Impact of Gas Flow and Heated Humidity on Pulmonary Deposition of Radio-labeled Aerosol Administered Using a High-flow Nasal Cannula and the Aerogen® Solo Drug Delivery System

Original article: Alcoforado L, Ari A, de Melo Barcelar J, et al. Impact of gas flow and humidity on trans-nasal aerosol deposition via nasal cannula in adults: a randomized cross-over study. Pharmaceutics. 2019;11(7):320.

Background

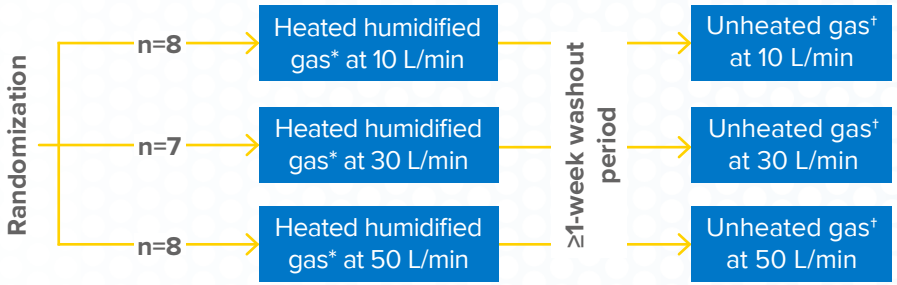
Patients receiving oxygen via a HFNC may benefit from inhaled medications; however, it is not known to what extent trans-nasal pulmonary deposition of aerosolized medicines is affected by gas flow and humidification

Objective

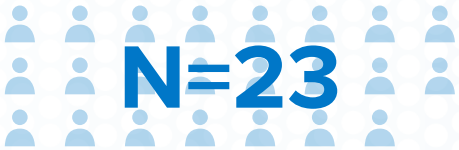
The aim of this study was to evaluate how gas flow rate and heated humidity affected the pulmonary deposition and distribution of radio-labeled aerosol administered using a HFNC and the Aerogen Solo® drug delivery system

Materials and Methods

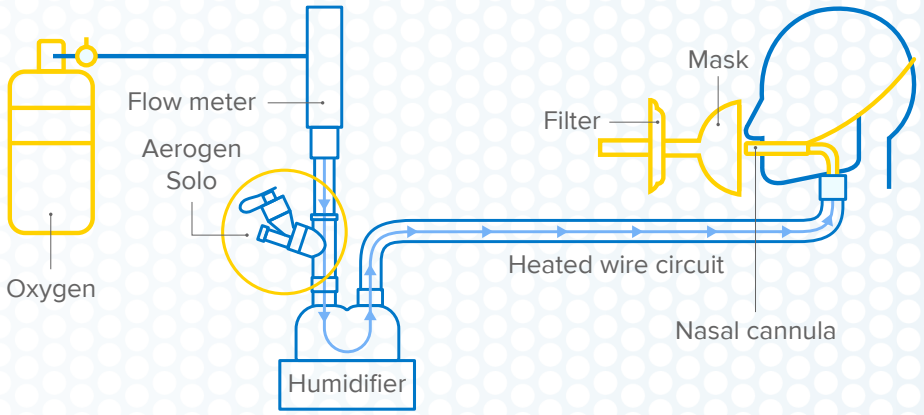
Design: Randomized, crossover pilot study



Healthy male and female subjects aged 18–65 years with an FVC or FEV_1 ≥80% predicted



Aerosol delivery and deposition analysis



- The reservoir of the Aerogen Solo® was filled with radio label in 1 mL of 0.9% saline solution
- The dose was administered until completion (2–4 minutes)
- Pulmonary aerosol deposition was evaluated using scintigraphic imaging

*34–36 °C; †Room temperature (20–22 °C)

^{99m}Tc-DTPA, technetium-99m diethylenetriaminepentaacetic acid; FEV1, forced expiratory volume in 1 second; FVC, forced vital capacity; HFNC, high-flow nasal cannula

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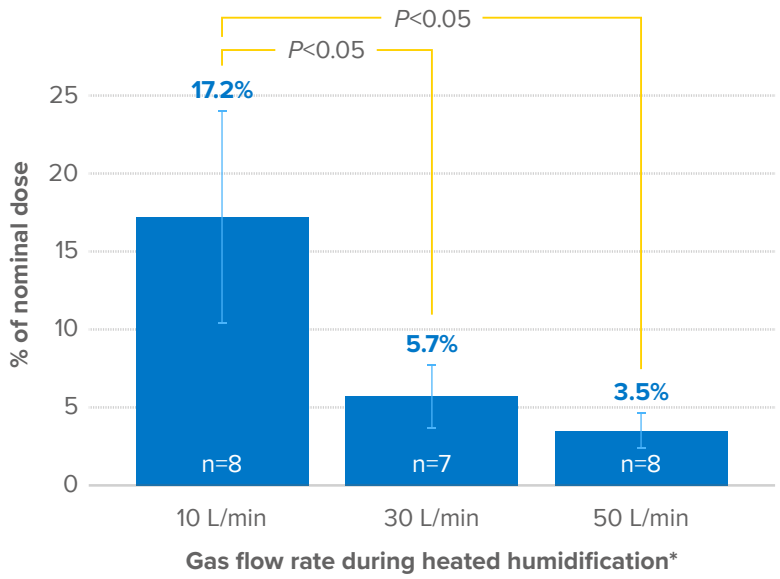
Aerosol administered using the Aerogen Solo® during HFNC resulted in measurable levels of lung deposition across a range of commonly used flow rates

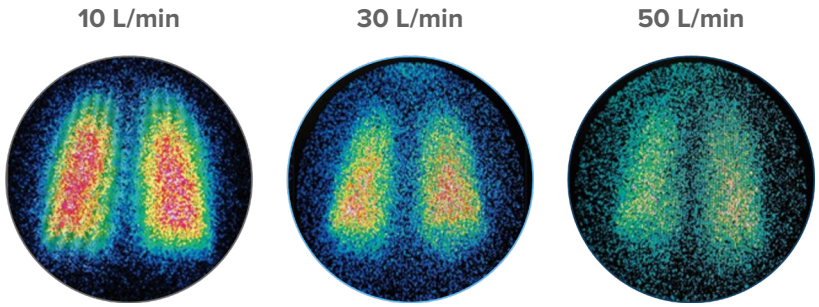
Radio-labeled aerosol deposited in the lungs
(% of nominal dose)



Medication delivery

3.5%–17.2% medication delivery to the lungs depending on flow rates.

Representative scintigraphic images of pulmonary aerosol deposition



Effect of heated humidity

- Lung deposition at a flow rate of 10 L/min was similar with active heated humidified gas* and unheated gas†
- Lung deposition was significantly lower with active heated humidified gas* versus unheated gas† at 30 and 50 L/min

PM1093

*34–36 °C; †Room temperature (20–22 °C)
HFNC, high-flow nasal cannula

Want to know more? Scan or click the QR code