

ALBUTEROL AND ACIDOSIS

OVERVIEW

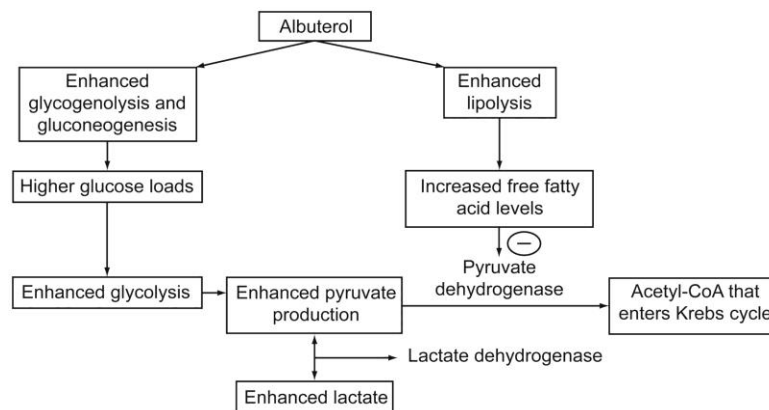
Albuterol is well-recognized in the literature to be associated with a rise in serum lactate with or without concomitant lactic acidosis. There is some emerging evidence that this phenomenon is more common than previously thought, with a recent study in 2014 showing 69% of patients treated with albuterol in an ED setting developing some degree of lactatemia > 2.2 mmol/L, and 15% showing at least one lactate level > 4.5 mmol/L (1).

PATHOGENESIS

Type A Lactic Acidosis: secondary to tissue hypoxia (e.g. shock, cardiac arrest, poor ventilation/oxygenation).

Type B Lactic Acidosis: not associated with tissue hypoxia. Can be related to vitamin deficiency (e.g. thiamine deficiency causing impaired pyruvate dehydrogenase), increased lactate production by neoplastic cells, medication-induced mitochondrial dysfunction (e.g. linezolid, ARVT).

Albuterol-associated lactic acidosis is thought to be a Type B acidosis. The mechanism is not definitively worked out, but may be due to induction of a hyperadrenergic state which enhances glycogenolysis and gluconeogenesis as well as lipolysis (2).



FINDINGS AND MANAGEMENT

A dose-dependent relationship between serum albuterol and lactate levels has been demonstrated (1), but controversy exists in the literature as to whether any resulting acidosis is clinically significant; some attributing lactic acidosis and continued β -2 agonist therapy to tachypnea and respiratory fatigue (3), and others reporting a case with a lactate as high as 10.47 mmol/L and pH of 7.29 without any apparent clinical consequences (4).

MANAGEMENT

There are currently no evidence-based approaches to managing an asymptomatic lactate in the setting of asthma treatment. One practical suggestion is to explicitly identify the situation through physical exam and serial peak flow measurements. Other suggestions include switching albuterol to ipratropium or at least holding the therapy steady in the absence of any clinical deterioration.

REFERENCES

1. *Albuterol Administration Is Commonly Associated with Increases in Serum Lactate in Patients with Asthma Treated for Acute Exacerbations of Asthma.* **Lewis, Lawrence M, et al.** 1, January 2014, *Chest*, Vol. 145, pp. 53-59.
2. *Can Albuterol Be Blamed for Lactic Acidosis?* **Dodda, Venkata R and Spiro, Peter.** 12, December 2012, *Respiratory Care*, Vol. 57, pp. 2115-2118.
3. *An Under-Recognized Complication of Treatment of Acute Severe Asthma.* **Creagh-Brown, Ben C and Ball, Jonathan.** 4, 2008, *The American Journal of Emergency Medicine*, Vol. 26, p. 514.
4. *Lactic Acidosis as a Complication of Beta-Adrenergic Aerosols.* **Claret, Pierre-Geraud, et al.** 7, September 2012, *The American Journal of Emergency Medicine*, Vol. 30, p. 1319.



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