Do inhaled levalbuterol and racemic albuterol have different cardiac effects?

Evidence-Based Answer

No consistent differences have been noted in the cardiac effects of levalbuterol and racemic albuterol when given at equivalent doses and intervals. (SOR: A, based on smaller RCTs.) Both agents are associated with increased cardiovascular events when used in patients with obstructive airway disease. (SOR: A, based on a meta-analysis.)

Levalbuterol (LEV) is purified to contain only the metabolically active R-isomer, whereas racemic albuterol (RAC) is composed of a 1:1 ratio of S- and R-isomers. No clinical trials have demonstrated direct cardiac effects of the S-isomer.

In 2004, a meta-analysis of 33 RCTs (n=6,855) evaluated the cardiovascular effects of beta-2-agonists. The study population had either asthma or chronic obstructive pulmonary disease (COPD). Compared with placebo, beta-2-agonists were associated with a 2.5 relative risk (95% CI, 1.69–4.1) for adverse cardiovascular events (P<.001). While most of these events were sinus tachycardia (RR=3.1; 95% CI, 1.7–5.5), there was a trend for major cardiovascular events, such as heart failure, myocardial infarction, ventricular tachycardia, and death (RR=1.7; 95% CI, 0.76–3.6).²

One small, prospective, randomized crossover study evaluated the cardiovascular differences between LEV and RAC. The study used 20 ICU patients who were treated every 4 hours with equivalent doses of either LEV or RAC (1.25 vs 2.5 mg, respectively). Both drugs caused a slight increase in heart rate (HR); however, no statistical difference was noted between the 2 medications (3.6 bpm LEV vs 4.4 bpm RAC).²

In a pediatric RCT (n=81), patients with severe asthma exacerbations were given either 10 mg/h of LEV or 20 mg/h of RAC. Tachycardia occurred with a mean HR of 130 to 137 bpm, but no statistically significant difference was noted between the 2 treatment groups.³

In an RCT (n=49) of patients with asthma under good control, researchers found the HR increased by an average of 3.5 bpm more in the RAC vs the LEV treatment group (95% CI, 0.6–6.4).³

One large study (n=486) of adults with COPD and asthma exacerbations did show a difference in the subjective sensation of “rapid heartbeat” with RAC (17.3% vs 6.1%; P<.001). No other cardiac data were available from this study. This study used a protocol of RAC every 1 to 4 hours and LEV every 8 hours.⁵

The 2007 National Heart, Lung, and Blood Institute guidelines for asthma exacerbation recommend that the dosing interval for both LEV and RAC is every 1 to 4 hours as needed.⁶

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The opinions and assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Medical Department of the US Army or the US Army Service at large.


What’s in an HDA?

We’ve asked Dr. Robert Gauer, author of numerous HDAs, What goes into writing an HDA?

I generally spend about 3 hours performing a literature search. When I get the articles I want, I go over their bibliographies and pull additional articles, spending about 8–10 hours of reading and processing.

From there, I am able to begin putting thoughts into words. This process takes about 4 hours; then I spend another 2 hours after I’ve let it sit for a few days. After the external peer review and a round or two of edits from Dr. Neher, it is usually ready for print.

My favorite part is the actual writing and seeing how I can take a mountain of information and make it into a molehill that still has relevance for the reader.

I can’t tell you the countless times I have referred to an HDA for a question asked by a student or resident. We find the answer easily, and it takes less than 5 minutes to read.

Read more at: www.fpin.org/page/Gauer