

Bronchodilators: Mechanism of action

Cholinergic pathway

Cholinergic receptors are located on airway smooth muscle cells; activation by acetylcholine increases peripheral airway resistance¹

Antagonists

Long-acting muscarinic antagonists (LAMAs)

Bind to muscarinic receptors and block the bronchoconstrictive effects of acetylcholine binding¹



Adrenergic pathway

β_2 -adrenergic receptors are located on airway smooth muscle cells; activation by β_2 -agonists results in relaxation of bronchial smooth muscle^{1,2}

Agonists

Long-acting β_2 -agonists (LABAs)

Bind to β_2 -receptors to induce bronchodilation and smooth muscle relaxation²

LAMAs and **LABAs** have complementary mechanisms of action^{1,2}

Bronchodilators act by improving lung function and reducing dynamic hyperinflation at rest and during exercise^{3,4}

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Inhaled corticosteroids (ICS): Mechanism of action

Corticosteroids enter the cell cytoplasm and bind inactive glucocorticoid receptor complexes¹

Activated glucocorticoid receptor binds DNA at the glucocorticoid response element sequence¹

↑ Anti-inflammatory proteins (transactivation)
↓ Transcription and synthesis of proinflammatory cytokines (transrepression)¹

Inflammatory cells



Eosinophil: ↓ numbers (apoptosis)



T lymphocyte: ↓ cytokines



Mast cell: ↓ numbers



Macrophage: ↓ cytokines



Dendritic cell: ↓ numbers

Cellular effects of ICS²



Epithelial cell: ↓ cytokine mediators



Endothelial cell: ↓ leak



Airway smooth muscle: ↑ β_2 -receptors
↓ cytokines



Mucus gland: ↓ mucus secretion

Actions of ICS:^{1,2}

- Inhibiting recruitment of inflammatory cells and release of proinflammatory mediators
- Reducing airway hyperresponsiveness