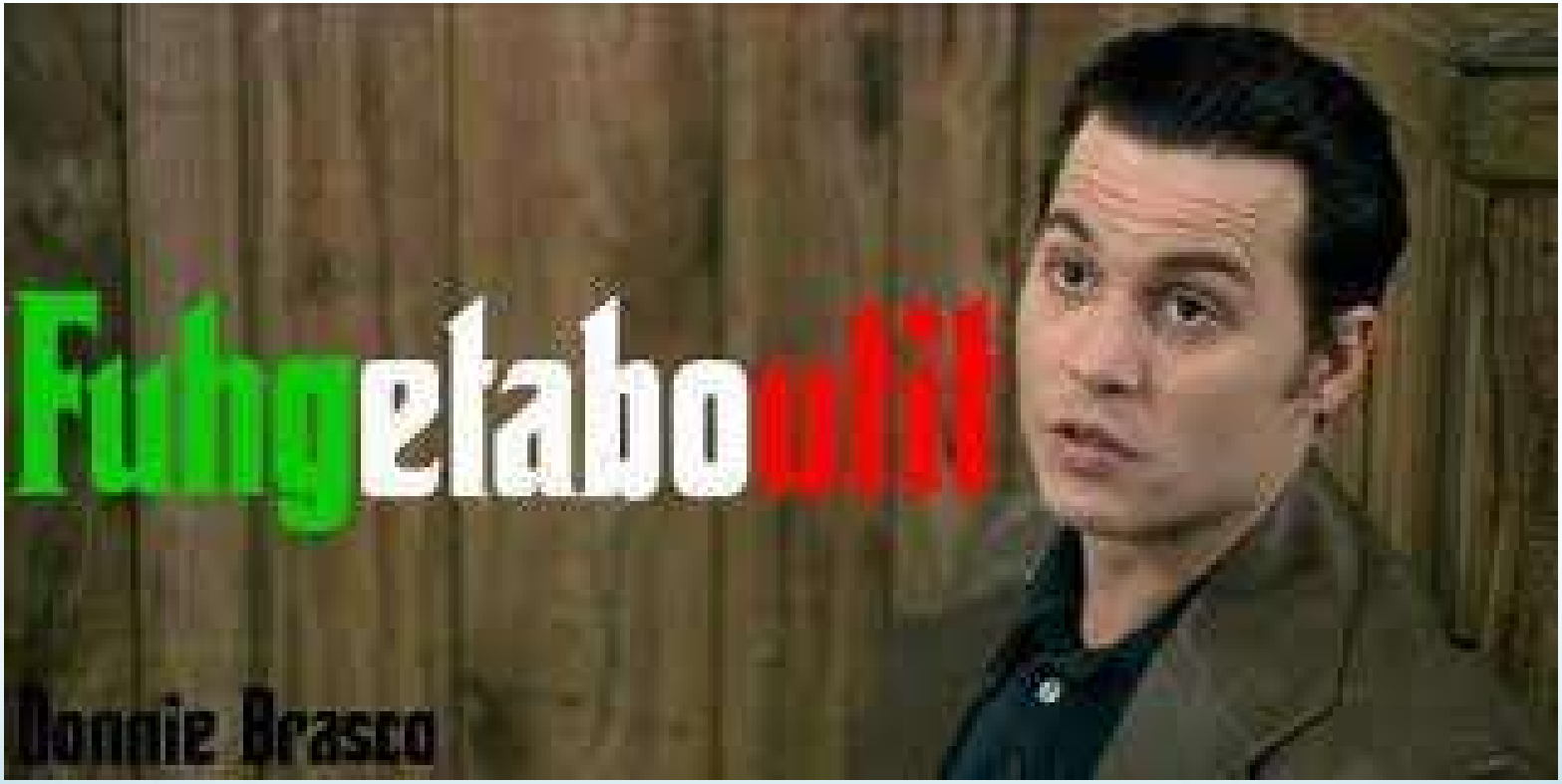
This is comparing the patient to a peer based on height, weight, age, gender and ethnicity.

COPD Diagnosis and Treatment



So do this once,
then, the good news . . .

COPD Diagnosis and Treatment



COPD Diagnosis and Treatment

Spirometry
or
PFT

Category
or
Treatment

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

Set this aside and ask them how they are doing

CAT™ ASSESSMENT

For each item below, place a mark (x) in the box that best describes you currently.
Be sure to only select one response for each question.

EXAMPLE: I am very happy	0 (X) 2 3 4 5	**I am very sad**	**SCORE**
I never cough	0 1 2 3 4 5	I cough all the time	
I have no phlegm (mucus) in my chest at all	0 1 2 3 4 5	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	0 1 2 3 4 5	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0 1 2 3 4 5	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0 1 2 3 4 5	I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	0 1 2 3 4 5	I am not at all confident leaving my home because of my lung condition	
I sleep soundly	0 1 2 3 4 5	I don't sleep soundly because of my lung condition	
I have lots of energy	0 1 2 3 4 5	I have no energy at all	

TOTAL SCORE:

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.

MODIFIED MRC DYSPNEA SCALE[a]

PLEASE TICK IN THE BOX THAT APPLIES TO YOU | ONE BOX ONLY | Grades 0 - 4

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.	☐

Single Question Symptom Check

Can you walk at a reasonable pace on level ground without stopping to catch your breath?

THE REFINED ABCD ASSESSMENT TOOL

Spirometrically Confirmed Diagnosis

Assessment of airflow limitation

Assessment of symptoms/risk of exacerbations

Post-bronchodilator $FEV_1/FVC < 0.7$

Grade	FEV_1 (% predicted)
GOLD 1	≥ 80
GOLD 2	50-79
GOLD 3	30-49
GOLD 4	< 30

Moderate or Severe Exacerbation History

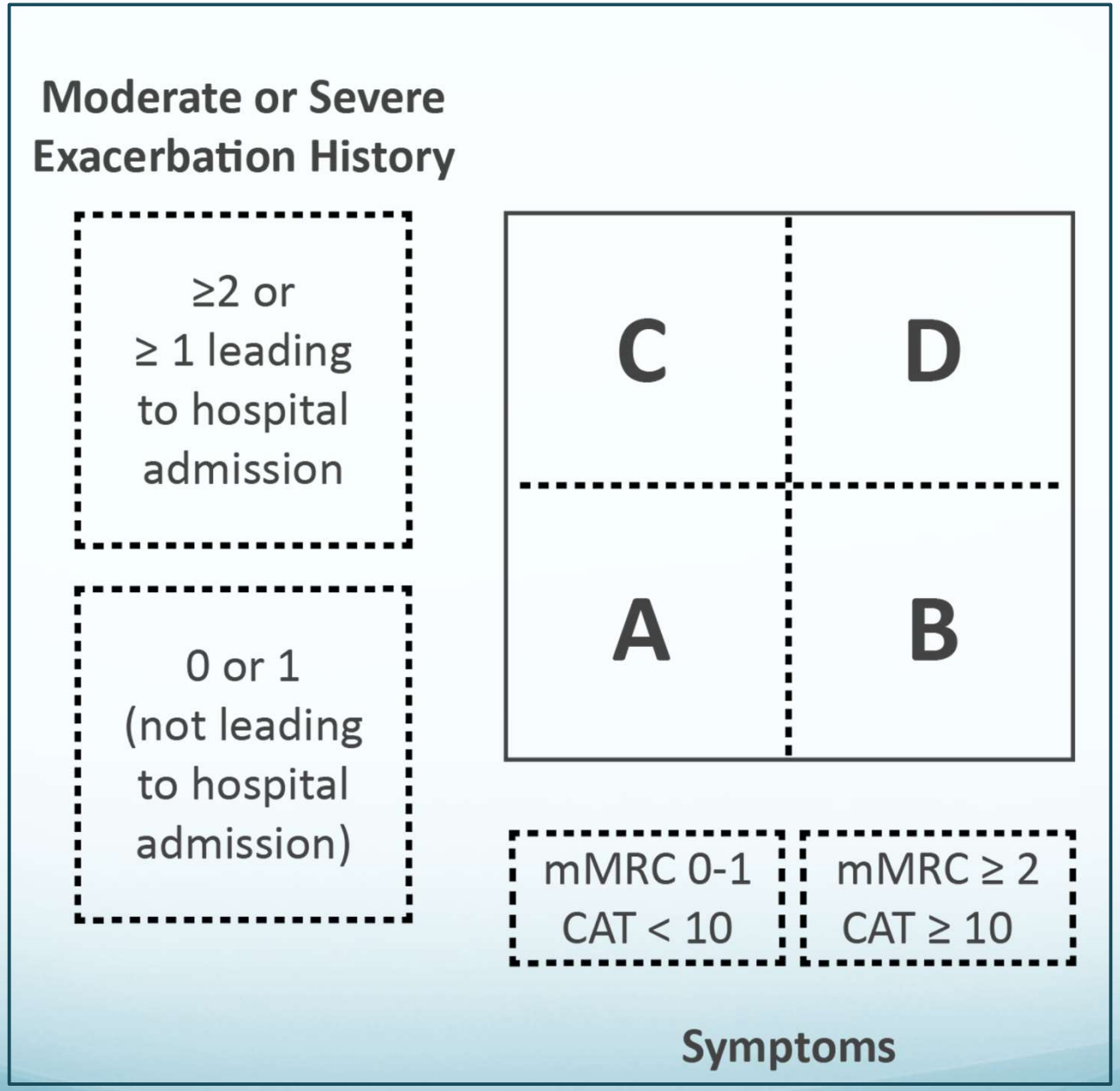
≥2 or ≥ 1 leading to hospital admission

0 or 1 (not leading to hospital admission)

C	D
A	B

mMRC 0-1 CAT < 10 | mMRC ≥ 2 CAT ≥ 10

Symptoms



INITIAL PHARMACOLOGICAL TREATMENT

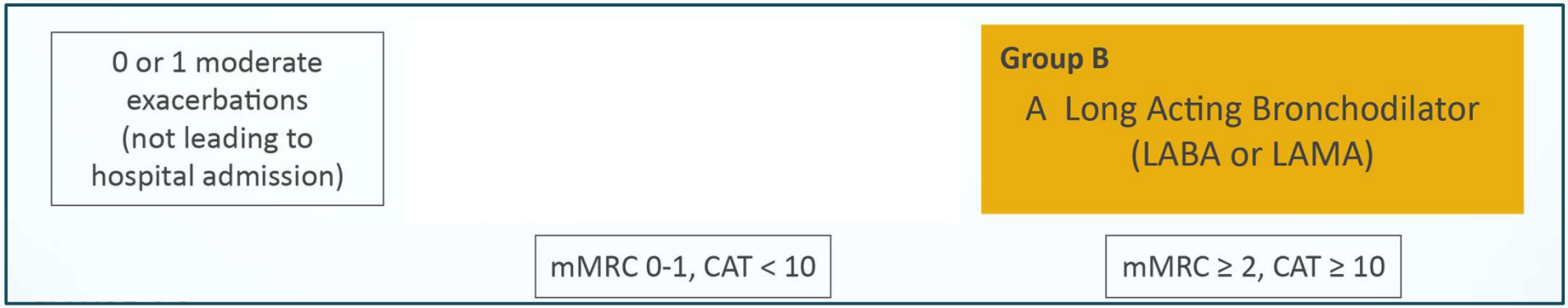
≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization	**Group C** LAMA	**Group D** LAMA or LAMA + LABA* or ICS + LABA** *Consider if highly symptomatic (e.g. CAT > 20) **Consider if eos ≥ 300
0 or 1 moderate exacerbations (not leading to hospital admission)	**Group A** A Bronchodilator	**Group B** A Long Acting Bronchodilator (LABA or LAMA)
	mMRC 0-1, CAT < 10	mMRC ≥ 2, CAT ≥ 10

0 or 1 moderate exacerbations (not leading to hospital admission)

Group A

A Bronchodilator

mMRC 0-1, CAT < 10



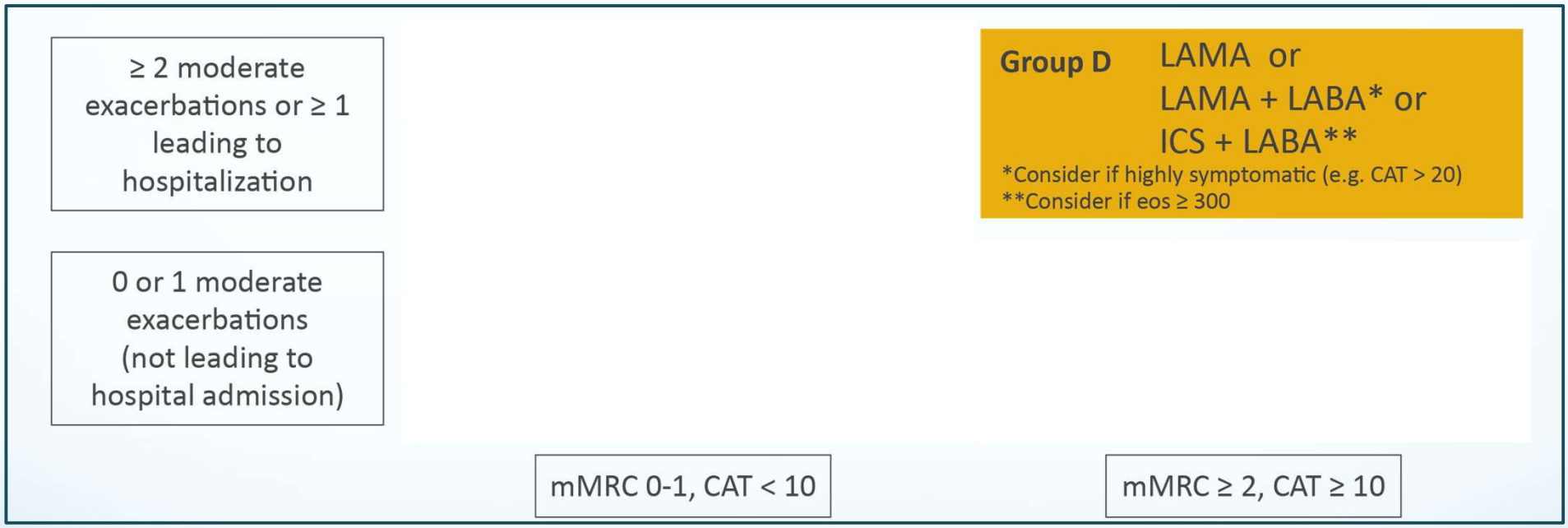
≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization

Group C

LAMA

0 or 1 moderate exacerbations (not leading to hospital admission)

mMRC 0-1, CAT < 10



Inhaled Steroids (ICS) –

If not needed don't use them!

Increased risk of all URIs and increased risk of pneumonia and exacerbations

Fluticasone is the worst

Group D	LAMA or LAMA + LABA* or ICS + LABA**

*Consider if highly symptomatic (e.g. CAT > 20)
**Consider if eos ≥ 300

Meta-Analysis > Int Immunopharmacol. 2019 Dec;77:105950. doi: 10.1016/j.intimp.2019.105950. Epub 2019 Oct 17.

Inhaled corticosteroids and risk of pneumonia in patients with chronic obstructive pulmonary disease: A meta-analysis of randomized controlled trials

Mingjin Yang [1], Yuejun Du [1], Hong Chen [1], Depeng Jiang [2], Zhibo Xu [3]

Affiliations + expand

PMID: 31629940 DOI: 10.1016/j.intimp.2019.105950

Abstract

Objective: Inhaled corticosteroids (ICS) are generally used to treat patients with chronic obstructive pulmonary disease (COPD) who suffer from repeated exacerbations. Recently, it was reported that ICS treatment increased the risk of pneumonia in COPD patients. But it is controversial.The objective of this paper is to clarify the associations between ICS treatment and the risk of pneumonia in COPD patients.

Methods: PubMed, Cochrane Library, Clinical Trials.gov, and Embase were searched from February 2019 to June 2019. Randomized clinical trials (RCTs) were incorporatedthat compared ICS with non-ICS treatment on the risk of pneumonia in COPD patients. Meta-analyses were conducted by the Peto and Mantel-Haenszel approaches with corresponding 95% CIs.

Results: Twenty-five trials (N = 49,982 subjects) were included. Pooled results demonstrated a significantly increased risk of pneumonia with ICS use in COPD patients (RR, 1.59, 95% CI, 1.33-1.90; I^2 = 51%). ICS treatment also increased the risk of severe pneumonia (RR, 2.17, 95% CI, 1.47-3.22; I^2 = 29%). The results of subgroup analysis based on doses of ICS were consistent with the above. However, subgroup analyses based on types of ICS revealed that fluticasone therapy was associated with an increased risk of pneumonia but not budesonide. In addition, medium- and low-doses of budesonide treatment also did not increase the risk of pneumonia.

Conclusions: Use of ICS increases the risk of pneumonia in patients with COPD. The above is prominent for fluticasone-containing ICSs but not for budesonide-containing ICSs.

Group D	LAMA or LAMA + LABA* or ICS + LABA**

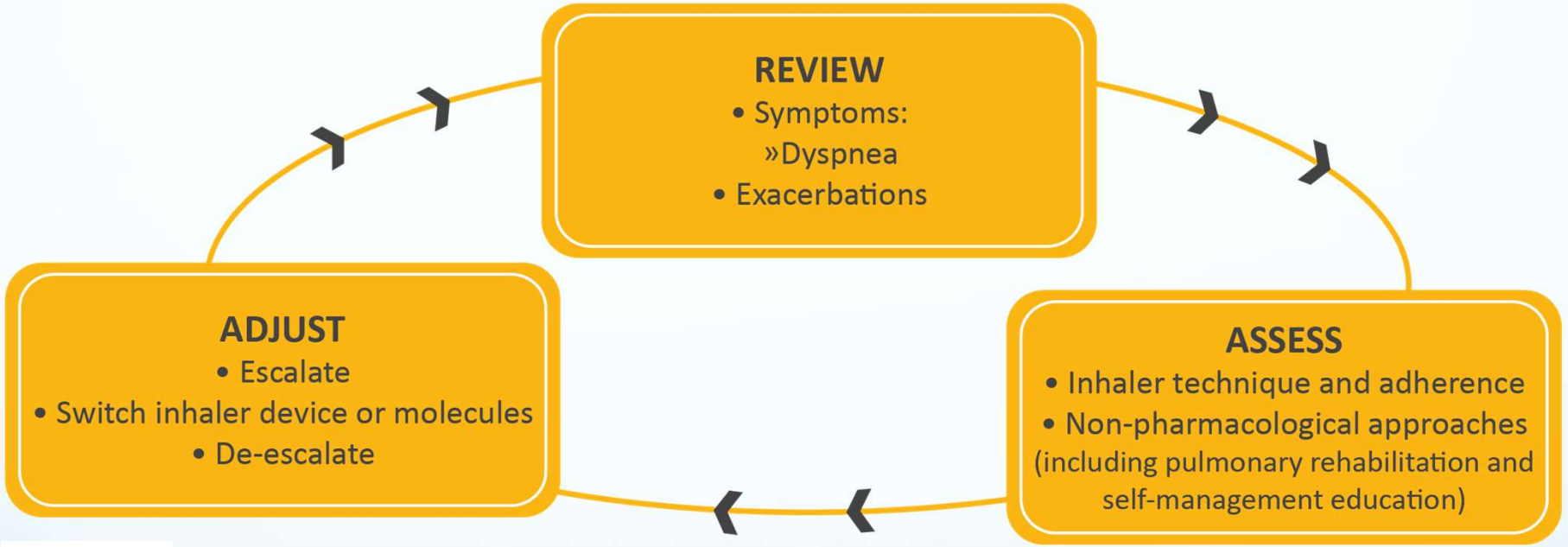
*Consider if highly symptomatic (e.g. CAT > 20)
**Consider if eos ≥ 300

Inhaled Steroids (ICS) – more likely to help:

- Allergic or asthma history
- Eosinophils over 300 cells/ul
- History if benefit

Can always do a steroid challenge, a good idea really, 40 mg PO for 7 days and see how they respond

MANAGEMENT CYCLE



COPD Best Practices

Diagnose with Spirometry or PFT

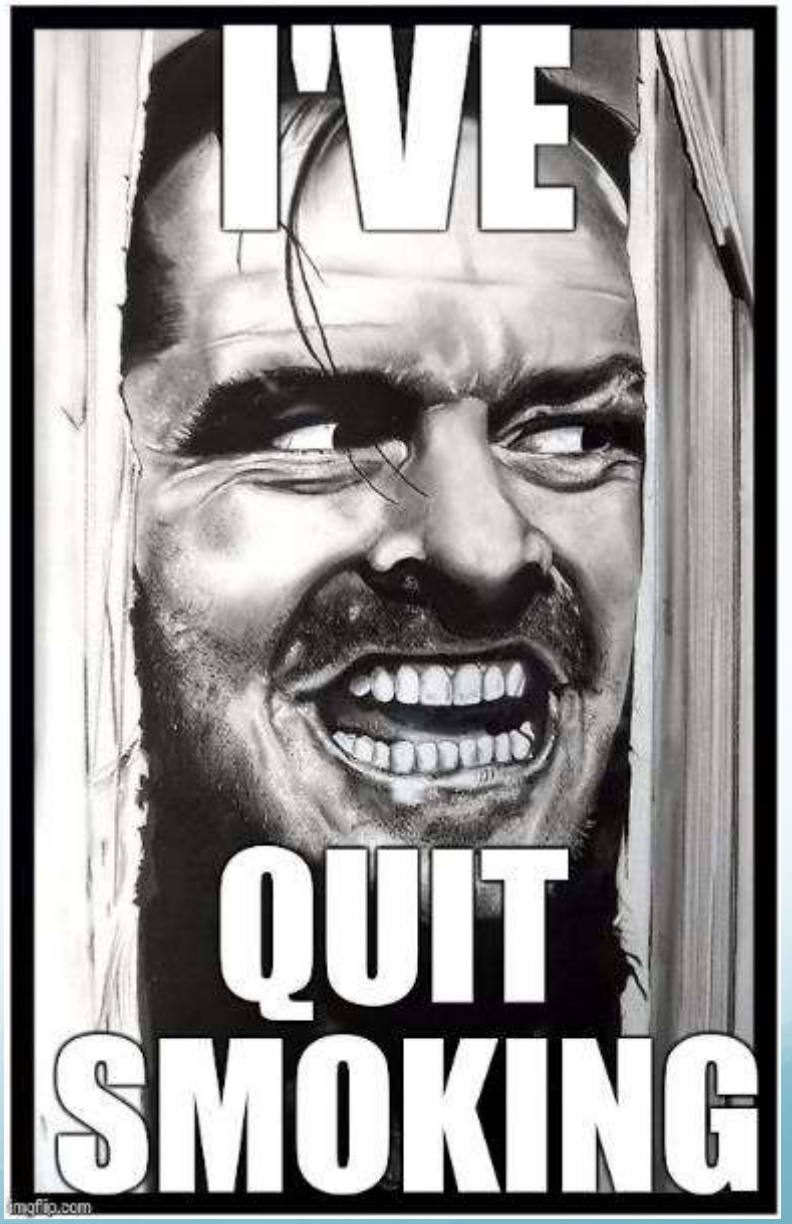
Once this is done set aside the numbers and focus on symptoms and exacerbations/hospitalizations

Use the CAT and figure out what category (A-D) and corresponding medication type, make changes

Questions on this so far?

COPD Best Practices

Smoking Cessation



NON-PHARMACOLOGIC MANAGEMENT OF COPD*

PATIENT GROUP	ESSENTIAL	RECOMMENDED	DEPENDING ON LOCAL GUIDELINES
A	Smoking Cessation (can include pharmacologic treatment)	Physical Activity	Flu Vaccination Pneumococcal Vaccination Pertussis Vaccination Covid-19 Vaccination
B, C and D	Smoking Cessation (can include pharmacologic treatment) Pulmonary Rehabilitation	Physical Activity	Flu Vaccination Pneumococcal Vaccination Pertussis Vaccination Covid-19 Vaccination

*Can include pharmacologic treatment.

Practice Guidelines

Medications for Smoking Cessation: Guidelines from the American Thoracic Society

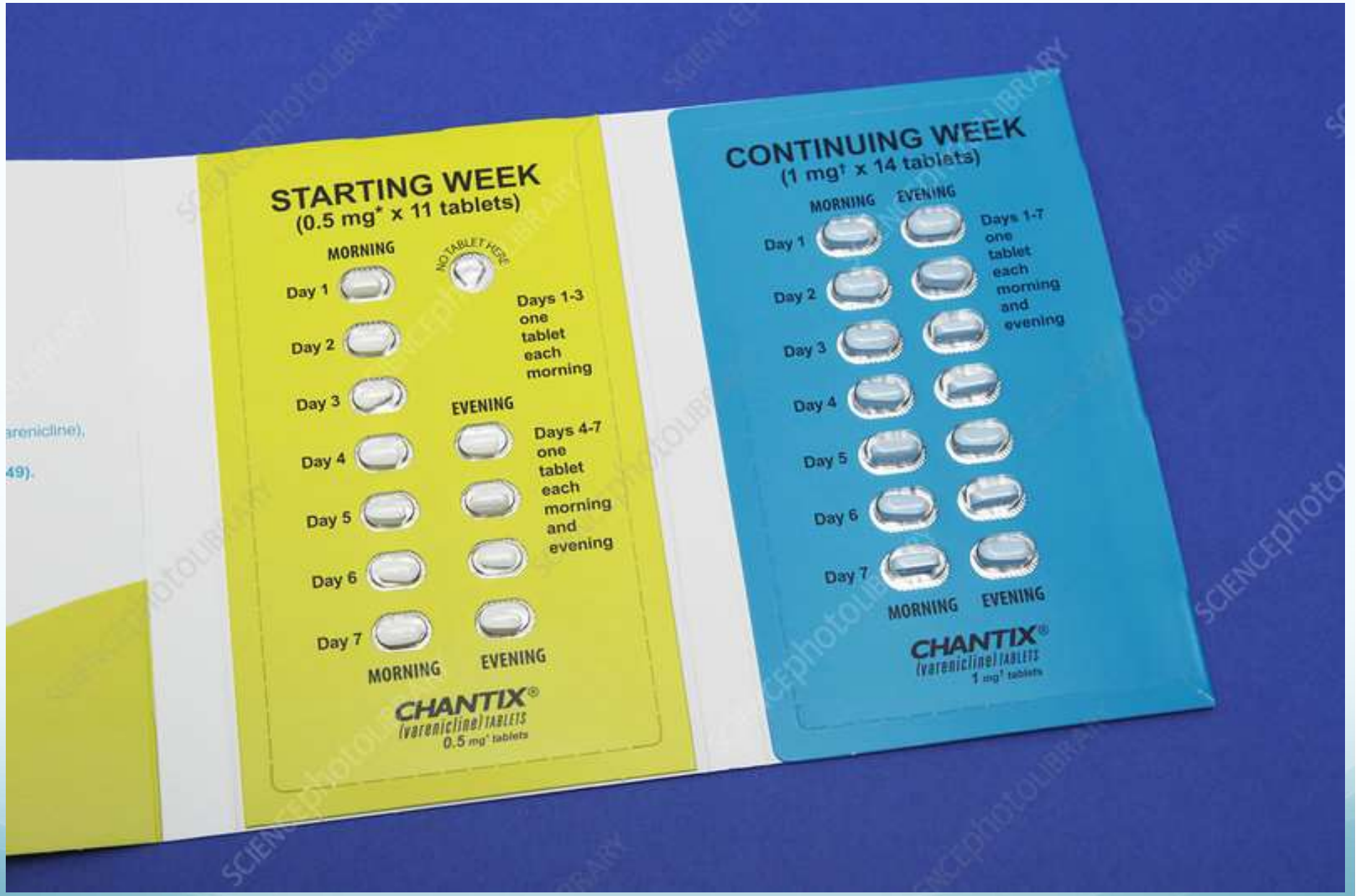
Am Fam Physician. 2021 Mar 15;103(6):380-381.

Author disclosure: No relevant financial affiliations.

Key Points for Practice

- Varenicline is more effective than nicotine patches and bupropion with similar or fewer adverse events, even with comorbid psychiatric or substance abuse conditions.
- Combining varenicline with nicotine patches appears to be more effective than using varenicline alone based on limited evidence.
- For people who smoke and are not ready to quit, prescribing varenicline increases six-month abstinence with an NNT of 6 compared with waiting for readiness.
- Extending treatment beyond 12 weeks increases abstinence, with an NNT of 19 compared with shorter treatment durations.

From the *AFP* Editors

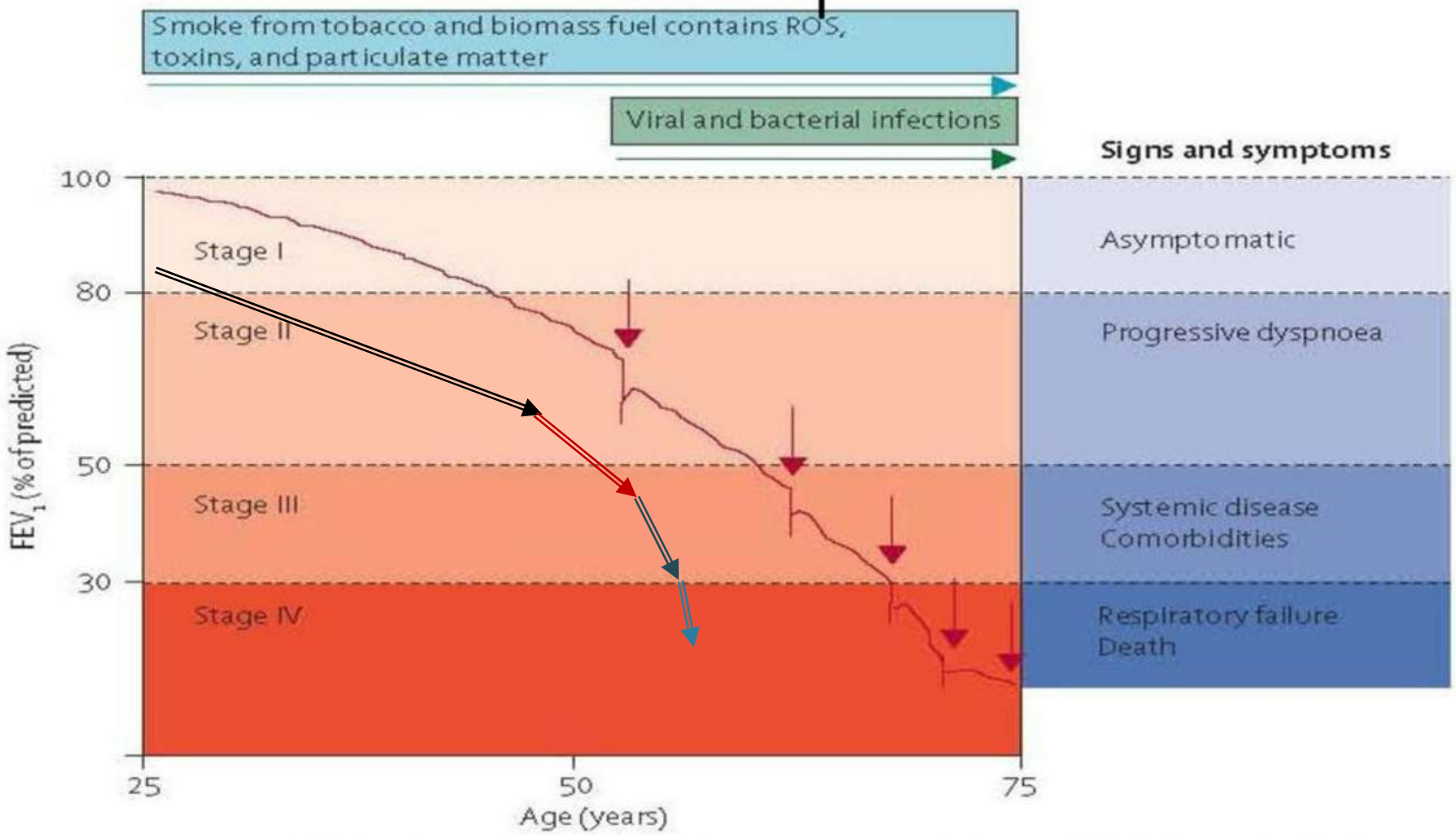


COPD Exacerbations

Exacerbations are not “bumps” in the road like they are for asthma

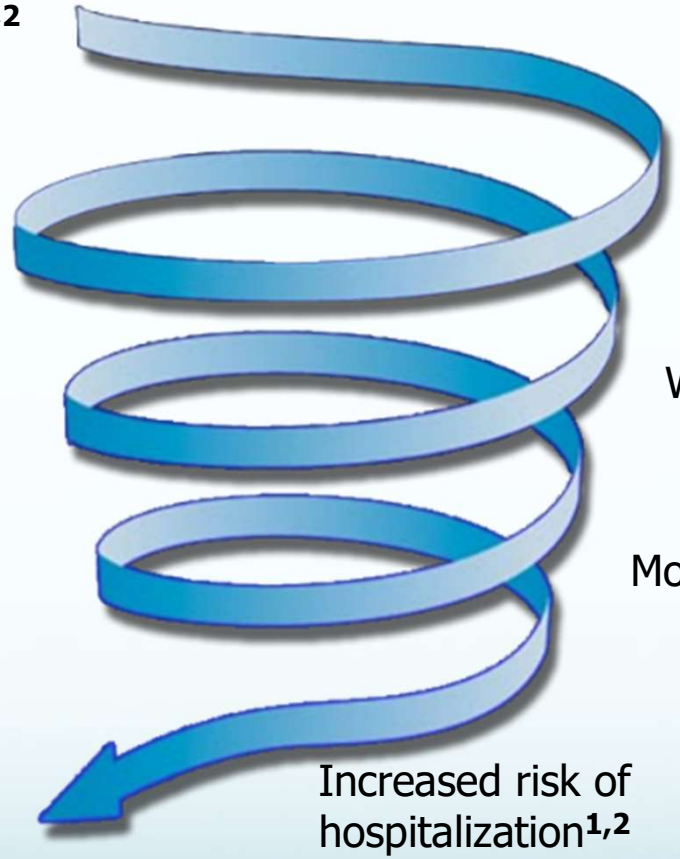
Moderate to severe exacerbations are life altering, patients never recover fully.

COPD exacerbations & Effect on FEV_1



Lancet, Vol. 374, Hansel TT, Barnes PJ, New drugs for exacerbations of COPD, Pages 744-55, 2009

What does an exacerbation mean to a patient?



1. Garcia-Aymerich J *et al*. 2001
2. Donaldson D *et al*. 2002
3. Gore JM *et al*. 2000
4. Seemungal T *et al*. 1998
5. Pauwels P *et al*. 2001
6. Seemungal T *et al*. 2000
7. Garcia-Aymerich J *et al*. 2003
8. Anto JM *et al*. 2001

COPD Exacerbations

Causes – viral make up about 80% of flares in a standard COPD population.

Bacterial infections, increased BLM smoke or toxin exposure

Ran out of meds/noncompliance

COPD Exacerbations

Generally, PO steroids are used:

Consider shorter and lower

40 mg for 3 days and 20 mg for 3 days

Patient controlled taper - 40 mg till they are 50% better then 20 mg till they are close to normal

COPD Exacerbations

Macrolides (or other) should be used for moderate or worse exacerbations.

If you'd like to avoid steroids try Azithromycin 250 mg daily for 10 days.

Have them do their rescue medication Q4H or Q6H for a couple days then move back to PRN.

COPD Exacerbations

Prevent these with vaccines, talks over compliance and cost.

Provide a “Flare Kit” with prednisone and a macrolide, have them start this then call

- **Add a macrolide.** The best available evidence exists for the use of azithromycin, especially in those who are not current smokers.[21,22] Consideration to the development of resistant organisms should be factored into decision-making.
- **Stopping ICS.** This can be considered if there are adverse effects (such as pneumonia) or a reported lack of efficacy. However, a blood eosinophil count ≥ 300 cells /µL identifies patients with the greatest likelihood of experiencing more exacerbations after ICS withdrawal and who subsequently should be followed closely for relapse of exacerbations.[23,24]

COPD Best Practices

Can your patient fully inhale their medication?

Different inhalers require more or less force to inhale the medications

COPD Best Practices

Respiratory Medicine
Volume 118, September 2016, Pages 65-75

Review article

Inhalation device requirements for patients' inhalation maneuvers

Peter Haidl [a], Stefan Heindl [b], Karsten Siemon [a], Maria Bernacka [c], Rolf Michael Cloes [c]

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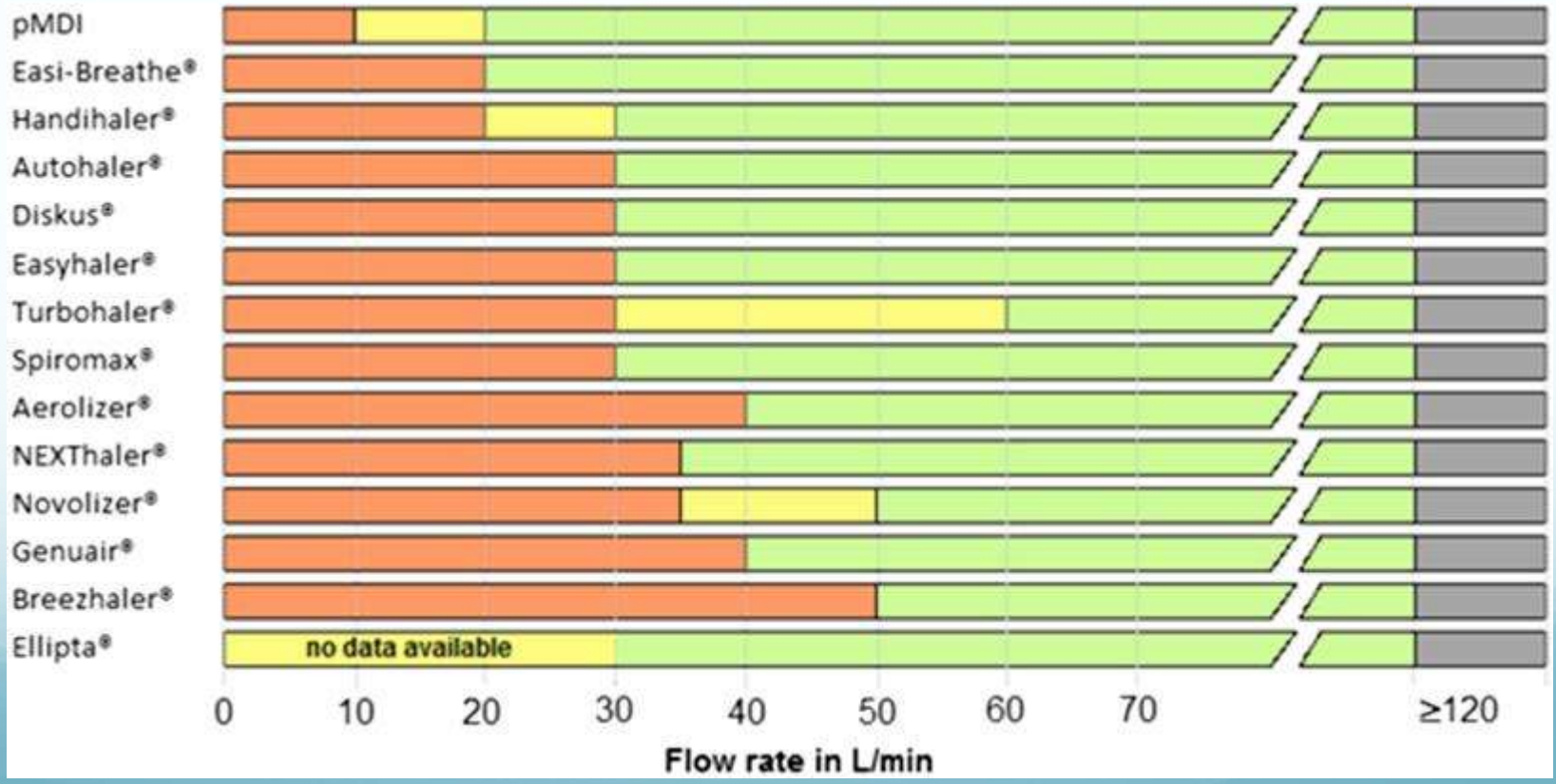
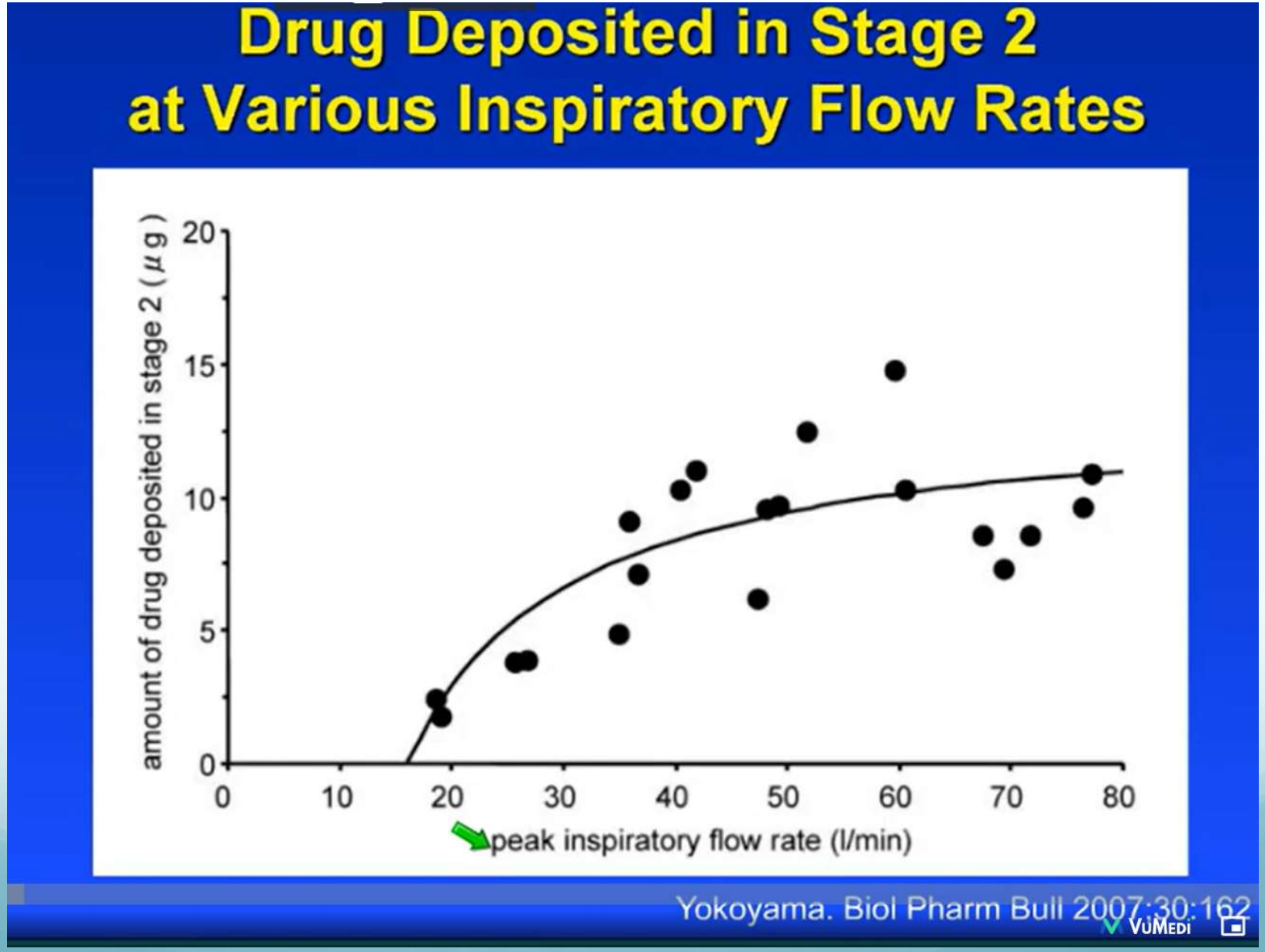


COPD Best Practices



COPD Best Practices

Measure this with an In-Check Device (below)

Can also see if they can “make noise” with their inhaler

Can they hold a Post-it note to their lips?

Do they feel nebulized medication is sig better?

COPD Best Practices

Consider moving patients over to nebulized medications, can be life altering. All three categories have options now (list next slide)

COMMONLY USED MAINTENANCE MEDICATIONS IN COPD*

		DELIVERY OPTIONS			
Generic Drug Name	**Inhaler Type**	***Nebulizer***	***Oral***	***Injection***	**Duration Of Action**
$BETA_2$-AGONISTS					
SHORT-ACTING (SABA)					
Fenoterol	MDI	√	pill, syrup		4-6 hours
Levalbuterol	MDI	√			6-8 hours
Salbutamol (albuterol)	MDI & DPI	√	pill, syrup, extended release tablet	√	4-6 hours 12 hours (ext. release)
Terbutaline	DPI		pill	√	4-6 hours
LONG-ACTING (LABA)					
Arformoterol		√			12 hours
Formoterol	DPI	√			12 hours
Indacaterol	DPI				24 hours
Olodaterol	SMI				24 hours
Salmeterol	MDI & DPI				12 hours
ANTICHOLINERGICS					
SHORT-ACTING (SAMA)					
Ipratropium bromide	MDI	√			6-8 hours
Oxitropium bromide	MDI				7-9 hours
LONG-ACTING (LAMA)					
Aclidinium bromide	DPI, MDI				12 hours
Glycopyrronium bromide	DPI		solution	√	12-24 hours
Tiotropium	DPI, SMI, MDI				24 hours
Umeclidinium	DPI				24 hours
Glycopyrrolate		√			12 hours
Revefenacin		√			24 hours
COMBINATION SHORT-ACTING $BETA_2$-AGONIST PLUS ANTICHOLINERGIC IN ONE DEVICE (SABA/SAMA)					
Fenoterol/ipratropium	SMI	√			6-8 hours
Salbutamol/ipratropium	SMI, MDI	√			6-8 hours
COMBINATION LONG-ACTING $BETA_2$-AGONIST PLUS ANTICHOLINERGIC IN ONE DEVICE (LABA/LAMA)					
Formoterol/aclidinium	DPI				12 hours
Formoterol/glycopyrronium	MDI				12 hours
Indacaterol/glycopyrronium	DPI				12-24 hours
Vilanterol/umeclidinium	DPI				24 hours
Olodaterol/tiotropium	SMI				24 hours
METHYLXANTHINES					
Aminophylline			solution	√	Variable, up to 24 hours
Theophylline (SR)			pill	√	Variable, up to 24 hours
COMBINATION OF LONG-ACTING $BETA_2$-AGONIST PLUS CORTICOSTEROID IN ONE DEVICE (LABA/ICS)					
Formoterol/beclometasone	MDI, DPI				12 hours
Formoterol/budesonide	MDI, DPI				12 hours
Formoterol/mometasone	MDI				12 hours
Salmeterol/fluticasone propionate	MDI, DPI				12 hours
Vilanterol/fluticasone furoate	DPI				24 hours
TRIPLE COMBINATION IN ONE DEVICE (LABA/LAMA/ICS)					
Fluticasone/umeclidinium/vilanterol	DPI				24 hours
Beclometasone/formoterol/glycopyrronium	MDI				12 hours
Budesonide/formoterol/glycopyrrolate	MDI				12 hours
PHOSPHODIESTERASE-4 INHIBITORS					
Roflumilast			pill		24 hours
MUCOLYTIC AGENTS					
Erdosteine			pill		12 hours
Carbocysteine†			pill		
N-acetylcysteine†			pill		

TABLE 3.3

*Not all formulations are available in all countries. In some countries other formulations and dosages may be available. † Dosing regimens are under discussion. MDI = metered dose inhaler; DPI = dry powder inhaler; SMI = soft mist inhaler. Note that glycopyrrolate & glycopyrronium are the same compound.

Alpha-1 Antitrypsin (AAT) Deficiency

AAT is a genetic form of COPD

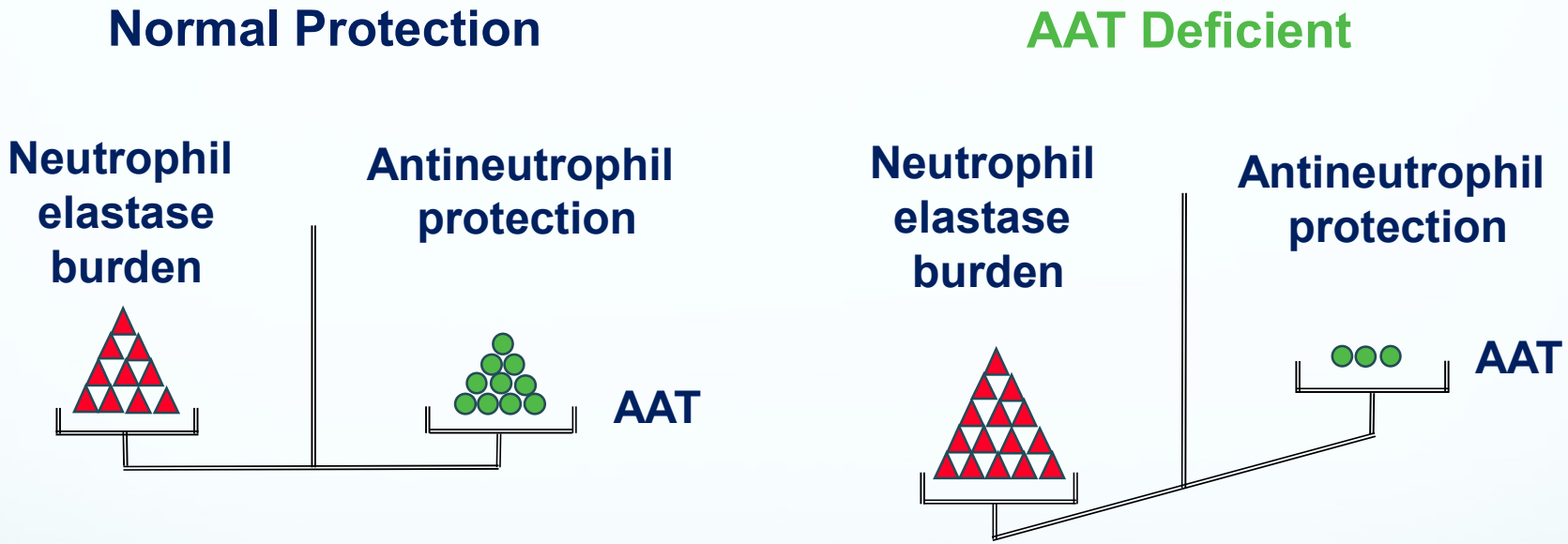
Lab testing is the only way to diagnose

There is treatment available

AAT, alpha$_1$-antitrypsin; COPD, chronic obstructive pulmonary disease.

Campbell EJ, et al. *Chest.* 2000;117(5 suppl 1):303S. Brantly M. *Clin Chem.* 2006;52(12):2180-2181. de Serres FJ. *Environ Health Perspect.* 2003;111(16):1851-1854. de Serres FJ, et al. *Clin Genet.* 2003;64(5):382-397. Campos MA, et al. *Chest.* 2005;128(3):1179-1186. Silverman EK, Sandhaus RA. *N Engl J Med.* 2009;360(26):2749-2757. 7. About AAT deficiency. http://www.ruleitout.org/hcp/about-aat-deficiency/. Accessed August 3, 2016.

Low Levels of AAT Leave Lung Tissue Vulnerable



AAT, alpha$_1$-antitrypsin.

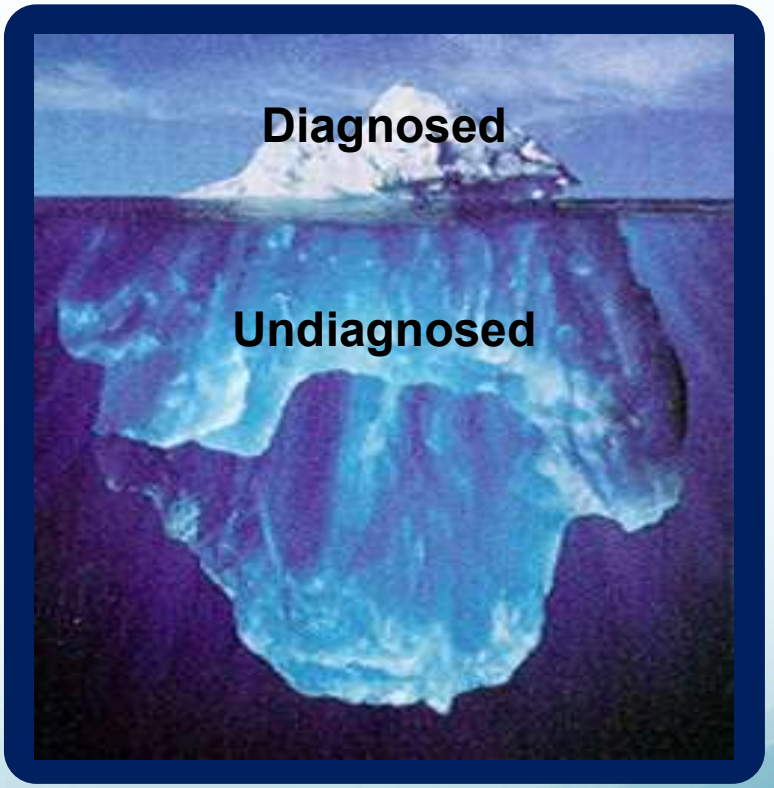
Köhnlein T, Welte T. *Alpha-1 Antitrypsin Deficiency: Clinical Aspects and Management.* Bremen, Germany: UNI-MED Verlag AG; 2007.

Alpha-1 Is Not a Rare Disease but One That Is Rarely Diagnosed[1]

The Problem

- Up to 25 million Americans have an abnormal allele (S or Z)[2]
- An estimated 100,000 Americans have alpha-1[3]
- **>90% remain undiagnosed[4,5]**
- **Early diagnosis and treatment is associated with health benefits[6]**
- Most common inherited risk factor for COPD (1 in 10 COPD patients)[6]

Alpha-1 in the US[3]



COPD, chronic obstructive pulmonary disease.

1. de Serres FJ. *Environ Health Perspect.* 2003;111(16):1851-1854. 2. de Serres FJ, et al. *Clin Genet.* 2003;64(5):382-397. 3. Campos MA, et al. *Chest.* 2005;128(3):1179-1186. 4. Silverman EK, Sandhaus RA. *N Engl J Med.* 2009;360(26):2749-2757. 5. About AAT deficiency. http://www.ruleitout.org/hcp/about-aat-deficiency/. Accessed August 3, 2016. 6. Brantly M. *Clin Chem.* 2006;52(12):2180-2181.

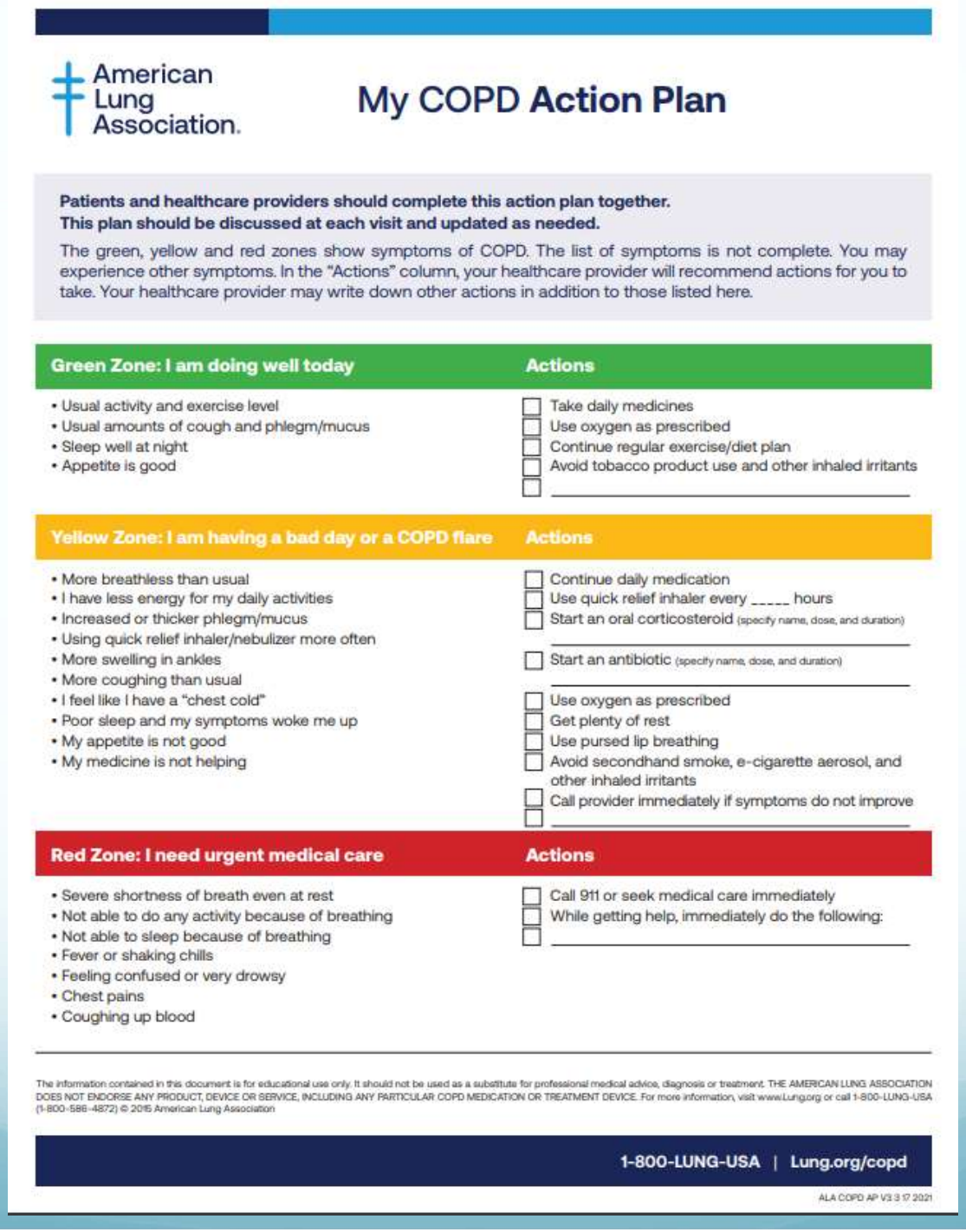
American Thoracic Society Guidelines Recommend Testing ALL Symptomatic COPD Patients

The American Thoracic Society Guidelines
• Test all adults with symptomatic COPD, **regardless of smoking history**
• Test all adults with symptomatic emphysema, **regardless of smoking history**
• Test all adults with symptomatic asthma whose airflow obstruction is incompletely reversible after bronchodilator therapy
• Test asymptomatic patients with persistent obstruction on pulmonary function tests and with identifiable risk factors (eg, smoking, occupational exposure)
• Test siblings of individuals with alpha-1

COPD, chronic obstructive pulmonary disease.

American Thoracic Society/European Respiratory Society. *Am J Respir Crit Care Med*. 2003;168(7):818-900.

https://www.lung.org/getmedia/c7657648-a30f-4465-af92-fc762411922e/copd-action-plan.pdf.pdf



American Lung Association.

My COPD Action Plan

Patients and healthcare providers should complete this action plan together.
This plan should be discussed at each visit and updated as needed.

The green, yellow and red zones show symptoms of COPD. The list of symptoms is not complete. You may experience other symptoms. In the "Actions" column, your healthcare provider will recommend actions for you to take. Your healthcare provider may write down other actions in addition to those listed here.

Green Zone: I am doing well today	Actions
• Usual activity and exercise level • Usual amounts of cough and phlegm/mucus • Sleep well at night • Appetite is good	☐ Take daily medicines ☐ Use oxygen as prescribed ☐ Continue regular exercise/diet plan ☐ Avoid tobacco product use and other inhaled irritants ☐ _____

Yellow Zone: I am having a bad day or a COPD flare	Actions
• More breathless than usual • I have less energy for my daily activities • Increased or thicker phlegm/mucus • Using quick relief inhaler/nebulizer more often • More swelling in ankles • More coughing than usual • I feel like I have a "chest cold" • Poor sleep and my symptoms woke me up • My appetite is not good • My medicine is not helping	☐ Continue daily medication ☐ Use quick relief inhaler every _____ hours ☐ Start an oral corticosteroid (specify name, dose, and duration) _____ ☐ Start an antibiotic (specify name, dose, and duration) _____ ☐ Use oxygen as prescribed ☐ Get plenty of rest ☐ Use pursed lip breathing ☐ Avoid secondhand smoke, e-cigarette aerosol, and other inhaled irritants ☐ Call provider immediately if symptoms do not improve ☐ _____

Red Zone: I need urgent medical care	Actions
• Severe shortness of breath even at rest • Not able to do any activity because of breathing • Not able to sleep because of breathing • Fever or shaking chills • Feeling confused or very drowsy • Chest pains • Coughing up blood	☐ Call 911 or seek medical care immediately ☐ While getting help, immediately do the following: ☐ _____

Thank you for attending, reach out to me if you have questions!

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