Canine Chronic Bronchitis
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DEFINITION OF CCB
• That disorder that causes a chronic cough when other causes of cough are ruled out
  - pneumonia
  - bacterial
  - fungal
  - CHF
  - malignancy
  - heartworm
  - tracheal collapse (?)
  - interstitial fibrosis (WHW Terriers)

CHRONIC BRONCHITIS not COPD
• COPD includes CB and emphysema
• COPD is what you get when you smoke cigarettes
• Our patients don’t get clinically significant emphysema (routinely)
CHRONIC BRONCHITIS IS NOT FIBROSIS

- CCB is an \textit{airway} disease
- FIBROSIS is a \textit{lung} disease
- The etiology is (probably) different
- The treatment is different
- The prognosis is different
ANATOMY of CCB

• Large # of small airway branches (2mm)
• So, large cross sectional area

Functional Significance:
• most airways need to be affected to cause clinical signs, so
• this disease has been developing for a long time

Poiseuille-Hagan Law
• relates airflow to pressure, resistance and airway size
• \( \text{airflow} \propto \text{pressure} \times \text{airway radius}^4 \)
• \( \uparrow \) SIZE BY 50% - \( \downarrow \) AIRFLOW 16-FOLD
ANATOMY of CCB

*Functional Significance:*
- Very small changes in size of airway
- \( \Rightarrow \) very large changes in amount of air *passing through that airway*

BERNOULLI PRINCIPAL
- Explains why planes fly
- Relates velocity of airflow to pressure
- Watch this!

BERNOULLI PRINCIPAL
CLINICAL RELEVANCE
- Airways narrow from mucus, edema, constriction - airflow velocity goes up
- Airflow velocity ↑
- Pressure inside the airway ↓
- That airway is prone to collapse
CANINE CHRONIC BRONCHITIS

ANATOMY of CCB

SUMMARY

CCB

- smaller area
- increased resistance to airflow
- air speed increases
- airways tend to collapse
- breathing is labored

ANATOMY of CCB

WHY DOESN’T THE PATIENT JUST BREATHE HARDER?

At the beginning of an exhalation
- more air is expelled
At the end of an exhalation
- less air is expelled
That is dynamic airway collapse

CANINE CHRONIC BRONCHITIS

REQUIRED FOR DIAGNOSIS

- Hx
  - daily cough for 2 months
  - gag, choke or swallow
  - otherwise ok
Feline Chronic Bronchitis is Different

CANINE CHRONIC BRONCHITIS
REQUIRED FOR DIAGNOSIS

Physical exam
- generally good health (dogs, not always cats)
- crackles
- wheezes suggest airway collapse and worse prognosis

CANINE CHRONIC BRONCHITIS
REQUIRED FOR DIAGNOSIS

- Hx
- Px Ex
- Chest Radiograph
- Whatever else you need to rule out common causes of cough
**CANINE CHRONIC BRONCHITIS**

- **DIAGNOSIS**
  - Diagnosis is based on clinical findings
  - Common lab tests *do not* confirm CCB

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**CANINE CHRONIC BRONCHITIS**

**REQUIRED FOR DIAGNOSIS**

Chest Radiograph

- why do we take films?
- what does a "normal" film mean?
- what does "compatible with age" mean?

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**“OLD DOG LUNGS”**

**WHAT DOES THAT MEAN?**

- “OLD CAT” Lungs?
- “OLD HORSE” Lungs?
- “OLD MAN” Lungs?
Linear and nodular markings of interstitial origin increase the overall lung opacity in normal old dogs. *This should not be interpreted as abnormal.*

Bronchial markings can be more prominent in older dogs and cats, *without being associated with current bronchial disease.*

9 yo Springer Spaniel with "old dog lungs" demonstrating heterotopic pulmonary bone formation manifesting as round, 1-3mm mineral opacities throughout the lung.

**Effect of Aging on Appearance of Bronchial Lumen**

1.5

12

1.5

12

**AGING AND FUNCTION**

Effect of aging on tracheal mucociliary clearance in beagle dogs


S L Whaley, B A Muggenburg, F A Seiler, R K Wolf

Tracheal mucous velocity measurements using a gamma camera to detect movement of instilled 99mTc-macroaggregated albumin.

<table>
<thead>
<tr>
<th>Age (yo)</th>
<th>Velocity (mm/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>3.6</td>
</tr>
<tr>
<td>3 yo</td>
<td>5.7</td>
</tr>
<tr>
<td>7 yo</td>
<td>6.9</td>
</tr>
<tr>
<td>10 yo</td>
<td>3.5</td>
</tr>
<tr>
<td>&gt; 13 yo</td>
<td>2.9</td>
</tr>
</tbody>
</table>
Are Old Dog Lungs Normal?

Reif JS et al: The Lungs of Aged Dogs: A Radiographic-Morphologic Correlation
J Amer Rad Soc VII, 5-11, 1966

100 dogs 57/100 > 8 years of age

1. **Pleural thickening**
   - pleural fibrosis with focal pleural scars and/or diffuse thickening of visceral pleura

2. **Increased linear markings (interstitial pattern)**
   - focal interstitial fibrosis with thickening of alveolar walls and ducts with inflammation

3. **Nodular densities (interstitial pattern)**
   - heterotopic bone formation with osteoblastic activity, some associated with inflammation

4. **Increased thickening of bronchial walls (bronchial pattern)**
   - calcification of bronchial cartilage

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**CANINE CHRONIC BRONCHITIS**
Bronchiectasis

THE CARINA IS AN UNDER APPRECIATED AREA OF THE CHEST FILM
YOU CAN READ THE PHASE OF RESPIRATION ON A CHEST FILM

INSPIRATION

This may be the only defining test for CCB

EXPIRATION
WHAT ELSE IN YOUR AREA CAUSES COUGH?

- parasites?
- fungi?
- foreign bodies?
CANINE CHRONIC BRONCHITIS

- TREATMENT
  - antibiotics
  - cough suppressants
  - bronchodilators
  - corticosteroids
  - antihistamines
  - anticholinergics
  - mucolytics
CANINE CHRONIC BRONCHITIS

TREATMENT

Antibiotics

Is there an infection?

LRTI (Peters et al JVIM 2000:14:534-541)
13/14 + aerobic culture
10/13 > 3 X 10^4 CFU/ml (77%)
9/13 single organism grown (70%)

CCB
7/20 + aerobic culture
7/7 < 1 X 10^3 (100%)
4/7 single organism grown (57%)
(included pseudomonas)

CCB IS NOT AN INFECTIOUS DISEASE

CANINE CHRONIC BRONCHITIS

TREATMENT

Cough suppressants

Why is the dog coughing?
what is the real problem?
When should the cough be suppressed?
CANINE CHRONIC BRONCHITIS

TREATMENT

Bronchodilators

- Do dog airways bronchoconstrict?
- How much?

Hycodan 0.22 mg/kg
1-4 times daily prn
CANINE CHRONIC BRONCHITIS

TREATMENT

Corticosteroids
- Prednisone - mainstay of therapy
  - 1mg/kg po bid x 7 days
    this is as good as it will get
  - 1/2 mg/kg po bid x 7 days
  - 1/2 mg/kg po sid x 7 days
  - at some point symptoms will reappear
  - **this is the dose you need**
  - **THEN YOU DECIDE ON INHALED STEROIDS**

- antihistamines - no reason for it to work
- anticholinergics - no reason for it to work
- mucolytics
  - mucus is thick
    acetylcysteine breaks the sulphhydril bonds
  - the vehicle is very irritating by inhalation
  - iv route is very transient

CONCLUSIONS
- not curable
- very treatable
- slowly progressive in dogs
- most responsive is eosinophilic/seasonal
- least responsive is with wheeze and airway collapse
THANK YOU !!