ECHO IDAHO

Optimizing COPD Care: Latest Guideline Changes & Clinical Insights

June 2, 2025

Brian Bizik, MS, PA-C, DFAAPA

Immediate Past-President – American Academy of Physician Assistants in Allergy, Asthma and Immunology

Pulmonology Care Coordinator, Terry Reilly Health Centers

208-404-5338
brianbizik@yahoo.com

University of Idaho
School of Health and Medical Professions

Brian Bizik, presenter for this educational event, is a speaker and on the advisory board for the following companies: AstraZeneca, Pfizer and Dermavant Pharmaceuticals. He is also an advisor for Regeneron and a speaker for Grifols Pharmaceuticals. All of the relevant financial relationships listed for these individuals have been mitigated.

Sponsored by:

Project ECHO

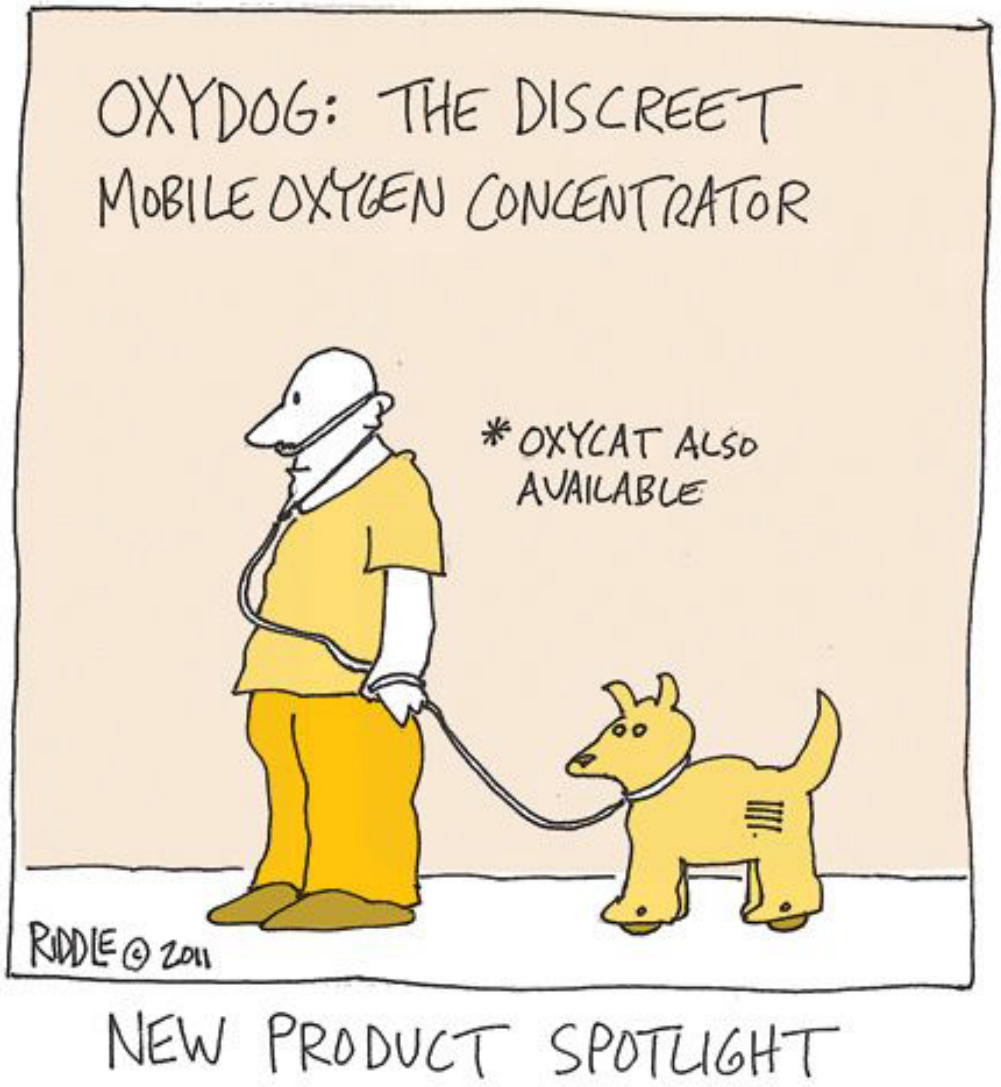
Disclosures

INDUSTRY AFFILIATIONS
Grifols Pharmaceutical - speaker, consultant
AstraZeneca – advisory board
Regeneron – advisory board
Sanofi – speaker, advisory board
Dermavant – speaker, consultant

CLINICAL RESEARCH
2017 – Sub-I, Genetech Zenyatta Severe Asthma Study
2016 – Sub-I, Biota Human Rhinovirus Study
2015 – Sub-I, Sanofi Traverse Severe Asthma Study
2015 – Sub-I, Sanofi Liberty Severe Asthma Study
2013 – Study Coordinator: MediVector Influenza Study

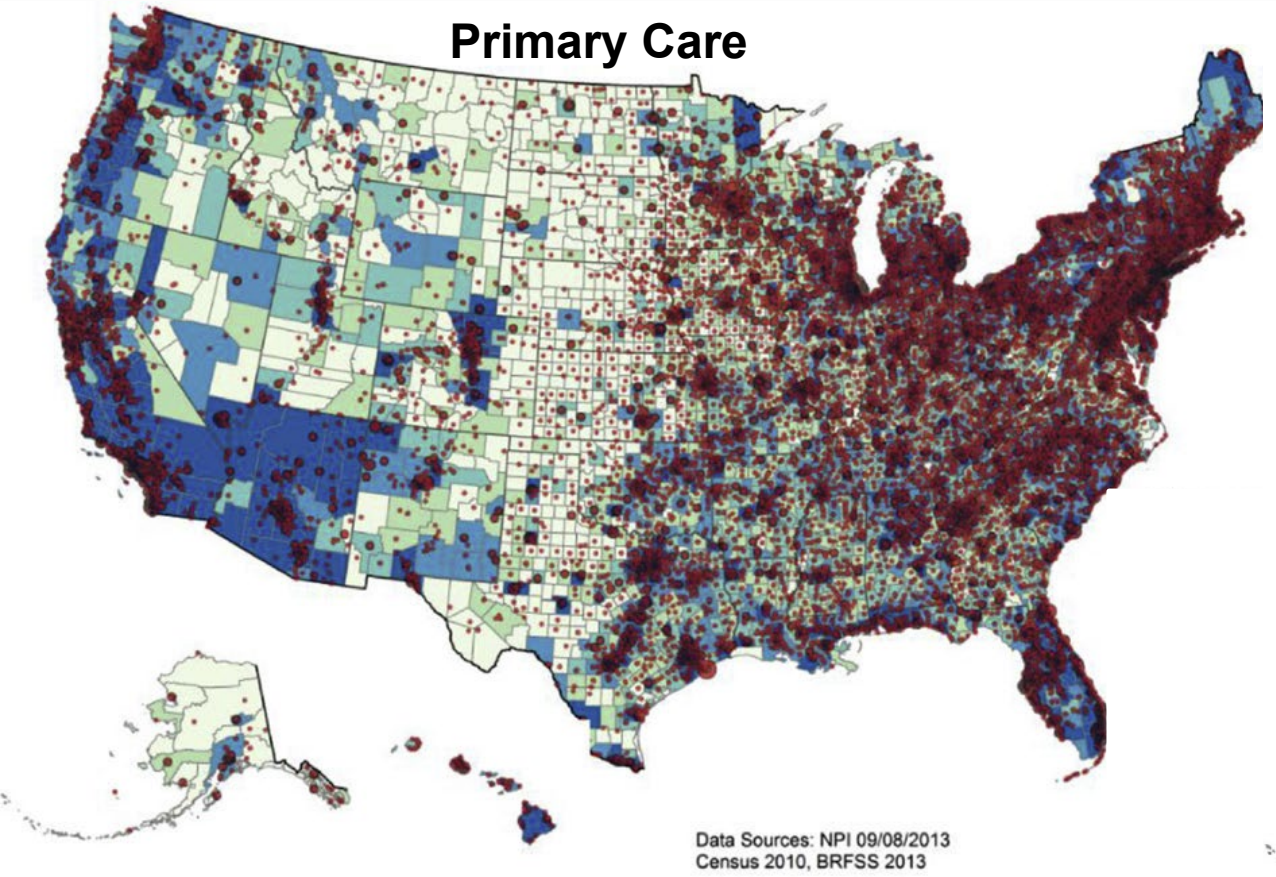
Brian Bizik does not intend to discuss the use of any off-label use/unapproved use of drugs or devices.

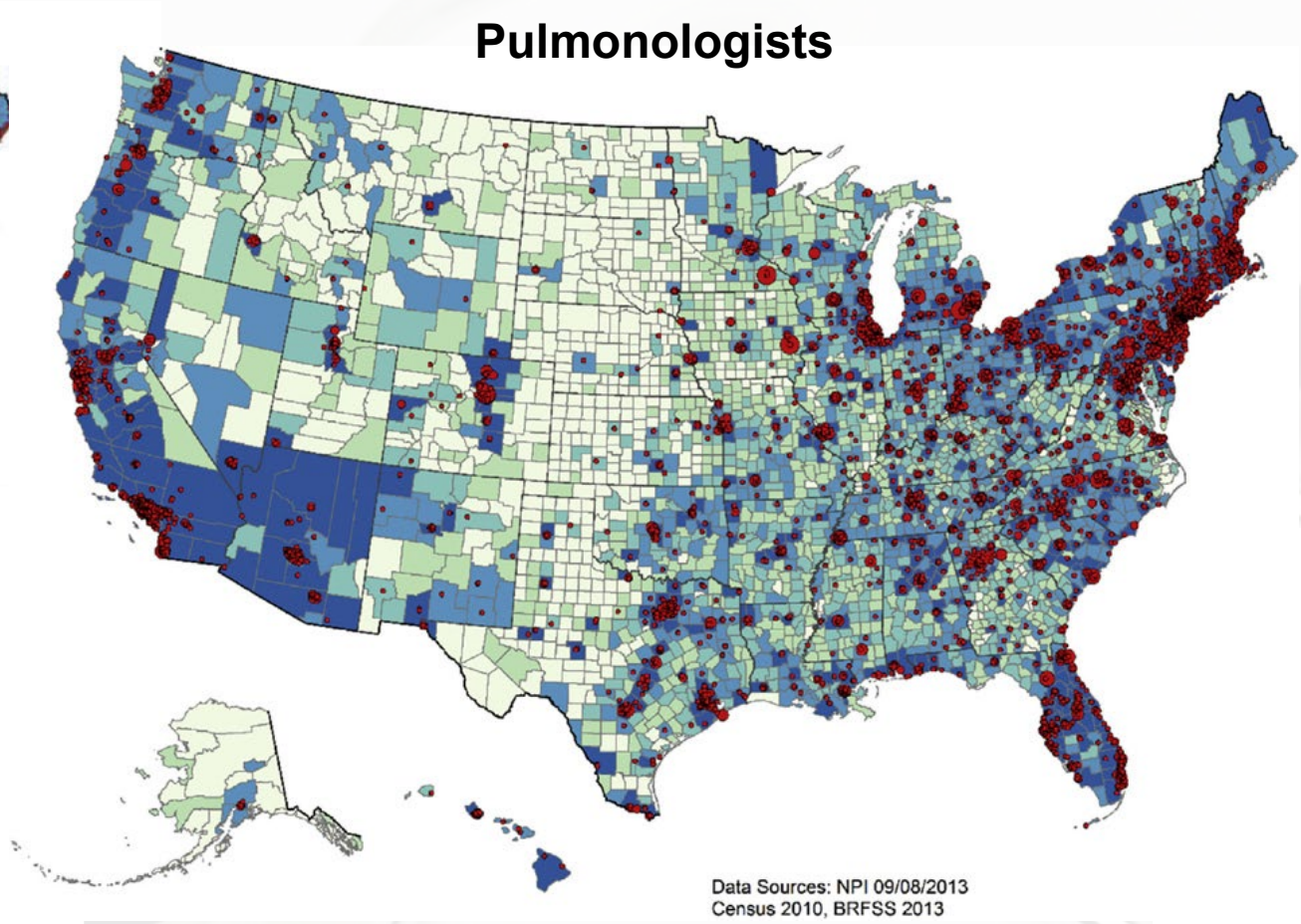
- **Review medication classes for COPD and new inhalers**
- **Talk over the guidelines, focus on the changes that you must know**
- **Some tips for personalized respiratory care/exacerbations and smoking cessation**



Plan For Today

Nearly all FP providers must treat COPD





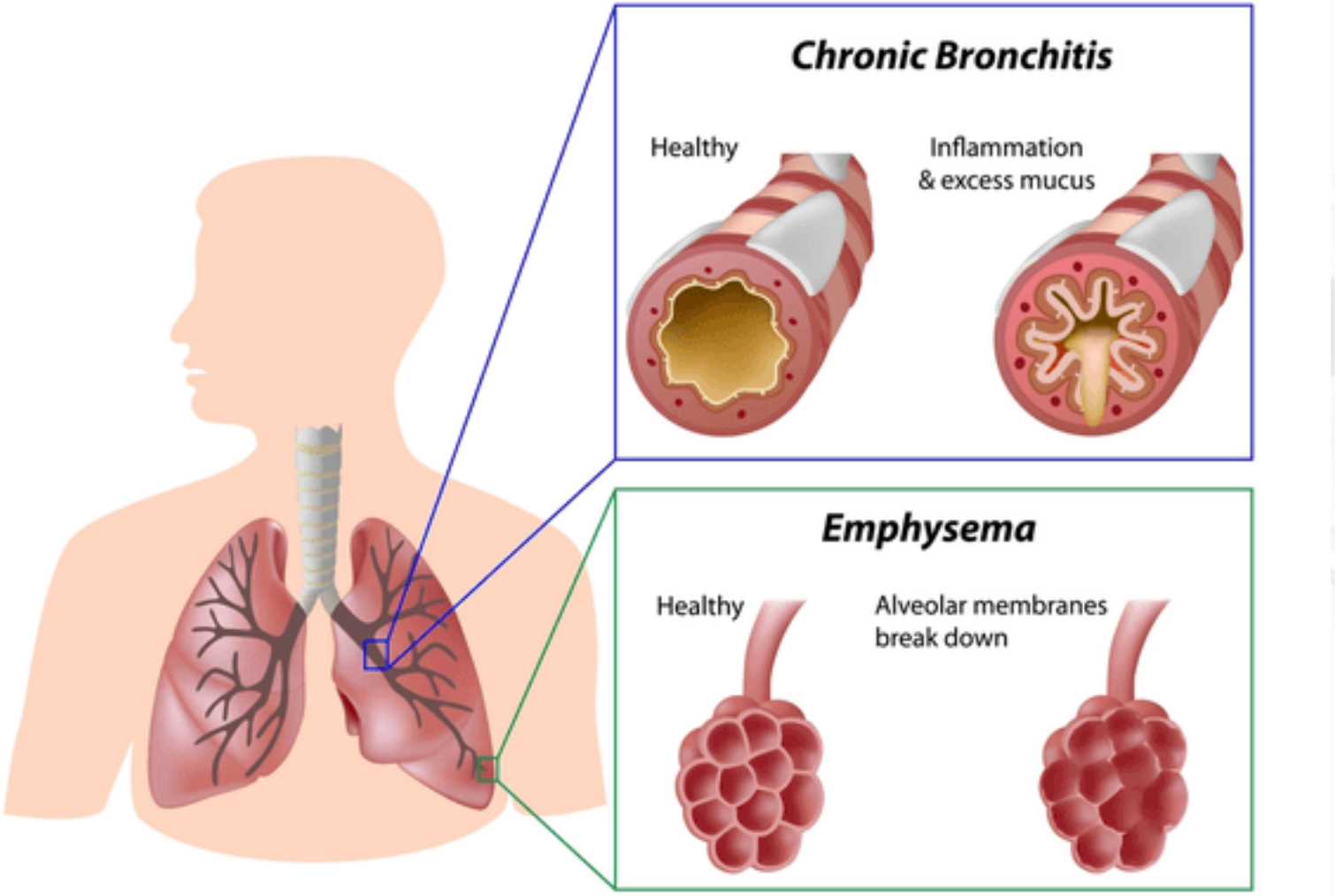
Croft JB, et al. *Chest*. 2016;150(3):544-53.

Asthma and COPD

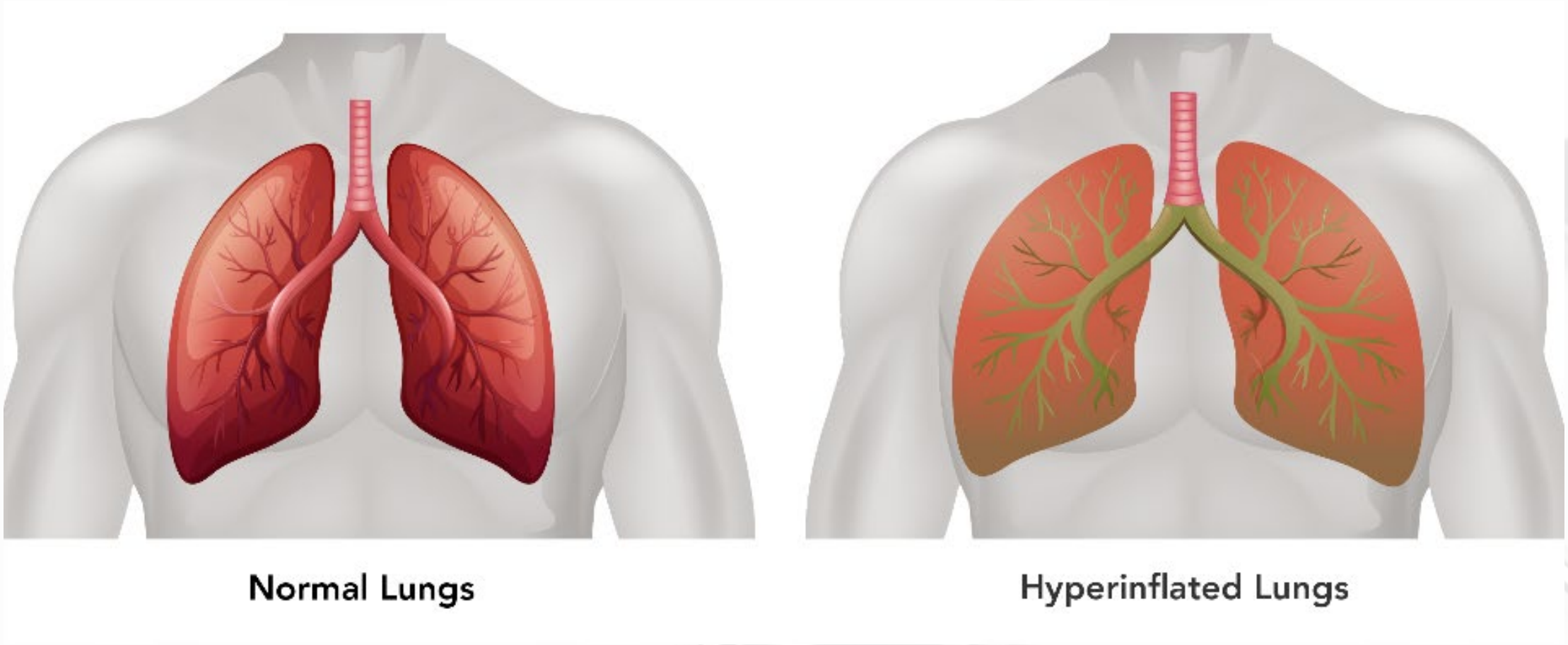
- **Asthma – bronchoconstriction, airway inflammation, mucous production**

- **COPD – Tissue destruction, chronic cough, due to exposure**

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 inhale but MUCH harder to exhale, air is trapped, stale.



Respiratory medications:
We have three categories of medications

Albuterol

Short – SABA
Long – LABA

Bronchodilators

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

Code for English Inhalers

Code for Spanish Inhalers

2024 Respiratory Treatments

Allergy & Asthma Network

American College of Allergy, Asthma & Immunology

VIATRIS

Theravance Biopharma

= DOSE INDICATOR
G = GENERIC AVAILABLE
N = NEBULIZER VIAL
DISEASE STATES:
A = ASTHMA
C = COPD

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

- **Albuterol Sulfate Inhalation Solution** — 0.63, 1.5, 2.5 mg; 3 mL — G N
- **ProAir® Digihaler™** — 90 mcg — albuterol sulfate inhalation powder — A
- **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®** — 0.31, 0.63, 1.25 mg; 3 mL — levalbuterol hydrochloride inhalation solution — A G N
- **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

- **Brovana®** — 15 mg; 2 mL — arformoterol tartrate inhalation solution — C N
- **Perforomist®** — 20 mcg; 2 mL — formoterol fumarate inhalation solution — C N
- **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
- **Fluticasone Propionate Diskus Inhalation Powder** — 50, 100, 250 mcg — Approved generic of Flovent Diskus — A
- **Fluticasone Propionate HFA** — 44, 110, 220 mcg — Approved generic of Flovent HFA — A
- **Pulmicort Flexhaler®** — 90, 180 mcg — budesonide inhalation powder — A
- **Pulmicort Respules®** — 0.25, 0.50, 1.0 mg; 2 mL — budesonide inhalation suspension — A G N
- **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
- **Ipratropium Bromide Inhalation Solution** — 0.5, 2.5 mg; 2.5 mL — G N
- **Spiriva® Handi Haler®** — 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
- **Yupelri®** — 175 mcg; 3 mL — revefenacin inhalation solution — N

PDE4 INHIBITORS

target lung inflammation and reduce exacerbations

- **Daliresp®** — 250, 500 mcg — roflumilast — 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 C 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®** — 50/25, 100/25, 200/25 mcg — fluticasone furoate and vilanterol inhalation powder — A C G
- **Breyna™** — 80/4.5, 160/45 mcg — budesonide and formoterol fumarate dihydrate (approved generic of Symbicort) — 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 (approved generic of Advair Diskus) — 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 — 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

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

- **Combivent® Respimat®** — 20/100 mcg — ipratropium bromide and albuterol — C
- **Ipratropium Bromide and Albuterol Sulfate Inhalation Solution** — 2.5 mg; 3 mL — C G

contain inhaled corticosteroid and short-acting beta$_2$-agonist (SABA)

- **AirSupra®** — 80, 90 mcg — budesonide and albuterol — A

BIOLOGICS

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

- **Cinqair®** — 62.5/25 ml — reslizumab — A
- **Dupixent®** — 100, 200, 300 mg — dupilumab — A
- **Fasenra™** — 30 mg — benralizumab — A
- **Nucala®** — 100 mg — mepolizumab — A
- **Tezspire™** — 210 mg — tezepelumab-ekko — A
- **Xolair®** — 75 to 375 mg — omalizumab — A

LEUKOTRIENE MODIFIERS

block chemicals called leukotrienes that cause airway inflammation; available as tablet or granules

- **Singulair®** — 4, 5, 10 mg — montelukast — A
- **Zafirlukast** — 10, 20 mg — zafirlukast — A
- **Zyflo CR®** — 600 mg — zileuton — A

Respiratory medications:
We have three categories of medications

Steroids

All long acting

Reduce most every aspect of inflammation

Medication Categories: Steroids

- Corticosteroids bind to the glucocorticoid receptor and mediate changes in gene expression that lead to multiple downstream effects over hours to days.
- Almost every inflammation mediator is reduced
- Many actions, all with a central goal of reducing inflammation at the source
- Most aspects of inflammation are affected

2024 Respiratory Treatments

Allergy & Asthma Network

800.878.4403 • AllergyAsthmaNetwork.org

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.

American College of Allergy, Asthma & Immunology

VIATRIS

Theravance Biopharma

DOSE INDICATOR
G = GENERIC AVAILABLE
N = NEBULIZER VIAL
DISEASE STATES:
A = ASTHMA
C = COPD

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

- **Albuterol Sulfate Inhalation Solution** — 0.63, 1.5, 2.5 mg; 3 mL — G N
- **ProAir® Digihaler™** — 90 mcg — albuterol sulfate inhalation powder — 1 2 3 4 — A
- **ProAir RespiClick®** — 90 mcg — albuterol sulfate inhalation powder — 1 2 3 4 — A
- **Proventil® HFA** — 90 mcg — albuterol sulfate — 1 2 3 4 — A G
- **Ventolin® HFA** — 90 mcg — albuterol sulfate — 1 2 3 4 — A G
- **Xopenex®** — 0.31, 0.63, 1.25 mg; 3 mL — levalbuterol hydrochloride inhalation solution — A G N
- **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

- **Brovana®** — 15 mg; 2 mL — arformoterol tartrate inhalation solution — C N
- **Perforomist®** — 20 mcg; 2 mL — formoterol fumarate inhalation solution — C N
- **Serevent® Diskus®** — 50 mcg — salmeterol xinafoate inhalation powder — 1 2 3 4 — A C
- **Striverdi® Respimat®** — 2.5 mcg — olodaterol hydrochloride — 1 2 3 4 — 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 — 1 2 3 4 — A
- **ArmonAir® Digihaler™** — 55, 113, 232 mcg — fluticasone propionate inhalation powder — 1 2 3 4 — A
- **Arnuity® Ellipta®** — 50, 100, 200 mcg — fluticasone furoate inhalation powder — 1 2 3 4 — A
- **Asmanex® HFA** — 50, 100, 200 mcg — mometasone furoate — 1 2 3 4 — A
- **Asmanex® Twisthaler®** — 110, 220 mcg — mometasone furoate inhalation powder — 1 2 3 4 — A
- **Fluticasone Propionate Diskus Inhalation Powder** — 50, 100, 250 mcg — Approved generic of Flovent Diskus — 1 2 3 4 — A
- **Fluticasone Propionate HFA** — 44, 110, 220 mcg — Approved generic of Flovent HFA — 1 2 3 4 — A
- **Pulmicort Flexhaler®** — 90, 180 mcg — budesonide inhalation powder — 1 2 3 4 — A
- **Pulmicort Respules®** — 0.25, 0.50, 1.0 mg; 2 mL — budesonide inhalation suspension — A G N
- **QVAR® Redihaler™** — 40, 80 mcg — beclomethasone dipropionate — 1 2 3 4 — 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 — 1 2 3 4 — C

LONG-ACTING

- **Incruse® Ellipta®** — 62.5 mcg — umeclidinium inhalation powder — 1 2 3 4 — C
- **Ipratropium Bromide Inhalation Solution** — 0.5, 2.5 mg; 2.5 mL — C G N
- **Spiriva® HandiHaler®** — 18 mcg — tiotropium bromide inhalation powder — C
- **Spiriva® Respimat®** — 1.25, 2.5 mcg — tiotropium bromide — 1 2 3 4 — A C
- **Tudorza™ Pressair™** — 400 mcg — aclidinium bromide inhalation powder — 1 2 3 4 — C
- **Yupelri®** — 175 mcg; 3 mL — revefenacin inhalation solution — C N

PDE4 INHIBITORS

target lung inflammation and reduce exacerbations

- **Daliresp®** — 250, 500 mcg — roflumilast — 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 — 1 2 3 4 — A C G
- **Advair® HFA** — 45/21, 115/21, 230/21 mcg — fluticasone propionate and salmeterol xinafoate — 1 2 3 4 — A G
- **AirDuo® Digihaler™** — 55/14, 113/14, 232/14 mcg — fluticasone propionate and salmeterol inhalation powder — 1 2 3 4 — A
- **AirDuo® RespiClick®** — 55/14, 113/14, 232/14 mcg — fluticasone propionate and salmeterol inhalation powder — 1 2 3 4 — A G
- **Breo® Ellipta®** — 50/25, 100/25, 200/25 mcg — fluticasone furoate and vilanterol inhalation powder — 1 2 3 4 — A C G
- **Breyna™** — 80/4.5, 160/45 mcg — budesonide and formoterol fumarate dihydrate (approved generic of Symbicort) — 1 2 3 4 — A C
- **Dulera®** — 50/5, 100/5, 200/5 mcg — mometasone furoate and formoterol fumarate dihydrate — 1 2 3 4 — A
- **Symbicort®** — 80/4.5, 160/4.5 mcg — budesonide and formoterol fumarate dihydrate — 1 2 3 4 — A C G
- **Wixela™ Inhub™** — 100/50, 250/50, 500/50 mcg — fluticasone propionate and salmeterol xinafoate (approved generic of Advair Diskus) — 1 2 3 4 — 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 — 1 2 3 4 — C
- **Bevespi Aerosphere®** — 9/4.8 mcg — glycopyrrolate and formoterol fumarate — 1 2 3 4 — C
- **Duaklir® Pressair®** — 400, 12 mcg — aclidinium bromide and formoterol fumarate — 1 2 3 4 — C
- **Stiolto™ Respimat®** — 2.5/2.5 mcg — tiotropium bromide and olodaterol — 1 2 3 4 — 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 — 1 2 3 4 — A C
- **Breztri Aerosphere™** — 160/9/4.8 mcg — budesonide, glycopyrrolate and formoterol fumarate — 1 2 3 4 — C

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

- **Combivent® Respimat®** — 20/100 mcg — ipratropium bromide and albuterol — 1 2 3 4 — C
- **Ipratropium Bromide and Albuterol Sulfate Inhalation Solution** — 2.5 mg; 3 mL — C G

contain inhaled corticosteroid and short-acting beta$_2$-agonist (SABA)

- **AirSupra®** — 80, 90 mcg — budesonide and albuterol — 1 2 3 4 — A

BIOLOGICS

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

- **Cinqair®** — 62.5/25 mL — reslizumab — A
- **Dupixent®** — 100, 200, 300 mg — dupilumab — A
- **Fasenra™** — 30 mg — benralizumab — A
- **Nucala®** — 100 mg — mepolizumab — A
- **Tezspire™** — 210 mg — tezepelumab-ekko — A
- **Xolair®** — 75 to 375 mg — omalizumab — A

LEUKOTRIENE MODIFIERS

block chemicals called leukotrienes that cause airway inflammation; available as tablet or granules

- **Singulair®** — 4, 5, 10 mg — montelukast — A
- **Zafirlukast** — 10, 20 mg — zafirlukast — A
- **Zyflo CR®** — 600 mg — zileuton — A

Respiratory medications:
We have three categories of medications

SAMA/LAMA

Short – SAMA
Long – LAMA

Anticholinergic and constriction prevention

Medication Categories: SAMA/LAMA

- Ipratropium bromide is our only short acting muscarinic, and there are several long acting
- These are anti-cholinergic medications that dry up secretions and help prevent constriction

2024 Respiratory Treatments

Allergy & Asthma Network

800.878.4403 • AllergyAsthmaNetwork.org

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.

American College of Allergy, Asthma & Immunology

VIATRIS

Theravance Biopharma

DHIS = DOSE INDICATOR
G = GENERIC AVAILABLE
N = NEBULIZER VIAL
DISEASE STATES:
A = ASTHMA
C = COPD

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

- **Albuterol Sulfate Inhalation Solution** — 0.63, 1.5, 2.5 mg; 3 mL — G N
- **ProAir® Digihaler™** — 90 mcg — albuterol sulfate inhalation powder — DHIS A
- **ProAir RespiClick®** — 90 mcg — albuterol sulfate inhalation powder — DPI A
- **Proventil® HFA** — 90 mcg — albuterol sulfate — DHIS A G
- **Ventolin® HFA** — 90 mcg — albuterol sulfate — DHIS A G
- **Xopenex®** — 0.31, 0.63, 1.25 mg; 3 mL — levalbuterol hydrochloride inhalation solution — A G N
- **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

- **Brovana®** — 15 mg; 2 mL — arformoterol tartrate inhalation solution — C N
- **Perforomist®** — 20 mcg; 2 mL — formoterol fumarate inhalation solution — C N
- **Serevent® Diskus®** — 50 mcg — salmeterol xinafoate inhalation powder — DPI A C
- **Striverdi® Respimat®** — 2.5 mcg — olodaterol hydrochloride — DHIS 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 — DPI A
- **ArmonAir® Digihaler™** — 55, 113, 232 mcg — fluticasone propionate inhalation powder — DPI A
- **Arnuity® Ellipta®** — 50, 100, 200 mcg — fluticasone furoate inhalation powder — DHIS A
- **Asmanex® HFA** — 50, 100, 200 mcg — mometasone furoate — DPI A
- **Asmanex® Twisthaler®** — 110, 220 mcg — mometasone furoate inhalation powder — DHIS A
- **Fluticasone Propionate Diskus Inhalation Powder** — 50, 100, 250 mcg — Approved generic of Flovent Diskus — DPI A
- **Fluticasone Propionate HFA** — 44, 110, 220 mcg — Approved generic of Flovent HFA — DPI A
- **Pulmicort Flexhaler®** — 90, 180 mcg — budesonide inhalation powder — DHIS A
- **Pulmicort Respules®** — 0.25, 0.50, 1.0 mg; 2 mL — budesonide inhalation suspension — A G N
- **QVAR® Redihaler™** — 40, 80 mcg — beclomethasone dipropionate — DHIS 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 — DPI C

LONG-ACTING

- **Incruse® Ellipta®** — 62.5 mcg — umeclidinium inhalation powder — DHIS C
- **Ipratropium Bromide Inhalation Solution** — 0.5, 2.5 mg; 2.5 mL — C G N
- **Spiriva® HandiHaler®** — 18 mcg — tiotropium bromide inhalation powder — C
- **Spiriva® Respimat®** — 1.25, 2.5 mcg — tiotropium bromide — DPI A C
- **Tudorza™ Pressair™** — 400 mcg — aclidinium bromide inhalation powder — DHIS C
- **Yupelri®** — 17.5 mcg; 3 mL — revefenacin inhalation solution — C N

PDE4 INHIBITORS

target lung inflammation and reduce exacerbations

- **Daliresp®** — 250, 500 mcg — roflumilast — 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 — DPI A C G
- **Advair® HFA** — 45/21, 115/21, 230/21 mcg — fluticasone propionate and salmeterol xinafoate — DPI A G
- **AirDuo® Digihaler™** — 55/14, 113/14, 232/14 mcg — fluticasone propionate and salmeterol inhalation powder — DPI A
- **AirDuo® RespiClick®** — 55/14, 113/14, 232/14 mcg — fluticasone propionate and salmeterol inhalation powder — DPI A G
- **Breo® Ellipta®** — 50/25, 100/25, 200/25 mcg — fluticasone furoate and vilanterol inhalation powder — DPI A C G
- **Breyna™** — 80/4.5, 160/45 mcg — budesonide and formoterol fumarate dihydrate (approved generic of Symbicort) — DPI A C
- **Dulera®** — 50/5, 100/5, 200/5 mcg — mometasone furoate and formoterol fumarate dihydrate — DHIS A
- **Symbicort®** — 80/4.5, 160/4.5 mcg — budesonide and formoterol fumarate dihydrate — DPI A C G
- **Wixela™ Inhub™** — 100/50, 250/50, 500/50 mcg — fluticasone propionate and salmeterol xinafoate (approved generic of Advair Diskus) — DHIS 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 — DHIS C
- **Bevespi Aerosphere®** — 9/4.8 mcg — glycopyrrolate and formoterol fumarate — DPI C
- **Duaklir® Pressair®** — 400, 12 mcg — aclidinium bromide and formoterol fumarate — DPI C
- **Stiolto™ Respimat®** — 2.5/2.5 mcg — tiotropium bromide and olodaterol — DPI 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 — DPI A C
- **Breztri Aerosphere™** — 160/9/4.8 mcg — budesonide, glycopyrrolate and formoterol fumarate — DPI C

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

- **Combivent® Respimat®** — 20/100 mcg — ipratropium bromide and albuterol — DPI C
- **Ipratropium Bromide and Albuterol Sulfate Inhalation Solution** — 2.5 mg; 3 mL — C G

contain inhaled corticosteroid and short-acting beta$_2$-agonist (SABA)

- **AirSupra®** — 80, 90 mcg — budesonide and albuterol — DPI A

BIOLOGICS

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

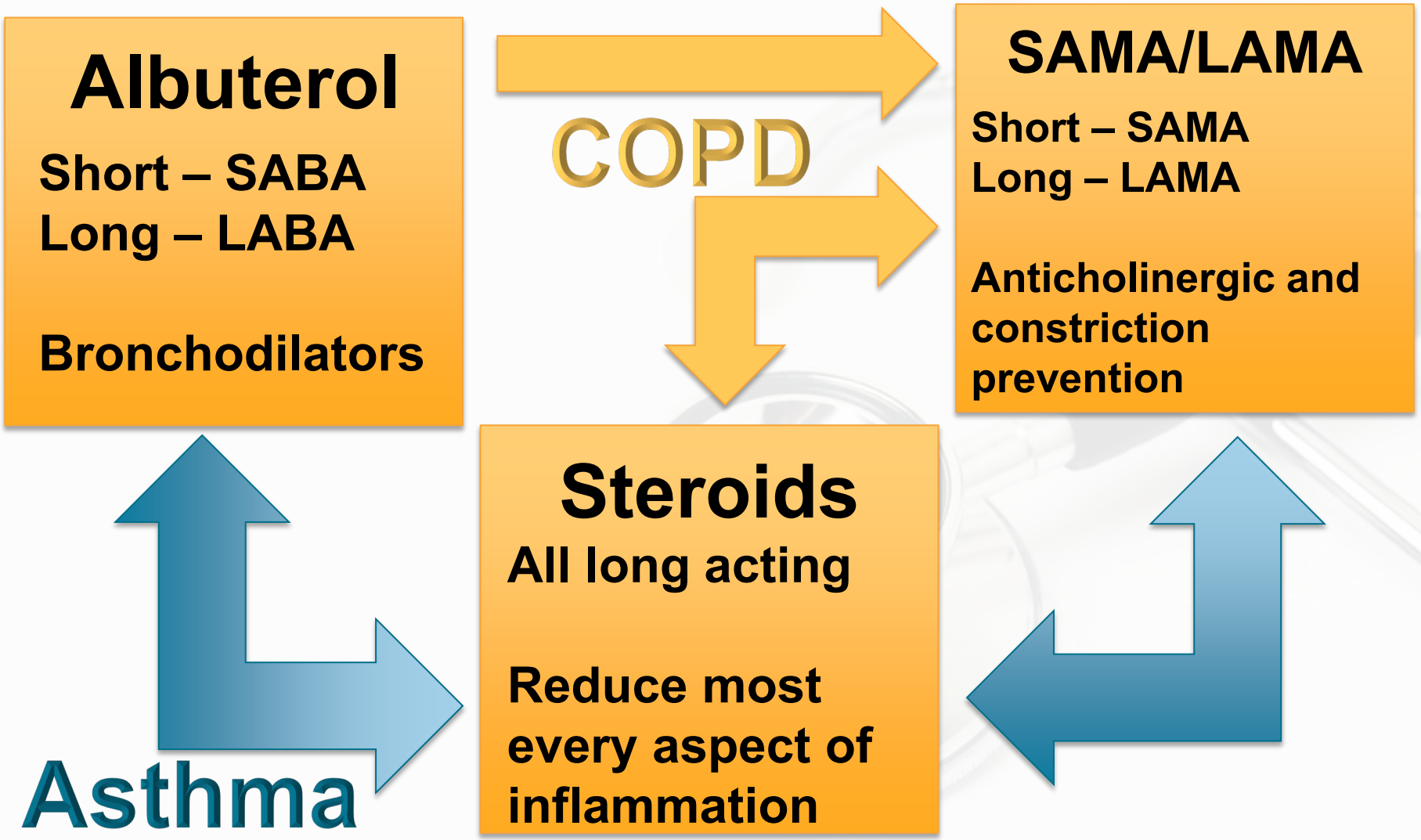
- **Cinqair®** — 62.5/25 mL — reslizumab — A
- **Dupixent®** — 100, 200, 300 mg — dupilumab — A
- **Fasenra™** — 30 mg — benralizumab — A
- **Nucala®** — 100 mg — mepolizumab — A
- **Tezspire™** — 210 mg — tezepelumab-ekko — A
- **Xolair®** — 75 to 375 mg — omalizumab — A

LEUKOTRIENE MODIFIERS

block chemicals called leukotrienes that cause airway inflammation; available as tablet or granules

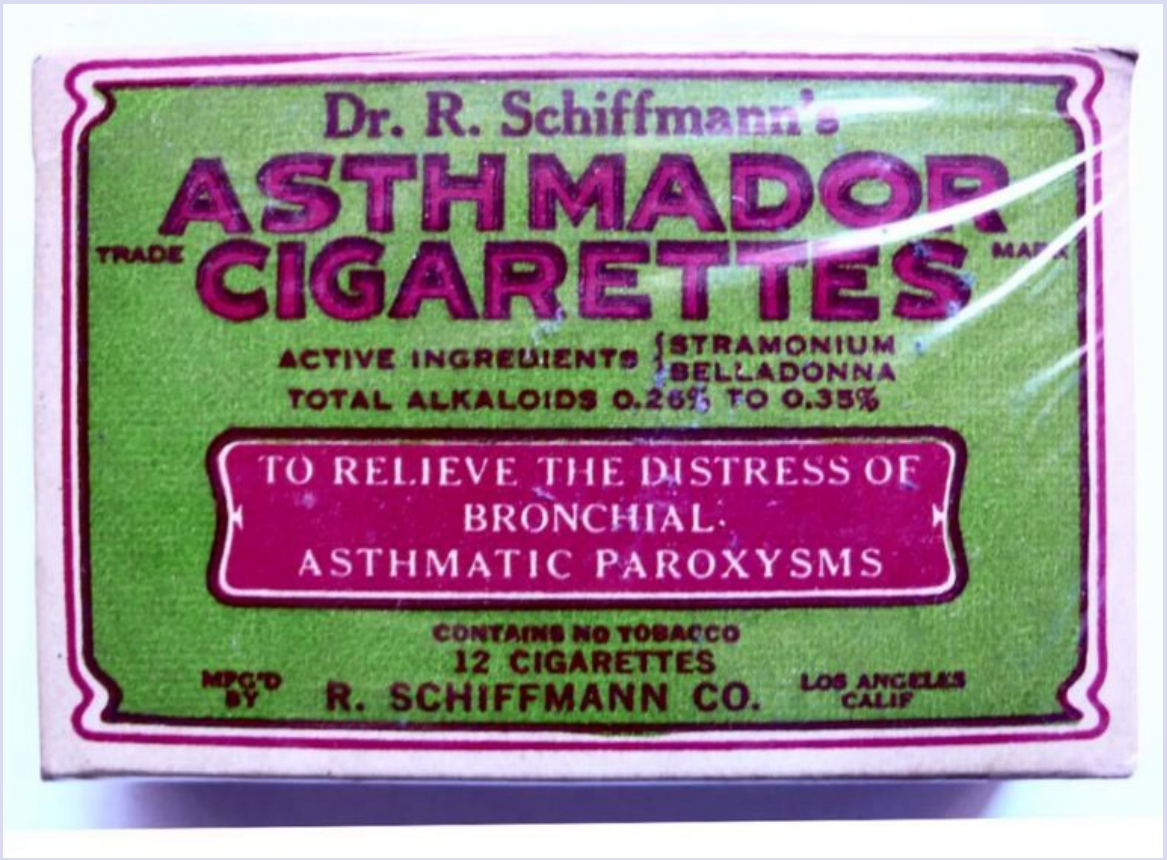
- **Singulair®** — 4, 5, 10 mg — montelukast — A
- **Zafirlukast** — 10, 20 mg — zafirlukast — A
- **Zyflo CR®** — 600 mg — zileuton — A

Respiratory medications:
We have three categories of medications



Random Fun Facts For No Apparent Reason

Asthma Cigarettes were effective treatment – they contained atropine – which is ipratropium



FOR REFERENCE

RESPTREC®
RESPIRATORY TRAINING & EDUCATOR COURSE

COPD MEDICATIONS

www.resptrec.org
www.lungsask.ca

Short-Acting Bronchodilators

SAMA
(Short-Acting Muscarinic Antagonist)
USE REGULARLY or PRN

Atrovent® MDI
(ipratropium bromide)
20 mcg/dose

Duration: 4-6h
Company: BI
*nebules also available

Company Key
AZ – AstraZeneca Canada Inc.
BI – Boehringer Ingelheim Canada Ltd.
GSK – GlaxoSmithKline Inc.
Novartis – Novartis Pharmaceuticals Canada Inc.
Valeant – Valeant Canada
Viatris – Viatris

SABA
(Short-Acting Beta2-Agonist)
USE REGULARLY or PRN

Airomir™ MDI
(salbutamol sulphate)
100 mcg/dose

Duration: 4-6h
Company: Valeant

Bricanyl® Turbuhaler®
(terbutaline sulphate)
0.5 mg/dose

Duration: 4-6h
Company: AZ

Ventolin® Diskus®
(salbutamol sulphate)
200 mcg/dose

Duration: 4-6h
Company: GSK

Ventolin® MDI
(salbutamol sulphate)
100 mcg/dose

Duration: 4-6h
Company: GSK
*nebules and generic brands available

Long-Acting Bronchodilators

LAMA
(Long-Acting Muscarinic Antagonist)
USE REGULARLY

Incruse™ Ellipta®
(umeclidinium bromide)
62.5 mcg/dose

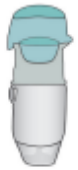
Duration: 24h
Company: GSK

Seebri® Breezhaler®
(glycopyrronium bromide)
50 mcg/dose

Duration: 24h
Company: Novartis

Spiriva® Handihaler®
(tiotropium bromide monohydrate)
18 mcg/dose

Duration: 24h
Company: BI



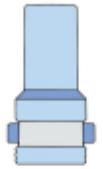
Spiriva® Respimat®
(tiotropium bromide monohydrate)
2.5 mcg/dose

Duration: 24h
Company: BI

Tudorza® Genuair®
(aclidinium bromide)
400 mcg/dose

Duration: 12h
Company: AZ

LABA
(Long-Acting Beta2-Agonist)
USE REGULARLY



Foradil® Aerolizer®
(formoterol fumarate)
12 mcg/dose

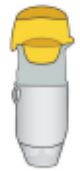
Duration: 12h
Company: Novartis

Onbrez® Breezhaler®
(indacaterol maleate)
75 mcg/dose

Duration: 24h
Company: Novartis

Serevent® Diskus®
(salmeterol xinafoate)
50 mcg/dose

Duration: 12h
Company: GSK



Striverdi® Respimat®
(olodaterol hydrochloride)
2.5 mcg/dose

Duration: 24h
Company: BI
*Approved by Health Canada but may not be available yet

Combination Inhalers

ICS/LABA
(Inhaled Corticosteroid/Long-Acting Beta2-Agonist)
USE REGULARLY

*only the Advair® Diskus® has been approved for COPD use.

Advair® Diskus®
(fluticasone propionate/ salmeterol xinafoate)
100/50; 250/50; 500/50 mcg doses

Duration: 12h
Company: GSK

Breo™ Ellipta®
(fluticasone furoate/ vilanterol trifenatate)
100/25 mcg/dose

Duration: 24h
Company: GSK

Symbicort® Turbuhaler®
(budesonide/formoterol fumarate)
100/6; 200/6; 400/12 FORTE mcg doses

Duration: 12h
Company: AZ

Wixela® Inhub®
(fluticasone propionate/ salmeterol xinafoate)
100/50; 250/50; 500/50 mcg doses

Duration: 12h
Company: Viatris

ICS/LAMA/LABA
USE REGULARLY

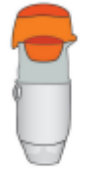
Breztri™ Aerosphere®
(budesonide/glycopyronium/ formoterol fumarate)
182/8.2/5.8 mcg/dose

Duration: 12h
Company: AZ

Trelegy™ Ellipta®
(fluticasone furoate/ umeclidinium bromide/ vilanterol trifenatate)
100/62.5/25 mcg/dose

Duration: 24h
Company: GSK

SAMA and SABA
USE REGULARLY



Combivent® Respimat®
(ipratropium bromide/ salbutamol sulphate)
20/100 mcg/dose

Duration: 4-6h
Company: BI
*nebules also available

LAMA and LABA
USE REGULARLY

Anoro™ Ellipta®
(umeclidinium bromide/ vilanterol trifenatate)
62.5/25 mcg/dose

Duration: 24h
Company: GSK

Duaklir® Genuair®
(aclidinium bromide/ formoterol fumarate dehydrate)
400/12 mcg/dose

Duration:12h
Company: AZ

Inspiolto® Respimat®
(tiotropium bromide monohydrate/olodaterol hydrochloride)
2.5/2.5 mcg dose

Duration: 24h
Company: BI

Ultibro® Breezhaler®
(glycopyrronium bromide/ indacaterol maleate)
50/110 mcg/dose

Duration: 24h
Company: Novartis

Global Initiative for
Chronic Obstructive
Lung Disease

2025
REPORT

Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease

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.’

Proposed Taxonomy (Etiotypes) for COPD

Figure 1.2

Classification	Description
Genetically determined COPD (COPD-G)	Alpha-1 antitrypsin deficiency (AATD) Other genetic variants with smaller effects acting in combination
COPD due to abnormal lung development (COPD-D)	Early life events, including premature birth and low birthweight, among others
Environmental COPD	
Cigarette smoking COPD (COPD-C)	• Exposure to tobacco smoke, including *in utero* or via passive smoking • Vaping or e-cigarette use • Cannabis
Biomass and pollution exposure COPD (COPD-P)	Exposure to household pollution, ambient air pollution, wildfire smoke, occupational hazards
COPD due to infections (COPD-I)	Childhood infections, tuberculosis-associated COPD, HIV-associated COPD
COPD & asthma (COPD-A)	Particularly childhood asthma
COPD of unknown cause (COPD-U)	

*Adapted from Celli et al. (2022) and Stolz et al. (2022)

2025 Teaching Slide Set

COPD Diagnosis Considerations

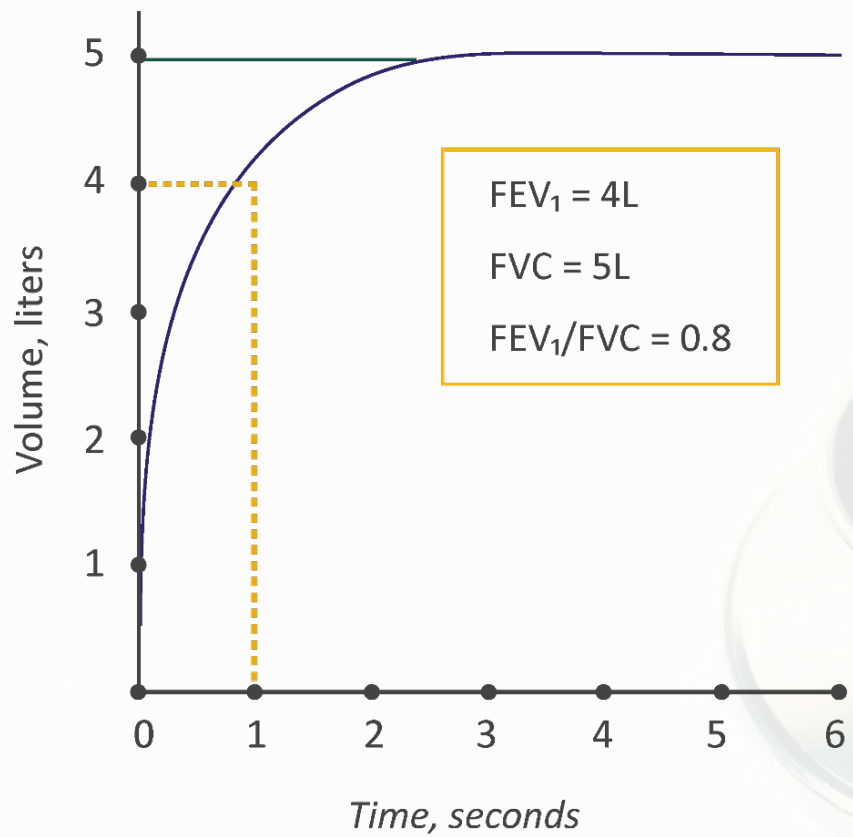
Consider COPD and perform spirometry if any of these indicators are present in a patient over 40 years of age:

Symptom	Detail
Dyspnea that is:	• Progressive over time • Characteristically worse with exercise • Persistent
Chronic cough	• May be intermittent and unproductive • Recurrent wheeze
Chronic sputum production	• Any pattern of chronic sputum production may indicate COPD
Recurrent LRTIs	
History of risk factors	• Host factors (e.g., genetic factors, congenital/developmental abnormalities) • Tobacco smoke • Smoke from home cooking and heating fuels • Occupational dusts, vapors, fumes, gases and other chemicals
Family history of COPD and/or childhood factors	• Examples include: low birthweight, childhood respiratory infections, Hx of Alpha-1 Antitrypsin Deficiency or unexplained pulmonary disease

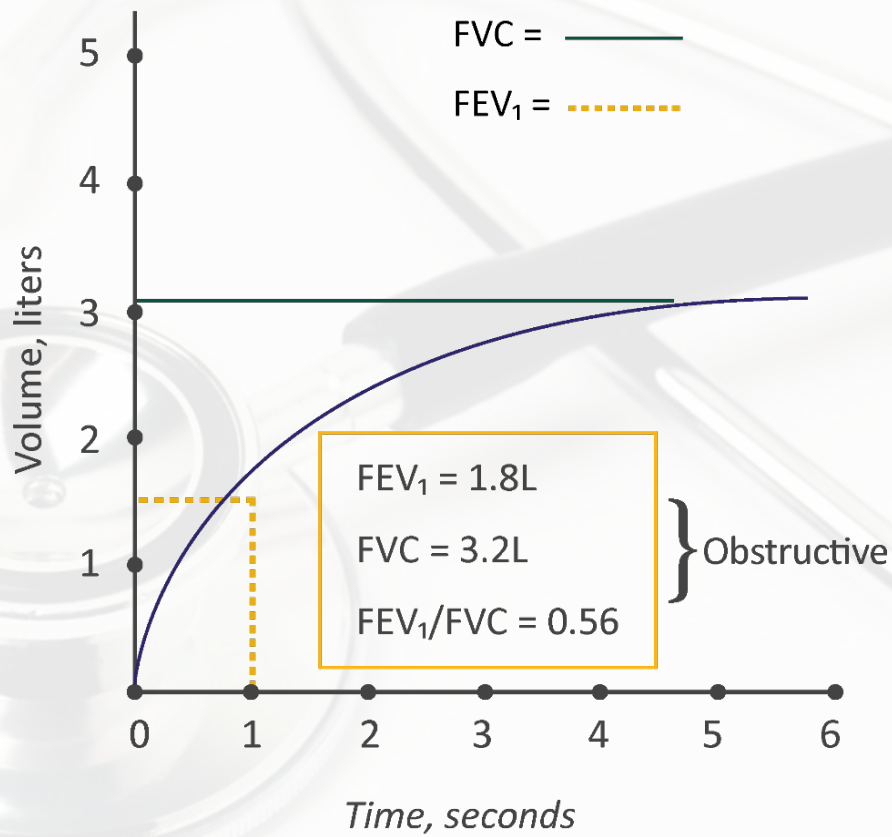
These indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of a diagnosis of COPD. COPD, chronic obstructive pulmonary disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease; LRTI, lower respiratory tract infection.
2023 GOLD Report. https://goldcopd.org/2023-gold-report-2/.

Spirometry or PFTs are Required

SPIROMETRY - NORMAL TRACE



SPIROMETRY - OBSTRUCTIVE DISEASE



COPD, chronic obstructive pulmonary disease; GOLD, Global Initiative for Chronic Obstructive Lung Disease; FEV_1, forced expiratory volume in one second; FVC, forced vital capacity.
2023 GOLD Report. https://goldcopd.org/2023-gold-report-2/.

COPD Diagnosis Considerations

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:

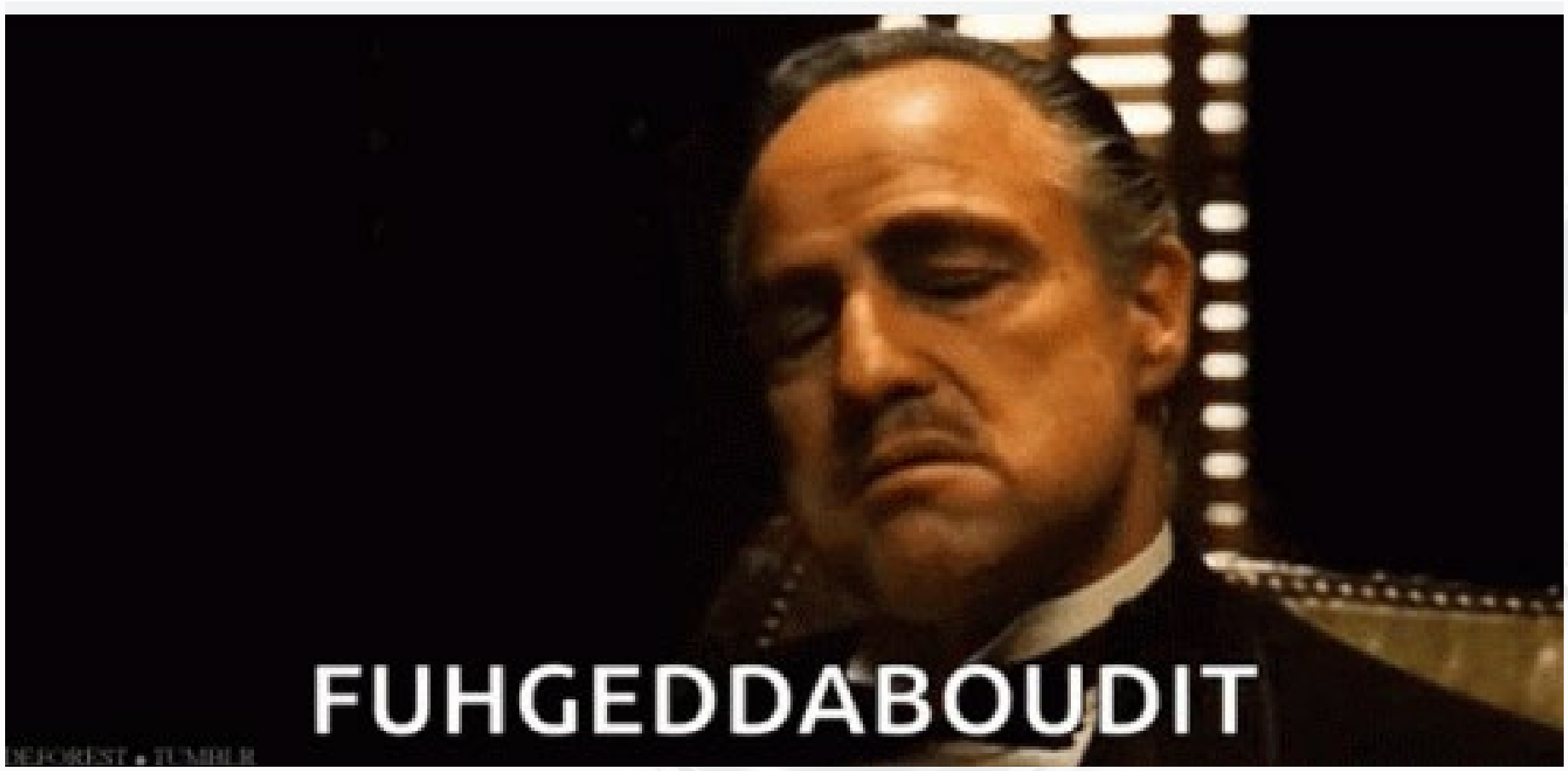
GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

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

Set this aside and ask them how they are doing

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

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

Just like with asthma, every visit needs to start with an assessment of symptoms, exacerbations and overall condition

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.

Figure 1. Comparison of the Original COPD Assessment Test (CAT) and the Chronic Airways Assessment Test (CAAT)

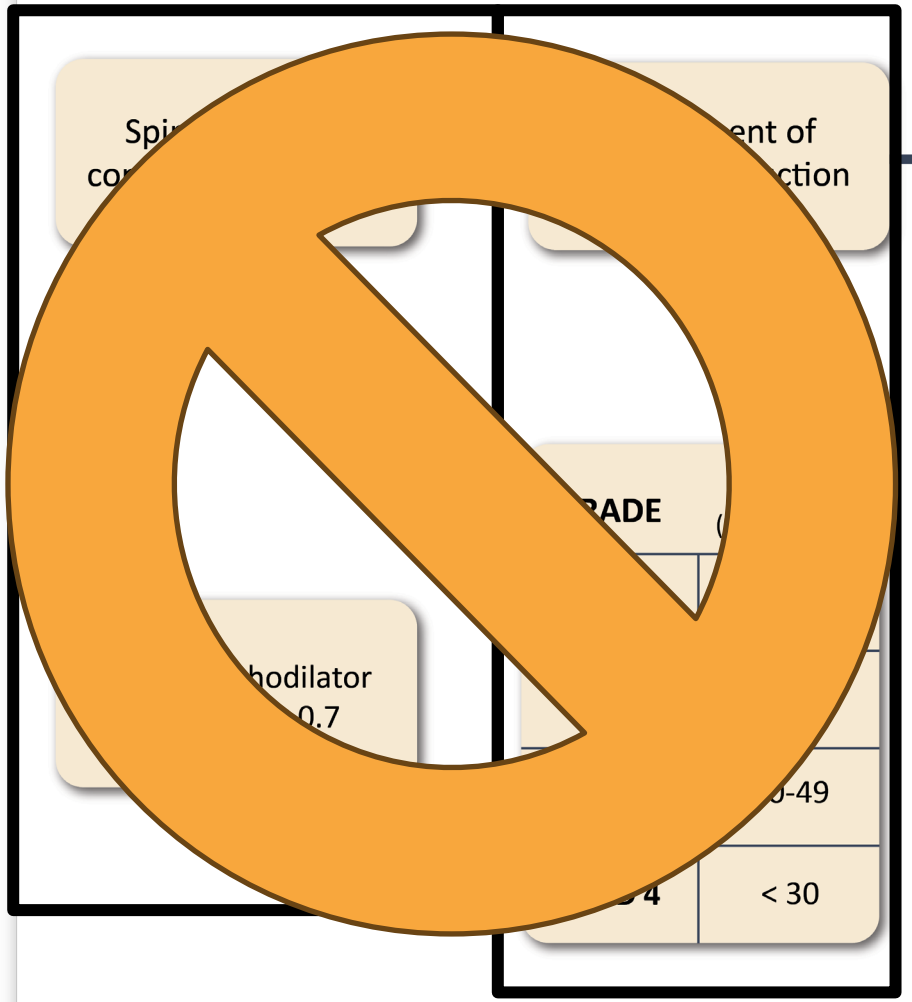
Original	Revision
CAT COPD Assessment Test	CAAT Chronic Airways Assessment Test
Take the COPD Assessment Test (CAT) This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life.	**Take the Chronic Airways Assessment Test (CAAT)** This questionnaire will help you and your healthcare professional measure the impact your Lung Disease is having on your wellbeing and daily life.
Validated vs. the SGRQ in COPD, "pre-COPD", asthma, bronchiectasis, IL-D	Validated vs. the SGRQ in COPD and asthma

SGRQ=St George's Respiratory Disease; ILD=interstitial lung disease

Quick Review

- COPD is widespread and largely underdiagnosed
- Most are tobacco related but there are others
- Consider this in patients with chronic issues
- You need spirometry to get the diagnosis and stage of COPD
- But the stage DOES NOT equal quality of life, life expectancy and does not affect treatment decisions
- Once this is done, you don't need to repeat it, now we just want to know –
- How are you?
- How often are you sick?

GOLD ABE Assessment Tool

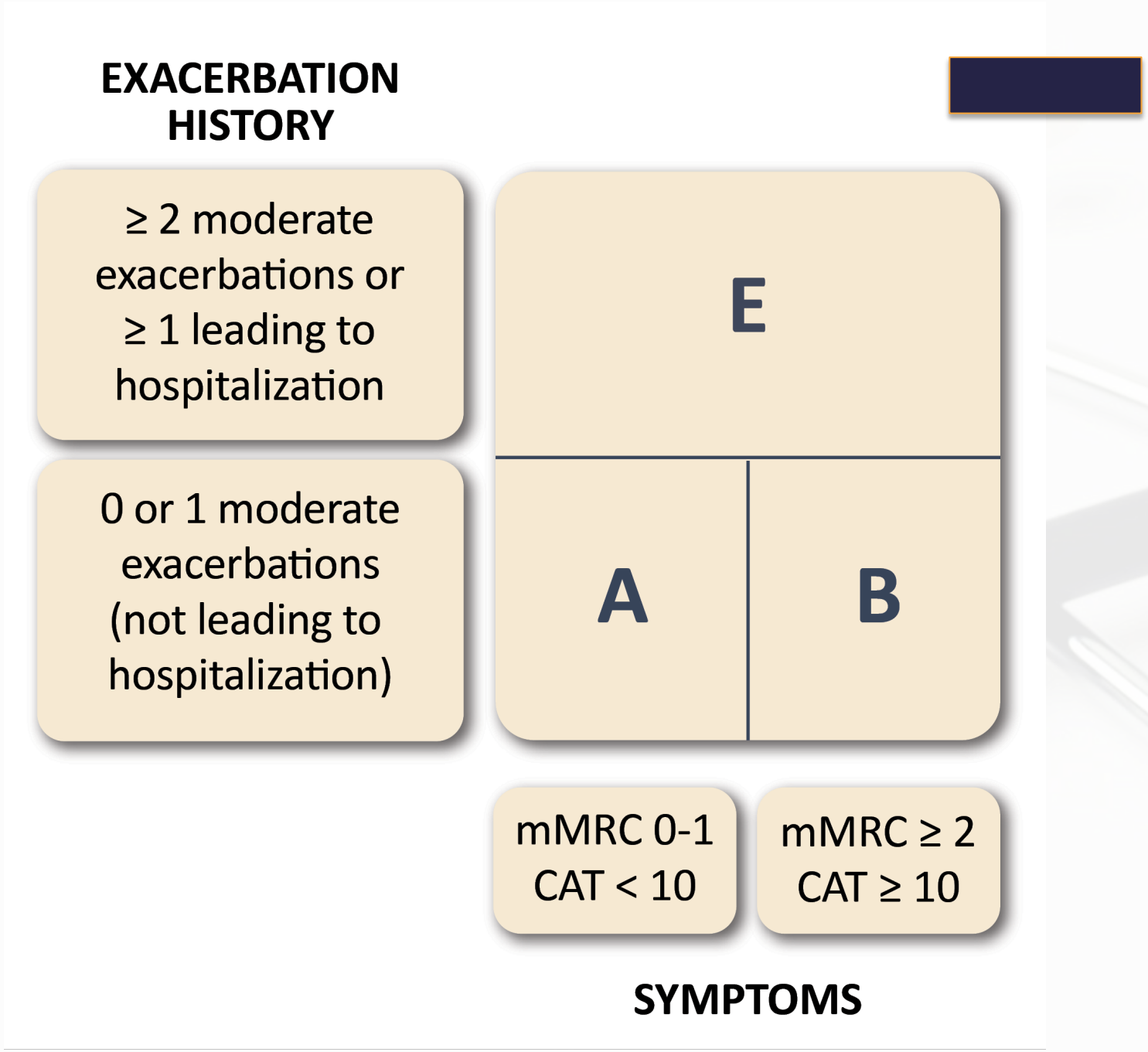


Assessment of symptoms/risk of exacerbations

EXACERBATION HISTORY

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization	**E**	
0 or 1 moderate exacerbations (not leading to hospitalization)	**A**	**B**
	mMRC 0-1 CAT < 10	mMRC ≥ 2 CAT ≥ 10

SYMPTOMS


EXACERBATION HISTORY
≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization
0 or 1 moderate exacerbations (not leading to hospitalization)
E
A
B
mMRC 0-1 CAT < 10
mMRC ≥ 2 CAT ≥ 10
SYMPTOMS

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

GROUP A

A bronchodilator

mMRC 0-1, CAT < 10

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

GROUP B

LABA + LAMA*

mMRC ≥ 2, CAT ≥ 10

≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization

GROUP E

LABA + LAMA*

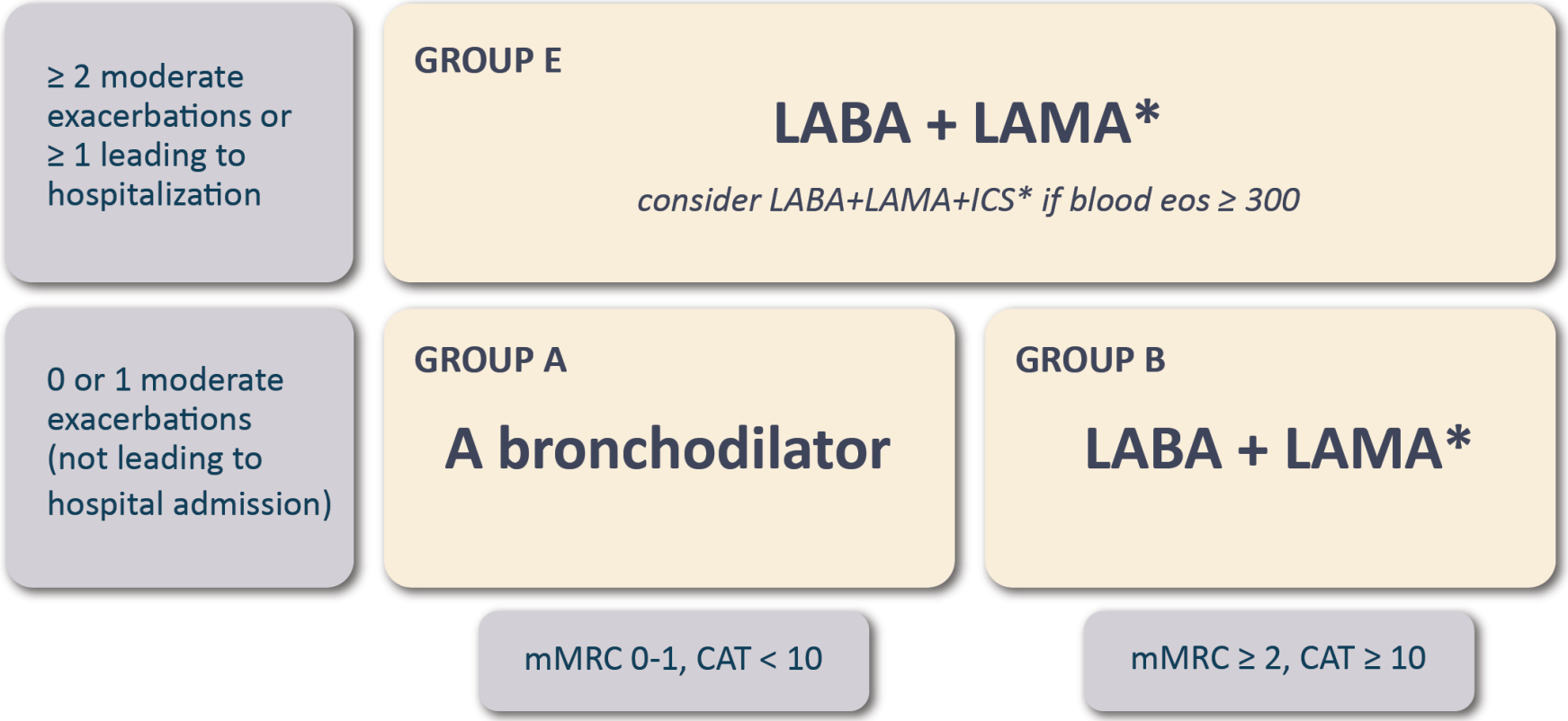
consider LABA+LAMA+ICS if blood eos ≥ 300*

mMRC 0-1, CAT < 10

mMRC ≥ 2, CAT ≥ 10

Initial Pharmacological Treatment

Figure 4.2



*single inhaler therapy may be more convenient and effective than multiple inhalers

Random Fun Facts For No Apparent Reason

Inhaling dried pig adrenal glands for asthma and COPD

Why the concern over inhaled steroids?

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 E

LABA + LAMA*

consider LABA+LAMA+ICS if blood 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

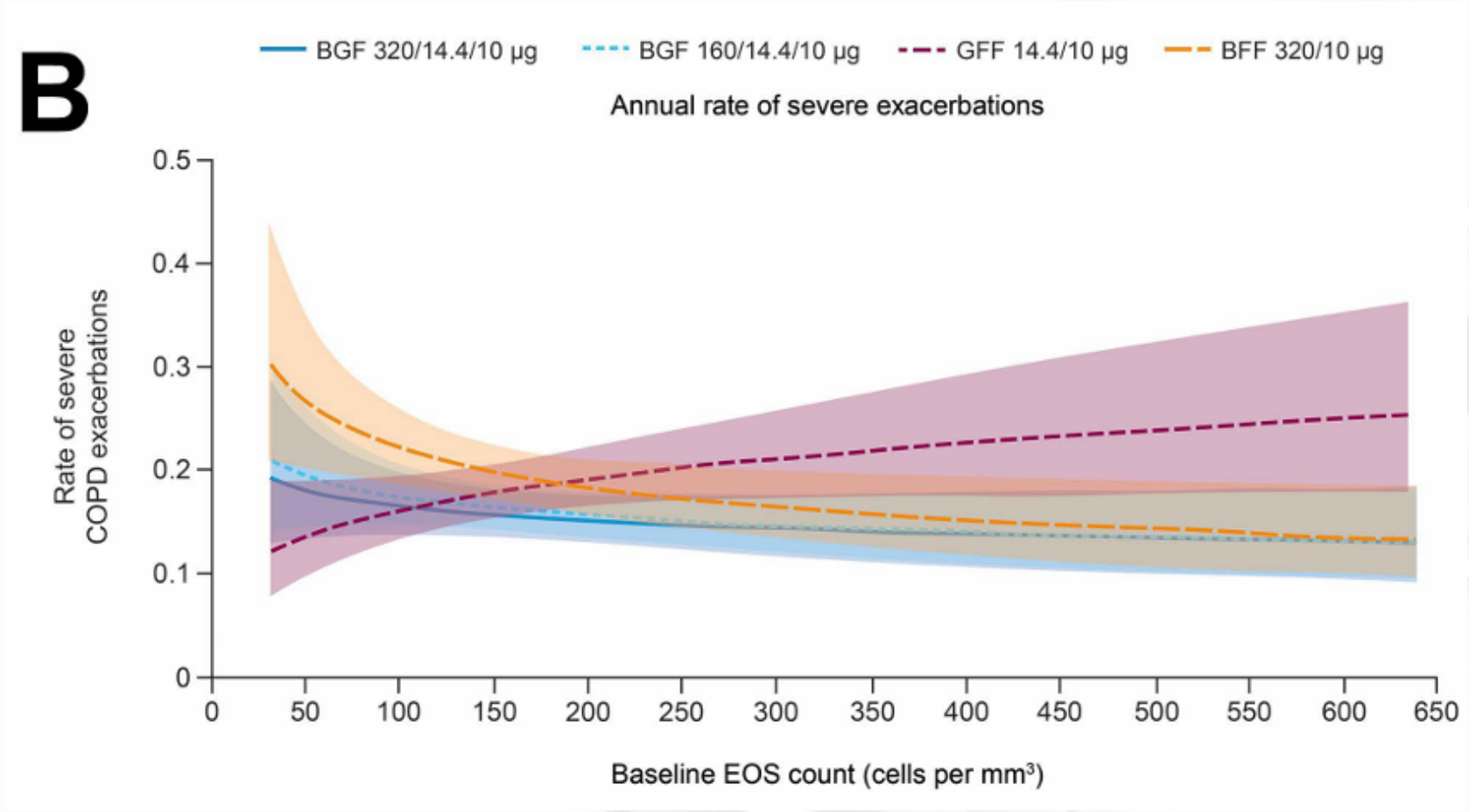
Objective: Inhaled corticosteroids (ICS) are generally used to treat patients with chronic obstructive pulmonary disease (COPD) who suffer from repeated exacerbations. Recently, it was reported that ICS treatment increased the risk of pneumonia in COPD patients. But it is controversial.The objective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

Why the concern over inhaled steroids?



The pink line – no inhaled steroid, the other three lines all have a steroid

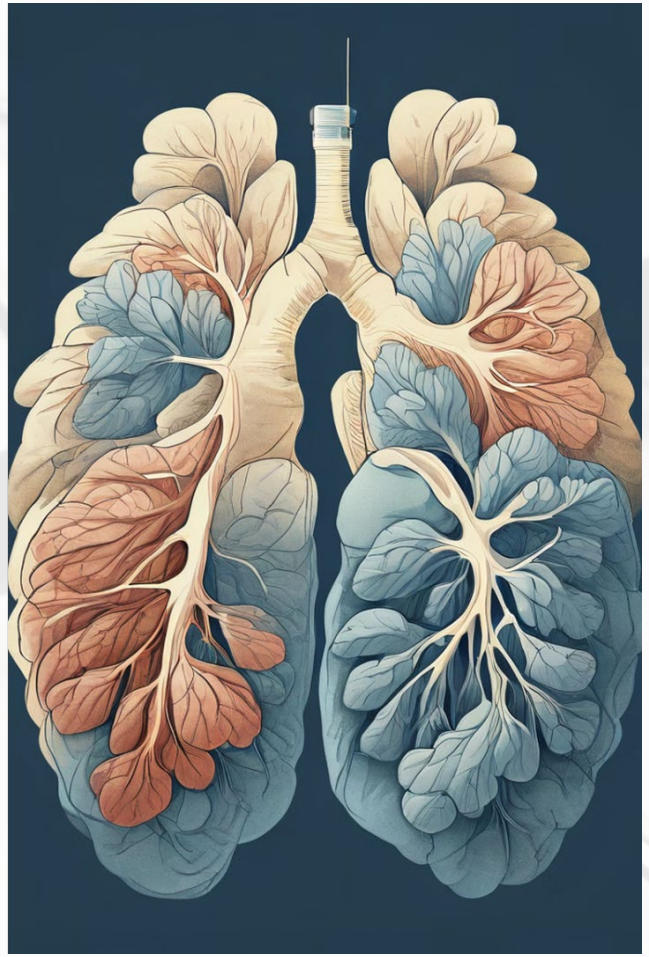
Bafadhel M, et al.. *Int J Chron Obstruct Pulmon Dis*. 2022;17:3061-3073 https://doi.org/10.2147/COPD.S374670

But WHY?

The summary

- Neutrophils (Type 1) – inflammation reduced by steroids, but their role is different. They are needed for pathogen (bacterial, cells that have engulfed bacteria, virally infected cells). So, while inflammation is reduced, the benefit may not outweigh the negative.

- Eosinophils (Type 2) – they have a minimal role in pathogen destruction (aside from parasitic), so reduction is usually helpful



Barnes PJ. Inflammatory endotypes in COPD. Allergy. 2019 Jul;74(7):1249-1256. doi: 10.1111/all.13760. Epub 2019 Mar 31. PMID: 30834543.

For Reference

Steroid effects that may not be helpful:

Neutrophils are the cells that fight bacteria/viral infections

Inhibition of Neutrophil Recruitment: Steroids inhibit the recruitment of neutrophils to areas of inflammation, reducing the numbers present

Impairment of Neutrophil Function: Steroids can impair various functions of neutrophils, including adhesion, chemotaxis (movement towards chemical signals), and the bactericidal capacity.

Modulation of Neutrophil Activation: Steroids can modulate the activation state of neutrophils, reducing their ability to produce reactive oxygen species and other pro-inflammatory mediators.

Adhesion to bacteria and infected cells, cell movement and ability to kill bacteria reduced.

Reduced ability to produce reactive oxygen species, which are critical for the destruction of pathogens

Barnes PJ. Inflammatory endotypes in COPD. Allergy. 2019 Jul;74(7):1249-1256. doi: 10.1111/all.13760. Epub 2019 Mar 31. PMID: 30834543.

Eosinophils are on almost all CBCs

Total WBC - 5400

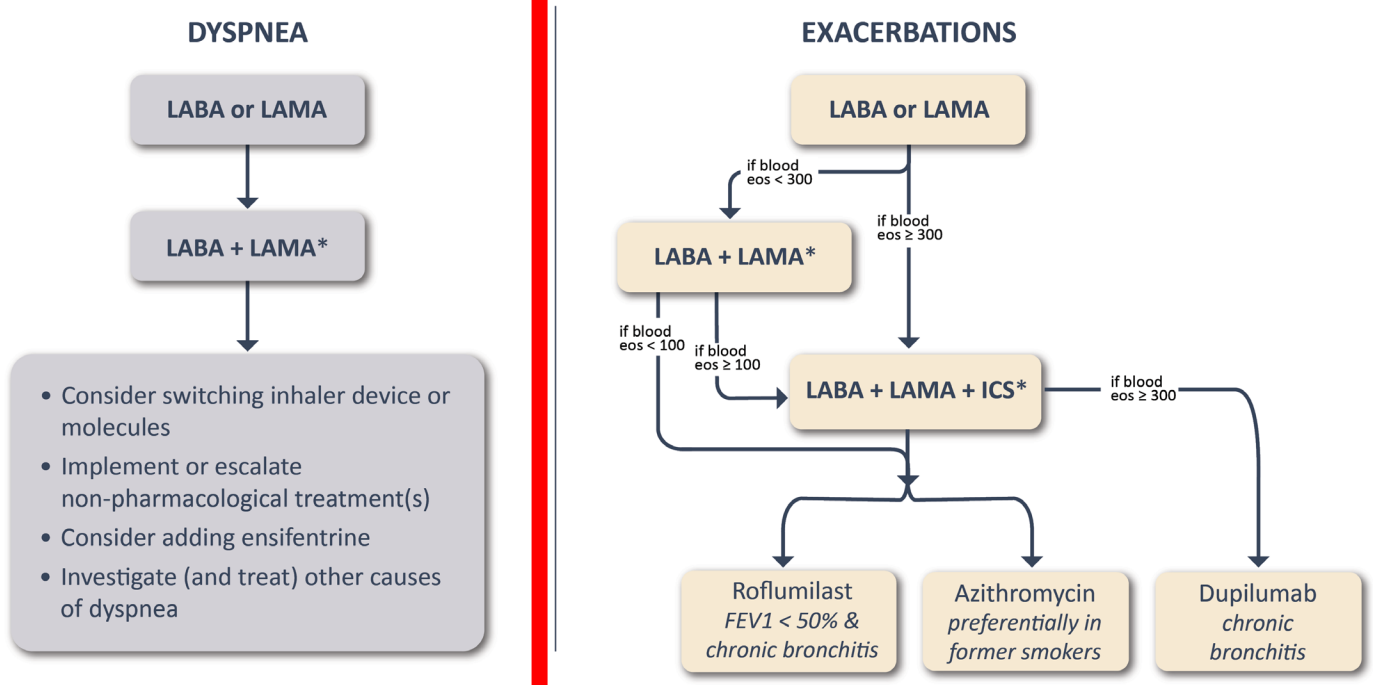
Eosinophil % 7

Total Eosinophil count 378

Component	Your Value	Standard Range	Units	Flag
White Blood Cell Count	5.4	4.0 - 11.0	K/uL	
Red Blood Cell Count	5.20	4.40 - 6.00	M/uL	
Hemoglobin	16.0	13.5 - 18.0	g/dL	
Hematocrit	47.2	40.0 - 52.0	%	
MCV	91	80 - 100	fL	
MCH	30.8	27.0 - 33.0	pg	
MCHC	33.9	31.0 - 36.0	g/dL	
RDW	12.7	<16.4 -	%	
Platelet Count	149	150 - 400	K/uL	L
Differential Type	Automated			
Neutrophil %	56	49.0 - 74.0	%	
Lymphocyte %	23	26.0 - 46.0	%	L
Monocyte %	13	2.0 - 12.0	%	
Eosinophil %	7	0.0 - 5.0	%	H
Basophil %	1	0.0 - 2.0	%	
Abs. Neutrophil	3.1	2.0 - 8.0	K/uL	
Abs. Lymphocyte	1.2	1.0 - 5.1	K/uL	
Abs. Monocyte	0.7	0.0 - 0.8	K/uL	
Abs. Eosinophil	0.4	0.0 - 0.5	K/uL	
Abs. Basophil	0.0	0.0 - 0.2	K/uL	

Follow-up Pharmacological Treatment

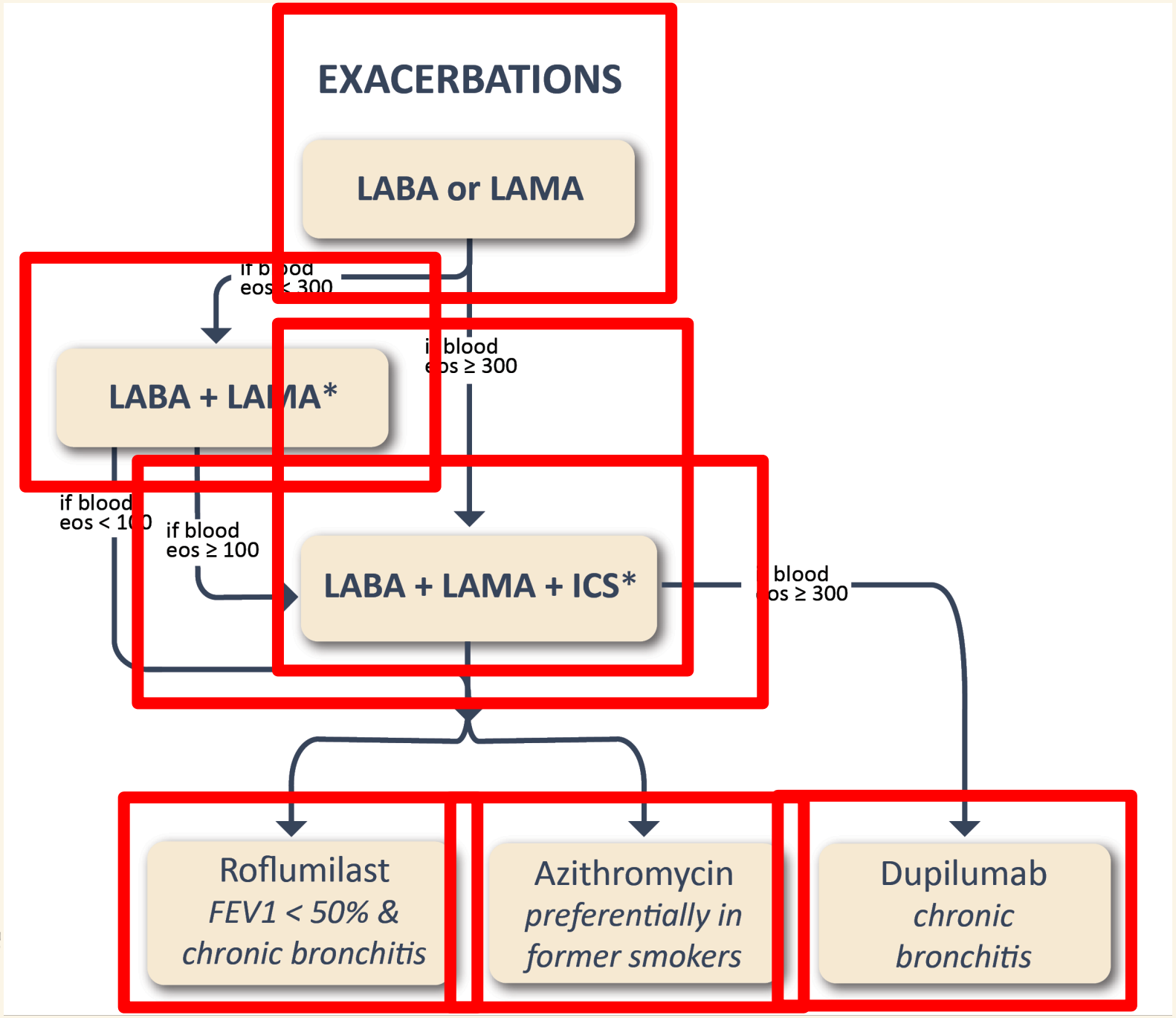
Figure 3.9



*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment.

Consider de-escalation of ICS if pneumonia or other considerable side-effects. In case of blood eos ≥ 300 cells/µl de-escalation is more likely to be associated with the development of exacerbations.

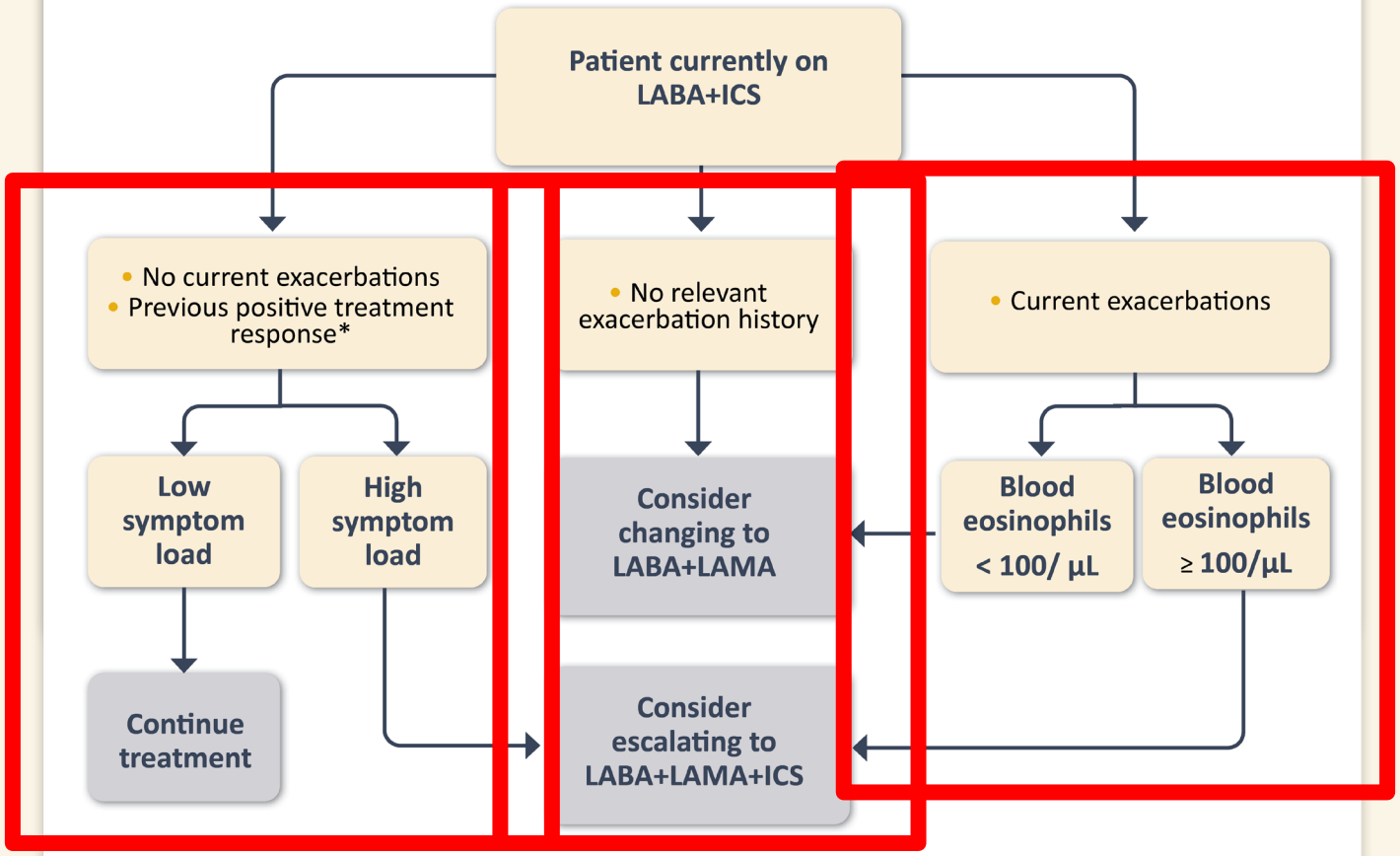
Exacerbations refers to the number of exacerbations per year.



2025
Teaching Slide Set

Management of Patients Currently on LABA+ICS

Figure 3.22



*Patient previously had exacerbations and responded to LABA+ICS treatment

Factors to Consider when Initiating ICS Treatment

Figure 3.1

Factors to consider when adding ICS to long-acting bronchodilators:

(note the scenario is different when considering ICS withdrawal)

STRONGLY FAVORS USE	**History of hospitalization(s) for exacerbations of COPD[#]**
	≥ 2 moderate exacerbations of COPD per year[#]
	Blood eosinophils ≥ 300 cells/µL
	History of, or concomitant asthma
FAVORS USE	1 moderate exacerbation of COPD per year[#]
	Blood eosinophils 100 to < 300 cells/µL
AGAINST USE	**Repeated pneumonia events**
	Blood eosinophils < 100 cells/µL
	History of mycobacterial infection

[#]despite appropriate long-acting bronchodilator maintenance therapy (see Table 3.4 and Figure 4.3 for recommendations); *note that blood eosinophils should be seen as a continuum; quoted values represent approximate cut-points; eosinophil counts are likely to fluctuate.

Adapted from & reproduced with permission of the © ERS 2019: *European Respiratory Journal 52 (6) 1801219; DOI: 10.1183/13993003.01219-2018 Published 13 December 2018*

Three Keys to COPD care/future focus

- Diagnose
- How are you? How often are you sick?
- Decide on what inhaler(s) to use (hint: not a steroid)
- Then become a superstar!

Recent GOLD Changes/Focus Points

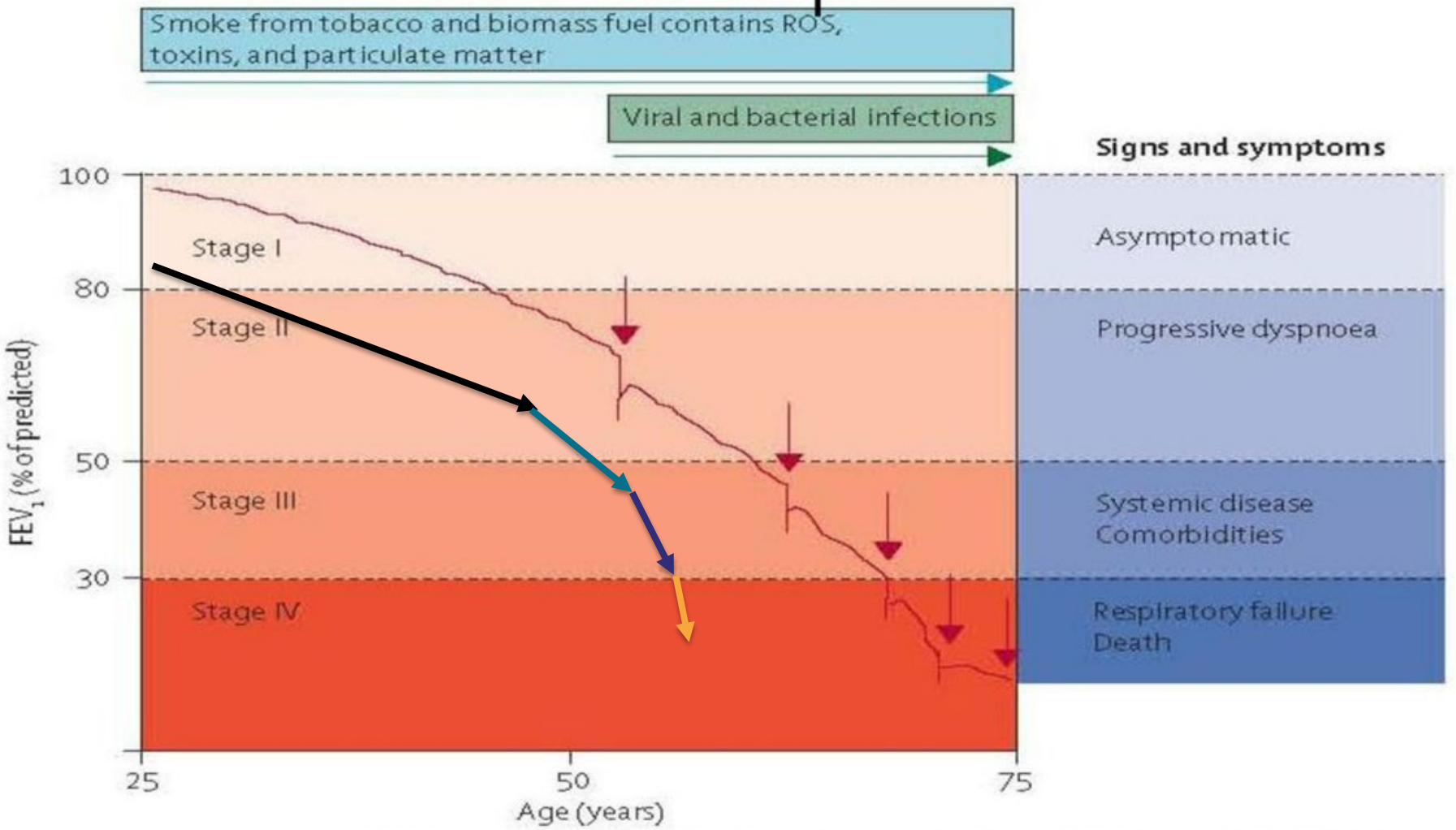
- **Exacerbations are KEY**
- **Medication Delivery**
- **New Therapy**
- **Biologic Therapy**
- **Smoking Cessation**

Exacerbations

- **Exacerbations are not “bumps” in the road like they are for asthma**
- **Moderate to severe exacerbations are life altering, patients never recover fully.**
- **An exacerbation is an acute change in a patient's baseline dyspnea, cough, or sputum that is beyond normal variability, and that is sufficient to warrant a change in therapy.**

1.Cazzola M, MacNee W, Martinez FJ, et al.; for the American Thoracic Society, European Respiratory Society Task Force on Outcomes of COPD. Outcomes for COPD pharmacological trials: from lung function to bio-markers. *Eur Respir J.* 2008;31(2):416-469.

COPD exacerbations & Effect on FEV_1



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

Exacerbations

- **Causes – viral make up about 80% of flares in a standard COPD population.**
- **Bacterial infections, wildfire smoke, cooking fuels or toxin exposure**
- **Ran out of meds/noncompliance**

Medication Delivery

Respiratory Medicine 161 (2020) 105857

Contents lists available at ScienceDirect

Respiratory Medicine

journal homepage: http://www.elsevier.com/locate/rmed

Review article

The role of inspiratory flow in selection and use of inhaled therapy for patients with chronic obstructive pulmonary disease

Donald A. Mahler [a,b]

[a] Emeritus Professor of Medicine, Geisel School of Medicine at Dartmouth, One Rope Ferry Road, Hanover, NH, 03755, USA
[b] Valley Regional Hospital, Kane Center, 243 Elm Street, Claremont, NH, 03743, USA

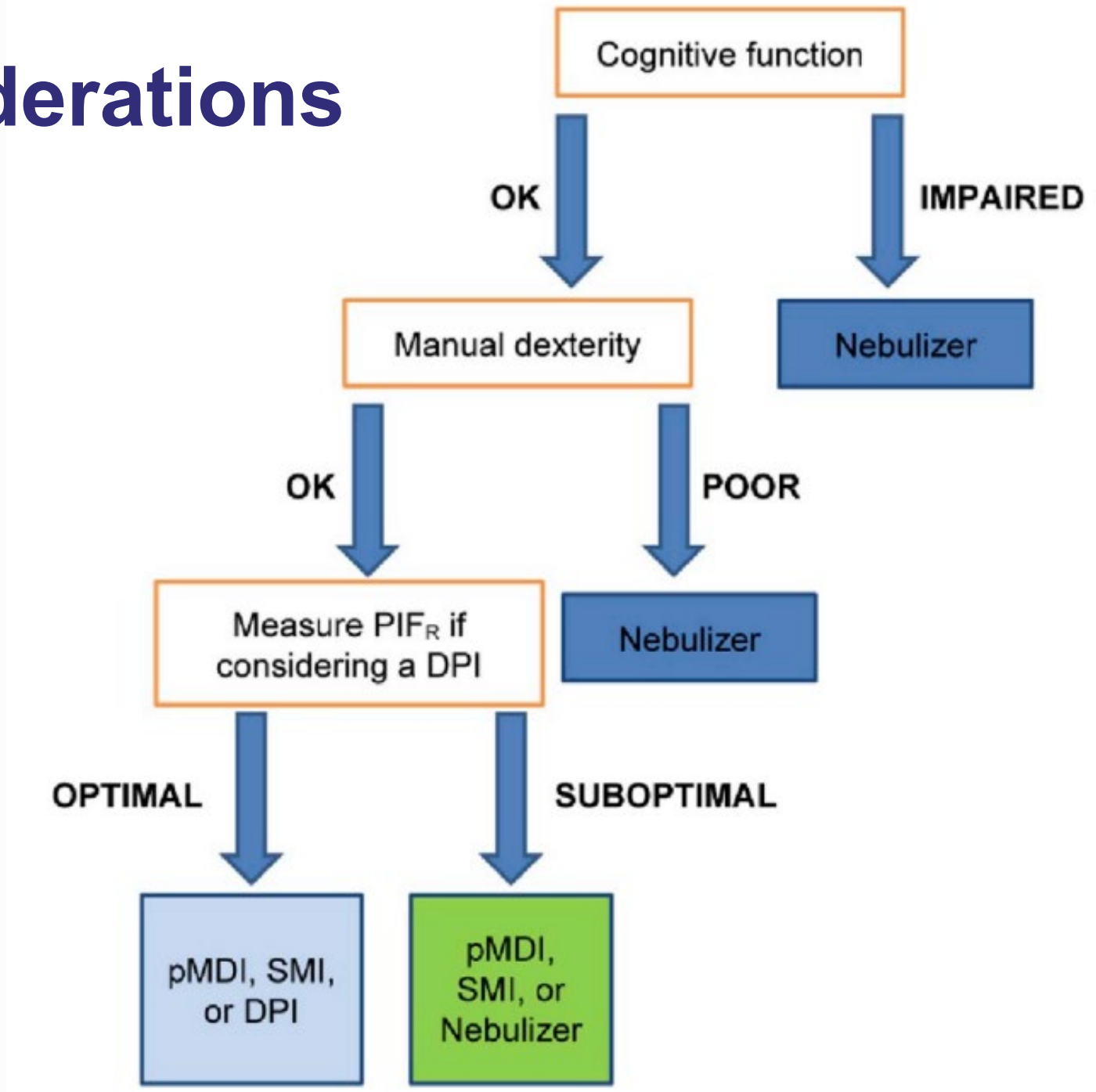
ARTICLE INFO

Keywords:
Chronic obstructive pulmonary disease
Hand-held inhalers
Inhalation technique
Inspiratory flow
Peak inspiratory flow

ABSTRACT

Inhalation therapy is the mainstay of chronic obstructive pulmonary disease management, and inhaler selection can have a profound impact on drug delivery and medication adherence, as well as on treatment outcomes. Although multiple delivery systems, such as pressurized metered-dose inhalers, dry powder inhalers, slow-mist inhalers, and nebulizers, are available, clinical benefits achieved by patients rely on effective delivery of the inhaled medication to the airways. Among several factors influencing drug deposition, inspiratory flow is one of the most important. Inspiratory flow impacts drug delivery and subsequent clinical efficacy, making it necessary to adequately train patients to ensure correct inhaler use. Peak inspiratory flow is the maximal airflow generated during a forced inspiratory maneuver. Health care professionals need to select the appropriate delivery system after carefully considering patient characteristics, including lung function, optimal inspiratory flow, manual dexterity, and cognitive function. Herein, the role of inspiratory flow in the selection and use of inhaled therapy in patients with COPD is reviewed.

Delivery Considerations



Evaluate Inspiratory Effort

- **Measure this with an In-Check Device**
- **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?**

Commonly Used Maintenance Medications in COPD*

Generic Drug Name	Inhaler Type	DELIVERY OPTIONS			Duration of Action
		Nebulizer	Oral	Injection	
$BETA_2$-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, DPI				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		

*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.

Biologic Therapy in COPD

Why are some COPD patients different?

1. Evidence of Type 2 inflammation present in 20-40% of COPD patients, usually with EOS over 300 cells/µl
2. For those patients, there is an increased risk of exacerbations, ER visits, inpatient care and a quicker loss of FEV_1, especially with flares
3. These patients may have a diagnosis of asthma as well, they respond better to oral and inhaled steroids

Bhatt SP et al. N Engl J Med2023;389:205-214

Biologic Therapy in COPD

Dupilumab (Dupixent)

1. 34% reduction in moderate or severe acute COPD exacerbations over 52 weeks

2. Improved lung function from baseline by 139 mL at 12 weeks compared to 57 mL for placebo

3. Earned FDA Priority Review for Add-on COPD therapy in February 2024.

The NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

Dupilumab for COPD with Type 2 Inflammation Indicated by Eosinophil Counts

Bhatt SP et al. DOI: 10.1056/NEJMoa2303951

CLINICAL PROBLEM

Some patients with chronic obstructive pulmonary disease (COPD) have elevated eosinophil counts, a marker of type 2 inflammation, which may increase the risk of disease exacerbations. Patients with type 2 inflammation commonly have elevated levels of interleukin-4 and interleukin-13. Dupilumab is a fully humanized monoclonal antibody that blocks the shared receptor component for these two interleukins.

CLINICAL TRIAL

Design: In a phase 3, international, double-blind, randomized, placebo-controlled trial, the efficacy and safety of dupilumab were evaluated in patients with COPD and an absolute blood eosinophil count of ≥300 per microliter.

Intervention: 939 current or former smokers 40 to 80 years of age, who had symptomatic COPD and were at increased risk for exacerbations despite the use of standard inhaled triple therapy, received add-on therapy with either subcutaneous dupilumab (300 mg) or placebo every 2 weeks for 52 weeks. The primary end point was the annualized rate of moderate or severe exacerbations of COPD during the trial.

RESULTS

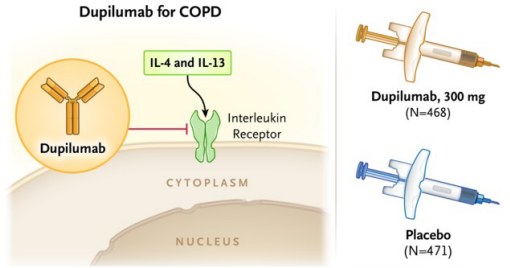
Efficacy: Treatment with dupilumab resulted in a lower annualized rate of moderate or severe exacerbations of COPD than placebo.

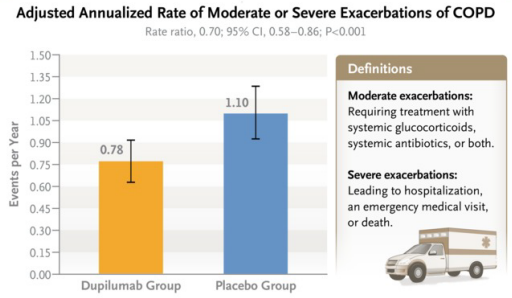
Safety: The percentages of patients with adverse events and serious adverse events during treatment were similar in the two groups.

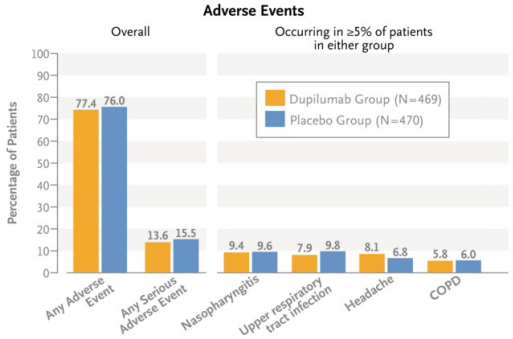
LIMITATIONS AND REMAINING QUESTIONS

- The trial was conducted during the coronavirus disease 2019 pandemic, which may have affected patient behaviors, exposures, and frequencies of exacerbations of COPD.
- Patients who identified as Black were underrepresented in the trial.
- Randomization was not stratified according to smoking status.

Links: Full Article | NEJM Quick Take | Editorial





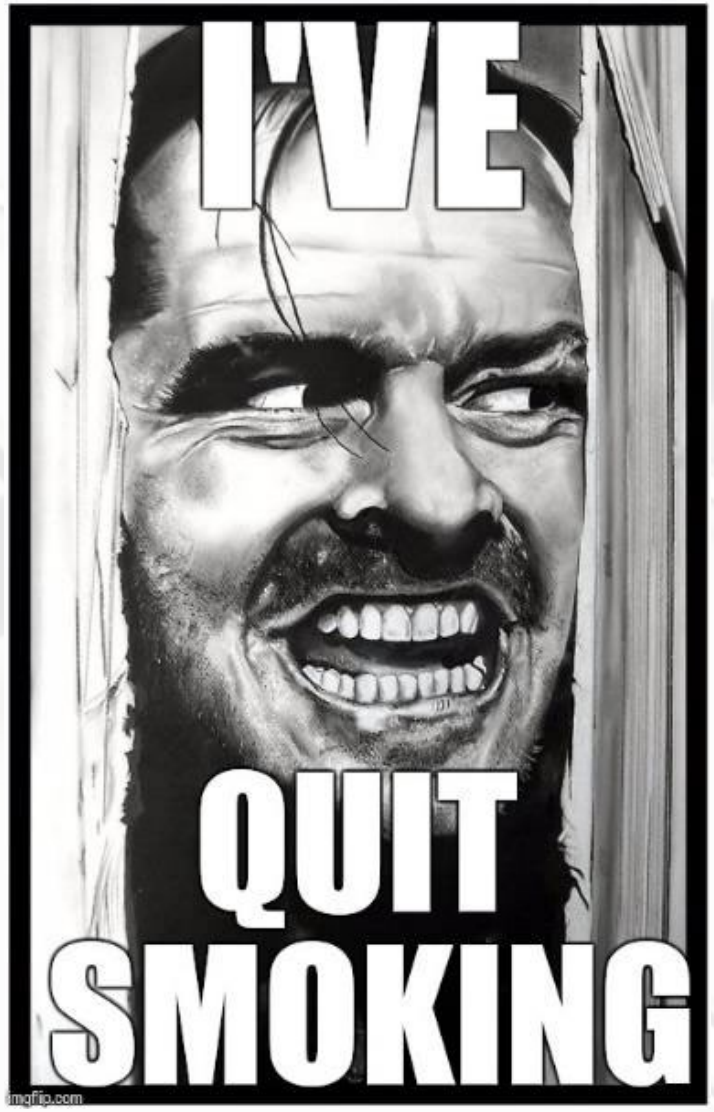


CONCLUSIONS

In patients with COPD who had type 2 inflammation as indicated by elevated eosinophil counts, add-on treatment with dupilumab resulted in a lower annualized rate of moderate or severe exacerbations than placebo.

Few thoughts on smoking cessation

Tough job. . . but we need to try!



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

Few thoughts on smoking cessation

Smoking Cessation Pharmacotherapy Efficacy in Comorbid Medical Populations: Secondary Analysis of the Evaluating Adverse Events in a Global Smoking Cessation Study (EAGLES) Randomized Clinical Trial

Alana M Rojewski [1,2,#,✉], Amanda M Palmer [3,#], Nathaniel L Baker [4], Benjamin A Toll [5,6]

▸ Author information ▸ Article notes ▸ Copyright and License information

PMCID: PMC10734386 PMID: 37474127

ADDICTION SSA SOCIETY FOR THE STUDY OF ADDICTION

RESEARCH REPORT doi:10.1111/add.15440

Estimation of risk of neuropsychiatric adverse events from varenicline, bupropion and nicotine patch versus placebo: secondary analysis of results from the EAGLES trial using Bayes factors

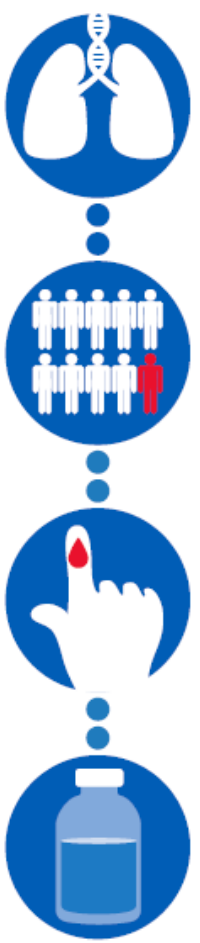
Emma Beard[1], Sarah E. Jackson[1], Robert M. Anthenelli[2], Neal L. Benowitz[3], Lisa St. Aubin[4], Thomas McRae[4], David Lawrence[4], Cristina Russ[4], Alok Krishen[5], A. Eden Evins[6] & Robert West[1]

Research Department of Behavioural Science and Health, University College London, London, UK,[1] Department of Psychiatry, University of California, San Diego, CA, USA,[2] University of California, San Francisco, CA, USA,[3] Pfizer Inc, New York, NY, USA,[4] Formerly at GSK, Research Triangle Park, NC, USA[5] and Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA[6]

Few thoughts on smoking cessation

Conclusions: Secondary analysis of the Evaluating Adverse Events in a Global Smoking Cessation Study trial using Bayes factors provides moderate to strong evidence that use of varenicline, bupropion or nicotine patches for smoking cessation does not increase the risk of neuropsychiatric adverse events relative to use of placebo in smokers without a history of psychiatric disorder. For smokers with a history of psychiatric disorder the evidence also points to no increased risk but with less confidence.

Uncovering Alpha-1



AAT deficiency, commonly called alpha-1, is a genetic form of COPD

An estimated 100,000 Americans have alpha-1[3]

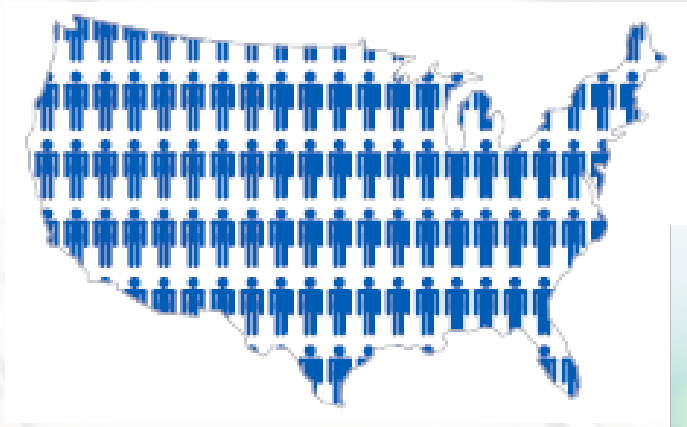
- >90% remain undiagnosed[4,5]

Laboratory testing is the only way to diagnose alpha-1

- Can be a free test

ATS Recommends testing everyone with COPD and every asthma patient that does not show good reversibility

Up to 25 million Americans have an abnormal allele (S or Z)[6]



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

1. Campbell EJ, et al. *Chest.* 2000;117(5 suppl 1):303S. 2. Brantly M. *Clin Chem.* 2006;52(12):2180-2181. 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 February 16, 2017. 6. de Serres FJ, et al. *Clin Genet.* 2003;64(5):382-397.

Thank you!
Reach out anytime with questions or if you do want Alpha-1 testing kits or to test yourself, it's always free.

Brian Bizik, MS, PA-C
Immediate Past-President – American Academy of Physician Assistants in Allergy, Asthma and Immunology
Pulmonology Care Coordinator, Terry Reilly Health Centers
208-404-5338
brianbizik@yahoo.com

Resources

A Hidden Contributor to Climate Change — Asthma Inhalers | Commonwealth Fund "In 2020, metered-dose inhalers made up 75 percent of inhalers in use in the United States, with the equivalent emissions impact of driving half a million cars for a year. The outsized carbon footprint of these inhalers is a result of hydrofluoroalkanes (HFAs), the active propellant that administers the medication in the inhaler. HFAs were an improvement from the original propellant in metered-dose inhalers, chlorofluorocarbons (CFCs), which damage the ozone layer." https://www.commonwealthfund.org/blog/2023/hidden-contributor-climate-change-asthma-inhalers#:~:text=In%202020%2C%20metered%2Ddose%20inhalers,million%20cars%20for%20a%20year.

Using a Spirometer: Measuring Lung Function More Accurately and More Equitably: Race-neutral lung function testing. https://hms.harvard.edu/news/measuring-lung-function-more-accurately-more-equitably.