

# ECVP/ESVP Summer School in Veterinary Pathology

Summer School 2014 – Mock Exam

## CASE 5 Bovine brainstem Listeriosis

Histologic Description	Points
Style	1
Brainstem	1
Severe thickening of (over 5 times normal) of meninges (1) and expansion of perivascular/ Virchow-Robin spaces (0,5) by mixed inflammatory cells and multinodular (0,5) parenchymal inflammation.	2
<b>White matter</b>	0
Multifocal aggregates of non degenerated neutrophils 0,5 (microabscesses 1)	1,5
Lesser numbers of reactive astrocytes	0,5
Diffuse vacuolation/edema (spongiosis)	0,5
Increased cellularity (gliosis)	0,5
Frequently dilated/swollen myelin sheets (0,5) with a homogeneous lightly basophilic central core with a round (spheroids 0,5 ) or elongated shape (torpedoes 0,5) interpreted as demyelination(0,5)	2
Occasional aggregates of reactive astrocytes (glial nodules)	0,5
<b>Thick perivascular cuffs</b>	0,5
Virchow robin space severely expanded by	0,5
A prevalence of reactive lymphocytes	0,5
and lesser numbers of non degenerated neutrophils	0,5
Hyperhemia	0,5
Plump reactive endothelial cells	0,5
<b>Grey Matter</b>	0
Occasional neurons shrunken and hypereosinophilic (necrosis)	0,5
Neuronal central chromatolysis	0,5
Occasional glial cells surrounding degenerated neurons (satellitosis)	0,5
<b>Morphological diagnosis:</b> Meningoencephalitis (1), severe (0,5), multifocal to diffuse, necrotic (0,5) and suppurative (0,5) with microabscesses (0,5) and glial nodules	3
<b>Etiology</b> <i>Listeria monocytogenes</i>	2
<b>Name the disease</b> Circling disease	1
	20

### Listeriosis - brain - cow

HD: Brainstem: Diffuse, severe thickening of meninges and expansion of meninges and Virchow-Robin spaces by a mixed inflammatory cell component and multinodular parenchymal inflammation. In the white matter multiple small aggregates of non degenerated neutrophils (abscesses) in some cases associated with microglial reactive cells are present. At one margin of the section two large accumulations of neutrophils with lesser numbers of eosinophils, lymphocytes and histiocytes (abscesses) are present. Severe and diffuse perivascular cuffing dilates the Virchow-Robin spaces. These cuffs are composed by several layers of small mature lymphocytes and very rare neutrophils. The white matter is edematous with vacuolation and characterized by diffuse increased cellularity (gliosis)



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associated with dispersed lymphocytes and neutrophils. In the areas severely involved by inflammation, neurons are occasionally swollen and characterized by central chromatolysis or otherwise shrunken and hypereosinophilic with loss of the internal organelles (neuronal necrosis). Virchow-Robin space is expanded up to three times normal with similar inflammatory cells. In less affected areas there are numerous microabscesses and glial nodules.

**E:** *Listeria monocytogenes*

**Etiologic Diagnosis:** Listerial meningoencephalitis

**ND:** Circling Disease

## General Discussion:

- Gram positive, facultative, anaerobic bacillus with 16 serovars
- Ubiquitous in the environment, especially temperate zones
- Resistant to harsh environmental conditions
- Species is named because of the monocytosis seen in sublethally infected rabbits, guinea pigs and dogs; this is NOT a feature of infection in ruminants or swine.
- Sporadic disease in a variety of animals including man
- Economically important in ruminants, seasonal occurrence (winter months)
- Associated with poorly preserved silage, big bale silage, moist feed

## Pathogenesis:

- Three disease syndromes in animals (seldom overlap; likely separate pathogeneses):
  - Encephalitis: Disease of adult animals
    - Bacterial invasion through oral mucosa > travels centripetally along trigeminal nerve to medulla oblongata > spreads rostrally and caudally
    - Affinity for medulla oblongata and pons (brainstem)
  - Septicemia: More common form in monogastrics
    - transported by macrophages
    - organism produces virulence factor, hemolysin (listeriolysin O) which is required for intracellular multiplication

## Typical Clinical Findings:

- Encephalitic form:
  - Dullness, turning or twisting of head to one side, walking in circles
  - Unilateral facial nerve paralysis with drooping of eyelid and ear, drooling due to pharyngeal paralysis



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- Strabismus, nystagmus, hemiparesis, head pressing, decreased rumenal motility
- Purulent endophthalmitis, usually unilateral

### Typical Gross Findings:

- Gross brain lesions rare
- Meninges may be thickened by greenish gelatinous material.
- Soft, gray malacic foci in brainstem sections

### Typical Light Microscopic Findings:

#### CNS

- Microabscesses and glial nodules infiltrated by neutrophils and gitter cells that may contain bacteria
- Acute vascular fibrinoid necrosis secondary to drainage into Virchow-Robin space
- Leptomeningitis and densely cellular perivascular cuffs composed of lymphocytes and histiocytes with fewer neutrophils and eosinophils
- Neuronal necrosis
- Cranial nerves may have intrafascicular and perineural accumulations of inflammatory cells (lymphocytes, macrophages, plasma cells and neutrophils)