“Feline Asthma”

- Better called feline bronchopulmonary disease (FBPD)
- Many different conditions
- 1% of general cat population
- >5% of Siamese cats
- Any age, but usually young/middle-aged
- No gender predisposition
Causes of Feline Bronchopulmonary Disease
Asthma

- IgE mediated
- Hypersensitivity to airborne allergens
- Helper T cells produce interleukins
- Release of inflammatory mediators
- Genetic component in humans
Chronic bronchitis

- Chronic cough
- Chronic airway inflammation
- Underlying cause usually not determined
Mycoplasma

- Extracellular pathogen
- Attaches to & destroys ciliated epithelial cells
- Produces airway hyperreactivity & pulmonary inflammation in mice
Mycoplasma

In Human children:

- 20% of asthmatic kids were infected
- 50% of kids experiencing 1st attack
  - 62% of kids with resp infection had asthma recurrences vs. 27% of kids w/out infection

- Biscardi et al, Clin Infect Dis 2004
Mycoplasma

・~25% of cats with FBPD culture +
Heartworm Disease

Naturally Resistant

- Fewer immature larva reach adulthood
- Fewer adult worms
- Shortened adult worm lifespan
- Low or no microfilaria
Heartworm-Associated Respiratory Disease (HARD)

- Proliferative changes in pulmonary arteries & arterioles, bronchioles & lung parenchyma
- ~50% of cats with occult infections develop respiratory signs
- ~75% of cats with adult HW infections develop respiratory signs
Heartworm

1/3 of cats were indoors-only!
Bromide

- Coughing developed in 6/17 cats
- Onset 2 wk-23 mon after Br initiated
- Euthanasia due to airway disease in 1 cat
- Coughing developed in 42% of cats
- Increased airway eosinophilia
- Bromide not recommended

Boothe et al, JAVMA 2002
Wagner, JVIM abstract 2001
Pathophysiology
Airway response to irritants

- Walls become thickened & edematous
- Hyperplastic submucosal glands
- Excessive amounts of thick mucus

Airway hypereactivity
Airway response results in...

- Narrowed airways
- Increased resistance

Initial Changes are Reversible; Remodeling → **fixed** airway obstruction
Clinical implications

Diameter affects velocity of airflow

50% reduction in airway radius → 16x increase in resistance
Clinical signs
Clinical signs

- Signs range from mild to potentially fatal
- Intermittent respiratory distress
- Cough
- Wheeze
- Dyspnea
- Owners may mistake signs for vomiting or hairballs
Physical examination

- Harsh lung sounds
- Crackles
- Wheezes
- Prolonged expiratory phase
- Cyanotic and open-mouth breathing
Ddx for cough & dyspnea

- Feline bronchopulmonary disease
- Infectious diseases (fungal, parasitic, viral, bacterial, protozoal)
- Pleural space disease (fluid, air)
- Heart failure
Ddx for cough & dyspnea

- Upper airway disease
- Neoplasia
- Foreign body
- PTE
- Cat is actually vomiting
Diagnostics
Work-Up

CBC:
- Eosinophilia (~20%)
- Neutrophilia/stress leukogram

Chemistry profile:
- Hyperproteineinemia
Fecal Exam

Rule out parasites
Heartworm testing

Antibody vs. Antigen

- Antigen positive = adult worm
- Antibody positive = exposure/occult infection
  - 50% of occult infection develop HARD
Thoracic radiographs

- Bronchial pattern “Donuts & Tramlines”
- Atelectasis of R middle lung lobe
- Diaphragmatic flattening
- Airway trapping
Airway cytology

- Tracheal wash
- Bronchoscopy
Airway cytology

**Normal findings**
- 80%-90% macrophages

**Cats with Bronchial disease**
- Increased Eosinophils or
- Increased Neutrophils
Bronchoscopy

- Allows visualization of airways
- Increased secretions
- Edema
Bronchoscopy

- JVIM 2007 paper by LR Johnson & TL Drazenovich
- 62% no complications
- 24% of 68 bronchs = mild complications
  - Mainly hemoglobin desaturation
  - Prolonged recovery
- 3% pneumothorax (predisposing factors present)
- 6% euthanized
Bronchoscopy

- JVIM 2007 paper by LR Johnson & TL Drazenovich
- Pretreatment with terbutaline minimized complications
- Type of inflammation did not correlate with complication
Conclusions and Clinical Relevance: Bronchoscopic abnormalities are common in cats with lower respiratory tract disease, and visualization of the airways provides additional nonspecific clinical information in cats.

Bacteriology

- Lower airways not necessarily sterile
- Colonization versus true infection
- Single organism $>5 \times 10^3$ organisms/ml consistent with infection
- 19/88 cases diagnosed with infection

(Foster et al, JFMS 2004)
Mycoplasma

- TTW or BAL can be submitted for culture
- Not recovered from airway of normal cats?
- 25% of cats w/ bronchial disease culture +
Endothelin-1

- Pro-inflammatory
- Profibrotic
- Bronchoconstriction
- Upregulated ET-1 in BALF in experimental asthmatic cats
Pulmonary Function Testing

Tidal Breathing Flow Volume Loop

- Relates air flow and volume
- In normal cats, peak flow rates occur during late inspiration & early expiration
- Decreased expiratory flow rates in FBPD
Barometric whole body plethysmography (BWBP)

- Airtight, ventilated chamber
- Pressure changes as cat breathes
- Bronchoconstriction: major change during early expiration
Barometric whole body plethysmography (BWBP)
Exhaled Breath Condensation

- Used in humans
- Difference in metabolic pathway intermediates (= metabolomics)
Treatment

Truth

in advertising.
Acute Attack

● Do Not Stress!!! (the cat)
● Oxygen
● Dexamethasone 1-2 mg/kg IV
● Bronchodilator
  o Terbutaline 0.01 mg/kg IV, IM, SQ
  o Albuterol inhalant
● Epinephrine as last resort 0.02 mg/kg IV, IM, SC, or IT
Snoops stresses tremendously when brought in to hospital. O(wner) only bring him as last resort.
Maintenance Therapy
STEROIDS!
STEROIDS!
STEROIDS!
Corticosteroids

Control airway inflammation
Prevent progression of disease

- Prednisolone 1 mg/kg PO bid, then taper to lowest effective dose

  or

- Fluticasone (Flovent) 110 µg/actuation, 1-2 puffs bid
Initiating steroid therapy

- Start Pred 1 mg/kg PO bid concurrently with Flovent
- After 3-5 days, taper oral pred to 1 mg/kg q 24h
- Discontinue oral pred after addtl 3-5 days
- Takes 10 days for Flovent’s full effect
Using Inhalants

- Metered Dose Inhalers (MDI’s)
- Spacer (www.aerokat.com)
- Prevents excessive disposition of drug onto oropharynx
- Synchronizes breathing with actuation
- Fewer systemic side-effects
Lung scans
Left lateral

Right lateral
Using Inhalants

1. Prime if needed and Shake the MDI
2. Insert MDI into spacer
3. Place the mask over the cat's face
4. Actuate the MDI
5. Hold mask in place for 7-10 sec
6. If 2 puffs needed, wait 30-60 sec inbtw
7. At 1 puff bid, MDI contains Rx for 2 mon
Inhaled vs. oral steroids

- Inhaled steroids reduce bronchial reactivity
- Inhaled steroids reduce bronchial Eo
- Inhaled steroids do alter HPA axis
- Inhaled steroids have minimal effect on immune system
Bronchodilators

- Critical in crisis for enhancing airflow
- Should not be used as monotherapy!

- Methylxanthines
  - Aminophylline
  - Theophylline

- Beta-2 agonists
  - Terbutaline
  - Albuterol
Albuterol Inhaler

- Same technique as Flovent MDI
- Only comes in 1 dose
- Useful during times of increased symptoms
- Improvement within 5-10 minutes
- Can use every ½ hr up to 4 hr in crisis
Other Therapies
Antibiotics?

- Rarely indicated for asthmatic cats
- Treat based upon C & S
- Exception is treating for Mycoplasma
  - Doxycycline
  - Azithromycin
  - Fluoroquinolones
Cyproheptadine

- Serotonin antagonist
- Serotonin mediates smooth muscle contractility in feline airway
- Did NOT decrease airway eosinophilia
- May require higher doses
- Further studies needed
Cyclosporine

- Asthma is mediated by T helper 2 cells
- Cyclosporine decreases IL-2 production
  - Inhibition of T cell proliferation
- Experimentally reduces airway reactivity & remodelling
- Potential side-effects/cost
Immunotherapy

- “Allergy shots”
- Little/no correlation between skin test and blood test
- No correlation between BAL eosinophilia and number of positive reactions
- Both IDST & serum testing detected known allergen

Schulz, ACVIM abstract 2007
Lee-Fowler, ACVIM abstract 2009
Immunotherapy

86% improvement in 1997 study
Immunootherapy in Experimental Asthma

Study compared immunotherapy with concurrent oral vs. inhaled steroids

- Increased airway eosinophilia in cats treated with oral steroids
- May be better to use inhaled steroids concurrent to immunotherapy

Chang et al, Vet J 2013
Albert “Snoops”

- 3 yo MC DSH
- 1st presented to ER 6/6/11
- 3.5 wk history of coughing
- Initially treated with antibiotics, then oral bronchodilator and steroids
- Presented in respiratory distress
Snoops’ Rads
Snoops initial therapy

Discharged on:
• Prednisolone 5 mg PO bid
• Doxycycline 50 mg PO q 24 hr
• Fluticasone 220 µg/actuation 1 puff via aerokat bid
• Albuterol 90 µg/actuation 1-2 puffs prn
• Recommended recheck in 1 week
So a year goes by…

- Snoops presents again in respiratory distress 8/19/2012
- Still receiving Flovent twice daily and albuterol as needed
- Stabilized by placing in Oxygen cage and administering IV terbutaline and steroids
- Sent home on increased Flovent (2 puffs bid) and oral pred on tapering course
3 months later… Another crisis

• Start cyclosporine 5 mg/kg PO bid
• Allergy tested (via blood) and started desensitization therapy

• Follow up via phone calls. Snoops did well for 6 months.
Snoops continued

- Owners discontinued cyclosporine and desensitization therapy
- Snoops’ asthma out of control
- Reinstated cyclosporine in addition to Flovent and bronchodilator
Moral of the story

- Whenever Snoops’ owners attempt to wean cyclosporine, he has another crisis. Owners have discontinued his desensitization therapy at an unknown point.
- As of January 2015, he is doing well on Flovent and cyclosporine.
Omega 3 Fatty Acids

- Did not change BAL fluid cytology
- Did decrease pulmonary oxidative stress
- May be beneficial

- Kirschvink et al, ECVIM abstract, 2006
Mastinib

- Inhibits Tyrosine Kinase
- Decreases airway eosinophilia in cats with experimentally induced asthma

Environment

- Decrease airway irritants
  - Dusty cat litters
  - Aerosols
  - Smoke
  - Candles
- Use HEPA filters
Useful Owner Resource

- Fritzthebrave.com
Thank you!