



Rx



Inhaled Insulin – A New Delivery for an Old Drug

HEIDI COLLINS FANTASIA

More than 25 million people in the United States are affected by either type 1 or type 2 diabetes and many more have abnormal glucose metabolism that has not yet been diagnosed (Centers for Disease Control and Prevention [CDC], 2014). Insulin therapy has been a mainstay of diabetes treatment since its discovery in 1921, but issues with drug delivery and treatment adherence still exist (Rosenfeld, 2002). Subcutaneous injection of insulin, with syringes, injectors, pens or infusion pumps, is currently the mechanism of delivery for those who need exogenous insulin.

A significant drawback is that these methods are invasive, can cause discomfort and may require multiple injections throughout the day.

In June 2014, the Food and Drug Administration (FDA) approved Afrezza® Inhalation Powder, a rapid-acting inhaled form of human insulin, to treat diabetes in adults (FDA, 2014). This form of inhaled insulin is for use at meal-time and cannot be used as a substitute for long-acting insulin. Although inhaled insulin may not eliminate the need for injectable insulin in

Abstract Rates of diabetes continue to rise in the United States. It's estimated that more than 25 million people in the United States currently have either type 1 or type 2 diabetes. Insulin is the mainstay of treatment, and a new delivery option is available. In 2014, the U.S. Food and Drug Administration approved Afrezza® inhalation powder, a rapid-acting inhaled form of human insulin, to treat diabetes in adults. This article will provide an overview of the Afrezza system, indications for use, adverse reactions and implications for nurses who work with women with diabetes. DOI: 10.1111/1751-486X.12177

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all people with diabetes, especially those with type 1, it does represent a noninvasive treatment option for people with diabetes who experience blood sugar elevations after meals.

Classification of Diabetes

Diabetes can be classified into three categories: type 1, type 2 and gestational. Type 1 diabetes typically presents in childhood and is characterized by pancreatic beta cell failure and the cessation of insulin production. Type 2 develops in adolescence or adulthood and is associated with insulin resistance and deficiency, often as

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a result of a sedentary lifestyle, obesity and aging. Gestational diabetes mellitus develops during pregnancy as a result of hormonal insulin resistance (Bennett & Joseph, 2013; Mathers, Zarbock, & Sutton, 2014).

Mechanism of Action

Afrezza inhaled insulin contains regular human insulin and its metabolism and elimination is comparable to injectable, subcutaneous insulin. Like regular human insulin in other forms, inhaled insulin lowers blood glucose levels by

stimulating glucose uptake by skeletal muscle and reducing hepatic glucose production (Man-kind Corporation, 2014; Verma, Kumar, Malviya, & Sharma, 2014). The permeability of lung alveoli allows inhaled insulin a port of entry that is easily penetrable for absorption into the blood stream (Skyler et al., 2001).

Efficacy

Inhaled insulin is effective in lowering both postprandial blood sugar levels and hemoglobin A1C, but is not superior to subcutaneous insulin delivery. Researchers conducted a meta-analysis that included 16 randomized, controlled trials that compared inhaled insulin to subcutaneous delivery. Although inhaled insulin was effective, subcutaneous injections were slightly more effective in lowering hemoglobin A1C levels from baseline (Ceglia, Lau, & Pittas, 2006). Risks of hypoglycemia were similar among all methods of insulin delivery. The researchers concluded that inhaled insulin offered a noninvasive option for those who needed premeal insulin and were interested in a delivery option other than injections (Ceglia et al., 2006).

Dosage and Administration

Afrezza inhaled insulin is available in 4-unit and 8-unit cartridges that fit into the Afrezza inhaler. The insulin in the cartridges is in the form of dry powder and it becomes aerosolized when a person breathes through the inhaler. The initial starting dose for people who have never

Heidi Collins Fantasia, PhD, RN, WHNP-BC, is an assistant professor in the School of Nursing, College of Health Sciences at the University of Massachusetts in Lowell, MA, and a women's health nurse practitioner at Health Quarters in Beverly, MA. The author discloses that she is a member of the women's health advisory board for Actavis Pharma, for which she receives financial consideration. Address correspondence to: Heidi_Fantasia@uml.edu.



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