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

$\beta_2$-Agonists
$\beta_2$-agonists primarily relax airway smooth muscle by stimulating $\beta_2$-adrenergic receptors. This, in turn, increases cyclic adenosine monophosphate (AMP) and produces functional antagonism to bronchoconstriction. Side effects are more frequent in oral therapy than inhaled therapy. They include palpitations and premature ventricular contractions, tremor, and sleep disturbance.

Theophylline
Theophylline agents may act as nonselective phosphodiesterase inhibitors but have also been reported to have a range of nonbronchodilator actions. Theophylline requires careful dose management due to its potential toxicity and serious side effects, including ventricular and atrial rhythm disturbances and convulsions.

COMBINATION BRONCHODILATOR THERAPY

- Combining bronchodilators with different mechanisms and durations of action may increase the degree of bronchodilation.
- The combination of a $\beta_2$-agonist and an anticholinergic may produce additional improvements in lung function and health status.
- The safety of each component of the combination therapy should be assessed in evaluating its appropriateness for individual patients.

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.
**USE OF MEDICATIONS IN THE MANAGEMENT OF STABLE COPD**

Although airway obstruction in COPD is only partially reversible, pharmacological treatments may¹:
- Prevent and control symptoms
- Reduce the severity and frequency of exacerbations
- Improve health status
- Increase exercise tolerance

**BRONchodILATORS IN STABLE COPD**

- Bronchodilator medications are central to symptom management in COPD¹
- Inhaled therapy is preferred¹
- The choice of β₂-agonist, anticholinergic, theophylline, or combination therapy depends on availability and individual response in terms of symptom relief and side effects¹
- Bronchodilators are prescribed as needed or for maintenance therapy to prevent or reduce symptoms¹
- Long-acting inhaled bronchodilators are more effective and convenient than short-acting agents¹
- Combining bronchodilators may improve efficacy and decrease the risk of side effects compared with increasing the dose of a single bronchodilator¹

**OTHER AGENTS**

**Inhaled Corticosteroids**

The benefits of inhaled corticosteroids in treating COPD are much less dramatic than those seen in asthma. Their role in stable COPD management is limited to symptomatic patients with COPD with an FEV₁ < 50% predicted [Stage III: Severe COPD and Stage IV: Very Severe COPD] and in treating patients who have experienced repeated exacerbations.¹ ² ³

The dose-response relationships and long-term safety of inhaled corticosteroids in COPD are not known.¹ Inhaled steroids are not approved for use in COPD as monotherapy.

**COMBINATION MEDICATIONS**

Currently, only a few types of combination medications are available. The following are the most common combinations²:
- 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.

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**Recommended Therapy at Each Stage of COPD**¹ ² ³

<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>

*¹COPD definition includes FEV₁/FVC < 0.70 and post-bronchodilator FEV₁ values as described in table.
²FEV₁ = forced expiratory volume in 1 second.