

**ONE HEALTH DAY**

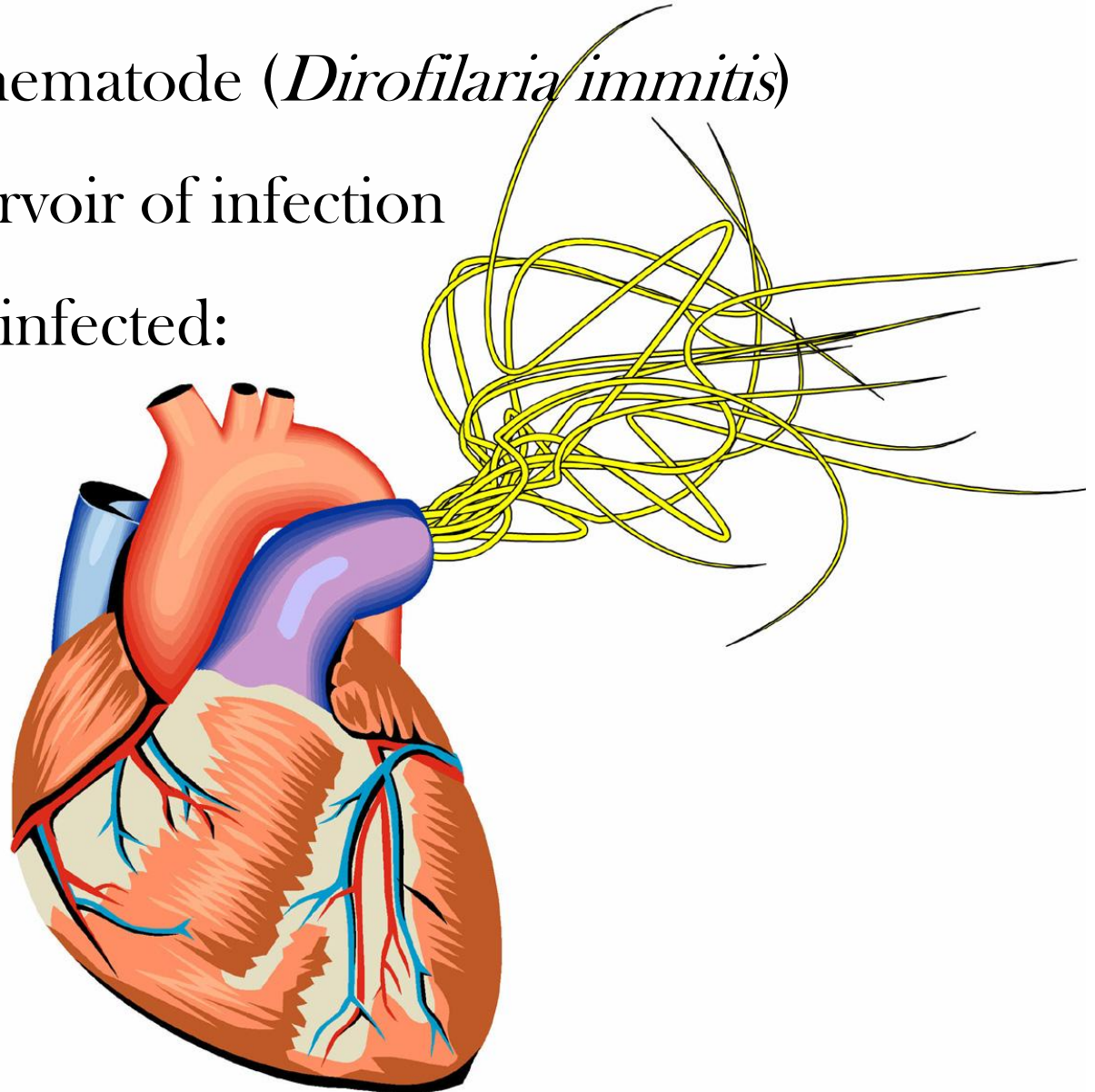
**HEARTWORM  
INFECTION**



**Patrick S. Craig DVM, Ph.D.**

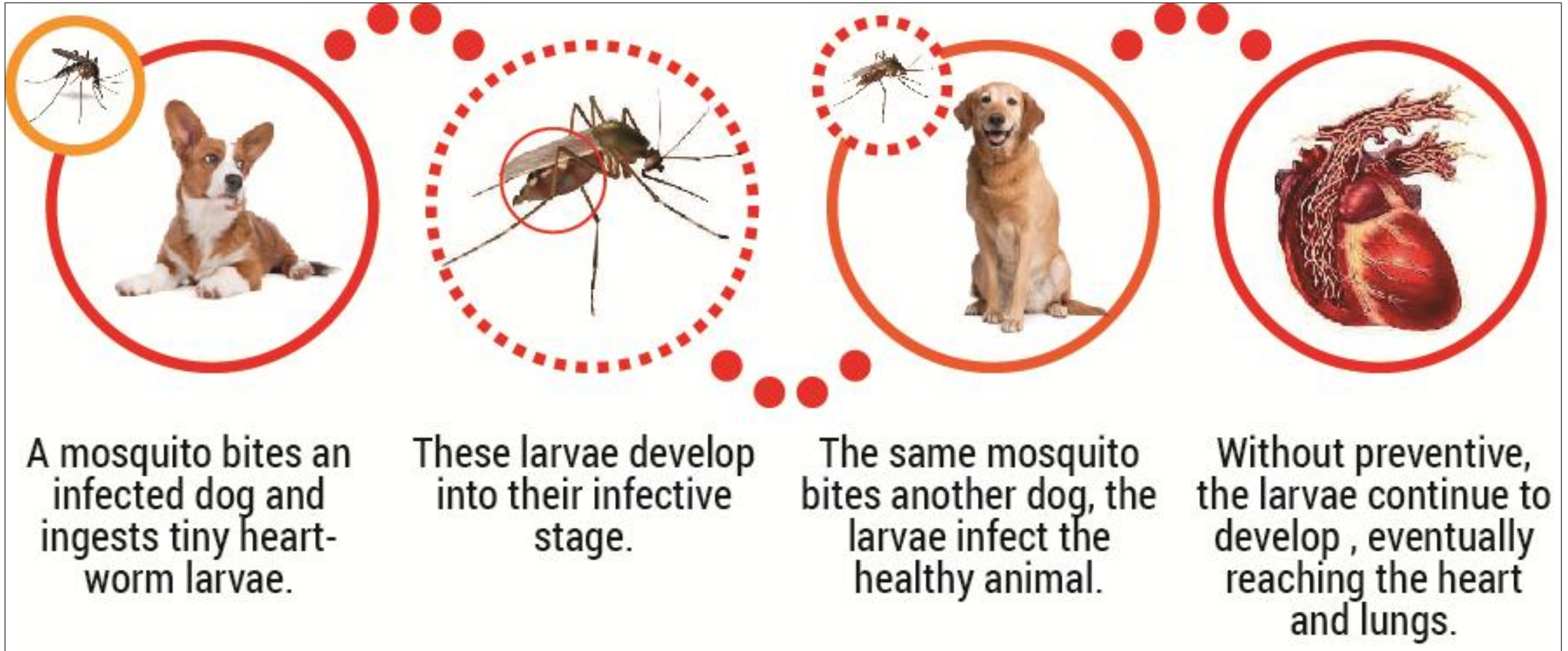
# Heartworm Infection

- 🍏 Canine heartworm – filarioid nematode (*Dirofilaria immitis*)
- 🍏 Dog is the only significant reservoir of infection
- 🍏 Other mammals may become infected:
  - 🍏 Domestic cats
  - 🍏 Wild felids
  - 🍏 Wild canids
  - 🍏 Horses
  - 🍏 Humans

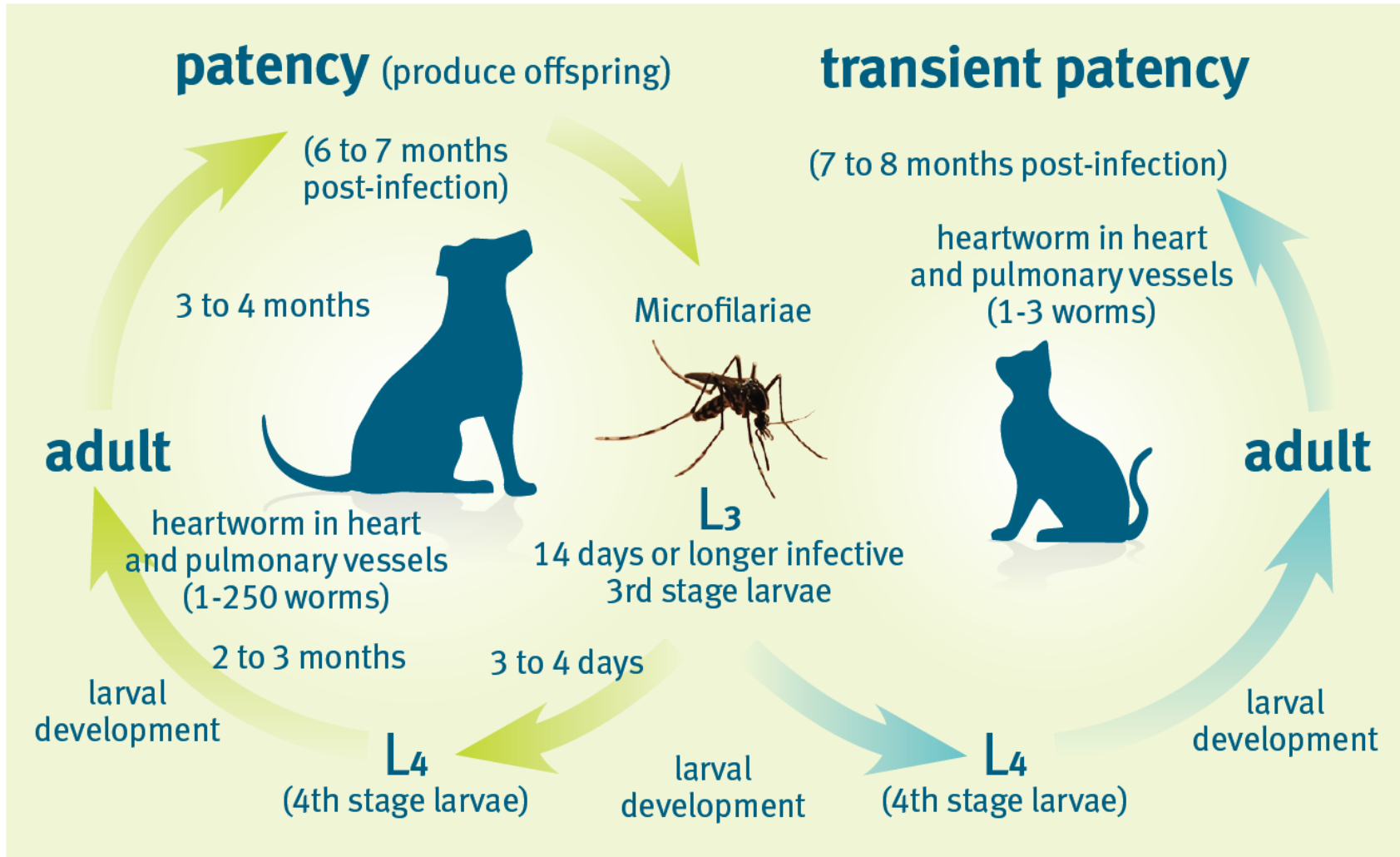




# Canine and Feline Heartworm Cycle



# Canine and Feline Heartworm Cycle



- 🍏 Larvae migrate to Malpighian tubules
- 🍏 Cephalic spaces of head or proboscis
- 🍏 1.2 mm when enter host
- 🍏 5 cm when reach RV 3-4 mon later
- 🍏 Mature for a further 3 mon
- 🍏 Pre-patent periods
- 🍏 Microfilariae survive apprx. 2.5 yrs
- 🍏 Bacterial endosymbiont - Wolbachia contributes to parasites' pathogenesis

# Clinical Signs of Canine Heartworm Disease

<b>Early infection</b>	<b>Class 1</b>	No signs
<b>Mild disease</b>	<b>Class 1</b>	Cough
<b>Moderate disease</b>	<b>Class 2</b>	Cough, exercise intolerance, abnormal lung sounds
<b>Severe disease</b>	<b>Class 3</b>	Cough, exercise intolerance, dyspnea, abnormal heart and lung sounds, hepatomegaly, syncope, ascites, death
<b>Caval syndrome</b>	<b>Class 4</b>	Sudden onset of severe lethargy and weakness accompanied by haemoglobinemia and haemoglobinuria

# Heartworm Clinical Signs

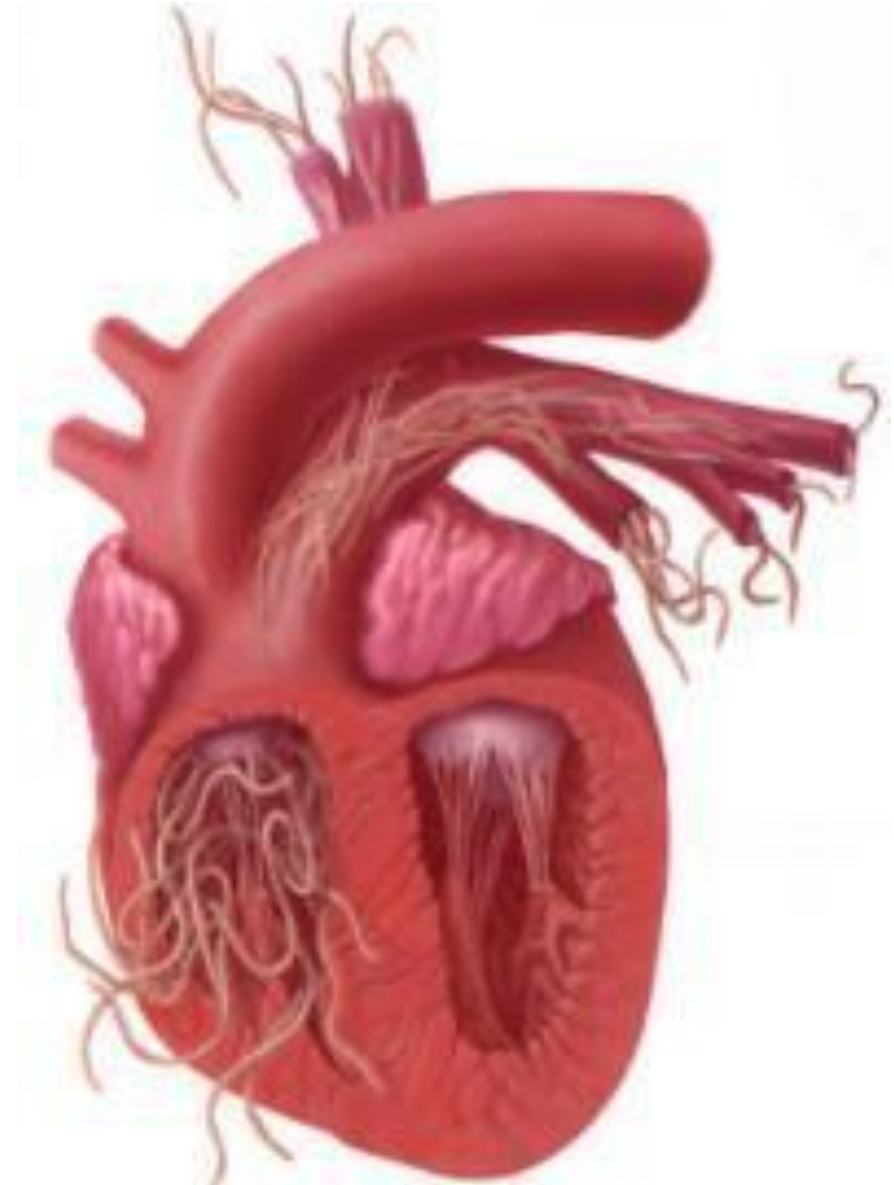
- 🍏 Lobar artery and main PA
- 🍏 Worms in RV when burden is high



- 🍏 Vena caval syndrome (liver failure syndrome)
- 🍏 Worms maneuver to RV, RA, CVC, AVC

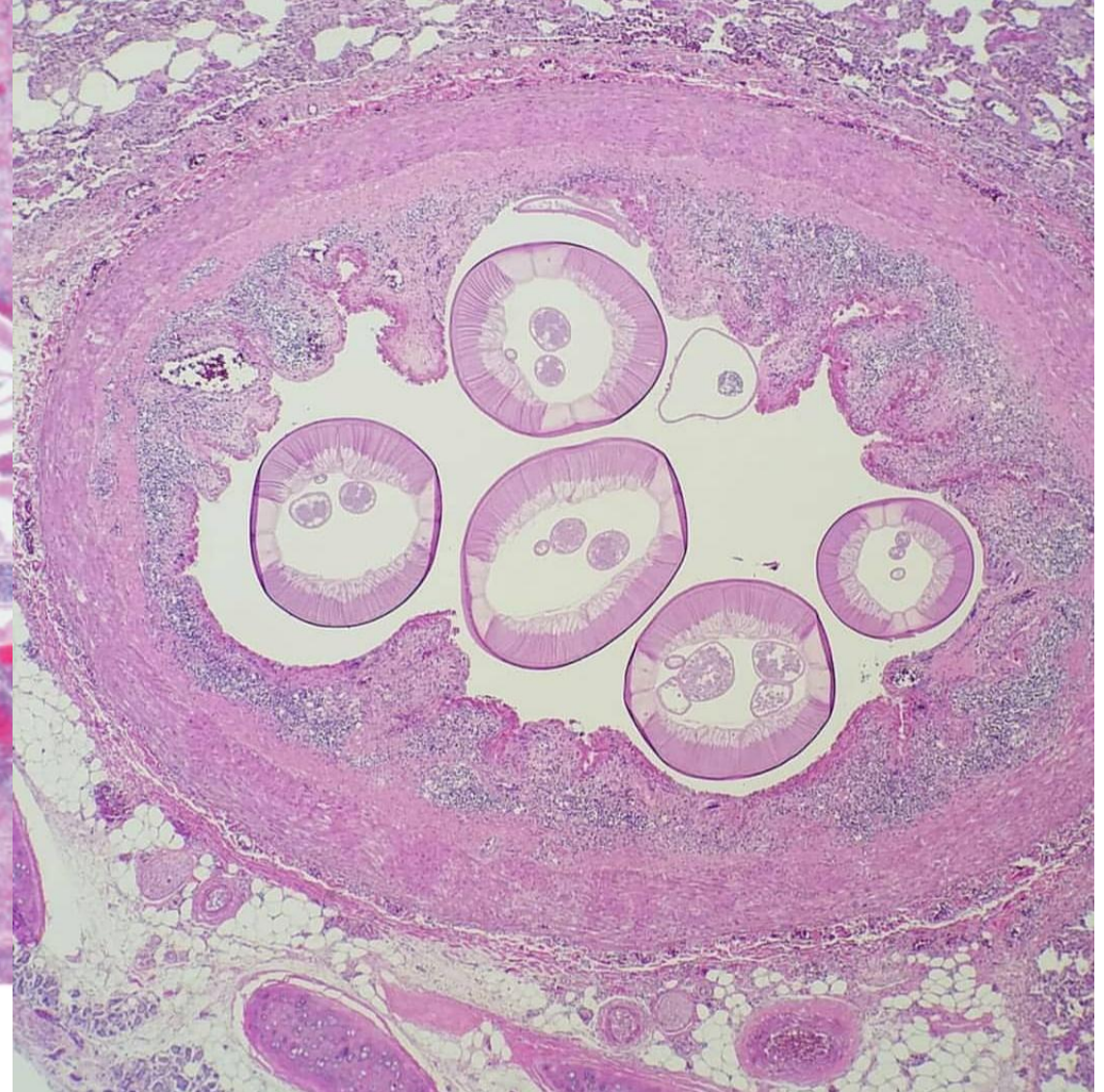
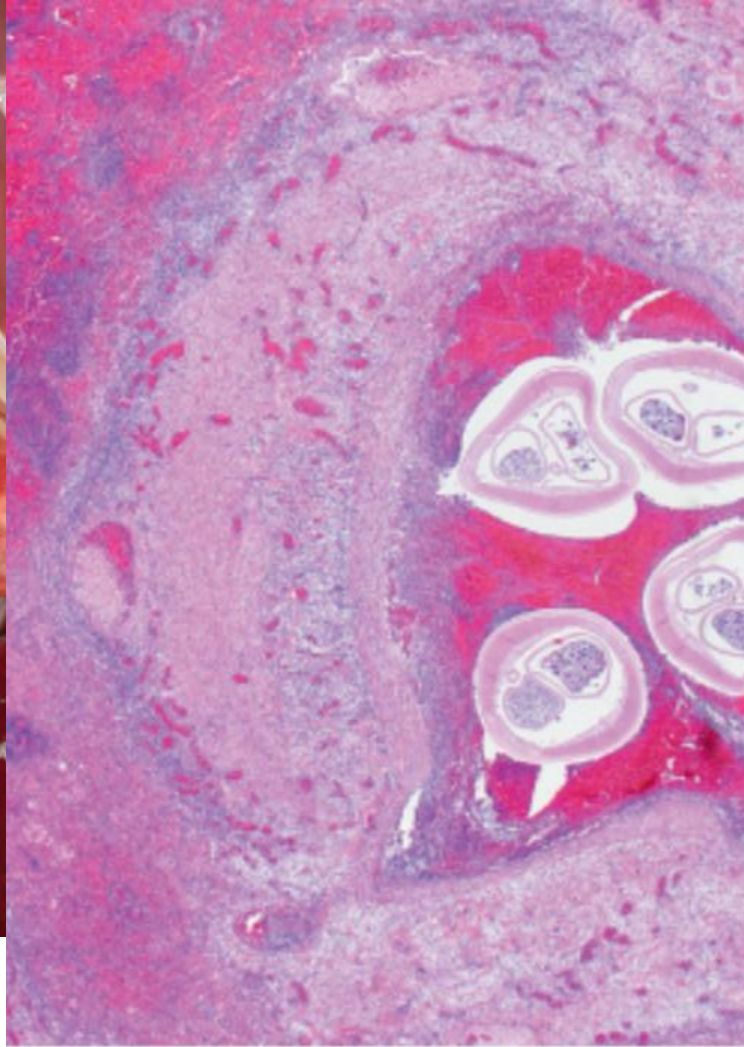
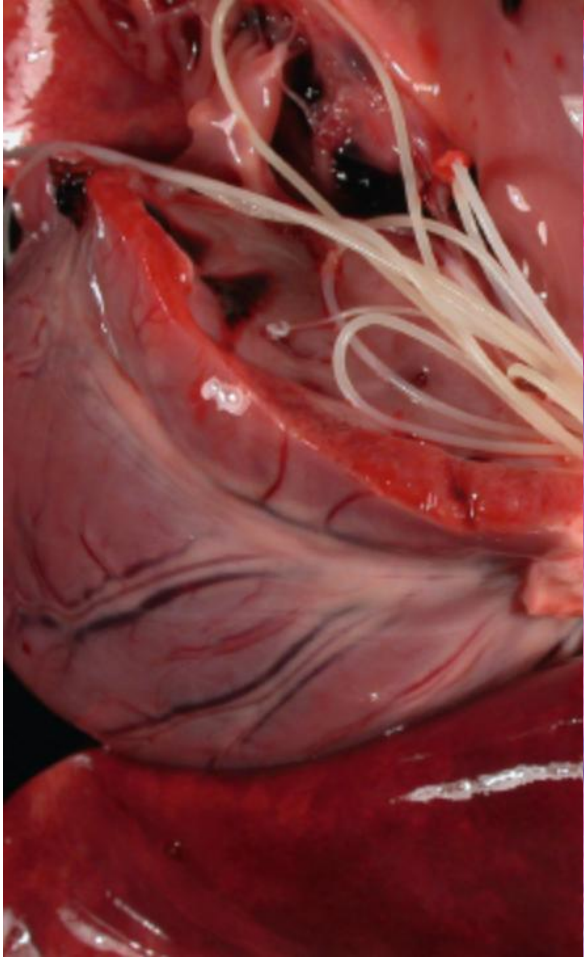


- 🍏 Valvular dysfunction and blood flow
- 🍏 Haemolysis
- 🍏 Liver and kidney dysfunction
- 🍏 Anaemia, haemoglobinuria and bilirubinuria
- 🍏 Congestive RV failure
- 🍏 Shock – decreased venous return





# Heartworm Clinical Signs



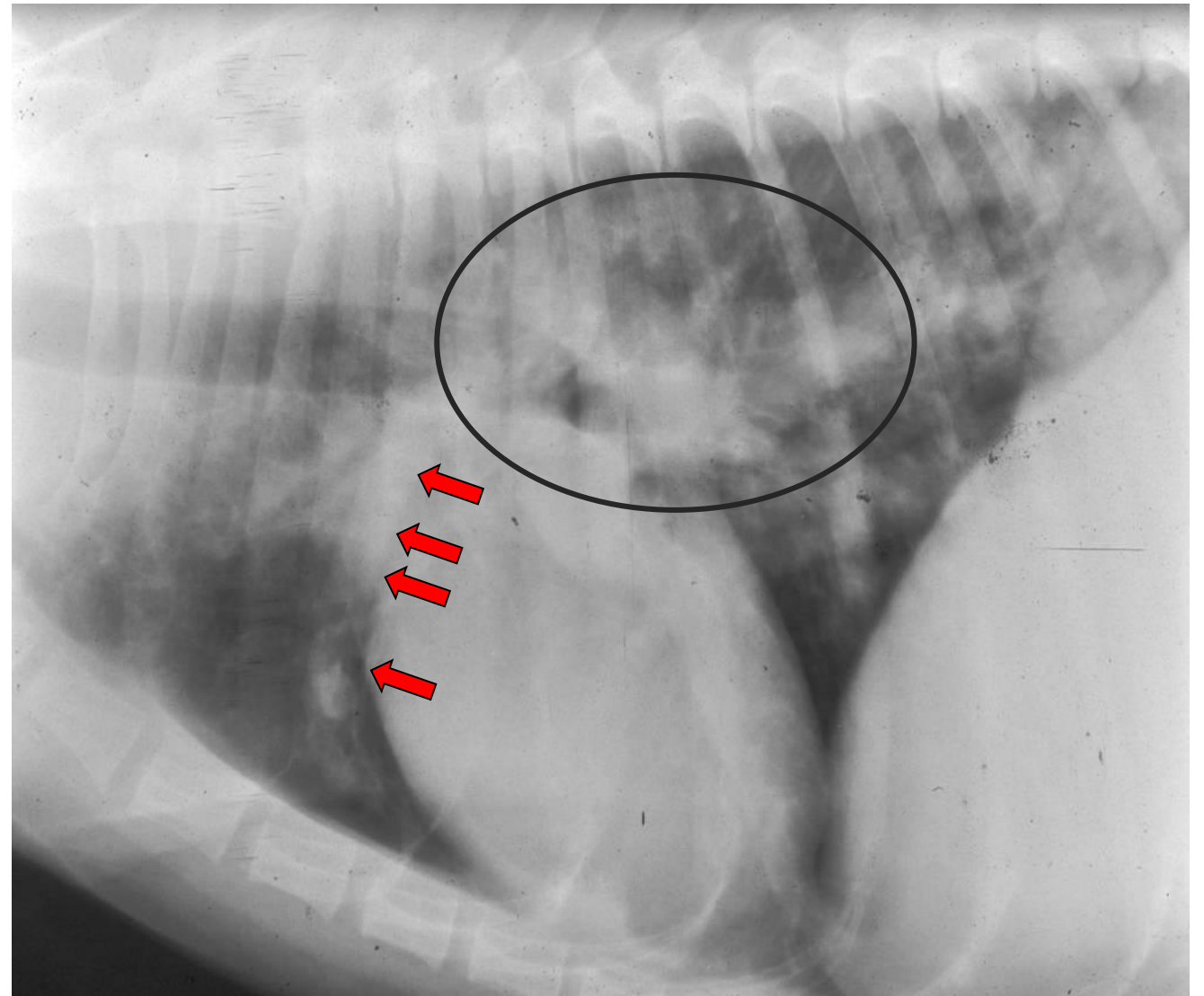
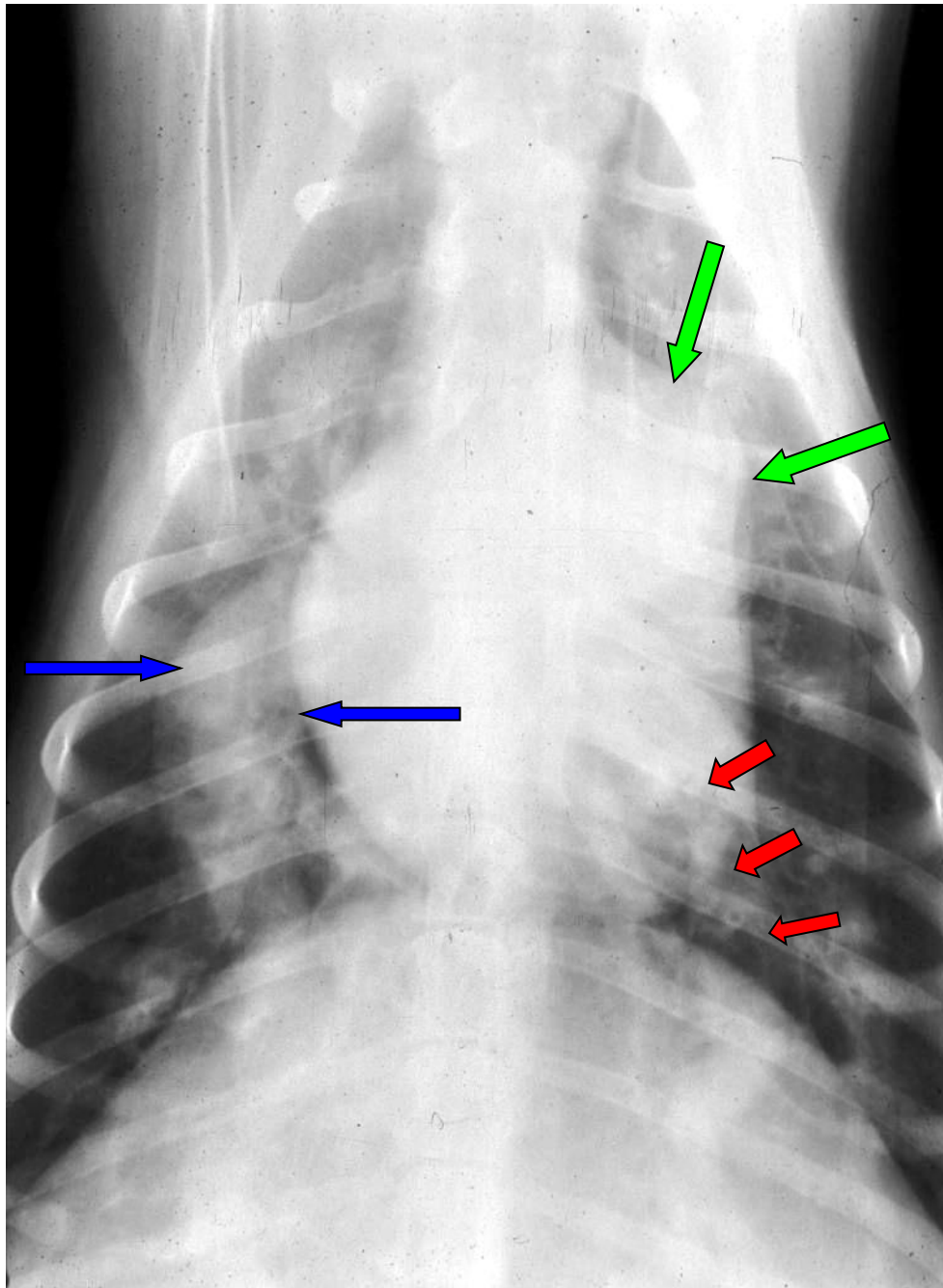






# Heartworm Clinical Signs



- 🍏 RV hypertrophy
- 🍏 RV dilated
- 🍏 PA dilated
- 🍏 Coarse systolic murmur – tricuspid regurgitation
- 🍏 Jugular vein pulsation
- 🍏 Severe passive hepatic congestion



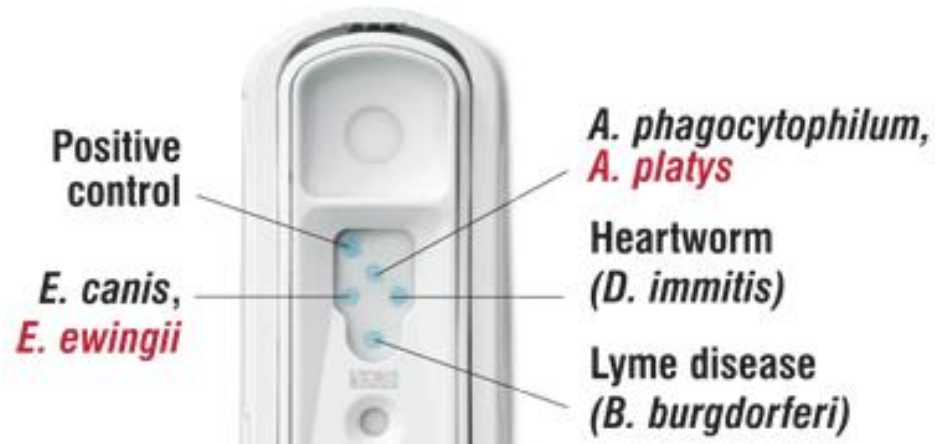
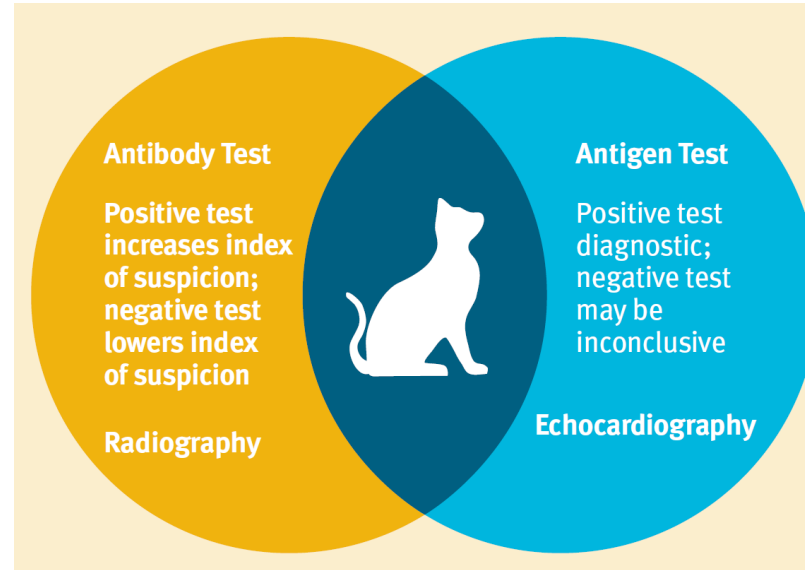
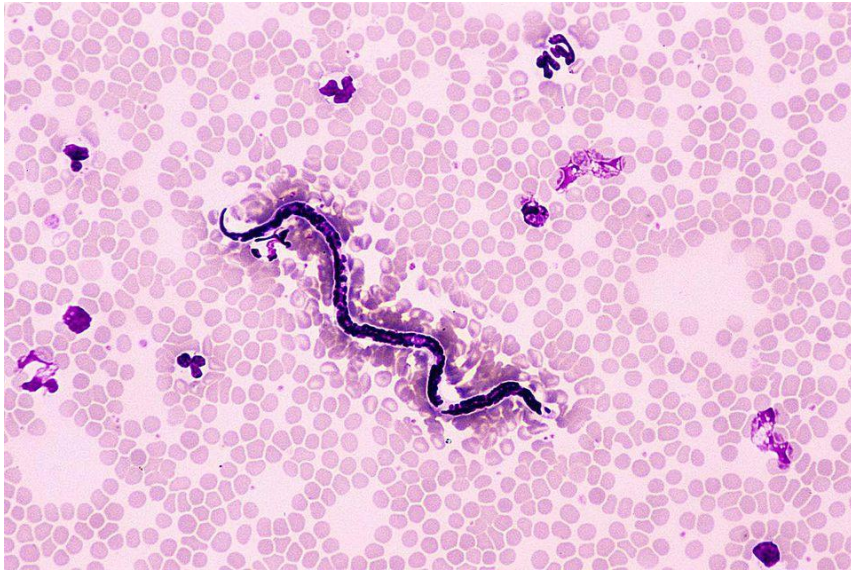


-  Enlarged Right Atrium
-  Widened Caudal Vena Cava (Caval Syndrome)
-  Enlarged Pulmonary Arteries
-  Lung Disease (Heartworm Pneumonitis)

# Heartworm Diagnosis in Dogs and Cats

Tests	Description	Comments
Blood smear	Mobile <i>mf</i> in smear	Rapid, inexpensive
Concentration tests	Conc. <i>mf</i> in buffy coat stain mf (Knott test)	Rapid, low sensitivity
Antigen test	protein from repro tract female worms	High Sp. and Sen.,
Antibody test	Ab produced by host's immune response	Less Sen. than AG test Mainly used in cats

# Heartworm Diagnosis in Dogs and Cats



- 🍏 AG test are far more sensitive compared to others
- 🍏 Microfilaremic period – very short in cats
- 🍏 A percentage of dogs with adults worms are Amicrofilaremic
- 🍏 When diagnostic tests are inconclusive – radiography and echo are useful adjunct tests.



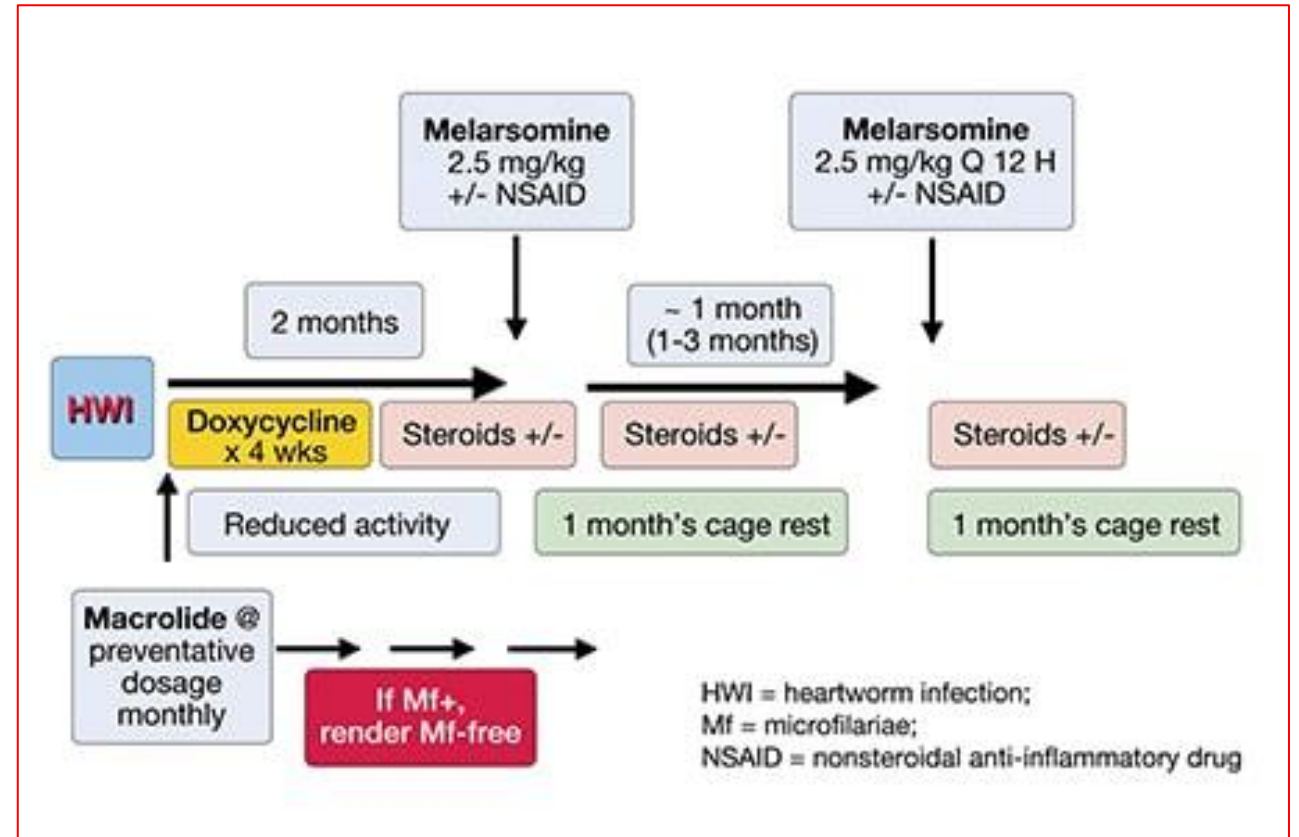
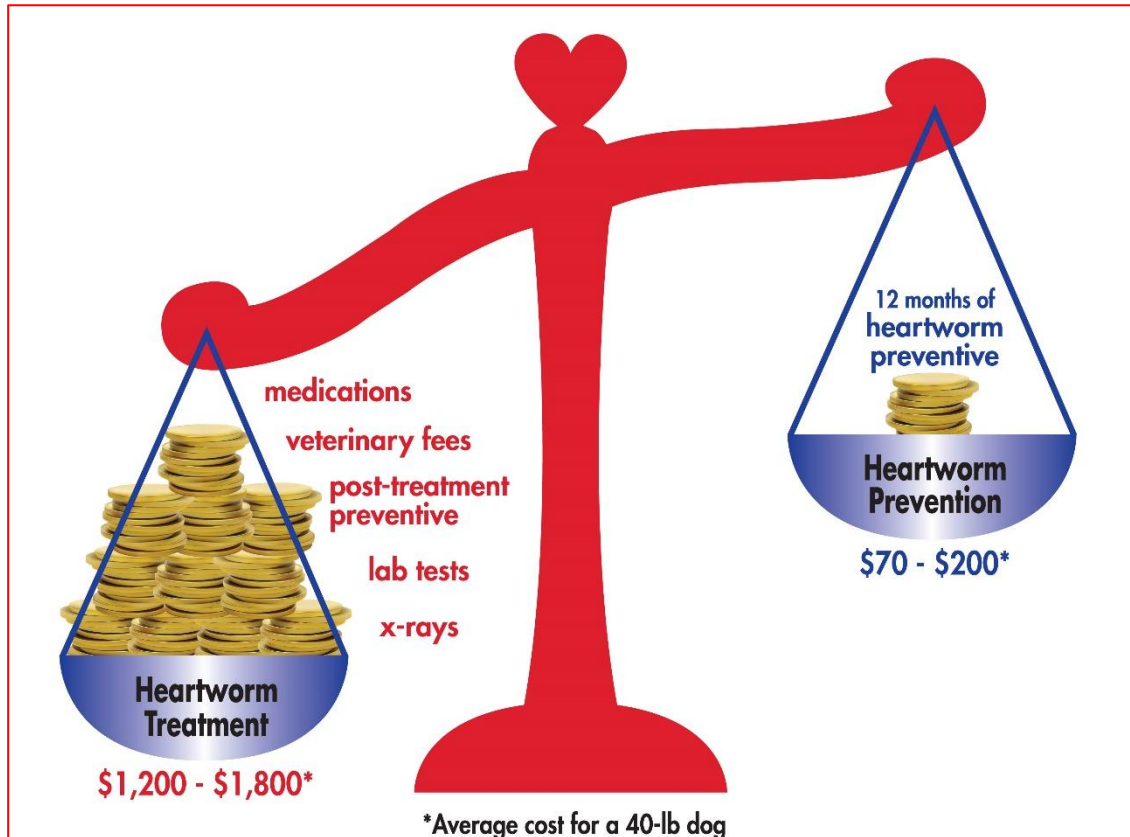
# Heartworm Prevention in Dogs and Cats



**~US\$6 BILLION - 2016**

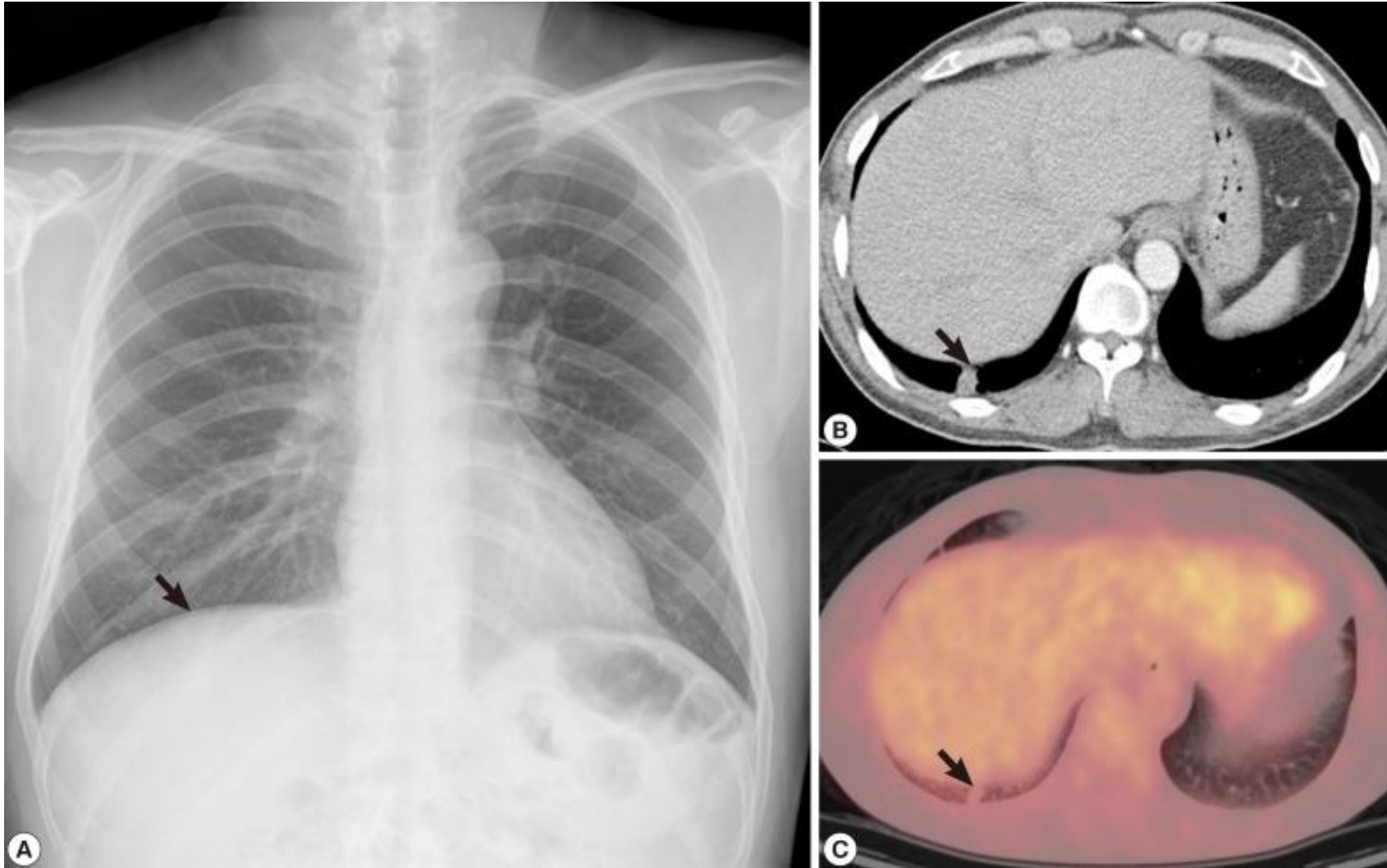


# Heartworm Treatment in Dogs and Cats



Glucocorticosteroids, Doxycycline, Adulticide Tx, Macrocylic lactone post adulticide for mf tx

# Heartworm in Humans



- A. Nodular lesion in RL
- B. CT scan of pulmonary nodule
- C. PET scan – subpleural nodule

- 🍏 Cough +/- blood
- 🍏 Fever
- 🍏 Pleural effusion
- 🍏 Worms rare in humans – eyes, brain, testicles, liver, subcutaneous sites, etc.



# THANK YOU

