



## ***Performance Comparison of Nebulizer Designs: Constant-Output, Breath-Enhanced, and Dosimetric***

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### **◆ Find This Study**

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### **◆ The Study**

To evaluate in vitro the total drug disposition of 3 different types of nebulizers. The Misty-Neb and Sidestream are traditional constant-output nebulizers, the Pari LCD breath-enhanced nebulizer and the Circulaire and AeroEclipse, considered as dosimetric devices.

### **◆ The Results**

The percentage of total inhaled drug mass differed significantly among the 5 nebulizer brands tested. The Sidestream, Misty-Neb and Pari LCD nebulizers were similar and the 2 dosimetric nebulizers differed in opposite directions. Also, the duration of nebulization differed significantly among the 5 nebulizers, with the longest time for the AeroEclipse at  $14.4 \pm 1.1$  minutes.

### **◆ What's New**

Each device nebulized a unit-dose of albuterol sulfate solution, 2.5 mg base equivalent, with a 3 mL total fill volume. All nebulizers were powered by 50 psi oxygen at 8 L/min. Nebulizers were connected to a breathing simulator which provided a complete breathing cycle with both inhalation and exhalation phases, 1:3 inspiratory-expiratory ratio. The total aerosol drug mass was measured and consisted of the total inhaled drug mass, exhaled/ambient drug loss, and drug lost in the device. All drug amounts were analyzed via spectrophotometry.

### **◆ Note**

Design differences among nebulizers affect drug disposition in inhaled mass, apparatus loss, and exhaled/ambient loss. Use of reservoir systems to store aerosol during the exhalation phase can cause large apparatus losses and decreases inhaled mass, whereas generating aerosol only during inhalation increases inhaled mass, decreases ambient drug loss and increases nebulization time.

### **◆ Bottom Line**

Excluding the dosimetric devices, which can be costly and increase the amount of time to complete nebulization of medication, the Sidestream had the least percent of exhaled ambient loss.