www.ijarp.com ISSN 2456-9992 Page: 01-06

International Journal Advanced Research Publications

Review Article

Volume: 02
Issue: 04

COMPARATIVE ANANYSIS OF ASTHALIN

***Abhishek Tiwari, Mr. Devashish Jena (Assistant Professor)**

India.

Article Received: 15 March 2026, Article Revised: 04 April 2026, Published on: 24 April 2026

***Corresponding Author: Abhishek Tiwari**

India.

DOI: https://doi-doi.org/101555/ijarp.2981

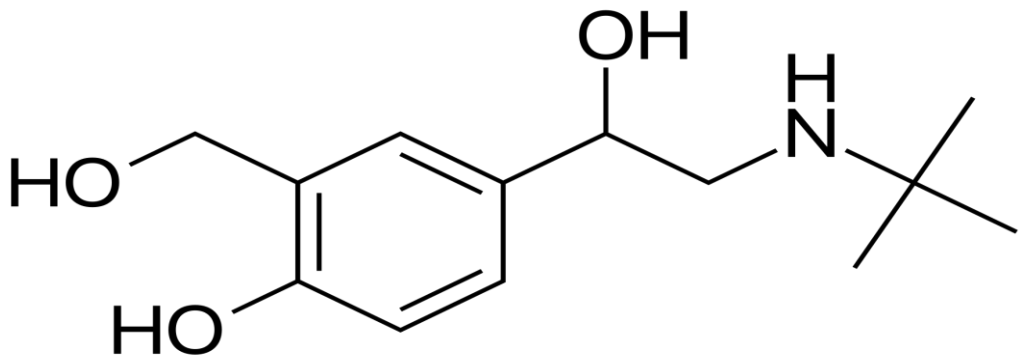
ABSTRACT

Salbutamol, which people also call albuterol and buy under names like Ventolin, is a medicine that helps open up the bigger air passages in your lungs. It works by relaxing the muscles around these airways. Doctors use it to help people with asthma, whether it's an ongoing condition, a sudden attack, or even just when they get out of breath from exercising. It's also used for COPD, a lung condition. Sometimes, it's used to deal with really high potassium in the blood too. You'll typically get salbutamol through an inhaler or a nebulizer, but it also comes in pill, liquid, and IV forms. If you breathe it in, it usually starts working in about 15 minutes and keeps working for a few hours.

INTRODUCTON

Salbutamol was first patented in Britain back in 1966 and started being sold in the UK in 1969. The United States gave it the green light for medical use in 1982. It's even on the World Health Organization's list of crucial medicines, and you can get it as a generic drug. In fact, in 2023, it was the seventh most prescribed medication in the US, with over 59 million prescriptions filled.

STRUCTURE



Medical uses

Salbutamol is generally used for bronchospasm, whether it's from allergies, exercise, or other reasons, and also for COPD. It's a go-to ingredient in rescue inhalers for quick relief during asthma attacks.

Because it acts as a beta-2 agonist, salbutamol also has a role in childbirth. When given intravenously, it can help relax the uterine muscles to hold off premature labor. Although it was once favored over drugs like atosiban and ritodrine, it's now less commonly used because nifedipine, a calcium channel blocker, is more effective and easier to handle.

Salbutamol has also been used to help with severe hyperkalemia, as it encourages potassium to move into cells, thereby lowering blood potassium levels.

More recently, a couple of studies have indicated that salbutamol might lessen the symptoms in newborns and teenagers who have myasthenia gravis or temporary neonatal myasthenia gravis.

Adverse effects

The most common side effects are fine tremor, anxiety, headache, muscle cramps, dry mouth, and palpitation. Other symptoms may include tachycardia, arrhythmia, flushing of the skin, myocardial ischemia (rare), and disturbances of sleep and behaviour. Rarely occurring, but of importance, are allergic reactions of paradoxical bronchospasms, urticaria (hives), angioedema, hypotension, and collapse. High doses or prolonged use may cause hypokalemia, which is of concern especially in patients with kidney failure and those on certain diuretics and xanthine derivatives.

Salbutamol metered dose inhalers have been described as the "single biggest source of carbon emissions from NHS medicines prescribing" due to the propellants used in the inhalers. Dry powder inhalers are recommended as a low-carbon alternative.

Side effect

You might experience some common side effects like trembling, a headache, a racing heart, feeling dizzy, or a bit anxious. More serious issues could pop up too, such as your breathing getting worse, an uneven heartbeat, or your potassium levels dropping too low. It's generally considered safe to use when you're pregnant or breastfeeding, as there's no evidence it causes harm.

Pharmacology

The reason salbutamol works so well on β2 receptors is because of its tertiary butyl group. These receptors are the main ones found on the muscles in your airways. When these receptors are activated, they trigger a chain reaction that starts with a molecule called adenylyl cyclase turning ATP into cAMP. This whole process eventually stops myosin from being phosphorylated and reduces the amount of calcium ions inside the cells. Both myosin phosphorylation and calcium ions are needed for muscles to contract. Plus, the higher cAMP levels stop inflammatory cells in the airways, like basophils, eosinophils, and particularly mast cells, from releasing substances and cytokines that cause inflammation. Salbutamol and similar drugs also boost the flow of calcium and potassium ions through channels, which makes the airway muscles relax and become more polarized.

Your body gets rid of salbutamol either by your kidneys filtering it out directly, or it's first changed into a 4′-O-sulfate form and then passed out in your urine.

Pharmacokinetic data	
Metabolism	Liver
Onset of action	< 15 min (inhalation), < 30 min (by mouth)[7]
Elimination half-life	3.8–6 hrs (inhalation); 5–7.2 hrs (by mouth)[7]
Duration of action	3–6 hrs (inhalation); ≤ 8 hrs (by mouth)[7]
Excretion	Kidney

Chemistry

Salbutamol is typically sold as a mix of both its R and S forms. The image on the right shows the R form, which is the one that actually works for its intended purpose. The S form, on the other hand, doesn't do much on its own but interferes with how the body gets rid of the R form and itself. Because the S form hangs around longer, it can build up in the lungs, potentially leading to airways becoming too sensitive and inflamed. Trying to create a pure R form of Salbutamol as a drug is tricky because the molecule isn't stable; it tends to change back into a mix of R and S forms over a few days to weeks, depending on the acidity of its environment.

Researchers have found ways to separate the different forms of Salbutamol and check how pure each form is using a technique called thin-layer chromatography.

Chemical and physical data	
Formula	$C_{13}H_{21}NO_3$
Molar mass	239.315 g·mol^{-1}
3D model (JSmol)	Interactive image
Chirality	Racemic mixture

Synthesis

The chemical synthesis of salbutamol has been desccribed:[29] Perhaps the most fabled of the available methods starts with the Fries rearrangement of aspirin, but many more methods are discussed in the review.

Society and culture

Name

Salbutamol is the international nonproprietary name (INN) while albuterol is the United States Adopted Name (USAN). The drug is usually manufactured and distributed as the sulfate salt (salbutamol sulfate).

It was first sold by Allen & Hanburys (UK) under the brand name Ventolin, and has been used for the treatment of asthma ever since.[36] The drug is marketed under many names worldwide.

Doping

As of 2011 there was no evidence that an increase in physical performance occurs after inhaling salbutamol, but there are various reports for benefit when delivered orally or intravenously. In spite of this, salbutamol required "a declaration of Use in accordance with the International Standard for Therapeutic Use Exemptions" under the 2010 WADA

prohibited list. This requirement was relaxed when the 2011 list was published to permit the use of "salbutamol (maximum 1600 micrograms over 24 hours) and salmeterol when taken by inhalation in accordance with the manufacturers' recommended therapeutic regimen.

Abuse of the drug may be confirmed by detection of its presence in plasma or urine, typically exceeding 1,000 ng/mL. The window of detection for urine testing is on the order of just 24 hours, given the relatively short elimination half-life of the drug estimated at between 5 and 6 hours following oral administration of 4 mg

CONCLUSION

In conclusion, salbutamol, also known as albuterol, is a crucial medication for treating conditions like asthma, COPD, and bronchospasm. This beta-2 agonist is effective in opening up air passages in the lungs by relaxing the surrounding muscles. Its pharmacological action on β2 receptors and its role in reducing potassium levels make it a versatile drug. However, it's important to be aware of potential side effects and environmental impact, as well as its use in doping.

Overall, salbutamol's significance in respiratory health and beyond is undeniable.

REFERENCE

1. ugs.com. Archived from the original on 30 March 2016. Retrieved 11 April 2016.
2. Thereaputic Goods Administration (19 December 2018). "Prescribing medicines in pregnancy database". Australian Government.
3. "Albuterol Use During Pregnancy". Drugs.com. 8 March 2019.
4. Retrieved 21 December 2019.
5. Thereaputic Goods Administration. "Poisons Standard October 2017". Australian Government.
6. "Prescription Drug List". Government of Canada. 23 October 2014.
7. "Respiratory health". Health Canada. 9 May 2018. Retrieved 13
8. April 2024.
9. "Albuterol". Drugs.com. The American Society of Health-System Pharmacists. Archived from the original on 8 December 2015. Retrieved 2 December 2015.
10. Mahoney BA, Smith WA, Lo DS, Tsoi K, Tonelli M, Clase CM (April 2005). "Emergency interventions for hyperkalaemia". The Cochrane Database of Systematic Reviews. 2005 (2)
11. CD003235. doi:10.1002/14651858.CD003235.pub2. PMC 6457842. PMI D 15846652.
12. Starkey ES, Mulla H, Sammons HM, Pandya HC (September2014). "Intravenous salbutamol for childhood asthma: evidence-based medicine?" (PDF). Archives of Disease in Childhood. 99 (9): 873–7. doi:10.1136/archdischild-2013-304467. PMID 24938536. S2CID 2070868. Archived from the original (PDF) on 8 September 2017.

13. Landau R (1999). Pharmaceutical innovation: revolutionizing human health. Philadelphia: Chemical Heritage Press. P. 226. ISBN 978-0-941901-21-5. Archived from the original on 8 December 2015.
14. Fischer J, Ganellin CR (2006). Analogue-based Drug Discovery. John Wiley & Sons. p. 542. ISBN 978-3-527-60749-5.
15. The selection and use of essential medicines 2023: web annex A: World Health Organization model list of essential medicines: 23rd list (2023). Geneva: World Health Organization. 2023. hdl:10665/371090. WHO/MHP/HPS/EML/2023.02.
16. "The Top 300 of 2023". ClinCalc. Archived from the original on 12 August 2025. Retrieved 12 August 2025.
17. "Albuterol Drug Usage Statistics, United States, 2014 - 2023". ClinCalc. Retrieved 12 August 2025.
18. Hatfield H. "Asthma: The Rescue Inhaler -- Now a Cornerstone of Asthma Treatment". WebMD. Archived from the original on 16 July 2017. Retrieved 27 June 2017.
19. Rossi S (2004). Australian Medicines Handbook. AMH. ISBN 978-0-9578521-4-3.
20. Allen NM, Hacohen Y, Palace J, Beeson D, Vincent A, Jungbluth H (February 2016). "Salbutamol-responsive fetal acetylcholine receptor inactivation syndrome". Neurology. 86 (7): 692–4. doi:10.1212/WNL.0000000000002382. PMC 4762416. PMID 26791147.
21. Allen NM, O'Rahelly M, Eymard B, Chouchane M, Hahn A, Kearns G, et al. (October 2023). "The emerging spectrum of fetal acetylcholine receptor antibody-related disorders (FARAD)". Brain: A Journal of Neurology. 146 (10): 4233–4246. doi:10.1093/brain/awad153. PMC 10545502. PMID 37186601
22. "3.1.1.1 Selective beta2 agonists – side effects". British National Formulary (57 ed.). London: BMJ Publishing Group Ltd and Royal Pharmaceutical Society Publishing. March 2008. ISBN 978-0-85369-778-7.
23. "Primary care networks incentivised to switch patients to more environmentally friendly inhalers". Pharmaceutical Journal. 3 September 2021. Retrieved 16 October 2021.
24. Lemke TL, Williams DA, Roche VF, Zito SW (2013). Foye's Principles of Medicinal Chemistry. Philadelphia, PA: Lippincott Williams & Wilkins. pp. 1314–1320. ISBN 978-1-60913-345-0. OCLC 748675182. Archived from the original on 8 September 2017.
25. "Albuterol Sulfate". Rx List: The Internet Drug Index. Archived from the original on 18 July 2014. Retrieved 13 July 2014.