History and signalment

- Male castrated 13-year-old lion
  - Inhabitant of large cat sanctuary
- No significant medical history
History and signalment

- Male castrated 13-year-old lion
  - Inhabitant of large cat sanctuary
- No significant medical history
- Found dead in enclosure
- Submitted for necropsy
Additional information

- Pericardial serous effusion (350 mL)
- Hepatic and pulmonary congestion
- Aerobic and anaerobic cultures: No growth
Microscopic findings
Endocardium

Epicardium

Permission granted only for viewing on SEVPAC website
Plasma cells

Macrophage

Eosinophil

Permission granted only for viewing on SEVPAC website
Immunohistochemistry

- *Toxoplasma gondii*
Immunohistochemistry

- *Toxoplasma gondii*
  - Negative
Immunohistochemistry

- *Toxoplasma gondii*
  - Negative
- *Sarcocystis neurona*
Immunohistochemistry

- *Toxoplasma gondii*
  - Negative
- *Sarcocystis neurona*
  - Negative
Immunohistochemistry

- *Toxoplasma gondii*
  - Negative
- *Sarcocystis neurona*
  - Negative
- *Neospora caninum*
Immunohistochemistry

- *Toxoplasma gondii*
  - Negative

- *Sarcocystis neurona*
  - Negative

- *Neospora caninum*
  - Positive
Morphologic diagnosis

- Severe multifocal to coalescing histiocytic, plasmacytic, eosinophilic, and necrotizing myocarditis with intralesional protozoal tachyzoites (*Neospora caninum*)
Final diagnosis

• Neospora myocarditis
Apicomplexan coccidian organism
Apicomplexan coccidian organism
Apicomplexan coccidian organism
Apicomplexan coccidian organism
Neosporosis

• Naturally-occurring clinical infection not previously reported in felids

• Antibodies detected in lions and domestic cats
Neosporosis

- Naturally-occurring clinical infection not previously reported in felids
- Antibodies detected in lions and domestic cats
- Infection via carnivorism with transplacental transmission demonstrated in domestic cat
  - Dubey JP, Lindsay DS. Int J Parasitol 2004;34:1157–1167
Clinical neospororosis

• Puppies: Usually transplacental transmission
  • Polymyositis, polyradiculoneuritis
Clinical neosporosis

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• Older dogs: Acute infection via carnivorism; recrudescence due to immunosuppression
  • Encephalomyelitis, polymyositis, myocarditis, pneumonia, hepatitis, dermatitis
Clinical neosporosis

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- Older dogs: Acute infection via carnivorism; recrudescence due to immunosuppression
  - Encephalomyelitis, polymyositis, myocarditis, pneumonia, hepatitis, dermatitis

- Cattle: Often subclinical in adults
  - Mid to late-term abortion
Mode of infection in this case:

• Exposure to canids unlikely
• Diet previously frozen
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- Ingestion of small prey?
  - Rodents, birds, lagomorphs
Mode of infection in this case:

• Exposure to canids unlikely
• Diet previously frozen
• Ingestion of small prey?
  • Rodents, birds, lagomorphs
• Recrudescence?
  • Tissue cysts not found elsewhere
  • No known cause of immunosuppression
Conclusion

• *Neospora caninum* should be considered as a potential cause of myocarditis in adult lions
• Differentiate from *Toxoplasma gondii* with immunohistochemistry or electron microscopy
Thank you!

- Dr. Linden Craig
- Dr. Andrew Cushing
- UT histology lab

- Dr. Tamas Nagy
- Dr. Buffy Howerth
- UGA histology lab
References


• Dubey JP. Review of *Neospora caninum* and neosporosis in animals. Korean J Parasitol 2003;41:1-16.


