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## Options exist for management of tracheobronchial disease



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### **Q: Could you provide a practical review of drugs used in the clinical management of tracheobronchial disease in older dogs and cats?**

At the recent 138th American Veterinary Medical Association Annual (AVMA) Convention, Dr. Patricia M. Dowling, diplomate of ACVIM and ACVCP and from the Western College of Veterinary Medicine presented an excellent review of drugs used in the clinical management of tracheobronchial disease in older dogs and cats. The practical content of the lecture is provided below.

*Codeine* is still commonly used as an effective antitussive agent. Codeine phosphate and codeine sulfate are found in many preparations including tablets, liquids and syrups.

Codeine has analgesic effects that are approximately one-tenth that of morphine, while its antitussive potency is approximately equal to that of morphine. The side effects of codeine are significantly less than those experienced with morphine at antitussive doses.

Signs of adverse drug effects, especially in cats, are excitement, muscular spasms, convulsions, respiratory depression, sedation and constipation. The potential for addiction and abuse is considerably lower than for morphine. The recommended dosage in dogs is 1-2 mg/kg orally every six to 12 hours.

*Hydrocodone* is chemically and pharmacologically similar to codeine, but more potent. Hydrocodone is combined with an anticholinergic agent (homatropine) in the commercial product *Hycodan*. The dosage is approximately 0.25 mg/kg orally every six to 12 hours. Hycodan should be used with caution in cats.

### **Dextromethorphan**

*Dextromethorphan* is contained in the antitussive product Robitussin, which also contains guaifenesin, a centrally acting muscle relaxant and expectorant effect by stimulating bronchial secretions. One should generally forgo antitussive therapy if there is productive cough. It is better to use dextromethorphan as a single substance than in a cough medicine combination. Even though dextromethorphan is not a real opioid, intoxications can often be treated with naloxone.

Caution should always be used in the treatment of advanced respiratory insufficiency and hepatic disease. In combination with monoamine oxidase inhibitors, dextromethorphan can cause a severe reaction (serotogenic syndrome with fever, hypertension, arrhythmias); avoid this combination if possible! Dextromethorphan is administered to dogs at 0.5-1 mg/kg orally every eight to 12 hours. Dextromethorphan is more efficacious in cats than codeine at a dosage of 2-4 mg/kg. Dextromethorphan is the safest antitussive product to use in cats.

### **Butorphanol**

*Butorphanol* (Torbutrol or Torbugesic) is approved as an analgesic and antitussive. It is more potent than morphine as an analgesic and more potent than codeine or dextromethorphan as an antitussive. It may produce considerable sedation. The parenteral dosage is 0.05-0.1 mg/kg intravenously or subcutaneously every six to 12 hours. It has a poor bioavailability, so the oral dosage in dogs is 0.55-1.1 mg/kg.

*Isoproterenol* (Isuprel) is a potent  $\beta$ -adrenergic receptor agonist. It is selective for  $\beta$  receptors, but its cardiac effects make it unsuitable for long-term use. It can be administered by inhalation or injection. It also has a short duration of action (less than one hour). In dogs, administer 0.1-0.2 mg intramuscularly or subcutaneously every six hours. In cats, administer 4-6 mcg intramuscularly every 30 minutes as needed.

### **Terbutaline**

*Terbutaline* (Brethine or Bricanyl) is similar to isoproterenol in its  $\beta$  receptor activity but is longer acting (six to eight hours). It may be injected subcutaneously to relieve an acute episode of bronchoconstriction. For cats with frequent, severe bronchoconstrictive disease while receiving chronic oral therapy, injectable terbutaline can be dispensed with instructions to administer 0.25 mg subcutaneously to abort respiratory distress episodes at home within 15 minutes, and it may be repeated if necessary.

An increase in the cat's heart rate to 240 beats per minute and a 50 percent decrease in respiratory rate indicate a positive drug effect. Terbutaline can also be given as chronic oral therapy at 0.625 mg per cat every 12 hours (of a 2.5 mg tablet) and 2.5 mg per dog every eight hours. Albuterol is similar to terbutaline and is used in dogs. Albuterol base is salbutamol (Proventil or Ventolin). The dose for dogs is 0.05 mg/kg orally every eight hours. It is also available in a metered dose inhaler. Salmeterol xinafoate (Serevent) is in a new class of selective, long-acting (12 hours), slow-onset (10-20 minutes)  $\beta$  receptor agonist available in a metered dose inhaler.

### Bronchodilators

The *methylxanthines* relax bronchial smooth muscle and are referred to as bronchodilators. *Theophylline*, *aminophylline* and *oxytriphyllyne* are the most commonly used oral methylxanthines in veterinary medicine.

*Theophylline* is poorly soluble in water and may produce GI irritation when administered orally. *Aminophylline* is a theophylline salt that is 78-86 percent theophylline. It is more water-soluble and produces less GI irritation. The dosage for aminophylline in dogs is 10 mg/kg orally every eight hours and in cats is 5 mg/kg orally every 12 hours. There are several sustained release formulations of theophylline that are suitable for use in older dogs and cats.

*Slo-Bid* and *Theo-Dur* brands of *theophylline* may be administered to dogs at 10-20 mg/kg orally every 12 hours, and *Choledyl-SA* (oxytriphyllyne) may be administered at a dose of 47 mg/kg orally every 12 hours. *Slo-Bid* and *Theo-Dur* may be administered to cats at an oral dosage of 25 mg/kg every 24 hours (best given in the morning).

### Glucocorticoids

The glucocorticoids inhibit the release of inflammatory mediators from macrophages and eosinophils, resulting in the decreased synthesis of prostaglandins, leukotrienes and platelet-activating factor.

Studies indicate glucocorticoids may enhance the action of adrenergic agonists on  $\beta$  receptors in the bronchial smooth muscle. In older dogs and cats, oral prednisone or prednisolone is usually the preferred drug for chronic therapy of tracheobronchial inflammation.

A typical anti-inflammatory dosage is 0.5-1 mg/kg, with chronic therapy on an every other day basis. Cats are somewhat resistant to the effects of glucocorticoids and a dosage of 1 mg/kg daily is used in the chronic therapy of feline asthma or 20 mg of methylprednisolone acetate (Depo-Medrol) intramuscularly every three weeks.

For emergency treatment of dyspneic cats, use of a shock dose of an intravenous prednisone sodium succinate 5-10 mg/kg or dexamethasone sodium phosphate 1-2 mg/kg is recommended.

### Metered dose inhalers

Glucocorticoid preparations in metered dose inhalers offer a promising method of drug delivery for asthmatic cats. Relatively inexpensive infant units for inhalation therapy are available (Opti-Chamber or Aero-Chamber) and are reasonably well tolerated.

Cats with mild asthmatic signs can be treated with a bronchodilator, such as albuterol (Ventolin) 90 mcg (one puff) as needed and 110 mcg (one puff) of fluticasone (Flovent) BID. Cats with moderate asthmatic signs can be treated with 90 mcg (one puff) of albuterol as needed, five-day course of prednisone orally at 1 mg/kg and 220 mcg (two puffs) of fluticasone BID.

Severely affected cats should be treated on an emergency basis with oxygen, an intravenous dose of a steroid and 90 mcg (one puff) of albuterol every 30 minutes as needed. Chronic therapy should include 220 mcg (two puffs) of fluticasone BID, 90 mcg (one puff) of albuterol as needed, and 1 mg/kg of prednisone every other day. Inhaled medications may also benefit dogs with chronic sinusitis and chronic bronchitis.

### Cyproheptadine

Cyproheptadine (Periactin) is an antihistamine with anti-serotonin activity. Because of the role of serotonin in allergen-induced bronchoconstriction in cats, cyproheptadine may be used in asthmatic cats to block bronchoconstriction as adjunct to corticosteroids and bronchodilators.

Cyproheptadine is dosed at 2 mg orally every 12-24 hours for chronic treatment of asthmatic cats. Because of its long elimination half-life (12 hours), it requires several days to reach steady-state concentrations and may take four to seven days to be clinically effective. Cyproheptadine serotonin antagonism in the appetite center may cause an appetite stimulant effect in cats, so weight gain may be a problem.

Lethargy, depression and increased appetite may occur within 24 hours of initiating therapy.