**Anticholinergic Agents**

The key mechanism of anticholinergic medications appears to be the blocking of muscarinic receptors (M1, M2, and M3). By blocking acetylcholine-mediated bronchoconstriction, the end result is bronchodilation.²

Side effects associated with anticholinergic therapy include dry mouth, glaucoma, and urinary retention.²

**β₂-Agonists**

β₂-agonists primarily relax airway smooth muscle by stimulating β₂-adrenergic receptors. This, in turn, increases cyclic adenosine monophosphate (AMP) and produces functional antagonism to bronchoconstriction.¹

Side effects are more frequent in oral therapy than inhaled therapy. They include palpitations and premature ventricular contractions, tremor, and sleep disturbance.³

**Theophylline**

Theophylline agents may act as nonselective phosphodiesterase inhibitors but have also been reported to have a range of nonbronchodilator actions.¹

Theophylline requires careful dose management due to its potential toxicity and serious side effects, including ventricular and atrial rhythm disturbances and convulsions.¹

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**COMBINATION BRONCHODILATOR THERAPY**

- Combining bronchodilators with different mechanisms and durations of action may increase the degree of bronchodilation¹
- The combination of a β₂-agonist and an anticholinergic may produce additional improvements in lung function and health status¹
- The safety of each component of the combination therapy should be assessed in evaluating its appropriateness for individual patients¹

**CONCLUSION**

For a discussion of specific bronchodilator treatment options for management of stable COPD, please refer to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) Executive Summary (updated 2006) in the Guidelines and Resources section of the GOLD Web site. This is available at www.goldcopd.org.

**References:**


Boehringer Ingelheim Pharmaceuticals, Inc. has no ownership interest in any other organization that advertises or markets its disease management products and services.

A healthcare practitioner educational resource provided by Boehringer Ingelheim Pharmaceuticals, Inc.
A COPD definition includes FEV1/FVC < 0.70 and post-bronchodilator FEV1 values as described in table. FEV1 = forced expiratory volume in 1 second.

Spontaneous skin bruising has been known to occur. Other topical side effects include oropharyngeal candidiasis and hoarse voice due to pharyngeal deposition.3

Combination Medications

Currently, only a few types of combination medications are available. The following are the most common combinations3:

- Short-acting β2-agonist and short-acting anticholinergic
- Long-acting β2-agonist and inhaled corticosteroid

Side effects are dependent on the medications in the combination1 and are described on pages 3 to 5 in the specific sections for these medications.

Recommended Therapy at Each Stage of COPD

<table>
<thead>
<tr>
<th>COPD Stage</th>
<th>Post-bronchodilator FEV1</th>
<th>Short-acting Bronchodilators</th>
<th>Long-acting Bronchodilators</th>
<th>Inhaled Glucocorticosteroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>I MILD</td>
<td>FEV1 ≥ 80% predicted</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>II MODERATE</td>
<td>50% ≤ FEV1 &lt; 80% predicted</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>III SEVERE</td>
<td>30% ≤ FEV1 &lt; 50% predicted</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IV VERY SEVERE</td>
<td>FEV1 &lt; 30% predicted or FEV1 &lt; 50% predicted plus chronic respiratory failure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* COPD definition includes FEV1/FVC < 0.70 and post-bronchodilator FEV1 values as described in table. FEV1 = forced expiratory volume in 1 second.