COMBINING INHALATION BY A BREATH ACTUATED NEBULIZER WITH EXHALATION WITH OSCILLATING POSITIVE EXPIRATORY PRESSURE DEVICE OFFERS POTENTIAL FOR SIMULTANEOUS THERAPY: A LABORATORY STUDY

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Rationale
- Secretion mobilization by Oscillating Positive Expiratory Pressure (OPEP) is often given separately to inhaled medication
- Combining a nebulizer with OPEP, both therapies can be delivered simultaneously
- *AeroEclipse*® Breath Actuated Nebulizer (BAN), Trudell Medical International, London Canada
- *Aerobika*® OPEP device, Trudell Medical International, London Canada
- We investigated to see if the stand-alone BAN output is affected by use with the *Aerobika*® device, or by substituting another OPEP product
- *acapella*® OPEP device, Smiths Medical North America, Norwell, MA, USA

Methods
- A Next Generation Cascade Impactor (NGI) operated at 15 L.min⁻¹ was used to make droplet size measurements of the BAN-aerosol operated by compressed air at 50 psig in accordance with United States Pharmacopeia (USP) <1601> ‘Products for Nebulization’
- Each BAN (3 x 3 replicates/device) was
  - Operated by compressed air at 50 psig
  - Filled with 4x1-mL ipratropium bromide (IPR) anticholinergic bronchodilator solution
  - 0.5 Mgm⁻¹ (TEVA Canada, Mirabel, QC).
- The mouthpiece of the BAN was initially connected directly to the USP induction port
- The measurements were repeated
  - With the *Aerobika*® OPEP device inserted between the BAN and induction port
  - Substituting the *acapella*® OPEP device
  - The BAN was run to sputter, and the therapeutically beneficial fine particle mass < 5.4 µm diameter (IPR) determined
  - This size limit represents an approximation to the mass of therapeutically beneficial medication capable of reaching the receptors in the Airways of the lungs
  - The BAN was run to sputter to assess the total mass IPR par 4-mL fill

Results
- Mean ± SD

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<tr>
<th>Device Combination</th>
<th>FM₅₀</th>
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<tr>
<td><em>AeroEclipse</em>® BAN alone</td>
<td>452 ± 28</td>
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<tr>
<td><em>Aerobika</em>® OPEP – BAN combination</td>
<td>426 ± 27</td>
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<tr>
<td><em>acapella</em>® OPEP – BAN combination</td>
<td>177 ± 21</td>
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Conclusion
- The *Aerobika*® OPEP – *AeroEclipse*® II BAN combination shows combined aerosol/OPEP therapy with minimal medication loss
- This outcome is the result of careful design that minimizes obstructions in the aerosol pathway during inhalation from the nebulizer
- Combined aerosol/OPEP therapy with the *acapella*® OPEP resulted in substantial reduction in medication delivery from the BAN that may have adverse clinical implications
- Clinicians should be aware of these differences when considering prescribing these devices for combined therapy