

# Diseases of the Bovine Central Nervous System

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## I. Diseases of the Spinal Cord

### A. Lower Motor Neuron (LMN) Disease

#### 1. Clinical Signs

- Paralysis
- Areflexia/hyporeflexia
- Decreased muscle tone
- Early and severe muscle atrophy
- Anesthesia to specific myotomes

#### 2. Diseases

- Botulism
- Organophosphate toxicity
- Tick paralysis
- Trauma
- Injection sites
- Compartmental syndrome

### B. Upper Motor Neuron (UMN) Disease

#### 1. Clinical Signs

- Paresis - Paralysis (loss of voluntary movements)
- Normal/hyperreflexia
- Normal - increased muscle tone
- Late muscle atrophy
- Decreased superficial and deep pain
- Decreased proprioception

#### 2. Diseases

- Tetanus
- Spastic Paresis
- Spastic Syndrome
- Nervous Ergotism
- Dallis/Bermuda Grass Staggers

### C. Mixed Spinal Cord Disease

#### 1. Clinical Signs

##### a. Lesion of C1 - C5

- UMN signs to all limbs
- Tetra or hemiparesis
- Rear limbs usually more affected than forelimbs

##### b. Lesion of C6 - T2

- UMN signs to hind limbs
- LMN signs to fore limbs

##### c. Lesion of T3 - L3

- UMN signs to hind limbs
- LMN signs to segmental spinal muscles
- May localize by panniculus testing

##### d. Lesion of L4 - Cy4

- LMN signs to hind limbs, tail, bladder, anal sphincter

#### 2. Diseases

- Trauma
- Breeding/riding injuries
- Forced fetal extraction (cow or calf)
- Head gate injuries
- Parasitic
- Death of cattle grubs in the spinal cord
- Spinal abscesses
- Spondylitis (bulls)
- Lymphosarcoma
- Rabies

## II. Diseases of the Brainstem

### A. Clinical signs

1. Cranial nerve deficits - Nuclei of Cranial nerves III - XII are in the brain stem. Frequently multiple cranial nerves involved with clinical deficit on same side as lesion.
2. Ataxia and paresis
3. Depression - damage to reticular activating system

### B. Diseases

1. Listeriosis
2. Thromboembolic Meningoencephalitis (TEME)
3. Sporadic Bovine Encephalomyelitis (SBE)
4. Middle Ear Infections
5. Horner's Syndrome
6. Rabies

## III. Diseases of the Cerebellum

### A. Clinical Signs

1. Ataxia
2. Bilateral dysmetria/hypermetria
3. Base wide stance
4. Head tremor
5. Opisthotonus
6. Nystagmus
7. NO paresis

### B. Diseases

1. Cerebellar abiotrophy  
Holsteins, Herefords
2. Cerebellar Hypoplasia
  - a. Inherited  
Herefords, Guernseys, Holsteins, Short-horns, Ayrshires
  - b. Infection  
In-utero BVD infections, rarely bluetongue
3. Inherited Cerebellar Ataxia  
Jerseys, Shorthorns, Holsteins
4. Mannosidosis - cerebellar signs predominate  
Angus, Murray Grey, Galloway
5. Progressive Ataxia  
Brown Swiss (Weavers), Charolais
6. Hereditary neuraxial edema  
Herefords

- Tumors
- 6. Vascular damage
  - Secondary to toxemia/septicemia, e.g. *E. coli* mastitis
- 7. Hydrocephalus/Hydranencephaly
  - Congenital
  - Toxic - Lupines
  - Infectious - Bluetongue

#### IV. Diseases of the Cerebrum and Thalamus

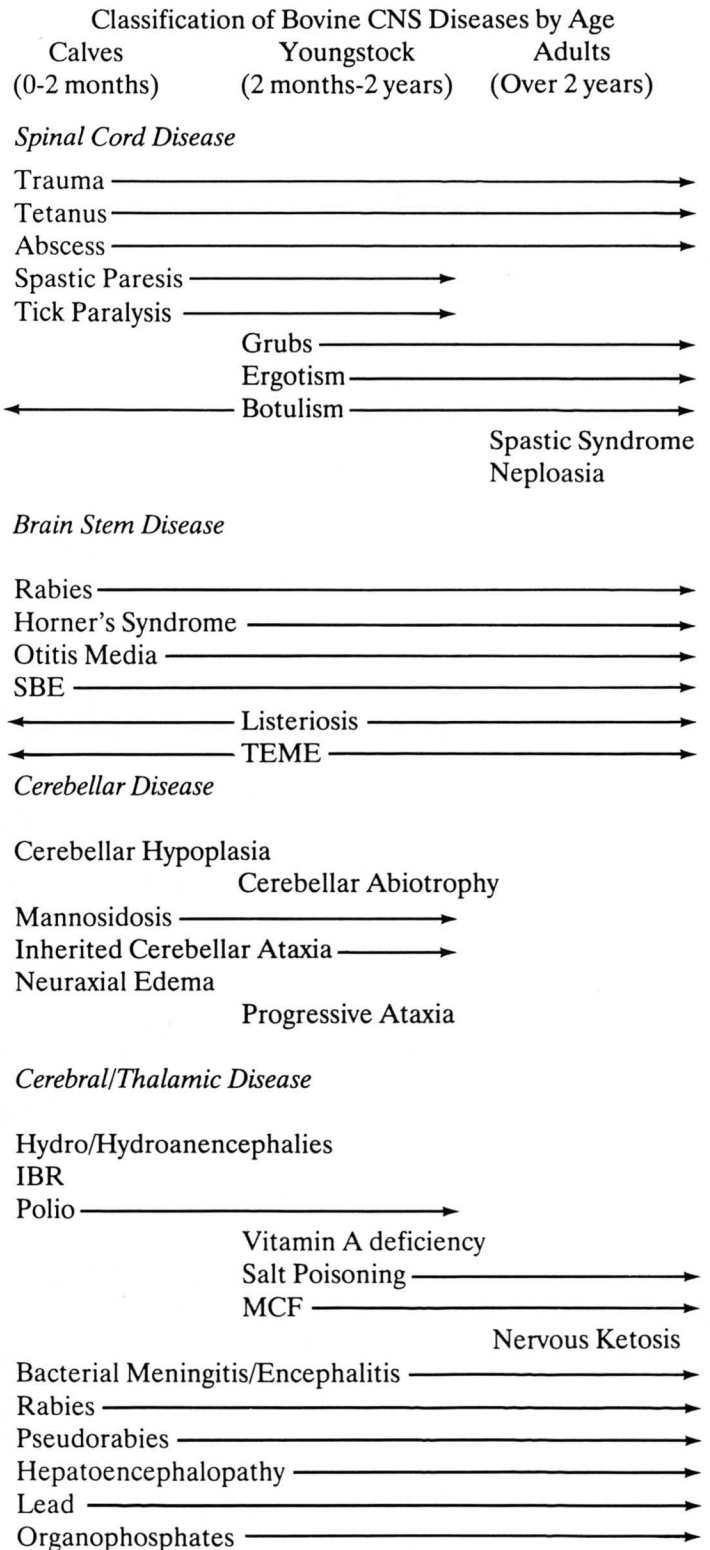
*(Often cerebrum and thalamus affected simultaneously due to close proximity).*

##### A. Clinical Signs

1. Abnormal behavior
2. Depression/somnolence
3. Coma
4. Head pressing
5. Convulsions
6. Ataxia
7. Opisthotonus
8. Visual deficit (cortical blindness)

##### B. Diseases

1. Toxic
  - Lead
  - Organophosphates
  - Salt poisoning
  - Hepatoencephalopathy
2. Metabolic
  - Polioencephalomalacia
  - Nervous ketosis
  - Vitamin A deficiency
3. Infectious
  - Bacterial encephalitis/meningitis
  - Neonatal septicemia
  - Navel ill
  - Frontal sinusitis
  - Thromboembolic Meningoencephalitis
  - Malignant Catarrhal Fever
  - Rabies
  - IBR
  - Pseudorabies
4. Trauma
5. Space occupying lesions
  - Abscesses



## Diagnosis and Treatment of Selected Bovine CNS Diseases

### A. General Therapy for Cord Trauma

1. DMSO - 1 gm/kg as 50% solution - slow IV
2. Prednisone - 1-2 mg/lb. daily
3. Dexamethasone - 2-5 mg/lb. IV - once

### B. Spinal Lymphosarcoma

1. Diagnosis
  - Premortem demonstration of other sites of neoplasia
  - (lymph nodes, retro-orbital, etc.)
  - Age of cow and history of progressive rear limb function.
  - CBC usually normal, only 15% leukemia
  - BLV + titer is not confirmatory, but a negative titer usually rules out disease
  - Postmortem confirmation by necropsy
2. Treatment
  - Terminal disease
  - Current interest in chemotherapy
  - Corticosteroids
  - Asparaginase (Elspar)

### C. Spinal Hypoderma

1. Diagnosis
  - History of recent pour-on or ivermectin therapy in late fall or winter
  - Alert, "dog-sitters"
  - Acute onset
  - CSF: increased protein, neutrophils, eosinophils
2. Treatment
  - General therapy for cord trauma
3. Prognosis - poor

### D. Tetanus

1. Diagnosis
  - Based solely on clinical signs:
  - stiff gait - tetany
  - sardonic smile
  - elevated tail head
  - erect ears
  - prolapsed 3rd eyelid
  - History of recent injury, surgery or **parturition**
2. Treatment - cattle are rewarding patients
  - Penicillin
  - Antitoxin
    - is of limited value in neutralizing preexisting toxin
  - massive doses - 300,000 units q 12 h for 3 treatments
  - intrathecal administration of 50,000 u
  - Sedation
    - chloral hydrate (1 oz./500 lb. p.o.)

- valium (.05 - .1 mg/lb. IV)
- phenothiazine tranquilizers
- muscle relaxants
- Dantrolene (1 mg/lb. p.o. bid.)
- Wound debridement - uterine irrigation
- use of H2O2 to provide oxygen
- Nursing care
  - quiet, dark surrounding
  - forced feeding and watering
  - parenteral
  - use of rumen fistula

### E. Botulism

1. Diagnosis
  - Clinical signs
    - dysphagia
    - bloating
    - flaccid paralysis - downers
    - respiratory arrest
    - may see herd outbreaks
    - may resemble lead toxicity, rabies or **milk fever**
  - Confirmed by isolation of botulism toxin from GI contents or feed
  - Electromyography will demonstrate neuromuscular blockade
  - History of pica in cattle
2. Treatment
  - Antitoxin - CDC & University of Pennsylvania
    - Expensive
  - Supportive care
  - Anticholinesterases (neostigmine)
    - provide transient improvement
    - Increased mortality

### F. Organophosphate Toxicity

1. Diagnosis
  - Clinical signs
    - muscarinic
      - salivation
      - lacrimation
      - sweating
      - diarrhea
      - colic
      - miosis
    - dyspnea (bronchospasm)
    - nicotinic
      - skeletal muscle tetany followed by paresis
    - central
      - hyperesthesia
      - stupor
      - convulsions are rare
    - History of exposure
    - Test for cholinesterase activity in blood or tissue (delta pH test)
      - blood cholinesterase levels of 25% or less of

normal are diagnostic

## 2. Treatment

- Atropine - .25 mg/lb. - repeat as needed
- 2-PAM - 10 mg/lb.
- Activated charcoal for oral exposure
- Shampoo for dermal exposure

## G. *Listeriosis*

### 1. Diagnosis

- Clinical signs
- stupor
- head pressing
- circling
- unilateral facial paralysis (drooped lip & ear, dry eye)
- head deviated, not necessarily tilted
- fever +/-
- History of :
  - silage of poor quality
  - recent freeze
  - flooding
  - CSF
    - increased protein
    - increased WBC, mainly **mononuclear** cells
    - Postmortem
      - Brainstem microabscesses
      - Organism notoriously difficult to culture

### 2. Treatment

- oxytetracycline - 5 mg/lb. IV
- penicillin - 25,000-30,000 u/lb.

## H. *Thromboembolic Meningoencephalitis*

### 1. Diagnosis

- Clinical signs
- acute onset
- recumbency & coma
- paresis and ataxia
- febrile
- nystagmus
- Fundic exam
- retinal hemorrhage and exudate
- CSF
  - increased protein
  - increased WBC, mainly neutrophils
  - Concurrent synovitis and lameness, pneumonia or CNS disease in other animals
  - Postmortem
    - Hemorrhagic infarcts of CNS -especially brainstem and cerebral cortex

### 2. Treatment

- oxytetracycline
- penicillin
- Animals showing CNS signs generally do not recover.

## I. *Horner's Syndrome*

### 1. Diagnosis

- Clinical signs
  - ipsilateral miosis
  - ipsilateral ptosis
  - ipsilateral dry muzzle
  - ipsilateral facial warmth
- Concurrent nasal carcinoma
- History of balling gun injury or perivascular accident

### 2. Treatment

- Symptomatic

## J. *Otitis media*

### 1. Diagnosis

- Clinical signs
- head tilt, +/- aural discharge
- circling
- ataxia
- febrile
- History of:
  - recent respiratory disease (*Pasteurella* sp. a frequent isolate)
  - ear sucking in calves

### 2. Treatment

- Antibiotics
  - Systemic
  - Topical and DMSO
- Antiinflammatory therapy
  - Banamine
  - Aspirin
  - Corticosteroids

## K. *Polioencephalomalacia*

### 1. Diagnosis

- Clinical Signs
  - usually less than 1 year old
  - ataxia
  - head pressing
  - cortical blindness (pupils respond to light)
  - coma
  - convulsions
- Response to thiamine
- Decreased erythrocyte transketolase activity
- Increased blood pyruvate levels
- CSF
  - normal to increased protein
  - markedly increased pressure
- Postmortem
  - Polioencephalomalacia

### 2. Treatment

- Thiamine - 5 mg/lb. IV - may need multiple treatments
- Dexamethasone - 1 mg/5 lb. IV

- In feeder cattle: - reduce grain and increase hay in diet
  - feed thiamine- 5 mg/lb. feed
- Assess for amprolium or molasses toxicity

#### L. Lead Toxicity

##### 1. Diagnosis

- Clinical signs
  - ataxia
  - cortical blindness
  - head pressing
  - twitching of facial muscles (ears, eyelids)
  - convulsions
  - constipation - diarrhea
  - bloat, rumen stasis
  - teeth grinding
  - colic
- CSF - increased protein and pressure
- blood lead level (heparinized sample)
  - .2 ppm
- liver, kidney lead
  - 10 ppm

##### 2. Treatment

- Calcium EDTA (Havidote) -110 mg/kg IV BID, 2 days on, 2 days off - up to 5 times
- magnesium sulfate -p.o.
- thiamine - 5 mg/lb. IV

#### M. Salt Poisoning

##### 1. Diagnosis

- Clinical signs
  - rear limb paresis and knuckling of fetlocks
  - cortical blindness
  - convulsions

- polyuria
  - diarrhea
  - vomiting
  - colic
  - history of added dietary salt or lack of water
  - serum sodium of 160 mEq/l.
  - CSF sodium of 160 mEq/l.
  - cerebral tissue sodium 1800 ppm
  - Postmortem: eosinophilic meningoencephalitis
- ##### 2. Treatment
- Symptomatic: diuretics, corticosteroids, DMSO & thiamine
  - Therapy is generally unrewarding.
  - Some animals recover regardless of therapy if water is available.

#### N. Pseudorabies

##### 1. Diagnosis

- Clinical Signs
  - \* sudden death
  - febrile
  - mania, bellowing, aggression
  - pruritus and self-mutilation -NOT always present
  - ataxia
  - convulsions
- History of exposure to swine
- Fluorescent antibody and virus isolation on brain and spinal cord
- Serology not useful -ruminants usually die before mounting an immune response

##### 2. Treatment - none

- Rarely, cattle have been reported to survive or be asymptotically infected.

## For Your Library

### Clinical Veterinary Oncology

Stephen Withrow,  
E. Gregory MacEwen

This textbook, with 24 contributors, is dedicated to Dr. Robert S. Brodey who was a leader in veterinary oncology.

The authors state that, historically, clinical veterinary oncology was characterized by strong opinions based on weak data. They have tried to assemble a text that is clinically relevant for the general veterinary practitioner and veterinary medical student as well as being a helpful reference for the veterinary oncologist. The emphasis is on treatment.

The first section covers the biology and diagnoses of

cancer; the second deals with principles of cancer therapy and the final section concentrates on management of specific cancers.

The authors conclude "Cancer is not *always* curable but in most cases the patient can be helped to an improved quality and quantity of life".

The text has 500 pages with 300 illustrations: price \$59.50.

Further information from Rosalind Mazur, J.B. Lippincott Company, East Washington Square, Philadelphia, PA 19105-9961.