

Feline Pneumonia – a practical look at diagnostics & management, inc. increasingly prevalent infectious causes

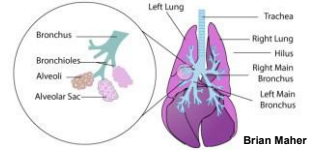


Conor O'Halloran

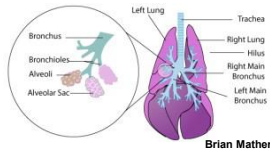
Daniëlle Gunn-Moore
Professor of Feline Medicine
University of Edinburgh

Causes of dyspnoea & coughing

- URT → larynx
- Trachea & bronchi
- Bronchioles & alveolar spaces
- Mediastinum
- Pleural space



Origin of dyspnoea



Cause	Nature of dyspnoea	Sneezing / nasal discharge	Cough
URT	Inspiratory	Yes / No	Yes / No
LRT	Expiratory	No	Yes / No
Alveolar / pleural	Inspiratory	No	Very rarely
Non-resp.	Tachypnoea	No	No

Non-respiratory causes

- Cardiovascular disease
Cardiogenic shock
- Anaemia (can hide cyanosis)
- ↑ abdomen
- Hyperthermia
- Hyperthyroidism
- Metabolic acidosis
- Fear / anxiety / pain
- Respiratory muscle weakness

URT vs LRT / pleural disease / acute / chronic?



Anaemic dyspnoeic cat;
Craig Breheny

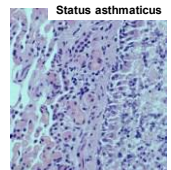
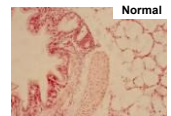
Causes of LRT Disease

Feline lower airway disease (FLAD)
(previously Chronic Bronchopulmonary Disease)

- Feline asthma (FA)
- Feline chronic bronchitis (FCB)
± bronchopneumonia

Associated with –

- Tracheobronchial inflammation & ↑ responsiveness
- Broncho-constriction
- ↑ airway secretion
- Reversible v irreversible

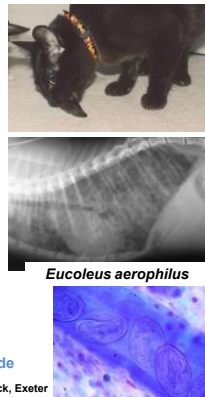


Causes of LRT Disease

Other DDx for bronchopneumonia

- **Parasitic** - *T. gondii*, *Aelurostrongylus abstrusus*, *Eucoleus aerophilus* (*Capillaria aerophila*), *Dirofilaria immitis*
- **Viral** - FCV, FHV-1, FCoV, Pox, Avian 'flu, Covid
- **Bacterial** - *Pasteurella*, *Mycoplasma* spp., *Bordetella*, *Mycobacteria*, *Strep. canis*, *Strep. Zooep.*, *E. coli*, *Neisseria* spp. (EF4), *Salmonella* spp, *Filobacterium felis*, *Stenophomonas maltophilia* *Yersinia pseudoTB* ...
- **Inhalation** - food, lipid, smoke
- **Toxic** - pancreatitis, uraemia, potassium bromide

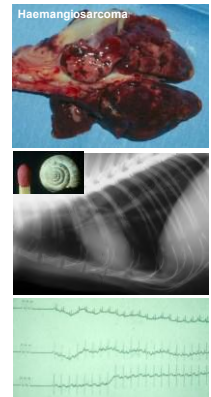
Oliver Coldrick, Exeter



Causes of LRT Disease

- **Neoplasia**
- **Foreign body**
- **Pulmonary oedema** – cardiogenic, non-cardiogenic
- **Pulmonary contusion / haemorrhage**
- **Pulmonary thromboembolism**
- **Pulmonary hypertension**

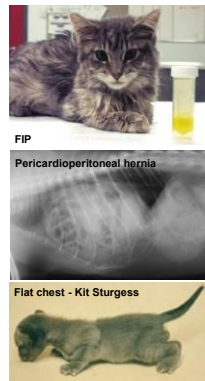
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Thoracic Cavity Disease

- **Thoracic effusions**
Transudate, exudate (bacteria or FIP), chyle, blood
- **Pneumothorax / mediastinum**
- **Neoplasia** - lymphoma, thymoma
- **Ruptured diaphragm**
- **Pericardioperitoneal hernia**
- **Chest wall defects / damage**

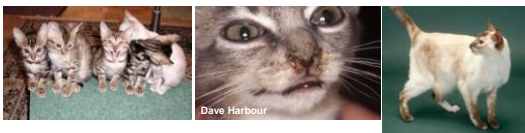
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Diagnosis

- **Signalment**
- **History**
- **Clinical signs**
- **Physical examination**
O₂ usage by muscles of respiration <5% → >50%
- **Thoracocentesis**
- **Ultrasonography**
- **Radiography / CT**
- **Clinical pathology**
- **Bronchioalveolar lavage**

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SIGNALMENT

- **Age & breed**

HISTORY

- **Age & pattern of onset**
- **Episodic nature** – day or night / seasonal
- **Environment** – pathogens / foreign body / toxins / pollution
- **Associated cough** – dry / moist / wheezing / honking / terminal retch
- **Progression & response to previous Tx**
- **Other infections** – e.g. previous URT infection

ELIPOSUN

CLINICAL SIGNS

- **Character of breathing**
Inspiratory v expiratory
Restrictive v obstructive
'Barrel' chest

Play video 4
Kerry Simpson/Rolph



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CLINICAL SIGNS

- **Character of breathing**
Inspiratory v expiratory
Restrictive v obstructive
'Barrel' chest
- **Thoracic palpation**
- **Compression**
- **Percussion**
- **Auscultation**
Wheezes
Crackles



Thanks to Kerry
Simpson for video 5

CARDIAC EXAMINATION

- **Mucous membrane colour**
- **Apex beat**
- **Jugular pulses**
- **Hepatojugular reflex**
- **Congestive failure**
- **Pulse quality**
- **Matched pulses**
- **Thoracic auscultation**



CLINICAL SIGNS of CARDIAC DISEASE

- **Dyspnoea** - pleural fluid or pulmonary oedema
- **Tachycardia** - >200bpm
- **Heart murmur** - sens. 31%, specif. 87%
103 healthy cats - 15.5% murmur (5 CM) - 15.5% CM; ↑ with age
- **Gallop** - myocardial disease, hyperdynamic (↑T₄ or ↓PCV)
- **Arrhythmia** - esp. tachycardias ... sinus arrhythmia?
- **Jugular distension / pulses** - hepatojugular reflex
- **Tachypnoea** - >80bpm
- **Pulselessness** - FATE 58% due to HCM
- **Hypothermia** - <37.5°C
- **Cough?***
- **Ascites**
- **Inappetence**
- **None**



*Seen in 25%!
Dickson *et al.* 2018



Paige *et al.* 2009



BLOOD PRESSURE

- **↓ BP = negative prognostic indicator**
>124mmHg 50% sens. + 90% specif. for survival
- **Cardiac failure**
- **Other** - sepsis, pancreatitis, GI, ...
- **BP <70mmHg** - lose peripheral pulses & renal perfusion

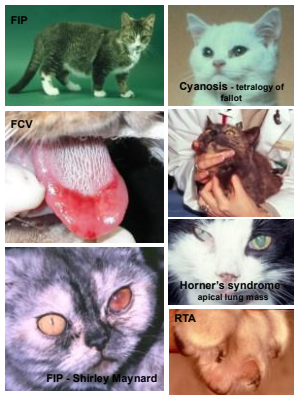
Simpson *et al.* 2007



CLINICAL SIGNS*

- **Mucous membranes**
- **Tracheal sensitivity**
- **Thyroid gland**
- **General body condition**
- **Lymph nodes**
- **Abdomen**
- **Eyes**
- **Skin, etc.**

*40% of fatal pneumonias have
NO clinical signs of respiratory
disease



CHRONIC BRONCHOPULMONARY DISEASE

History

- Previous 'flu infection
- Seasonal signs
- ↑ by airway irritants

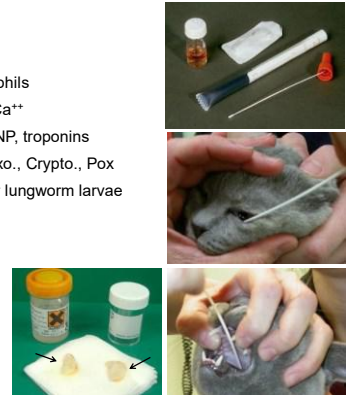
Clinical findings

- May be unremarkable
- ↑ lung sounds – wheezes, crackles
- 'Barrel' chest
- 'Heave' line



CLINICAL PATHOLOGY

- Haematology - ↑ eosinophils
- Serum biochemistry - ↑Ca⁺⁺
- Cardiac tests - NT-proBNP, troponins
- Serology - FeLV, FIV, Toxo., Crypto., Pox
- Faecal examination - for lungworm larvae



CLINICAL PATHOLOGY

- Bacterial swabs - *Bordetella*, *Mycoplasma*
- URT virus screening

Plain swabs: FHV, FCV, Bb, *Mycoplasma felis* & *gatea*, *C. felis*, *A. abstrusus* PCR

- Biopsy cutaneous lesions

Respiratory Mycoplasmas:
15-20%, *M. felis*, *M. gateae*, *M. feliminutum*

Haemoplasmas:
M. haemofelis, *M. turicensis*, *M. haemominutum*



ULTRASONOGRAPHY

i.e. THORACIC POINT OF CARE ULTRASOUND (TPOCUS)

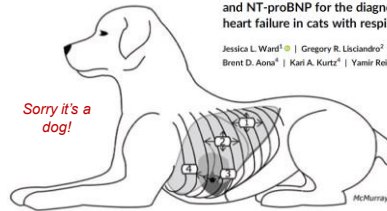
- Hold probe horizontally
- Assess both sides
- Assess all 4 sites

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DOI: 10.1111/jvim.15396

STANDARD ARTICLE

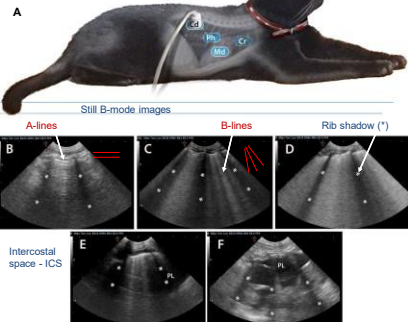
Evaluation of point-of-care thoracic ultrasound and NT-proBNP for the diagnosis of congestive heart failure in cats with respiratory distress

Jessica L. Ward¹ | Gregory R. Licciandro² | Wendy A. Ware¹ | Austin K. Viall¹ | Brent D. Aora³ | Karl A. Kurtz⁴ | Yamir Reina-Doreste¹ | Teresa C. DeFrancesco⁵



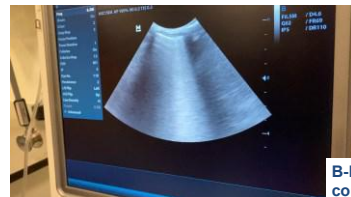
http://www.veterinaryirelandjournal.com/images/pdf/smal/1/sa_jul_2016.pdf

Hold probe horizontally; assess both sides
Cd, caudodorsal; Cr, cranial; Md, middle; Ph, perihilar
Intercostal space – ICS



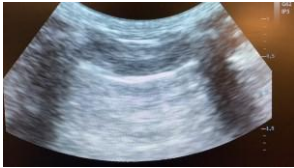
TPOCUS

- B - normal cat; horizontal
- A-lines
- C - cat in respiratory distress; many B-lines - linear hyperechoic artefacts from pleural-pulmonary interface inwards. Cranial ICS has infinite B-lines (they coalesce so individual B-lines cannot be seen); caudal ICS contains >3 B-lines
- D - infinite B-lines
- E - cat with large volume pleural effusion (PL); B-line seen within PL
- F - large volume PL
- LA : Ao from R Md site



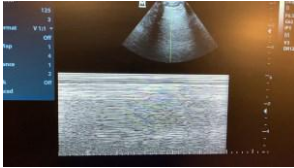
B-lines – consolidated lung
Craig Breheny

- B lines = interface between fluid & air
- Vertical lines radiating from the top
‘sunlight beams viewed underwater’
- ↑ number of lines → ↓ air content & ↑ lung density
- Fluid - pulmonary oedema, contusion, ... interstitial pneumonia, etc.
- Ventral - aspiration pneumonia
- Everywhere - CHF pulmonary oedema
- Good for monitoring as patients don't need to be moved



Normal

Normal - Glide sign = "string of pearls" which slide backwards & forwards as visceral & parietal pleura run against each other



Pneumothorax

Pneumothorax – no glide sign
M-mode – all 'barcode'

Pneumothorax; Craig Breheny
Lower 2nd panel - M mode



Pleural fluid

Transudates anechoic v thick cellular pyothorax ~tissue



Pyothorax fluid
Craig Breheny

Pyothorax - Consider zoonotic risk!

Pleural effusion
Craig Breheny



Septic dog, terrible systolic function;
Craig Breheny



Cardiac assessment

- **Systolic function**
- **Left atrial: Aorta ratio (LA:Ao)**
- R side, apex beat & 'Mercedes benz sign', with the aorta in the centre & the L atrium at '8 o'clock'; **CHF if >1.6**



Ward et al J Vet Intern Med. 2018;32:1530

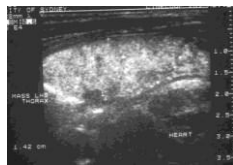
Cardiac assessment - Left atrial: Aorta ratio



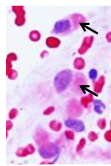
Craig Breheny; the initial beats show the markers across the L atria & aorta

ULTRASONOGRAPHY (TPOCUS)

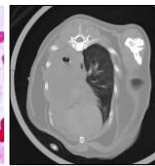
- **Pneumothorax** - loss of A lines
- **Pleural effusion** - anechoic → more structured fluid
- **B lines** - consolidated lung
- **"Hepatoid pneumonia"** - FHV-1, FCV, Pox, AI, *B. bronchiseptica*, *Strep.*, *Mycoplasma spp.*, *Mycobacteria*, *Toxoplasma*, fulminant neoplasia, lung torsion, pulmonary embolism
- **Intra-thoracic mass** - guide FNA
- **Systolic function & L atrial: Aorta ratio (LA:Ao)**



M. theromresistable; R. Malik



FNA: H&E Pox



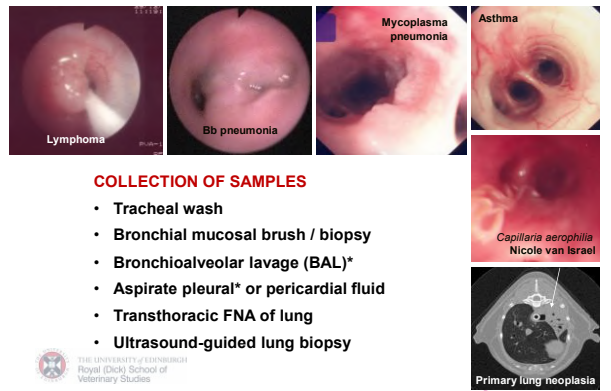
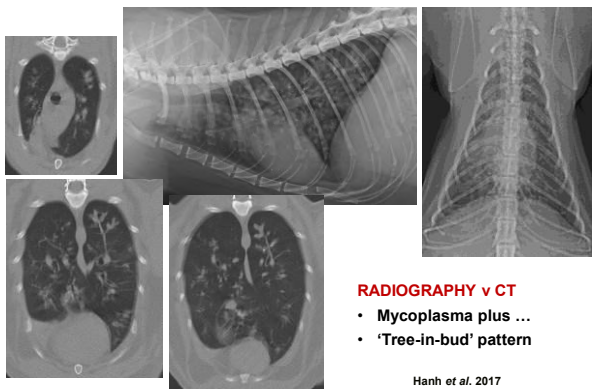
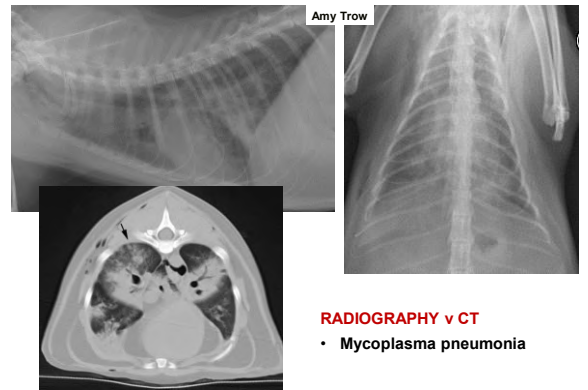
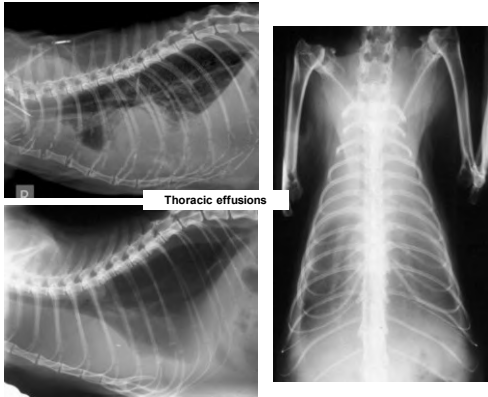
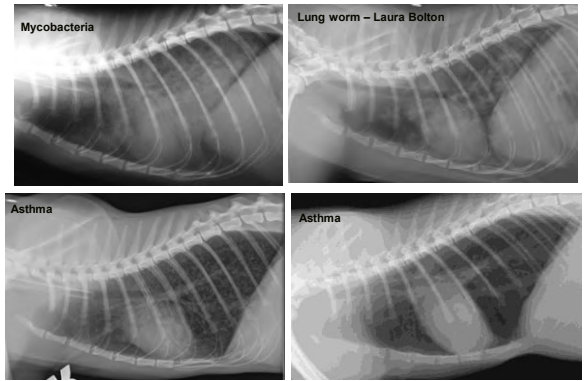
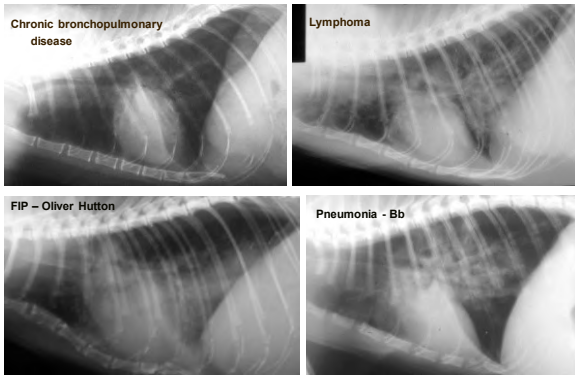
Mycoplasma pneumonia

RADIOGRAPHY (&CT)

- DV / VD / laterals
- **Take care!**
- **Standing lateral?**
- **General anaesthesia?**
- **Expose at end of inspiration**
- **Repeat radiography**
 - after thoracocentesis
 - after time

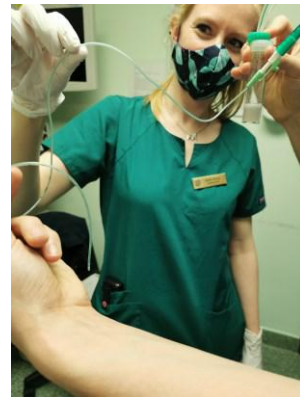
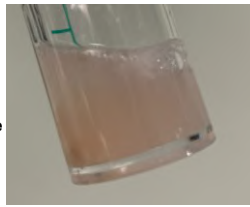


CT 'mouse-trap'



BRONCHIOALVEOLAR LAVAGE (BAL)

- GA sternal recumbancy
Pre-med with terbutaline (0.01mg/kg)
- Pass sterile catheter through ET tube
- Wedge gently in place
- Flush warm sterile saline
- Re-aspirate
- 3 ml/cat → 2-5 ml/kg
- Repeat 2-3 times

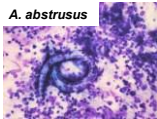


Good BALF recovery

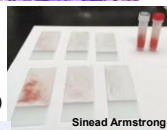


CELL SUSPENSION in BALF

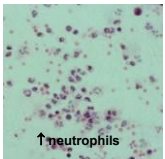
- Sample in plain tube for culture & PCR
Aerobic v anaerobic v fungal?
Transport media for *Mycoplasma*?
- Sample in EDTA tube for cytology
- Process promptly - make air dried + stained smears
- If few cells - spin (200 rpm 2-4 mins) + make smears
- Send: fluid + slides (2-3 air dried + 2-3 'Diff Quicked')



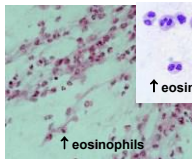
A. abstrusus



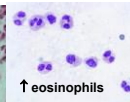
Sinead Armstrong



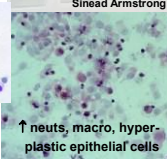
↑ neutrophils



↑ eosinophils



↑ eosinophils



↑ neuts, macro, hyperplastic epithelial cells



Any questions?

<https://www.flickr.com/photos/1234567890/>