Identifying New Strategies to Optimize the Management & Treatment of COPD

April 21, 2016
2016 Spring Managed Care Forum

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Disclosures

- Research Grants
  - GlaxoSmithKline
  - Pfizer
  - Novartis
  - Astra-Zeneca

- Advisory Boards
  - GlaxoSmithKline
  - Pfizer
  - Astra-Zeneca
  - Novartis
  - Merck
  - Nycomed
  - Forest
  - Amgen

- Expert Witness
  - In Environmental Tobacco Smoke exposure cases (Plaintiffs)
  - Diacetyl exposure cases (Defense)
  - Tobacco and Lung Disease cases (Plaintiffs)

- Chief Scientific Officer - COPD Foundation
Objectives

- Identify approaches for COPD screening, diagnosis, and ongoing patient monitoring
- Assess the diagnosis and progression of COPD including clinical data on pulmonary function
- Discuss management strategies for patients with COPD
- Discuss pharmacologic and non-pharmacologic treatment options for COPD to reduce exacerbations
- Educate patients and caregivers to provide clear medical instructions, assess patient preferences, and improve treatment adherence

Diagnosis and Management of Stable Chronic Obstructive Pulmonary Disease: A Clinical Practice Guideline Update from the American College of Physicians, American College of Chest Physicians, American Thoracic Society, and European Respiratory Society

Amir Claassen, MD, PhD, MHA; Timothy J. Will; MD, MPH; Steven E. Weinberger, MD; Nicola A. Hanania, MD, MS; Gerard Criner, MD; Thys van der Molen, PhD; Darcy D. Markstrom, MD; Tom Denberg, MD, PhD; Holger Schäfermeyer, MD, PhD, MSc; Winia Wedzicha, PhD; Rodney P. MacDonald, MD; and Paul Shelley, MD, PhD, for the American College of Physicians, the American College of Chest Physicians, the American Thoracic Society, and the European Respiratory Society

Recommendation Summary - Screening and Spirometry

- **Spirometry** should not be used to screen for airflow obstruction in individuals without respiratory symptoms (Grade: strong recommendation, moderate-quality evidence).

- **Spirometry** should be obtained to diagnose airflow obstruction in patients with respiratory symptoms (Grade: strong recommendation, moderate-quality evidence).

An Emerging Tool (CAPTURE™)

For each question, place an X in the box with the answer that is best for you. There are no right or wrong answers, only answers that are right for you.

<table>
<thead>
<tr>
<th>Please answer each question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you ever lived or worked in a place with dirty or polluted air, smoke, second-hand smoke, or dust?</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2. Does your breathing change with seasons, weather, or air quality?</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3. Does your breathing make it difficult to do things such as carry heavy loads, shovel dirt or snow, jog, play tennis, or swim?</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4. Compared to others your age, do you tire easily?</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>5. In the past 12 months, how many times did you miss work, school, or other activities due to a cold, bronchitis, or pneumonia?</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

If you answered “Yes” to 2 or more questions, talk with your doctor about your breathing, and ask about a quick and easy breathing test called “peak expiratory flow” (PEF). You may breathe easier with treatment.
Diagnosis/Classification

- Global Initiative on Chronic Obstructive Lung Disease (GOLD) guidance
- COPD Foundation Guidance

COPD Definition – GOLD 2011

- Characterized by chronic airflow limitation and a range of pathologic changes in the lung, significant extrapulmonary effects, and important comorbidities
- Features may include
  - Chronic bronchitis (cough and sputum production)
  - Emphysema (destruction of gas exchanging surfaces of the lung)
Combined Assessment of COPD

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

<table>
<thead>
<tr>
<th>Patient</th>
<th>Characteristic</th>
<th>Spirometric Classification</th>
<th>Exacerbations per year</th>
<th>mMRC</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Low Risk</td>
<td>GOLD 1-2</td>
<td>≤ 1</td>
<td>0-1</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>B</td>
<td>Low Risk</td>
<td>GOLD 1-2</td>
<td>≤ 1</td>
<td>2</td>
<td>≥ 10</td>
</tr>
<tr>
<td>C</td>
<td>High Risk</td>
<td>GOLD 3-4</td>
<td>≥ 2</td>
<td>0-1</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>D</td>
<td>High Risk</td>
<td>GOLD 3-4</td>
<td>≥ 2</td>
<td>2</td>
<td>≥ 10</td>
</tr>
</tbody>
</table>

The Future Classification of COPD?

Less Severe | More Severe

- **Lung Function**
- **Symptoms**
- **Exacerbations**
- **Polymorbidity**
- **SGRQ/CAT**
- **Exercise Capacity**
- **Body Mass Index/Other Factors**

Gauge Severity | Target Therapy
COPD THERAPY BASED ON SEVERITY DOMAINS

- Spirometry Grades
- Regular Symptoms
- Exacerbations
- Oxygenation
- Emphysema
- Chronic bronchitis
- Comorbidities

Objectives

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Concepts of disease progression

Time (age)

Severity

Genetic Predisposition  Exposure  Disease Onset  Advanced Disease

Induction  Latency

Clinical Manifestations (Patient-Centered Outcomes)
Physiological (Functional) Abnormalities
Radiographic Abnormalities
Pathological (Structural) Evidence
Biochemical and Cellular Events
What is Progression of COPD?

Health

Incident Disease

Prevalent Disease

Progressive Disease

At Risk

I Mild

II Moderate

III Severe

IV Very Severe

“Restriction”

Death

COPD Phenotypes ??

Chronic Bronchitis

Emphysema

Asthma

Irreversible Airflow Obstruction

Reversible Airflow Obstruction

Restriction?

"Restriction"


AJRCCM 1995 ; 152: S77-121
Effect of early childhood events on the natural history of COPD

Pre-natal factors
- Poverty
- Indoor air pollution
- Smoking, indoor & outdoor exposures

Smoking, indoor & outdoor exposures

Maximal Level of FEV₁ (%)

Lung immaturity
- Prolonged oxygen supplementation
- Mechanical ventilation
- Infections
- Patent ductus arteriosus

Healthy subjects
Survivors of broncho-pulmonary dysplasia

Symptoms
Disability

Age (y)

0 5 10 15 20 25 30 35 40 45 50 55 60

100 75 50 25 0

Courtesy of Prof. Sonia Buist
Natural History of Lung Function Changes

Overall Organ Decline
Horseracing Effect

Fletcher et al, *The Natural History of Chronic Bronchitis and Emphysema*, 1976
Burrows et al, ARRD, 1987

Hockey Match??

Adapted from Decramer M, Cooper CB. *Thorax* 2010; 65: 837-841.
Lung Function in 1000 “COPD” Patients

Kohler, D et al. Thorax 2003;58:825

Perfusion Heterogeneity

GOLD 0 COPD

Hoffman et al, PATS 2006
Imaging Airways

Hoffman et al, PATS 2006

Fig. 5. Classification results for three stages of disease severity using the methodologies under study. (Top row) axial and coronal slices for the original CTs. (Middle row) Classification results for KDE. (Bottom row) Classification results using LBPNT.

**Quantifying Emphysema**

Coxson et al, Acad Rad 2005

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**DLCO and Progression of Obstruction**

Normal DLCO (> 80%) at Baseline

Harvey at al, ERJ, in Press
DLCO and Progression of Obstruction

Harvey at al, ERJ, in Press

Summary

- Spirometry remains the best means of routinely classifying abnormality I patients with COPD

- Emerging subgroups/phenotypes of patients with normal airflow but
  - Emphysema on CT Scan OR
  - Impaired diffusion OR
  - Severe Symptoms OR
  - Exacerbation-like events
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Nonpharmacologic Therapy to Manage COPD

- Smoking Cessation
- Patient Education
- Vaccination
- Oxygen Therapy
- Pulmonary Rehabilitation
- Surgical and Non-Surgical Alternatives

Existing Pharmacologic Treatment Options

**Bronchodilators**
- Short-acting
  - β-agonists
    - Albuterol
    - Levalbuterol
  - Anticholinergic
    - Ipratropium
- Long-acting
  - β-agonists (LABA)
    - Salmeterol
    - Formoterol
    - Arformoterol
  - Anticholinergic (LAMA)
    - Tiotropium
    - Aclidinum
  - LABA/LAMA Combination
    - Sal + Fluticasone
    - For + Budesonide
    - For + Fluticasone

**Anti-inflammatory**
- Corticosteroids
  - Combination
    - Sal + Fluticasone
    - For + Budesonide
    - For + Fluticasone

**PDE4 Inhibitors – Roflumilast**

**Antibiotics ?????**

**Statins ?????**

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GOLD Therapy at Each Stage of COPD

**I: Mild**
- FEV₁/FVC < 0.70
- FEV₁ ≥ 80% predicted

**II: Moderate**
- FEV₁/FVC < 0.70
- 50% ≤ FEV₁ < 80% predicted

**III: Severe**
- FEV₁/FVC < 0.70
- 30% ≤ FEV₁ < 50% predicted
- FEV₁ < 30% predicted or FEV₁ < 50% predicted plus chronic respiratory failure

**IV: Very Severe**
- FEV₁/FVC < 0.70
- FEV₁ < 30% predicted

Active reduction of risk factor(s): influenza vaccination

Add short-acting bronchodilator (when needed)

Add inhaled glucocorticosteroids if repeated exacerbations

Add long-term oxygen if chronic respiratory failure

Consider surgical treatments

Global Strategy for Diagnosis, Management and Prevention of COPD

**Combined Assessment of COPD**

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

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<tr>
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<td>Less Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>More Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0-1</td>
<td>&lt; 10</td>
</tr>
<tr>
<td></td>
<td>Less Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>High Risk</td>
<td>GOLD 3-4</td>
<td>2</td>
<td>2</td>
<td>≥ 10</td>
</tr>
<tr>
<td></td>
<td>More Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Global Strategy for Diagnosis, Management and Prevention of COPD**

**Manage Stable COPD: Pharmacologic Therapy**

*(Medications in each box are mentioned in alphabetical order, and therefore not necessarily in order of preference.)*

<table>
<thead>
<tr>
<th>Patient</th>
<th>First choice</th>
<th>Second choice</th>
<th>Alternative Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMA prn or SABA prn</td>
<td>LAMA or LABA or SABA and SAMA</td>
<td>Theophylline</td>
</tr>
<tr>
<td>B</td>
<td>LAMA or LABA</td>
<td>LAMA and LABA</td>
<td>SABA and/or SAMA Theophylline</td>
</tr>
<tr>
<td>C</td>
<td>ICS + LABA or LAMA</td>
<td>LAMA and LABA</td>
<td>PDE4-inh. SABA and/or SAMA Theophylline</td>
</tr>
<tr>
<td>D</td>
<td>ICS + LABA or LAMA</td>
<td>ICS and LAMA or ICS + LABA and LAMA or ICS+LABA and PDE4-inh.</td>
<td>Carbocysteine SABA and/or SAMA Theophylline</td>
</tr>
</tbody>
</table>
COPD THERAPY BASED ON SEVERITY DOMAINS

- Spirometry Grades
- Regular Symptoms
- Exacerbations
- Oxygenation
- Emphysema
- Chronic bronchitis
- Comorbidities

COPD ASSESSMENT TEST (CAT)
WWW.CATESTONLINE.ORG/

- A CAT score over 10 suggests significant symptoms
- A change in CAT score of 2 or more suggests a possible change in health status
- A worsening of CAT score could be explained by an exacerbation, poor medication adherence, poor inhaler technique, or progression of COPD or comorbid condition. An adjustment in therapy may be needed.
### Antibiotics and COPD

- **Role of Chronic infection?**
- **Inflammatory role**
- **Resistance?**
- **Side affects?**
Macrolides and Exacerbations

Figure 1. Proportion of Participants Free from Acute Exacerbations of Chronic Obstructive Pulmonary Disease (COPD) for 1 Year, According to Study Group.

The analyses were based on the participants who were randomly assigned to the group minus those who did not return for any follow-up assessment — 558 participants in the azithromycin group, of whom 317 (57%) had an acute exacerbation, and 559 in the placebo group, of whom 383 (68%) had an acute exacerbation.


Table 2. Effect of Treatment for Chronic Obstructive Pulmonary Disease (COPD) on Hospitalization Rates, Emergency Department or Urgent Care Visits, and Unscheduled Office Visits.

<table>
<thead>
<tr>
<th>Event</th>
<th>Azithromycin</th>
<th>Placebo</th>
<th>P Value*</th>
<th>Hazard Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean events/patient/event</td>
<td>no. of events</td>
<td>no. of events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalization for any cause</td>
<td>323</td>
<td>329</td>
<td>0.13</td>
<td>0.94 (0.76-1.13)</td>
<td>0.52</td>
</tr>
<tr>
<td>Hospitalization related to COPD</td>
<td>156</td>
<td>200</td>
<td>0.14</td>
<td>0.82 (0.64-1.07)</td>
<td>0.15</td>
</tr>
<tr>
<td>Emergency department or urgent care visit</td>
<td>199</td>
<td>257</td>
<td>0.47</td>
<td>0.81 (0.63-1.04)</td>
<td>0.09</td>
</tr>
<tr>
<td>Unscheduled office visit</td>
<td>1202</td>
<td>1145</td>
<td>0.04</td>
<td>0.85 (0.74-0.98)</td>
<td>0.02</td>
</tr>
<tr>
<td>Intubations</td>
<td>11</td>
<td>16</td>
<td>0.23</td>
<td>0.79 (0.44-1.45)</td>
<td>0.56</td>
</tr>
</tbody>
</table>

* The P value is for the rate of events per patient-year.
† The hazard ratio and P value are for the time to the first event in the azithromycin group as compared with the placebo group.

Cochrane Review

Continuous prophylaxis: azithromycin (1 study, n = 1142), 250 mg/d for 12 months; clarithromycin (1 study, n = 67), 500 mg/d for 3 months; erythromycin (3 studies, n = 254), 250 mg thrice/d for 6 months; 250 mg twice/d for 12 months; 200–400 mg/d treatment for 1 month, observed for 12 months

Pulsed prophylaxis: azithromycin (1 study, n = 575), 500 mg/d for 3 days, monthly for 36 months; moxifloxacin (1 study, n = 1157), 400 mg/d for 5 days, 8 weekly for 48 weeks, then observed for 72 weeks

Steroids and COPD

- Role of Inflammation
- Asthma/COPD Overlap
- Treatment of Exacerbations
- Risk of Pneumonia
Benefits of ICS

**Graph D: Health Status**
- Placebo
- Salmeterol
- Fluticasone
- Combination therapy

No. of Patients

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Placebo</th>
<th>Salmeterol</th>
<th>Fluticasone</th>
<th>Combination therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1149</td>
<td>1144</td>
<td>1155</td>
<td>1133</td>
</tr>
<tr>
<td>24</td>
<td>854</td>
<td>906</td>
<td>942</td>
<td>941</td>
</tr>
<tr>
<td>48</td>
<td>781</td>
<td>844</td>
<td>848</td>
<td>973</td>
</tr>
<tr>
<td>72</td>
<td>726</td>
<td>807</td>
<td>807</td>
<td>814</td>
</tr>
<tr>
<td>96</td>
<td>675</td>
<td>723</td>
<td>751</td>
<td>773</td>
</tr>
<tr>
<td>120</td>
<td>635</td>
<td>701</td>
<td>686</td>
<td>731</td>
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<tr>
<td>156</td>
<td>569</td>
<td>634</td>
<td>629</td>
<td>681</td>
</tr>
</tbody>
</table>


**Graph C: COPD-Related Death**

No. of Patients

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Placebo</th>
<th>Salmeterol</th>
<th>Fluticasone</th>
<th>Combination therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1524</td>
<td>1521</td>
<td>1534</td>
<td>1533</td>
</tr>
<tr>
<td>24</td>
<td>1513</td>
<td>1515</td>
<td>1527</td>
<td>1525</td>
</tr>
<tr>
<td>48</td>
<td>1499</td>
<td>1502</td>
<td>1515</td>
<td>1513</td>
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<tr>
<td>72</td>
<td>1486</td>
<td>1492</td>
<td>1485</td>
<td>1499</td>
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<tr>
<td>96</td>
<td>1476</td>
<td>1475</td>
<td>1485</td>
<td>1490</td>
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<tr>
<td>120</td>
<td>1463</td>
<td>1450</td>
<td>1461</td>
<td>1470</td>
</tr>
<tr>
<td>156</td>
<td>1433</td>
<td>1428</td>
<td>1428</td>
<td>1460</td>
</tr>
</tbody>
</table>

Withdrawal of Steroids in COPD

D Change from Baseline in Trough FEV₁

Daily Fluticasone Dose in Withdrawal Group
- Reduced to 500 μg
- Reduced to 200 μg
- Reduced to 0 μg (placebo)

Adjusted Mean Change in FEV₁ (mg)

Week

No. at Risk
IGC continuation 1223 1135 1114 1077 970
IGC withdrawal 1258 1135 1092 1056 935

P<0.001


Withdrawal of Steroids in COPD

Moderate or Severe COPD Exacerbation

Hazard ratio, 1.06 (95% CI, 0.94-1.19)
P=0.35 by Wald’s chi-square test

Estimated Probability

Weeks to Event

No. at Risk
IGC continuation 1243 1059 927 827 763 694 646 615 581 14
IGC withdrawal 1242 1090 965 825 740 688 646 607 570 19

Pneumonia Risk

Table 4. Adverse Events among 634 Patients in the Safety Population and 606 Patients in the Substudy of Bone Mineral Density

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported during treatment — % of patients</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Serious event</td>
<td>50</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Drug-related event</td>
<td>13</td>
<td>12</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Event resulting in withdrawal or discontinuation of study medication</td>
<td>24</td>
<td>20</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>Pneumonia — % of patients</td>
<td>12.3</td>
<td>13.3</td>
<td>18.13</td>
<td>19.62</td>
</tr>
<tr>
<td>Fractures</td>
<td>5.1</td>
<td>5.1</td>
<td>5.4</td>
<td>6.3</td>
</tr>
<tr>
<td>Traumatic</td>
<td>1.8</td>
<td>2.5</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Eye disorders</td>
<td>3.6</td>
<td>4.3</td>
<td>4.1</td>
<td>5.2</td>
</tr>
</tbody>
</table>


Lung Volume Reduction

A. All Patients (N=1218)

- Probability of Death vs Months after Randomization
  - Low-risk patients: Surgery (608), Medical Therapy (610)
  - High-risk patients: Surgery (70), Medical Therapy (70)

B. High-Risk Patients (N=140)

- Probability of Death vs Months after Randomization
  - Low-risk patients: Surgery (44), Medical Therapy (64)
  - High-risk patients: Surgery (36), Medical Therapy (45)


a stopping end point. A subgroup defined by FEV, less than or equal to 20% predicted and either a diffusing capacity for carbon monoxide (D,CO) less than or equal to 20% predicted or homogenous emphysema met the prespecified stopping criteria in May 2001, because of excessive mortality after LVRS (19).
Lung Volume Reduction

D  Upper Lobe Predominance, Low Base-Line Exercise Capacity (N=290)

E  Upper Lobe Predominance, High Base-Line Exercise Capacity (N=413)

F  Non-Upper Lobe Predominance, Low Base-Line Exercise Capacity (N=149)

G  Non-Upper Lobe Predominance, High Base-Line Exercise Capacity (N=228)

Endoscopic Lung Volume Reduction

Figure 1: Technical aspects of BTVA courtesy of Apnée medical corporation. BTVA, bronchoscopic thermal vapor ablation.
Endoscopic Lung Volume Reduction

A

<table>
<thead>
<tr>
<th>Degree of Heterogeneity</th>
<th>Percent Change in FEV1 (Treatment - Control)</th>
<th>Point Estimate (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤10%</td>
<td>-16.3% to -9.0%</td>
<td>-16.3 to -9.0</td>
<td>0.004</td>
</tr>
<tr>
<td>11% to 20%</td>
<td>-0.8% to 9.1%</td>
<td>-0.8 to 9.1</td>
<td>0.82</td>
</tr>
<tr>
<td>21% to 30%</td>
<td>-12% to 13%</td>
<td>-12 to 13</td>
<td>0.02</td>
</tr>
<tr>
<td>31% to 40%</td>
<td>-6.4% to 11.3%</td>
<td>-6.4 to 11.3</td>
<td>0.008</td>
</tr>
</tbody>
</table>

B

<table>
<thead>
<tr>
<th>Degree of Heterogeneity</th>
<th>Percent Change in 6MWT (Treatment - Control)</th>
<th>Point Estimate (95% CI)</th>
<th>P Value</th>
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<tbody>
<tr>
<td>≤10%</td>
<td>6.1% to 12.8%</td>
<td>6.1 to 12.8</td>
<td>0.000</td>
</tr>
<tr>
<td>11% to 20%</td>
<td>-7.9% to 4.8%</td>
<td>-7.9 to 4.8</td>
<td>0.000</td>
</tr>
</tbody>
</table>

C

Figure 5. Effect of heterogeneity on endobronchial valve (EBV) response at 6 months. Shown is the effect of heterogeneity on change in (A) FEV1, and (B) 6-minute walk distance (6MWT) at 6 months after EBV implantation. Percent heterogeneity was the difference in quantitative emphysema score (the proportion of pixels less than 990 Hounsfield units) between EBV-treated and ipsilateral normal-appearing. (C), sagittal high-resolution chest computed tomography views with density mask views show low (6%), left, and high heterogeneity (25%), right. Smaller areas represent fewer pixels less than 990 Hounsfield units, consistent with emphysema. Reproduced by permission from Reference 2.

Am J Respir Crit Care Med Vol 184, pp 881-893, 2011

Moving towards Personalized Therapy

- Individual presentation and underlying mechanisms
  - Morbidity
  - Disease progression
  - Lung function
  - Symptoms: cough, sputum production, and dyspnea
  - Excessive bronchial hyperreactivity
  - Expectoration
  - Disability
  - Health status and quality of life

- Individual risk factors and underlying mechanisms
  - Pulmonary: emphysema
  - Tuberculosis
  - Skin disorders
  - Osteoporosis or fractures
  - Muscle wasting
  - Nutritional impairment
  - Cancer
  - Diabetes
  - Hypertension
  - Cardiovascular events
  - Neurological effects
  - Gastrointestinal symptoms

- Individualization of treatment choices in COPD
  - Present COPD pharmacological treatments
  - Expected benefits
  - Expected risks

Figure 1: Benefit-risk balance and its individual determinants with personalized COPD treatment choices. When deciding which pharmacological treatment options to prescribe to a patient, they have to consider expected benefits (determined by individual presentation and underlying mechanisms of disease) and possible risks (which depend on individual risk factors and comorbidity). COPD=chronic obstructive pulmonary disease, LABA=long-acting beta-2 agonists, LAMA=long-acting antimuscarinic agents, ICS=inhaled corticosteroids.

Moving towards Personalized Therapy

Figure 2: Interrelations between exposome, genome, endotype, and clinical phenotype of COPD

Figure 3: Present understanding of potential COPD endotypes
Objectives

- Identify approaches for COPD screening, diagnosis, and ongoing patient monitoring
- Assess the diagnosis and progression of COPD including clinical data on pulmonary function
- Discuss management strategies for patients with COPD
- Discuss pharmacologic and non-pharmacologic treatment options for COPD to reduce exacerbations
- Educate patients and caregivers to provide clear medical instructions, assess patient preference and improve treatment adherence
## Devices

Select your inhaler below to start the training

![Image of various inhalers](image)

## Factors Involved in Nonadherence

<table>
<thead>
<tr>
<th>Medication Usage</th>
<th>Nonmedication Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulties associated with inhalers</td>
<td>Misunderstanding/lack of information</td>
</tr>
<tr>
<td>Complicated regimens</td>
<td>Fears about side effects</td>
</tr>
<tr>
<td>Fears about/or actual side effects</td>
<td>Inappropriate expectations</td>
</tr>
<tr>
<td>Cost</td>
<td>Underestimation of severity</td>
</tr>
<tr>
<td>Distance to pharmacies</td>
<td>Attitudes toward ill health</td>
</tr>
<tr>
<td>Cultural factors</td>
<td>Poor communication</td>
</tr>
</tbody>
</table>
Conclusions

- COPD treatments continue to evolve
- The future may bring better phenotypic characterization and more individualized therapies

Chronic Obstructive Pulmonary Disease

- COPD is a PREVENTABLE and TREATABLE disease

ATS/ERS Guidelines for the Treatment of COPD, 2004