

Canine tuberculosis due to *Mycobacterium bovis* : about a case

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Identification of the case

- 4-year old dog
- Neutered Female
- Shepherd crossbreed
- 25 Kg
- In Tarn (81)
- In the countryside with neighboring farms
- Free to roam
- In contact with 2 cats



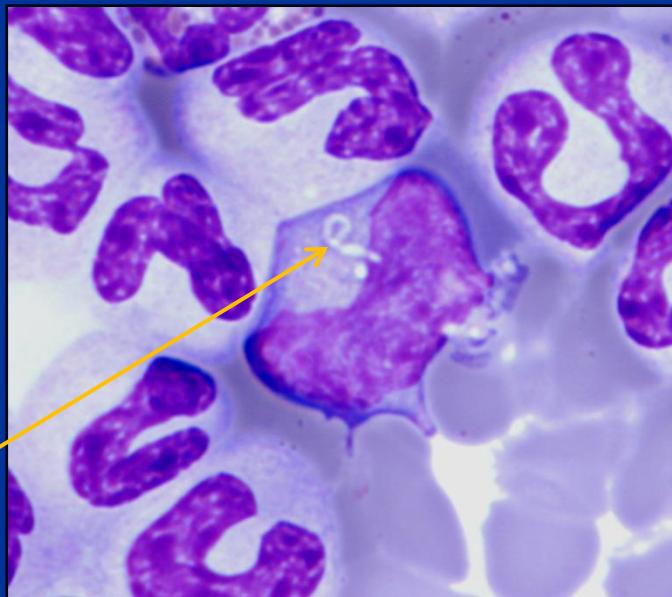
History – Clinical findings

- 1 month ago : Abcess on right thigh treated with local surgery and antibiotics, anti-inflammatory drug
- 10-day history of :
 - Polyadenomegaly and PuPd
 - Anorexia, tiredness, loss weight, diarrhea
- Apyrexia (38.4° C)
- Neutrophilic leukocytosis, lymphopenia
- Hyperuremia, hypercreatininemia (x4)

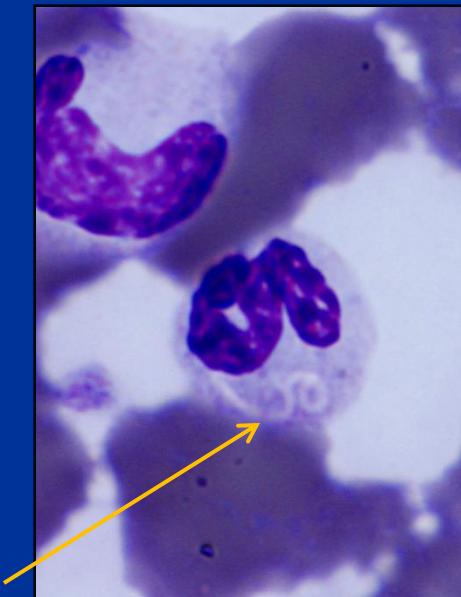
Hematology

Blood smear

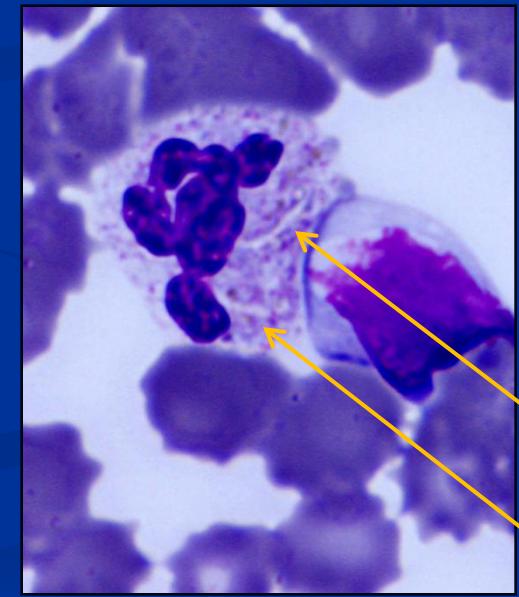
- Intracytoplasmic bacilli negatively stained with MGG
 - ➔ In monocytes
 - ➔ In neutrophils
- ➔ Acid-Fast Bacillus (AFB) consistent with mycobacterium
- ➔ Septicemic form



x1000 MGG



x1000 MGG

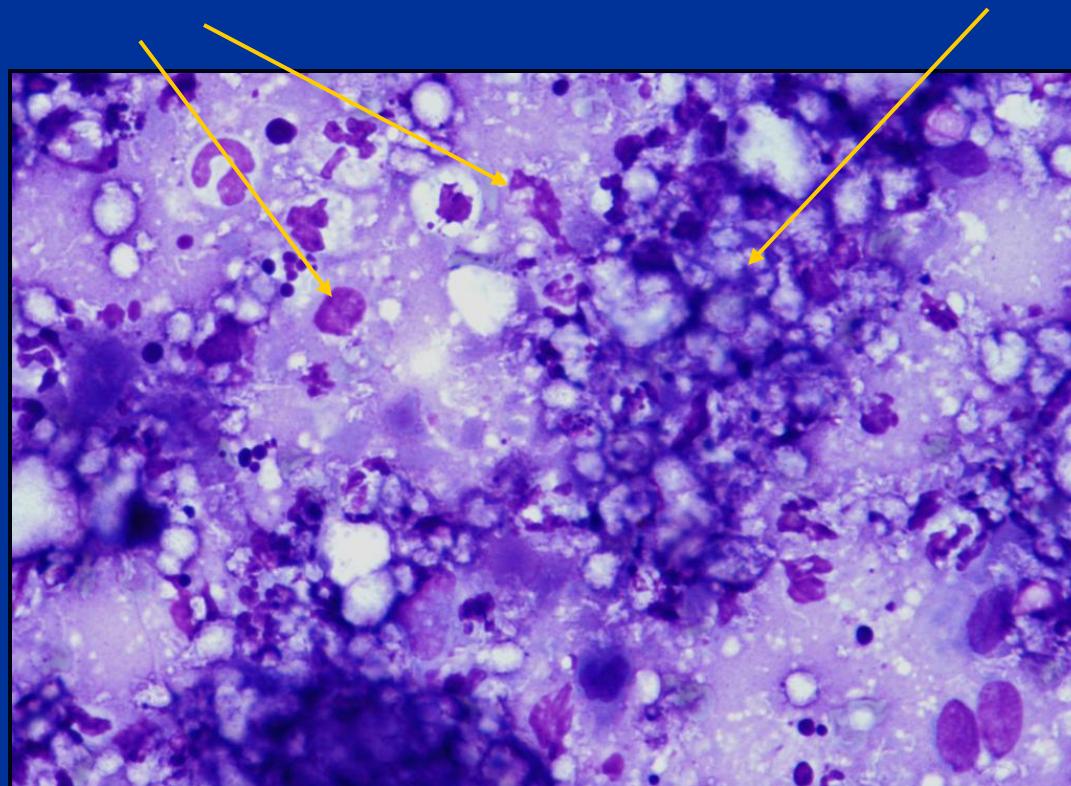


x1000 MGG

Cytology

LN cytoponction

- Numerous macrophages
 - Degenerated neutrophils
 - ➔ Pyogranulomatous adenitis
- Fat globules + calcification + degenerated neutrophils
 - ➔ Caseation necrosis

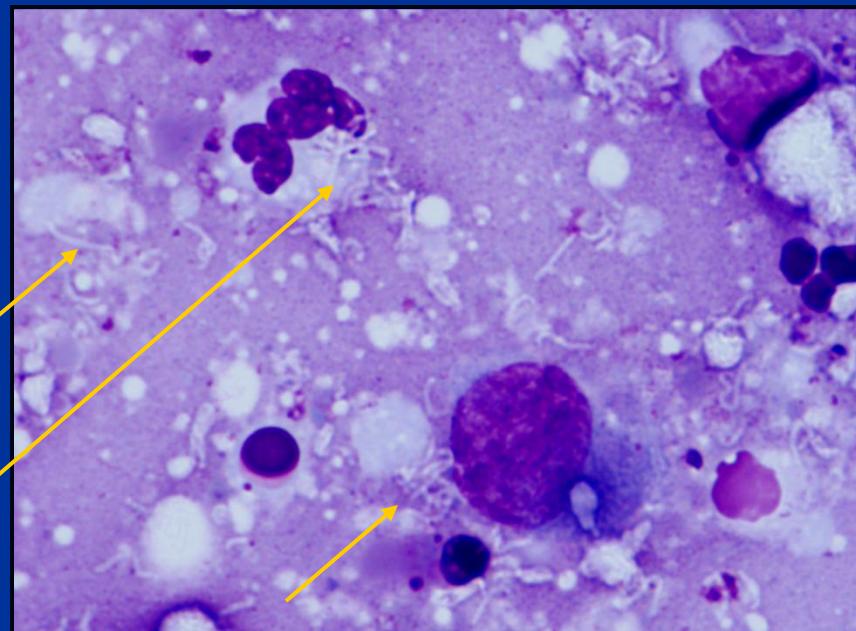


x400 MGG

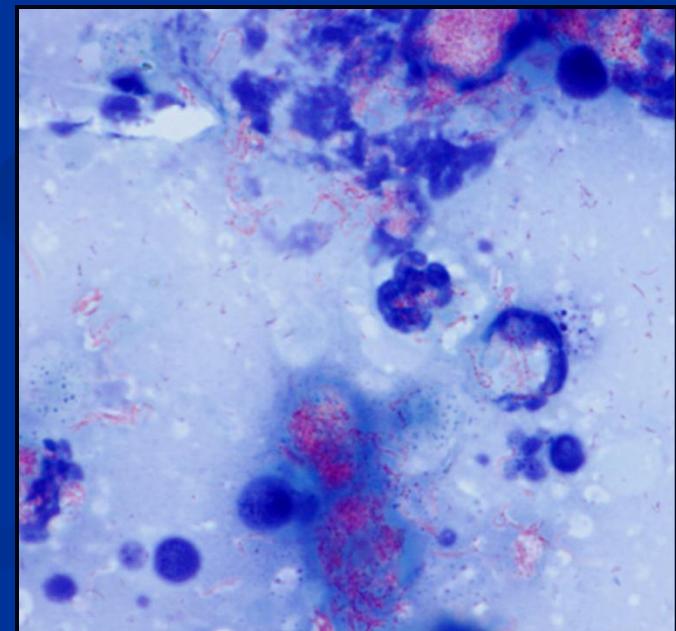
Cytology

LN cytoponction

- Extra and intracytoplasmic bacilli in macrophages and neutrophils
- Positive Ziehl-Neelsen stain
- ➔ Pyogranulomatous adenitis with infectious origin : Acid-Fast Bacillus



x1000 MGG



x1000 ZN

Macroscopic Results

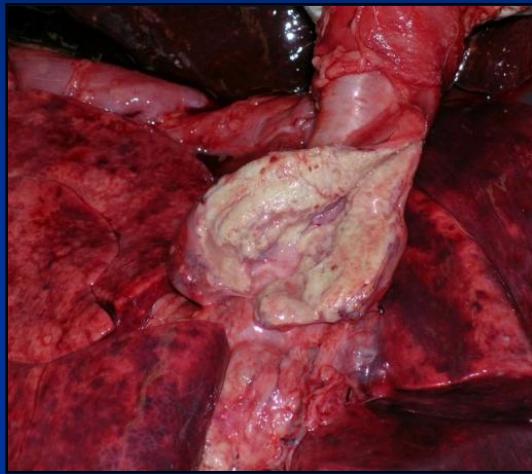
Subcutaneous adipose tissue



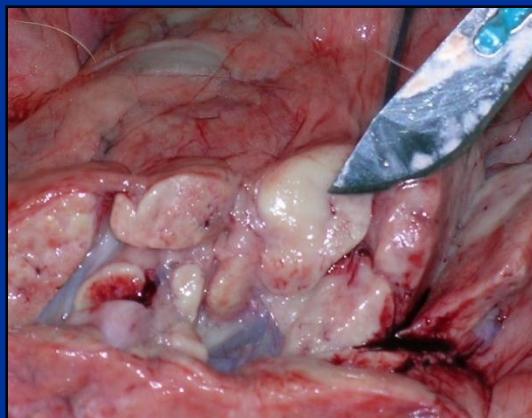
- Glistening surface
 - ➔ Marked subcutaneous edema
- Marked diffuse congestion
- Diffuse multiple extensive yellow and chalky foci
 - ➔ Fatty necrosis with mineralization
- ➔ Severe necrotizing panniculitis

Macroscopic Results

Lymph nodes (LN)



Anterior Mediastinal LN

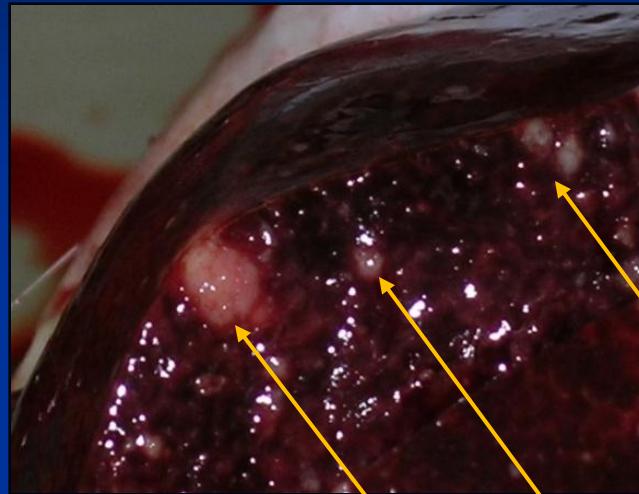
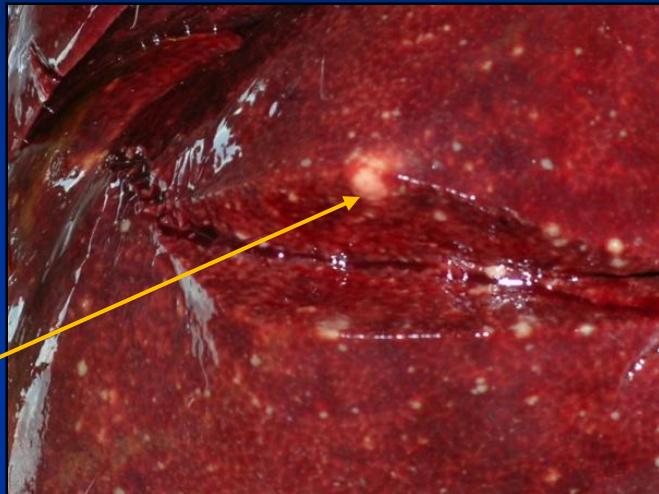


Left Axillary LN

- Severe hypertrophy and adherence to the surrounding tissues
 - Reactive pattern without distinctive cortico-medullary topography
 - Occasional foci with pus and mineralization
 - Admixture of white cellular (granulomatous type) and yellow chalky (necrosis and mineralization) foci
- ➔ Severe (pyo)granulomatous and necrotizing lymphadenitis with mineralization

Macroscopic Results

Liver



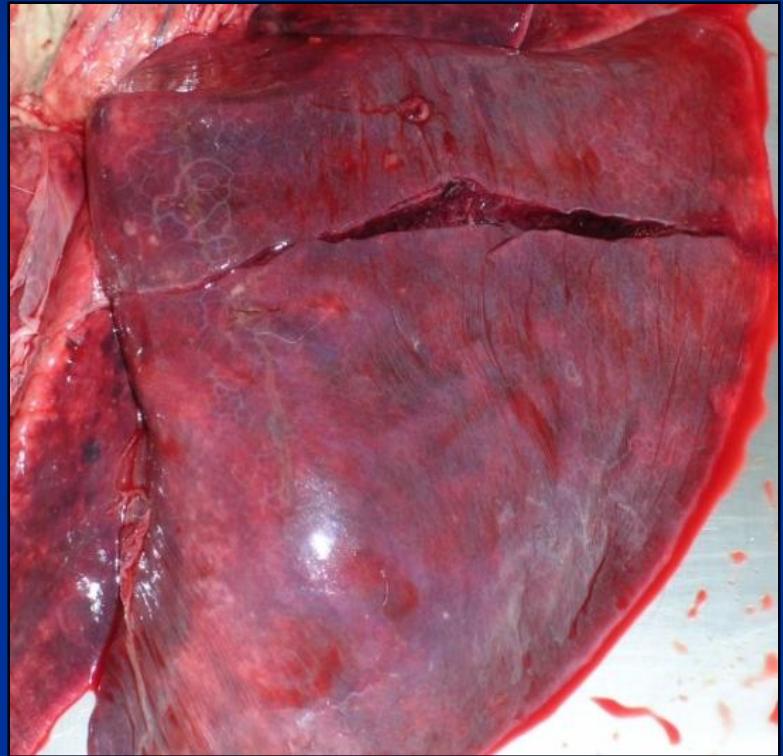
- Moderate diffuse hypertrophy
- Blood discharge on section
- ➔ Marked diffuse congestion
- Miliary white nodules (1-4 mm diameter)
- ➔ Granulomas +/- necrosis

➔ Severe granulomatous hepatitis

Macroscopic Results

Lung

- Marked bilateral diffuse red color
(added with a right hypostasis)
 - Mild increase of consistency
- Suspicion of subacute interstitial pneumonia



Macroscopic Results

Conclusion

- Severe necrotizing panniculitis
- Severe (pyo)granulomatous and necrotizing lymphadenitis with mineralization (caseous necrosis)
- Severe granulomatous hepatitis

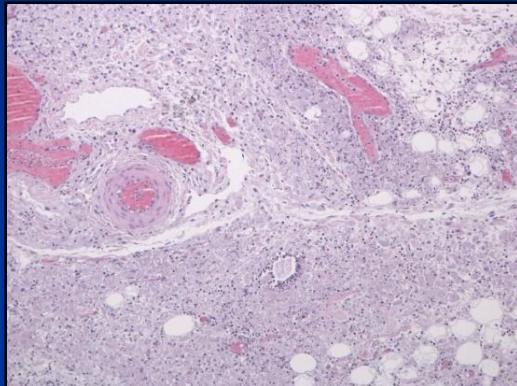
→ Systemic mycobacteriosis

Etiologic hypothesis :

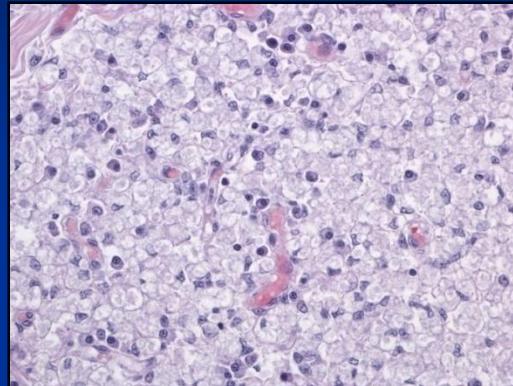
- Tuberculous mycobacterium : M. tuberculosis, M. bovis
- Opportunistic non tuberculous mycobacterium : Mycobacterium avium complex

Microscopic Results

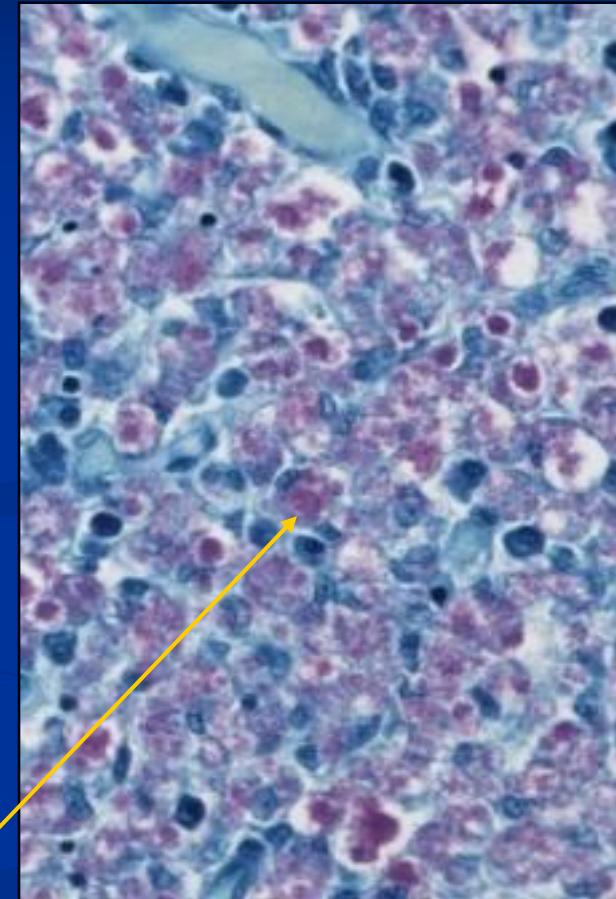
Subcutaneous adipose tissue



x100 HE



x400 HE



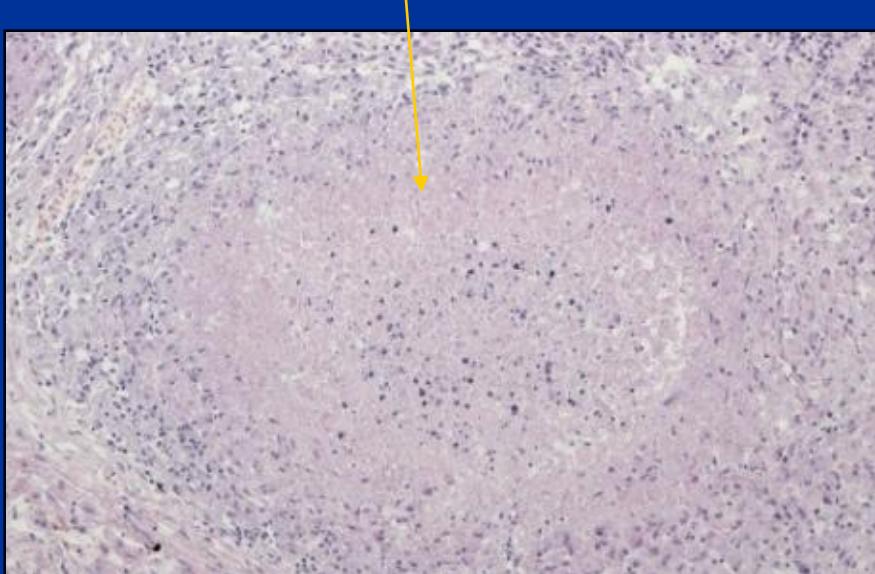
x400 ZN

- Edema, marked congestion
 - Foci of fatty necrosis
 - Nodular to confluent aggregates of epithelioid macrophages + giant cells with extra & intracytoplasmic acid-fast bacilli (AFB)
- Generalized granulomatous panniculitis

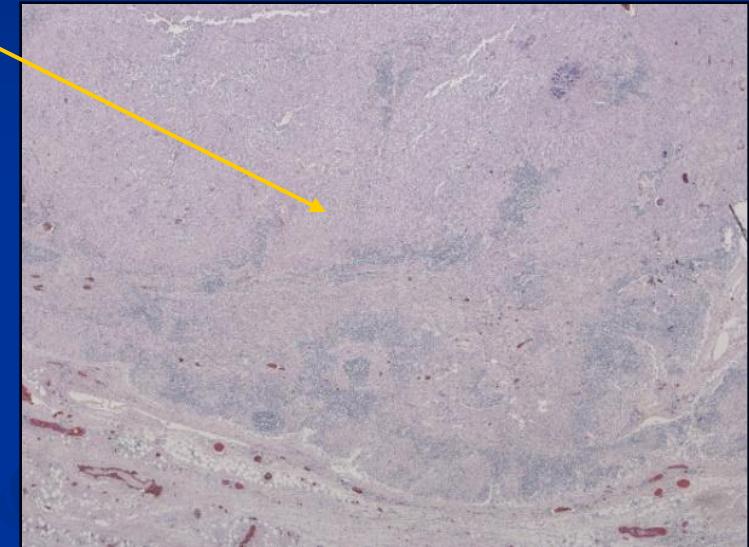
Microscopic Results

Lymph Nodes

- Severe architectural modification by granulomatous inflammatory reaction
- Necrosis and mineralization in the center of granulomas



Prescapular LN x100 HE

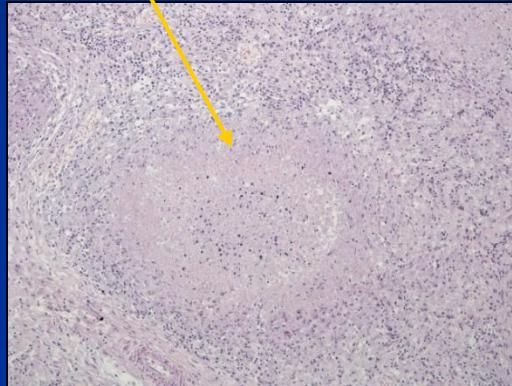


Prescapular LN x20 HE

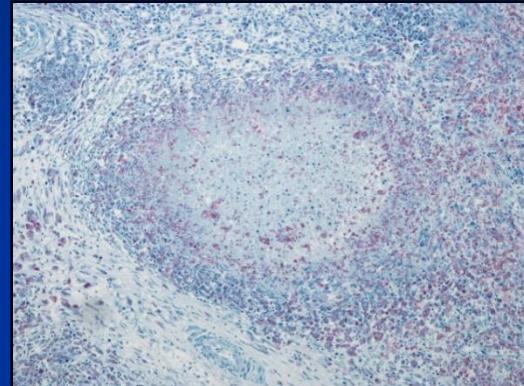
Microscopic Results

Lymph Nodes

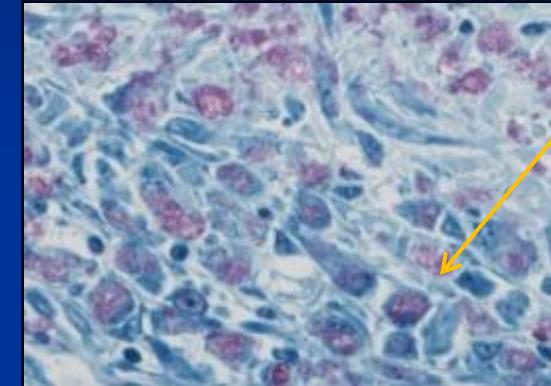
Granuloma



Prescapular LN x100 HE



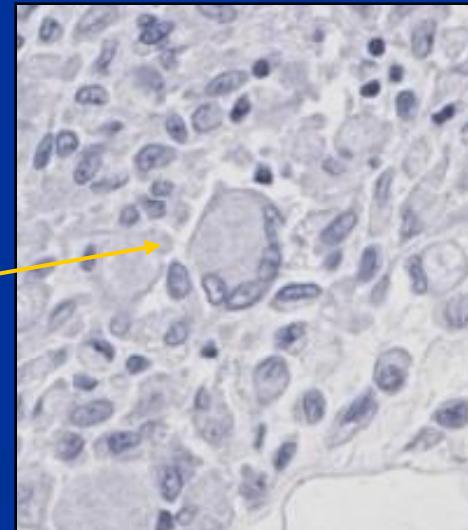
x100 ZN



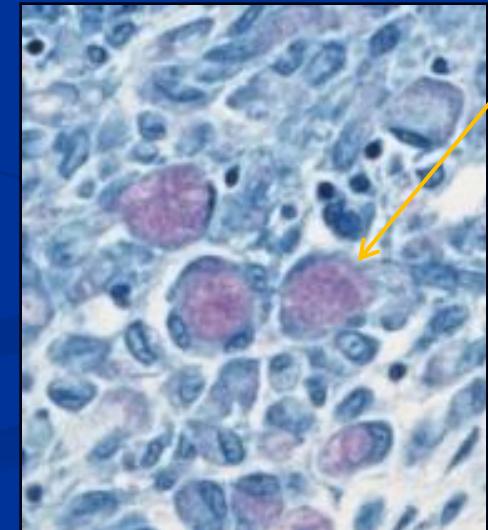
x400 ZN

- Epithelioid macrophages
- Langhans type giant cells
- with intracytoplasmic AFB

→ Generalized granulomatous lymphadenitis



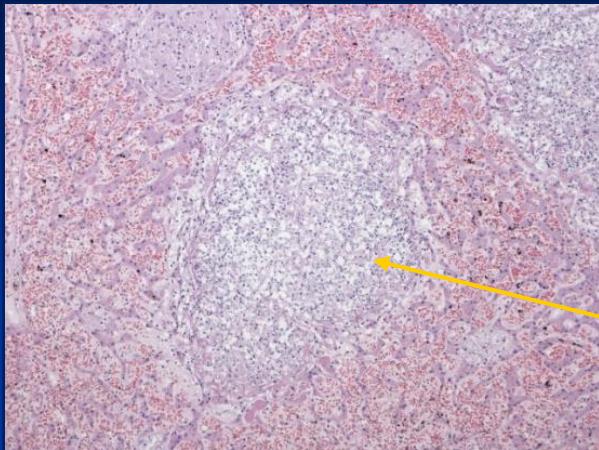
Giant cells x400 HE



Giant cells x400 ZN

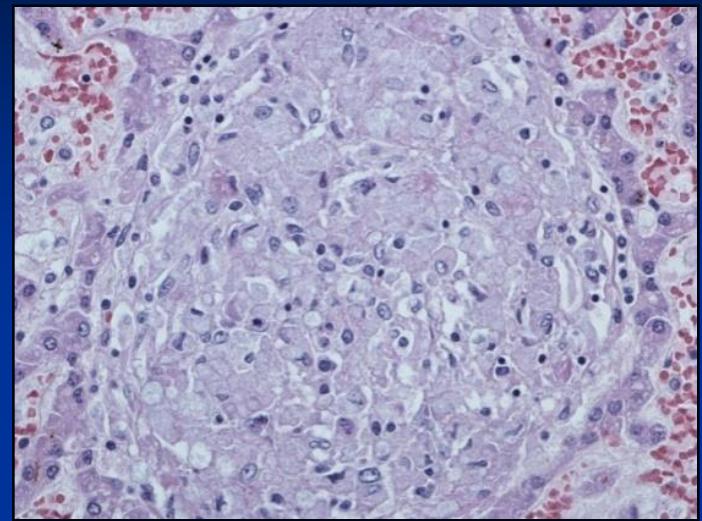
Microscopic Results

Liver



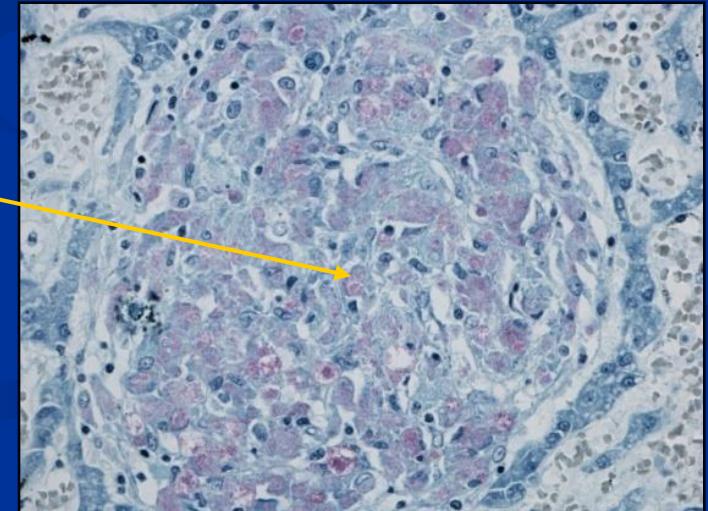
x100 HE

Granuloma



x400 HE

- Multiple portal macrophagic aggregates with formation of granulomas
 - Macrophages with **intracytoplasmic AFB**
 - Foci of hepatocytic necrosis around the granulomas
 - Focal areas of congestion
- ➔ Severe granulomatous hepatitis

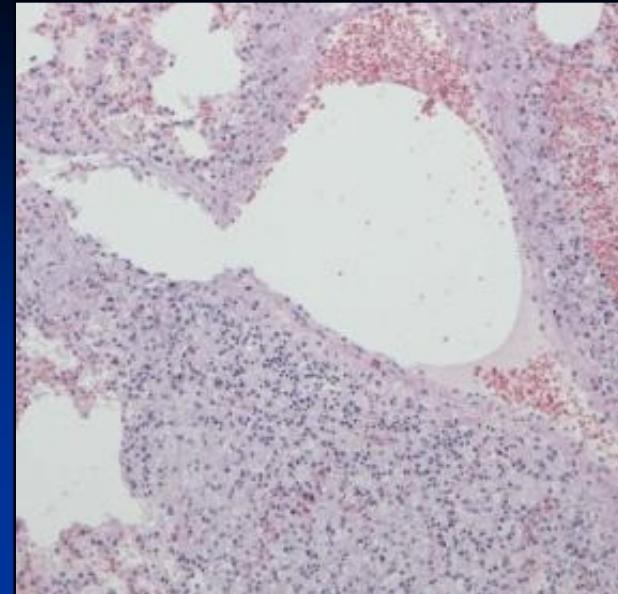


x400 ZN

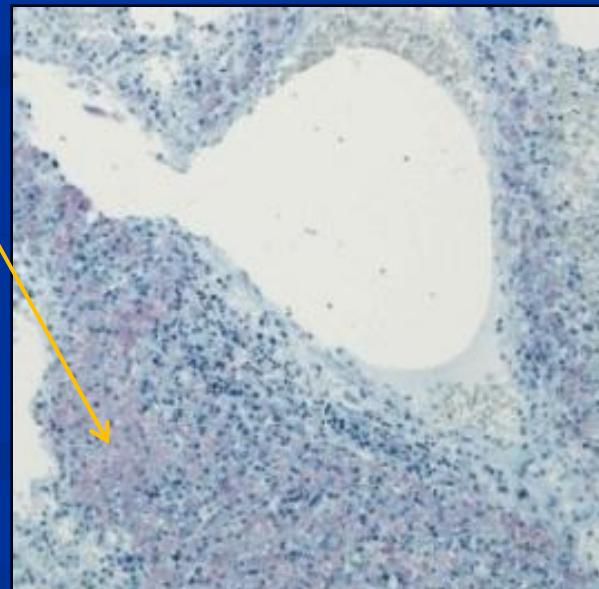
Microscopic Results

Lung

- Active congestion and intra-alveolar edema with occasionnal macrophages and few neutrophils
- Acute alveolar and interstitial multifocal hemorrhages
- Multiple small infiltrates of macrophages with AFB in parenchyma (perivascular and peribronchiolar pattern)



x100 HE



x100 ZN

➔ Moderate subacute macrophagic interstitial pneumonia

Microscopic Results

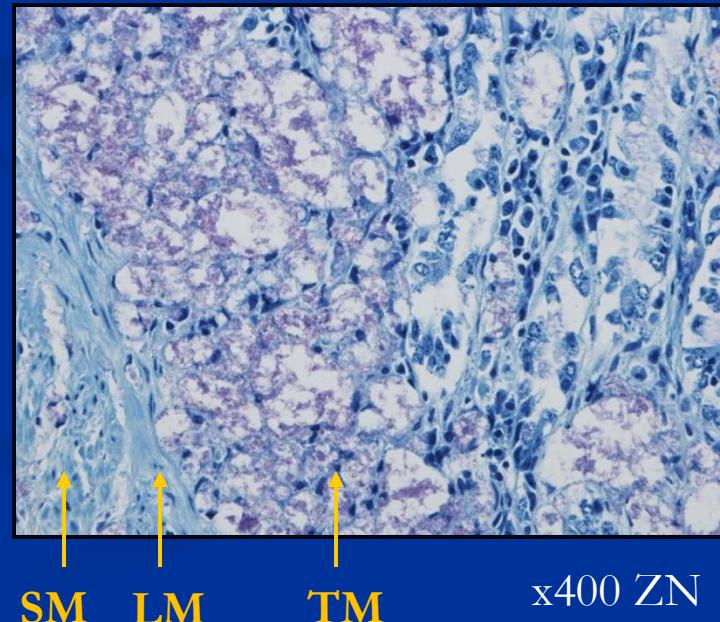
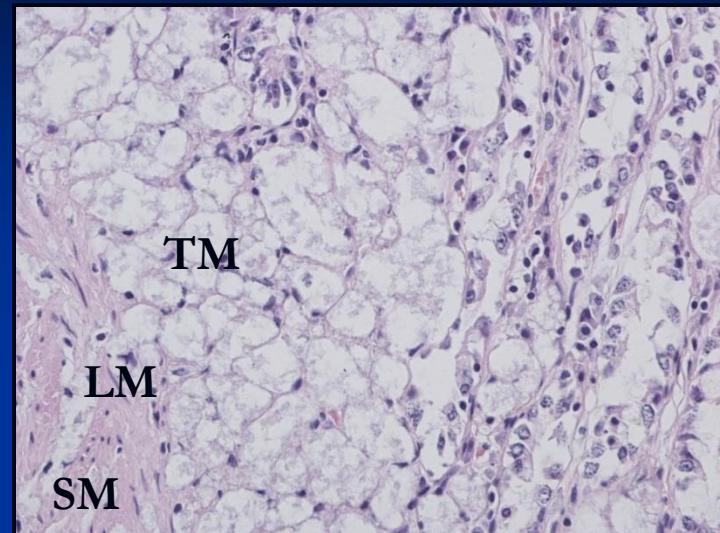
Colon

x400 HE

- Moderate multifocal infiltration :
 - deep Tunica Mucosa (TM)
 - Lamina muscularis (LM)
 - Submucosa (SM)

- Macrophages with intracytoplasmic AFB

- ➔ Moderate granulomatous colitis



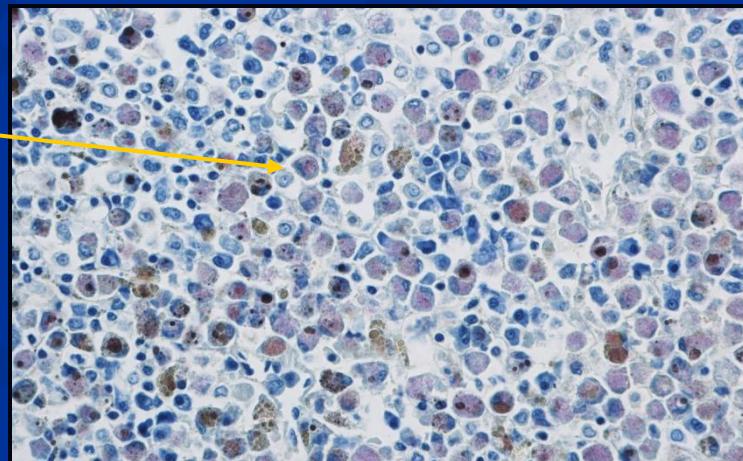
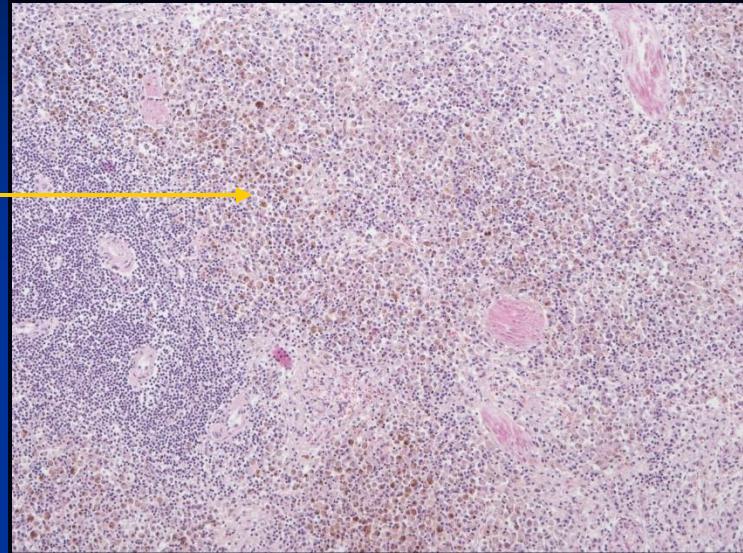
x400 ZN

Microscopic Results

Spleen

x100 HE

- Diffuse marked hemosiderosis
 - Moderate hyperplasia of white pulp
 - Diffuse infiltration by epithelioid macrophages with intracytoplasmic AFB
 - Granulomas at an early stage
- Moderate granulomatous splenitis



x400 ZN

Microscopic Results

Conclusion

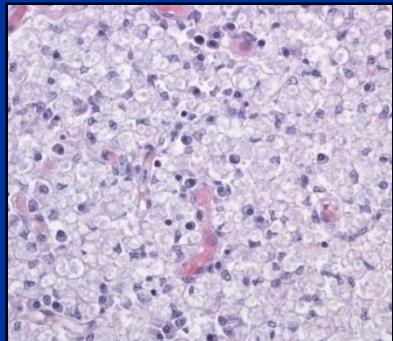
**Systemic granulomatous inflammation
→ with numerous AFB in macrophages**



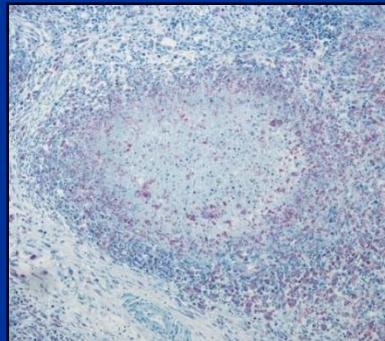
Anterior mediastinal LN



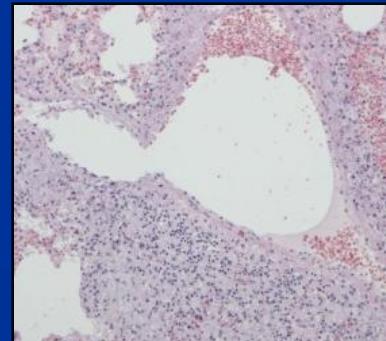
Liver



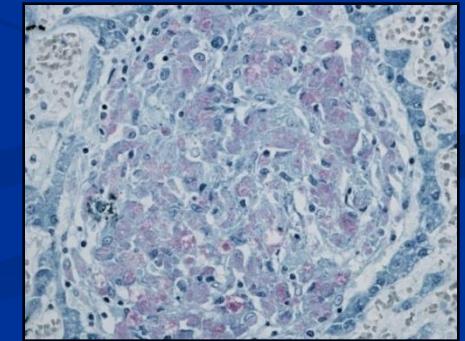
Subcutaneous tissue



Prescapular LN



Lung



Liver

Molecular biology : PCR

- Samples : fresh tissues
- Method : specific amplification of DNA sequences
- Results : *Mycobacterium bovis* +
- Quick detection within 24 to 48 hours
- Detection threshold : one mycobacterium
- Necessary culture in addition to PCR

Comment

Mycobacterium bovis

- *M. tuberculosis* complex = *M. tuberculosis* + *M bovis* + *M africanum* + *M microti* + *M canetti*
- ➔ *M bovis* under-diagnosed
- Environmental survival = 1 to 2 weeks
- Acid Fast Bacillus (ZN+)
- Slow-growing mycobacterium
- Facultative intracellular
- Characteristic tubercles, lymphadenitis, occasional dissemination

Comment Epidemiology

- Worldwide geographic distribution
- Main reservoir : domestic cattle
- Wildlife reservoir : wild pigs (Australia), opossums (New Zealand), badgers & foxes (Great Britain, Ireland)

- Dog : susceptible to both *M bovis* and *M tuberculosis*
- Infection : Dog < Cat



Comment Epidemiology

■ Mode of infection:

- GI tract :

- Milk without pasteurization,
- Raw carcasses

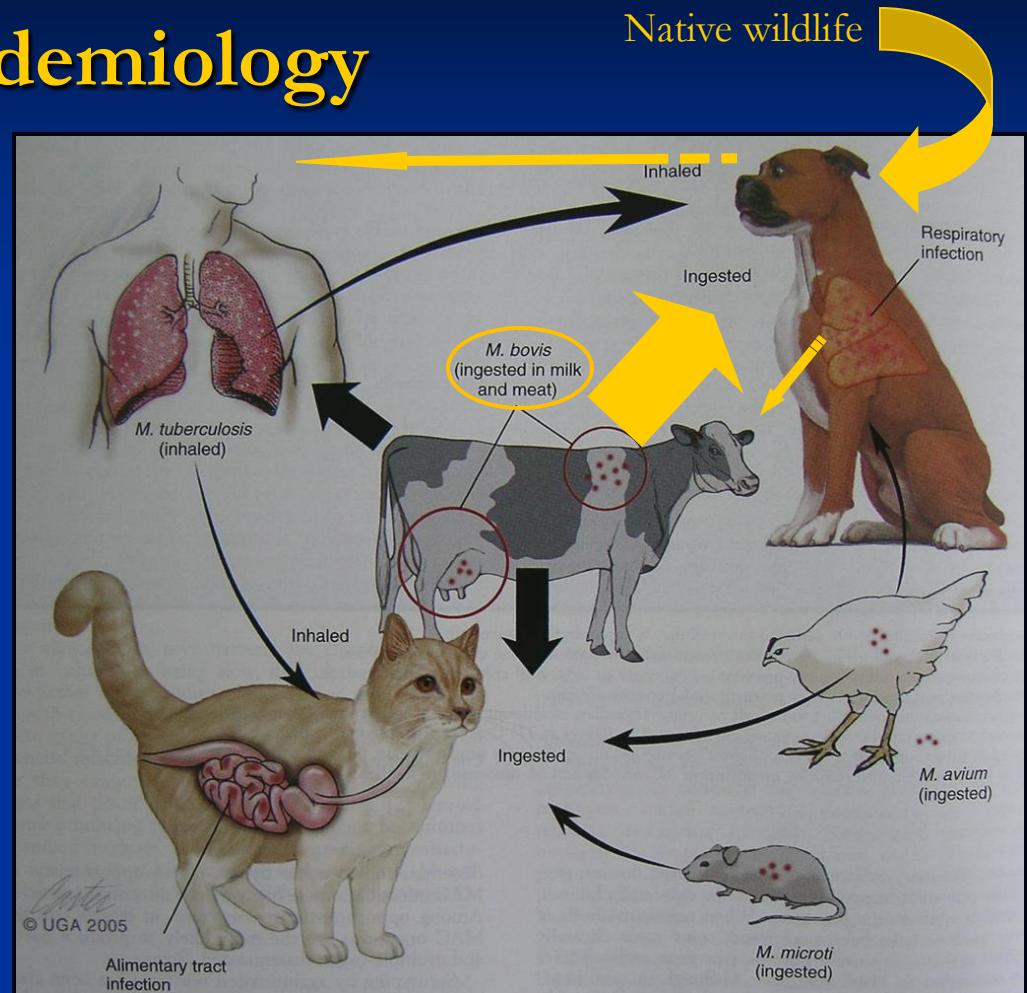
- Aerosol

- Cutaneous inoculation by native wildlife

■ Dog = spillover hosts

■ Dog excretion : sputum

■ Rare transmission to people and cattle



Epidemiology of tuberculosis in the dog and cat.
Courtney University of Georgia, Athens, Ga. 2005

Comment

Pathogenesis of tuberculous infections

- Bacilli penetration
- Macrophages
- ➔ Most of bacilli killed
- ➔ Local multiplication of remaining bacilli (initial site of deposition)
= **Inoculation chancre**

- Regional draining LN
= **Primary complex**

= **Latent tuberculosis infection**

LTBI

Recovery

Early generalization

- Defenses of immune system overcome
- ➔ Tubercl bacilli multiplication, generalization
= **Tuberculosis disease (secondary complex)**

Comment

Human risks - Zoonosis

- Potential risk from dogs to humans transmission
- *M bovis* : 2nd most pathogenic mycobacterium
- Canine tuberculosis cases : 75% *M tuberculosis* (25% *M bovis*)
 - ➔ Dog = marker for the human disease
- No canine treatment
- Other contaminated animals (cats)

- Human monitoring after a contact with a tuberculosis sufferer
 - ➔ Tuberculin-test
 - ➔ Lung x-ray
 - ➔ Medical monitoring
 - ➔ BCG booster

Conclusion

- Unusual case
→ cytology, *M. bovis*, systemic spread of infection
- Complete examination with different steps :
Clinical exam → Cytology → Histology → PCR
- Tuberculosis suspicion : contact DDSV
- Public health considerations



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Thank you for your attention

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