Feline Aerosol Drug Delivery

MD#939A-0809
Feline Asthma

- Approximately one in 100 cats has asthma
- Asthma usually affects cats between 2 and 8 years of age, with Siamese and Himalayan breeds having a higher prevalence

-Feline asthma has been referred to in veterinary literature since 1906 (Hill JW: Diseases of the respiratory organs. The Diseases of the Cat. New York, 1906, pp 11-21.)

-One in 100 hundred cats has asthma – perhaps more as the symptoms are often confused with hairballs
- The symptoms of asthma can mimic other diseases such as heartworm, pneumonia and congestive heart failure (Padrid, Use of Inhaled Medications to Treat Respiratory Diseases in Dogs and Cats. JAAHA 42: 165-169, 2006)

-Feline asthma can not be cured, but can be controlled
- Once the diagnosis of feline asthma is made, the first step is to determine if the clinical signs are intermittent or if they occur daily.
- If symptoms occur daily, determine whether they are mild, moderate or severe.
Treatment

- Historically, the most effective treatments for noninfectious airway inflammation have been injectable and oral corticosteroids (e.g. prednisone)

- Number of potential systemic side effects including behavioral changes, polydipsia, polyuria, increased appetite, skin and urinary tract infections, pancreatitis, and diabetes\(^1\)

- Aerosol delivery provides many benefits including potential for attaining high drug concentration at disease state with minimal systemic absorption. (Cohn LA, Inhalant therapy: Finding its place in small-animal practice. Veterinary Medicine, July 2009)

- Metered Dose Inhalers (MDIs) are the most prescribed drug format for respiratory medications because they act quickly, at the site and with few side effects.

- There are two main categories of drugs available in MDI format:
  1) Corticosteroids - for control of the inflammation that causes respiratory symptoms
  2) Bronchodilators – for quick relief of symptoms
Inhaled Corticosteroids

- Most effective long-term treatment of persistent feline asthma
- Reduce chronic inflammation
- No significant side effects
- Referred to as “preventer” or “controller” medication
- Fluticasone Propionate (Flovent† – GSK)

- Most commonly prescribed corticosteroid inhaler is Fluticasone Propionate (Flovent†) – Available in 44, 110, 220 mcg dose per actuation (USA)
- Other types include: Flunisolide (Aerobid†), Budesonide (Pulmicort†) and Beclomethasone Dipropionate (Beclovent†, Vanceril†, Qvar†)
- Inhaled corticosteroids pose no significant side effects with limited absorption into bloodstream
- Potential side effects:
  - Growth retardation in children with incomplete closure of growth plates was a concern, it has not been recognized in cats
  - Candida (yeast) infection of the oropharynx in adults - Not recognized in cats (usual symptom is dysphonia or hoarseness)
  - (Source: Padrid P. Inhaled Steroid for Asthma, Bronchitis Non Infectious Rhinitis. Fluticasone Propionate - Flovent†, 2009.)
Inhaled Bronchodilators

- Provide quick relief of symptoms
- Help reverse airway smooth muscle spasm
- May be used as needed for asthmatic cats with acute cough, wheeze or increased respiratory rate and/or effort
- Referred to as “rescue” or “reliever” medication
- Albuterol Sulfate - Available through a number of different manufacturers

Potential Side Effects:
- Musculoskeletal twitchiness, tachycardia
- Excitability, insomnia, anorexia
- These side effects should wane within a few hours

(Source: Padrid, Feline Asthma Therapy - Inhaled Bronchodilator, Albuterol HFA (PROVENTIL 8.5g, VENTOLIN 90mcg))
-Many MDIs deliver a dose at over 100km per hour (Newman S. Principles of Metered Dose Inhaler Design. Respir Car 2005; 50(9): 1177-1188)

-Without a Valved Holding Chamber, 60 – 80% of the released dose deposits in the upper airway (increasing potential for systemic absorption) and 20% passes into the lower pulmonary tract

-VHCs minimize oropharyngeal (mouth & throat) deposition by reducing the speed at which the aerosol is delivered and by removing larger (>5 µm) non-respirable particles

-Fine particles are typically <5 µm diameter- these are inhaled and reach the lower respiratory tract efficiently, where the drug receptors are located
- Proper use of a metered dose inhaler requires the patient to coordinate inhaling with the actuation of the device - which is not possible for felines.
- Fortunately - Valved Holding Chambers are available for use with Metered Dose Inhalers to facilitate delivery to felines.
- The AeroKat® Feline Aerosol Chamber was specifically designed for use in felines.
- The chamber is manufactured by Trudell Medical International; manufacturers of the AeroChamber® Brand of chambers for humans.
Delivery Technique

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<thead>
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<tbody>
<tr>
<td>1.</td>
<td>Remove cap from metered dose inhaler.</td>
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<tr>
<td>2.</td>
<td>Insert inhaler into backpiece of <em>AeroKat</em> Feline Aerosol Chamber. Shake briskly 4-5 times.</td>
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<td>3.</td>
<td>Gently apply mask to face and ensure there is an effective seal. The <em>Flow-Vu</em> Indicator only moves if there is a good seal.</td>
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<tr>
<td>4.</td>
<td>Depress the inhaler at the beginning of inhalation. Use the <em>Flow-Vu</em> Indicator to assist in the coordination of this maneuver. The <em>Flow-Vu</em> Indicator moves toward the cat as they inhale and returns to the vertical position upon exhalation. Maintain seal for 5-6 breaths after inhaler is depressed.</td>
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<td>5.</td>
<td>Administer one puff at a time. Follow instructions supplied with inhaler on how long to wait before repeating steps 2-4.</td>
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- Delivery technique pertains to use of a Metered Dose Inhaler along with an *AeroKat* Feline Aerosol Chamber
- There are a number of valved holding chambers on the market designed for human use
  - However, the **AeroKat* Feline Aerosol Chamber** is designed specifically for use with cats
  - Many of the facemasks on the human devices will not provide a good seal on cats
  - Facemask seal is one of the most important elements of aerosol drug delivery. Even a minimal break in the seal around the face will result in poor delivery to the patient. (Amirav I, Newhouse MT. *Review of Optimal Characteristics of Face-Masks for Valved-Holding Chambers*. Pediatric Pulmonolgy 43: 268-274. 2008)
- The exclusive Flow-Vu* Inspiratory Flow Indicator featured on the AeroKat* Feline Aerosol Chamber moves with patient respiration
- The Flow-Vu* Indicator only moves when the feline is inhaling from the AeroKat* chamber
- Many cats hold their breath when the mask is first put on their face. The Flow-Vu* Indicator allows caregivers to see when the cat is inhaling and to actuate the inhaler in concert with inhalation, optimizing aerosol delivery
- Breath counting is particularly important for this patient population – they require more than one breath to evacuate the chamber (avg 5-6 breaths)
- The Flow-Vu* Indicator provides assurance and peace of mind to caregivers that the cat is receiving the medication
Use of Anti-Static Materials

Static charge has a major impact on aerosol delivery\(^1,2\)

- Pre-washing (without rinsing) used to be required
- Anti-Static materials avoid this extra preparation step that is unlikely to be carried out
- **AeroKat** Feline Aerosol Chamber can be used right out of package

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-Anti-static chambers help maximize aerosol suspension time and improve drug availability for patients with lower tidal volumes
-This is particularly important with new charge sensitive HFA MDI formulations
-When administering fluticasone, it is important to realize that 1 to 2 weeks may be required for the drug to take full effect & it should be given twice daily (Padrid P. JAAHA, 2006)

-Felines that are currently on oral corticosteroids should be weaned off their oral medication over a 2 to 3 week period once the fluticasone MDI treatment is started (Padrid P. JAAHA, 2006)

-Felines that are newly diagnosed and requiring immediate corticosteroid therapy may be given oral medications at the same time fluticasone MDI is initiated and over the next 2-3 weeks, oral drug administered can be tapered (Padrid P. JAAHA, 2006)

-Note: this page contains a list of MDI medications and some selected information about each MDI medication, that have been used with the AeroKat** FAC. Trudell Medical International does not endorse the use of any specific MDI medications.

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### Treatment Guidelines

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<tr>
<th>Category</th>
<th>Treatment Details</th>
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<tr>
<td><strong>Mild Intermittent</strong></td>
<td>• Albuterol Metered Dose Inhaler with feline aerosol chamber as required</td>
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<tr>
<td><strong>Mild Persistent</strong></td>
<td>• Flovent® 110mcg, 1 actuation – twice daily with feline aerosol chamber</td>
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<td>• Albuterol Metered Dose Inhaler with feline aerosol chamber as required</td>
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<tr>
<td><strong>Moderate Persistent</strong></td>
<td>• Consider using mg/kg of prednisone administered orally twice daily for 5 days and then once daily for 5 additional days</td>
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<tr>
<td></td>
<td>• Albuterol Metered Dose Inhaler with feline aerosol chamber as required</td>
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<tr>
<td><strong>Severe Persistent</strong></td>
<td>Initial Treatment:</td>
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<td>- 2 mg/kg of dexamethasone administered intravenously</td>
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<td>- Albuterol metered dose inhaler with feline aerosol chamber every 30 minutes</td>
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<td>for up to 4 hours</td>
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<td>- 40-100% oxygen by nasal conduce or oxygen cage</td>
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<td>Once Stabilized:</td>
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<td>- Flovent® 110mcg, 1 actuation – twice daily with chamber</td>
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<td></td>
<td>- Albuterol Metered Dose Inhaler with feline aerosol chamber administered four times daily as needed</td>
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<tr>
<td></td>
<td>- Some cats may also require additional intermittent lower doses of oral</td>
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<td>prednisone</td>
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Helping cats around the world breathe easier

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