Comparison of Aerosol Drug Delivery With the Aerogen® Solo Versus a Jet Nebulizer or a Pressurized Metered-Dose Inhaler During Non-invasive Ventilation


**Background**

Administration of aerosolized therapy during non-invasive ventilation is common; however, there is a lack of data on the efficiency of different delivery systems and mask interfaces in this setting.

**Objective**

The aim of this study was to evaluate the drug delivery efficiency of the Aerogen Solo versus a jet nebulizer and a pMDI in a simulated adult lung model using different non-invasive ventilation facemasks.

**Design: Benchtop study**

- Deposition of aerosolized albuterol delivered using the Aerogen Solo, a jet nebulizer, and a pMDI was compared using an *in vitro* lung model.*
- Spectrophotometry was used to measure drug concentration from an absolute collecting filter attached to the bronchi of the mannikin.

**Materials and Methods**

**Jet nebulizer**

Administration of albuterol 2.5 mg/3 mL until sputter (flow rate 8 L/min)

**pMDI**

Administration of four actuations of albuterol (108 μg emitted/puff)

**Aerogen Solo**

Administration of albuterol (2.5 mg/3 mL) until no more aerosol was produced

---

*Target tidal volume 450 mL, 15 breaths/min, inspiratory time 1 second, with pressure settings of IPAP/EPAP 20/5 cmH₂O. pMDI, pressurized metered-dose inhaler.*
Comparison of Aerosol Drug Delivery With the Aerogen® Solo Versus a Jet Nebulizer or a Pressurized Metered-Dose Inhaler During Non-invasive Ventilation

Drug delivery with the Aerogen Solo during non-invasive ventilation was ~7 times higher than with a pMDI and ~2 times higher than with a jet nebulizer.

Inhaled mass in mg

- **Jet nebulizer**: 0.33 mg
- **pMDI (recommended position)**: 0.10 mg
- **pMDI (reversed position)**: 0.09 mg
- **Aerogen Solo**: 0.72 mg

**Inhaled mass as % of nominal dose**

- Jet nebulizer: 13.12%
- pMDI (recommended position)*: 0.1 g
- pMDI (reversed position)*: 0.09 g
- Aerogen Solo: 28.83%

**Residual volume**

- **Aerogen Solo**: 0.1 g
- **Jet nebulizer**: 1.65 g

This study also compared different vibrating mesh technologies and facemasks, the delivered dose was greatest with the Aerogen Solo combined with an oro-nasal mask.

*The pMDI was connected to the ventilator circuit via a spacer, which was connected either as recommended (ie actuator in a distal position with aerosol emitted towards the patient) or in a reversed orientation. pMDI, pressurized metered-dose inhaler.