

# ECVP/ESVP Summer School in Veterinary Pathology

Summer School 2014 – Mock Exam

## CASE 2. Bovine, eyelid Blepharitis caused by Besnoitiosis

Histologic Description	Points
<b>Style</b>	0,5
Mucosal lining (0,5) and haired skin. <b>Eyelid</b> (1 point)	1
Multifocally expanding and infiltrating approximately 40% (0,5) of section including dermis (0,5), muscles and submucosal lamina propria (0,5) there are inflammatory changes (0,5) surrounding myriads of protozoal cysts (0,5)	2,5
<b>Parassitic Cysts</b>	0
Cysts are 250-400 um in diameter	0,5
have a 10-30 um thick, hyaline capsule	0,5
Capsule surrounds a 5-10 um thick rim of host cell cytoplasm 0,5 (fibroblast 0,5)	1
with multiple enlarged but flattened nuclei	0,5
numerous crescent shaped 3-5 um bradyzoites	0,5
Peripheral fibrosis	0,5
<b>Cutaneous side</b>	0
Cysts surrounded and dermis infiltrated by perivascular to interstitial (0,5 for the pattern) inflammation composed of	0,5
Majority of lymphocytes	0,5
And plasma cells	0,5
reactive macrophages (0,5) and multinucleated giant cells (0,5)	1
Lesser numbers of eosinophils	0,5
epidermal hyperplasia/hyperkeratosis	0,5
subcorneal pustules	0,5
<b>Muscle inflammation/degeneration (hyaline, necrosis) any muscular lesion</b>	1
<b>Conjunctival side</b>	0
submucosal multinodular to diffuse inflammation	0,5
lymphocytes arranged in nodular aggregates (follicles)	0,5
Submucosale edema	0,5
Goblet cell/mucous cell hyperplasia	0,5
Mucosa is eroded/ulcerated	0,5
<b>Morphologic Diagnosis</b> Moderate (0.5) blepharitis, (0,5) chronic granulomatous (1) and eosinophilic (0,5), diffuse with intralesional protozoal cysts (0,5) <b>ALSO ACCEPTED:</b> histiocytic, lymphoplasmacytic inflammation	3
<b>Etiology</b> <i>Besnoitia besnoiti</i>	2
	20

**HD:** Multifocally expanding the superficial dermis, skeletal muscles and mucosal lamina propria there are numerous protozoal cysts. Protozoal cysts measure 250-400 um in diameter that compress adjacent collagen, and have a 10-30 um thick, hyaline capsule that surrounds a 5-10 um thick rim of host cell cytoplasm with multiple enlarged but flattened



# ECVP/ESVP Summer School in Veterinary Pathology

Summer School 2014 – Mock Exam

nuclei that in turn surrounds numerous, densely packed crescentic 3-5 um bradyzoites. Rarely, cysts are ruptured or collapsed and devoid of bradyzoites. Multifocally there is a mild to moderate pericyclic inflammatory infiltrate composed of moderate numbers of lymphocytes, plasma cells, macrophages, occasional multinucleated giant cells and fewer eosinophils. Multifocally, surrounding the cysts, there is increased amount of mature dermal collagen (fibrosis). The overlying epidermis is multifocally mildly hyperplastic with moderate orthokeratotic hyperkeratosis. The mucosal lining is multifocally eroded, has superficial mucous gland hyperplasia and submucosal inflammation similar to the one in the dermis and in association with multiple nodular aggregates (follicles).

**M D: Blepharitis** moderate chronic granulomatous, multifocal with intralesional protozoal cysts

**E:** *Besnoitia besnoiti*

**ED: Conjunctival and cutaneous** besnoitiosis

## General Discussion:

- Host specific coccidian parasite of family Sarcocystidae, phylum Apicomplexa
- In the U.S., found primarily in rodents and opossums
- Disease is endemic in Africa, Asia, and Southern Europe primarily in bovids.

## Pathogenesis:

- Cats are the proposed definitive host.
- Intermediate hosts are cattle, wildebeest, impala, kudu.
- Arthropod transmission of bradyzoites occurs between intermediate hosts.
- Cysts develop in connective tissue throughout the body, especially in the skin, conjunctiva, mesentery, and scrotum.

## Lifecycle:

- Two-host life cycle: Definitive carnivore host and an intermediate herbivore host
- 4 days to 4 weeks prepatent period in definitive host
- 1-3 weeks from ingestion by intermediate host to tissue cysts
- Definitive host ingests tissue containing cysts > release bradyzoites which invade enterocytes and endothelial cells > merogony > merozoites enter enterocytes and develop into male or female gamonts (gametogony) > in situ fertilization of female > oocysts within enterocyte > enterocyte rupture > oocysts in feces
- Environment is where the oocysts sporulate and are infective to intermediate host.

# ECVP/ESVP Summer School in Veterinary Pathology

## Summer School 2014 – Mock Exam

- Intermediate host ingests sporulated oocyst >sporozoites excyst in gastrointestinal tract >penetrate host tissues >merogony >tachyzoites proliferate in macrophages, fibroblasts and endothelial cells with possible vasculitis and thrombosis >develop into bradyzoite cysts within fibroblasts

### Typical Clinical Findings:

- Disease progression in cattle:
- Acute febrile disease with asexual reproduction in endothelial cells characterized by photophobia, anasarca, anorexia, lacrimation, lymphadenopathy, hyperemic sclera, 10% fatality rate
- Chronic disease (typical presentation in cattle) with tissue cysts characterized by alopecia, hyperpigmentation, seborrhea, lichenification, scleroderma, necrosis; affects the face, joints, lower limbs, nasal cavity and male sterility when scrotum is infected
- Dyspnea when the infection is in the upper respiratory tract

### Typical Gross Findings:

Very firm cysts in the dermis, subcutis, connective tissue fascia of muscles, blood vessel walls, conjunctiva, mesentery, scrotum. Alopecia with thickening, exudation and fissuring of skin, subcutaneous edema, generalized lymphadenopathy

### Typical Light Microscopic Findings:

- The principle distinguishing morphologic characteristic is the large zoite-filled cyst that occurs in the connective tissues of the intermediate (herbivore) host
- 4 layers of the cyst:
  - Compressed dermal collagen
  - Thick hyaline extracellular capsule
  - Host cell with peripheralized nuclei
  - Large parasitophorous vacuole filled with bradyzoites
- Little or no inflammatory reaction; granulomatous inflammation when cyst ruptures

### Additional Diagnostic Tests:

- Skin biopsy for bradyzoites in cysts
- Scleral conjunctival scraping
- PAS positive



# ECVP/ESVP Summer School in Veterinary Pathology

## Summer School 2014 – Mock Exam

- Immunohistochemistry: One report of 23.3% of cysts were positive for S100 protein, calmodulin, alkaline phosphatase, heat shock proteins 60 and 70, and Na<sup>+</sup>,K<sup>+</sup> - ATPase

### Differential Diagnosis:

- Hyperkeratotic and alopecic skin lesions in cattle:
  - [Dermatophilus congolensis](#): Gram positive cocci; proliferative, exudative dermatitis of the dorsal midline that mats hair together
  - [Dermatophytosis](#): Common fungal skin infection; usual etiology *Trichophyton verrucosum*; circular crusty lesion of the head, neck, dewlap
  - Lumpy skin disease: Africa; caused by a capripoxvirus, (eosinophilic intracytoplasmic inclusion bodies); firm, flat, well circumscribed lesions of the neck, back, chest, legs, udder, scrotum, perineum
  - [Demodex](#) *bovix*, *D. ghanensis*

### Comparative Pathology:

- Opossum, lizard - *B. darlingi* - cat is definitive host; Central and North America
- Caribou, reindeer, mule deer, muskox - *B. tarandi* - skin lesions, vascular occlusion; North America
- Goat, wild goat - *B. capri* - severe skin lesions, vascular occlusion in the testes and epididymis with resultant atrophy and probable sterility
- Horse, burro, zebra - *B. bennetti* - rare, chronic disease, unknown definitive host; Africa, US, southern Europe
- Deer mice, kangaroo rat, opossum - *B. jellisoni*, US
- Norway rat - *B. wallacei* - cat is definitive host