# Clinical Data Support Use of Low-Carbon Version of Albuterol Metered Dose Inhaler for Asthma

## Key Takeaways

- Albuterol with HFA-152a propellant shows therapeutic equivalence and safety similar to HFA-134a, supporting regulatory submissions for a sustainable option.
- The new formulation reduces the carbon footprint by approximately 92% compared with the current HFA-134a propellant, crucial for climate change mitigation.
- Despite low-carbon alternatives, many patients prefer MDIs, making this development important for balancing environmental goals with patient care.
- Lifecycle analyses reveal significant carbon footprint reductions primarily during the patient use phase, highlighting the environmental benefits of the new formulation.

*A new low-carbon albuterol inhaler shows therapeutic equivalence to original options, suggesting reduced emissions and improved sustainability for patients with asthma and other respiratory conditions.*

Clinical data confirm that the formulation of the metered-dose inhaler (MDI) for albuterol (Ventolin; GSK), containing a low-carbon propellant, HFA-152a, has therapeutic equivalence and is comparable in safety to salbutamol MDI containing HFA-134a, the current propellant, according to a news release from the manufacturer. These findings support regulatory submissions for a next-generation version of albuterol, referred to as salbutamol outside of the US, which will bring a more sustainable option to patients who have respiratory diseases.

Albuterol is approved by the FDA for the treatment and prevention of acute or severe bronchospasm in patients with reversible obstructive airway disease, such as asthma and chronic obstructive pulmonary disease (COPD). Albuterol acts on β2-adrenergic receptors, inducing bronchial smooth muscle relaxation and inhibiting immediate hypersensitivity mediator release, particularly from mast cells. Albuterol also affects β1-adrenergic receptors, but the impact is minimal, thereby having little effect on a patient's heart rate.[2]

Albuterol is available in various dosage forms and strengths, including an aerosol metered-dose inhaler delivering 90 μg (base)/actuation, equivalent to 108 μg of albuterol sulfate; a powder metered-dose inhaler form providing the same values as the aerosol metered-dose inhaler; 2-mg and 4-mg tablets; 4-mg and 6-mg extended-release tablets; nebulized solutions, including 0.083%, 0.5%, 0.63 mg/3 mL, and 1.25 mg/3 mL; and an oral syrup in a concentration of 2 mg/5 mL.[2]

In the absence of albuterol's bronchodilatory effects, patients experiencing bronchospasms may face the risk of catastrophic asphyxiation, emphasizing the crucial need for patients to have a readily available treatment. According to the manufacturers, nearly half a billion people are affected by asthma and COPD worldwide.[1,2]

"Healthy air is essential for healthy lungs, and our next-generation [albuterol] has the potential to reduce greenhouse gas emissions by 92% per inhaler. Almost 6 decades after its first development, this medicine remains highly valued by patients and health care professionals and is a key component of our respiratory portfolio. Today, we are one step closer to a reliever MDI that we believe will continue to help patients for many decades to come," Kaivan Khavandi, senior vice president, global head of respiratory, immunology & inflammation research and development at GSK, said in a manufacturer news release.[1]

The World Health Organization considers climate change to be the biggest global health issue, and patients with chronic respiratory diseases such as asthma and COPD are particularly susceptible to variable weather conditions and extreme weather events. Short-acting β2-agonists (SABAs) are typically used as reliever medications for the short-term relief of asthma and COPD symptoms; however, they are also responsible for approximately 70% of total inhaler-related greenhouse gas (GHG) emissions. The development of MDI devices that contain low global warming potential propellants can reduce the carbon footprint of MDIs while balancing reduced GHG emission goals with patient health and well-being.[3]

The aim of the trial was to assess the carbon footprints of albuterol HFA-152a MDI, albuterol HFA-134a MDI, and an albuterol dry-powder inhaler (DPI). For this study, 3 cradle-to-grave lifecycle analyses (LCA) were undertaken to compare the carbon footprints of albuterol HFA-152a MDI, albuterol HFA-134a MDI, and albuterol DPI. Over 600 individual emission factors were calculated from over 2000 data points and categorized into active pharmaceutical ingredient manufacture, micronization, device, formulation and packaging, use phase, distribution, and end-of-life stages.[3]

The data show that the average carbon footprint values were about 27.09, 2.24, and 0.76 kg CO2e per device for albuterol HFA-134a MDI, albuterol HFA-152a MDI, and albuterol DPI, respectively, representing an approximate 92% reduction in carbon footprint for albuterol HFA-152a MDI compared with albuterol HFA-134a MDI. The investigators observed that the difference was primarily driven by the patient use phase. These findings suggest that substituting the currently available HFA-134a propellant with a new HFA-152a candidate propellant could substantially reduce the carbon footprint of a SABA reliever.[3]

"While low carbon alternatives already exist, such as dry powder and soft mist inhalers, we know that many patients worldwide with both asthma and COPD prefer a[n albuterol] MDI to relieve their symptoms. These data should enable patients to use their preferred inhaler choice. This is a crucial advance to help global health care systems meet their climate targets at the same time as optimizing the care of patients," Ashley Woodcock, professor of respiratory medicine at the University of Manchester, said in the news release.[1]

## REFERENCES


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