New Zealand Equine Health Association Incorporated

Ministry for Primary Industries
Manatū Ahu Matua

EHV1 outbreak
Diagnosis and epidemiology

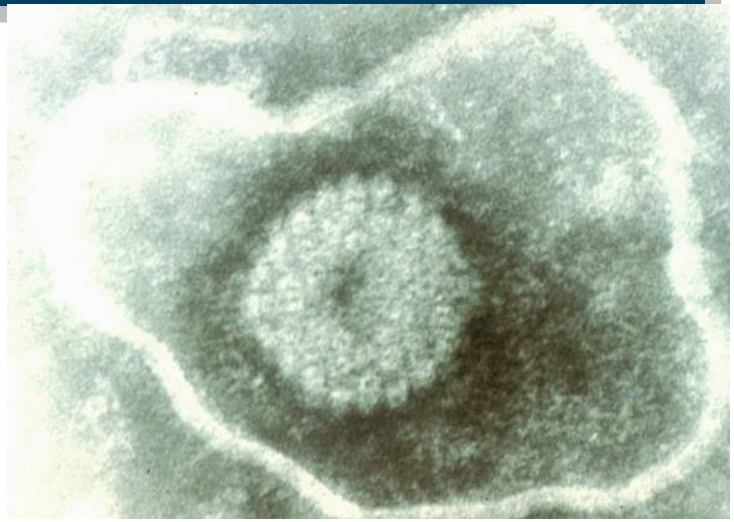
Andrew McFadden and Katie Hickey

www.mpi.govt.nz

Objectives

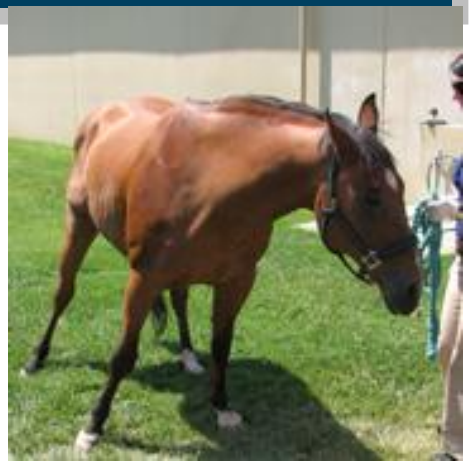
1. Make a diagnosis
2. Minimise spread and farm impact
3. Understand the epidemiology (including molecular epidemiology) of the outbreak, potential risk factors etc
4. Determine the origin of the outbreak
5. Removal of quarantine restrictions

Equine herpes viruses



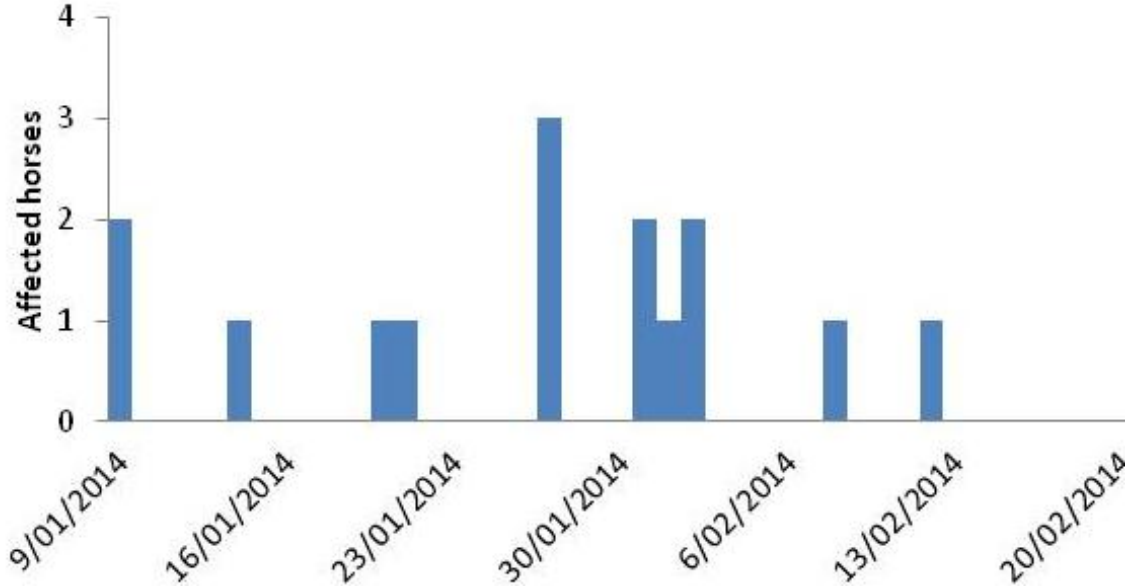
- Five distinct equine herpes virus
  - EHV1 causes
    - respiratory disease
    - sporadic and epidemic abortion
    - perinatal foal mortality
    - sporadic and epidemic myeloencephalitis
  - EHV4 predominantly causes
    - respiratory disease
- EHV1 and EHV4 are alphaherpesviruses of horses similar to the human alphaherpesviruses HSV1 and HSV2

1. Diagnosis



1. Clinical signs
   - Urinary incontinence, ataxia, paralysis

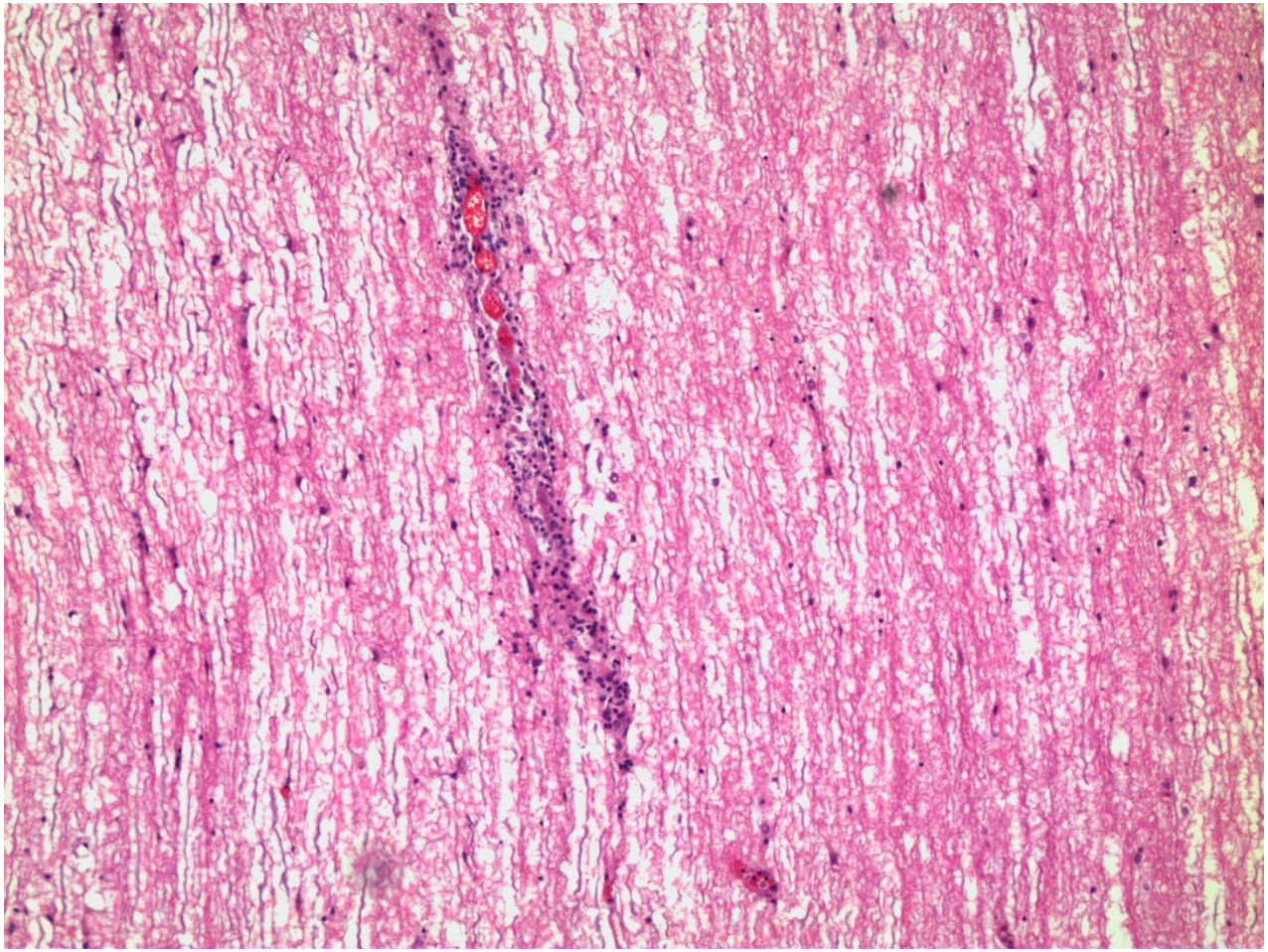
2. Outbreak epidemiology
   - Evidence of infectious agent; spread between horses within a paddock



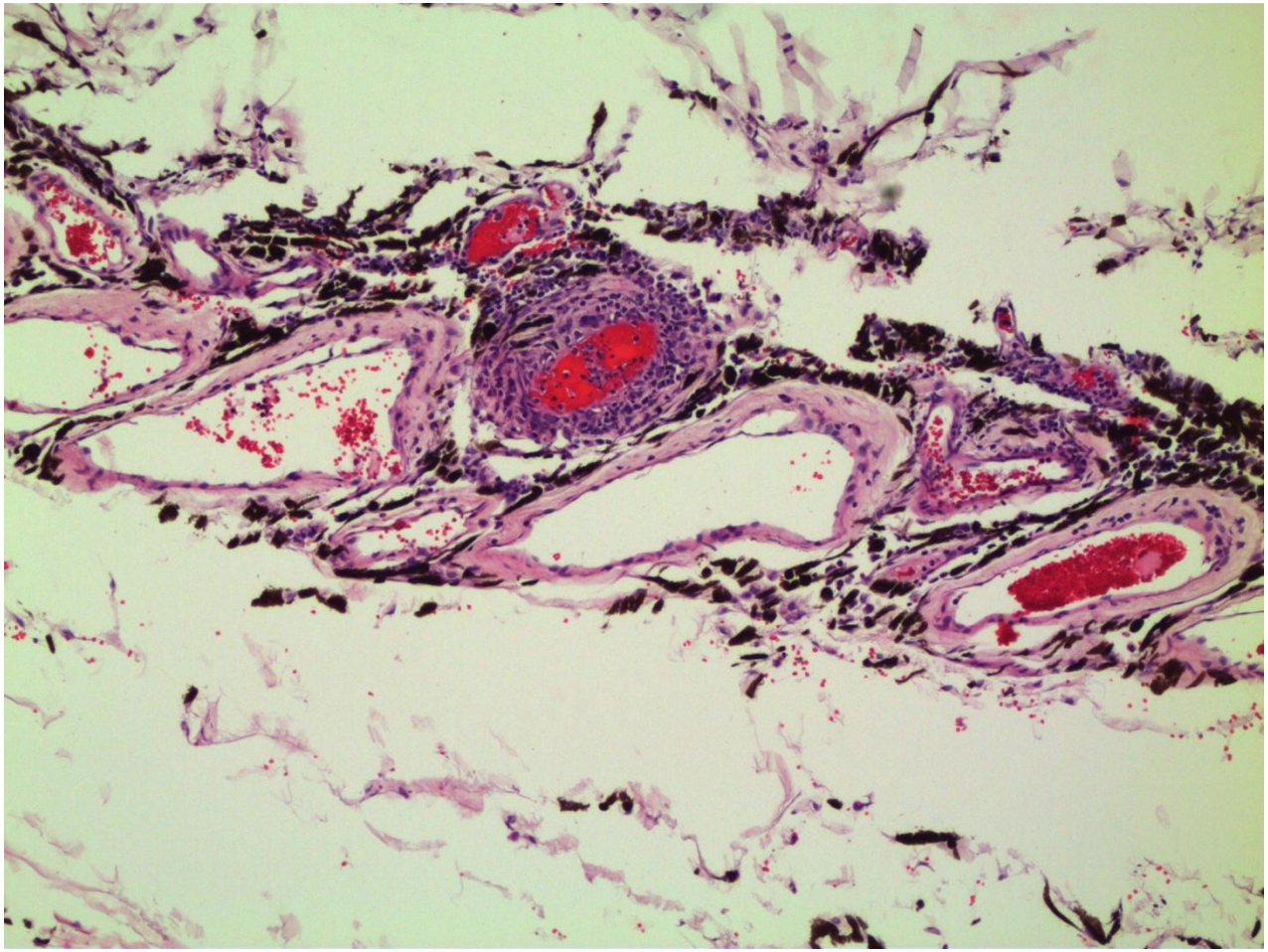
1. Diagnosis

1. Clinical signs
   - Urinary incontinence, ataxia, paralysis
2. Outbreak epidemiology
   - Evidence of infectious agent; spread between horses within a paddock
3. Laboratory tests
   - Biochemistry: No significant findings
   - CSF: Increased protein, xanthochromia
   - Histology (and immunohistochemistry)
   - PCR and sequencing (CSF, brain, spinal cord, other vascular tissues)
     - EHV1 can normally circulate in the horse population (detecting virus on its own is not sufficient for making a diagnosis)
     - Testing in-contact animals (peak virus shedding may have passed by the time neurological signs have appeared
   - Serology (High titres, Paired tests with a four fold rise in titre)

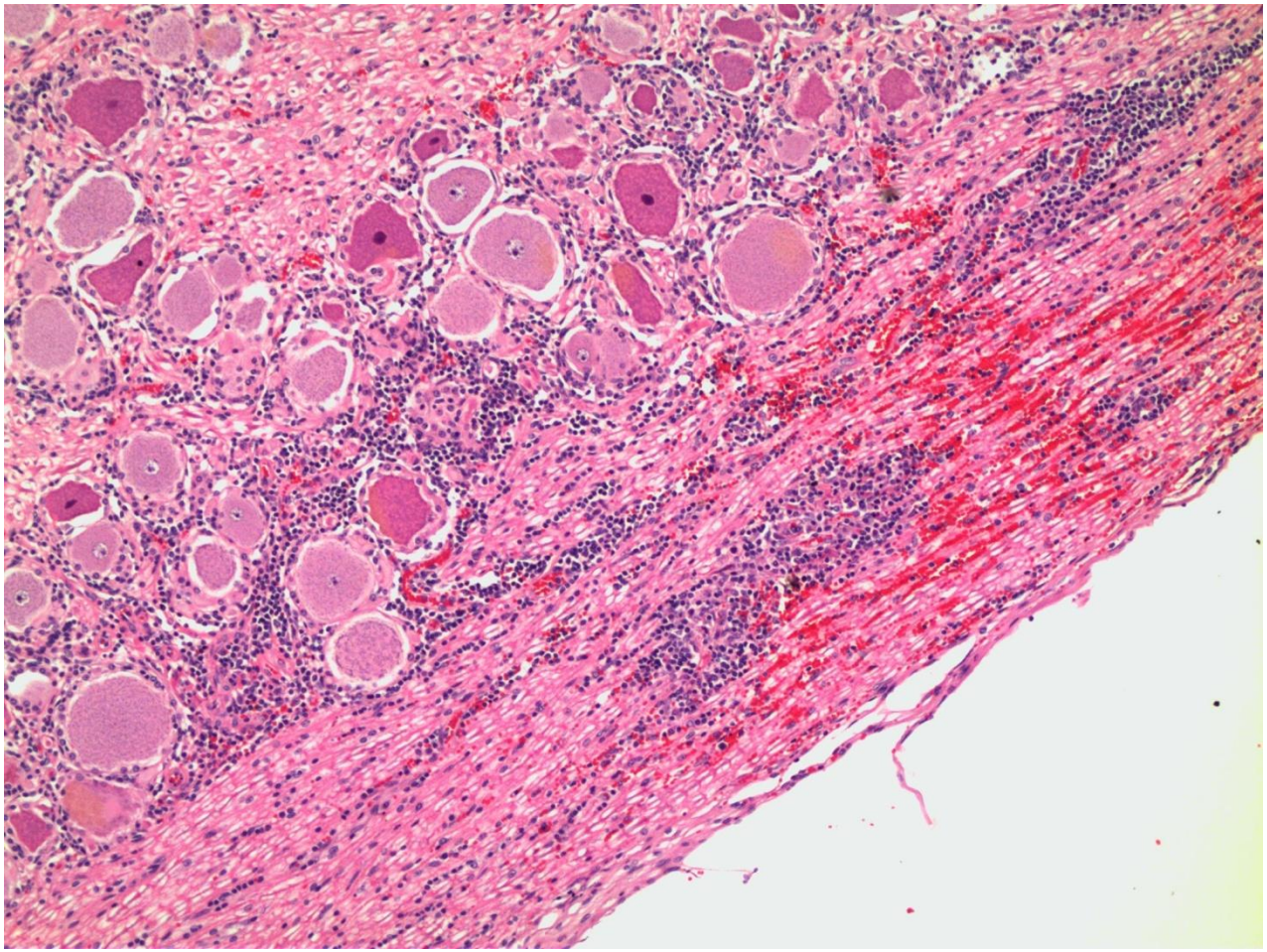
Histology: lumbar spinal cord



Histology: eye



Histology: trigeminal ganglia



2. Minimise spread and farm impact

1. Biosecurity and quarantine
   - Reducing risk of fomite transmission
   - C and D
2. Understanding risk
   - Testing exposed horses:
     - Is active virus is being spread within paddock cohorts?
     - Are all exposed cohorts excreting virus?
   - Testing of unaffected and unexposed horses:
     - Reduce risk pre-movement
   - Test yearlings
     - Is virus present in presumed free horse population?
3. Separation of unaffected and exposed horses from clinically affected animals
   - Reduce viral load

3. Molecular epidemiology

- The neuropathogenic strain of EHV1
  - Virus with DNA pol D752 replicate more efficiently and show a higher viral load
  - 162x greater probability of the DNA pol D752 being found in neurological disease
  - 24% of isolates from cases with neurological disease are actually DNA pol N752 (“wild type”)
  - The age of the horse is extremely important – experimental infections show that young to middle aged (<15) are 8x less likely to develop neurological disease than old horses (>20)
  - There is no correlation between serum neutralising antibodies and resistance/susceptibility to neurological disease

3. Molecular epidemiology

- Gene sequencing from affected and exposed mares
  - One affected mare was determined to have the wild type virus (non-neuropath strain)
    - Limited samples available for testing
  - Eight affected mares with the neuropathogenic strain

4. How was it introduced

1. introduction of a latently infected mare brought onto the property and reactivation through stress (NZ or foreign),
2. reactivation of a latently infected resident mare through stress,
3. introduction of a diseased mare shedding,
4. Introduction of virus through fomite etc.
5. Spontaneous mutation of EHV1 from a low risk variant to a high risk variant (D752 genotype).

5. Removal of quarantine restrictions

- 3 week quarantine period for movements of horses within the farm after last clinical case

- Additional lab testing may be considered but it can not rule out horses that are latently infected.

Response Summary

- Organism management
- Animal welfare
- National impacts, including trade impacts
- International experience with this disease
- Communications to industry and vets
- Contingency planning- NZEHA and MPI
- Research with Massey- Not the index case
- Collaboration internationally- world reference lab for EHV

MPI and NZEHA Joint Approach

- MPI and NZEHA have worked together very successfully.
- NZEHA is the umbrella body that represents the entire equine industry.
- TB Breeders Association is represented.
- We would like to acknowledge Dave Hanlon and the affected farm for their cooperation.

Liaison and Communication

- MPI and the equine industry has a responsibility to inform people of a situation that may affect them.
- Early communication to industry.
- Veterinarians were contacted by email via New Zealand Vet Council and New Zealand Veterinary Association.
- MPI developed information for the web and this was shared with NZEHA.
- 1300 NZTBA members were contacted via email

Communication within the Equine Industry

- NZ TB Association – webpage updates and email to 1300 members
- NZ Racing – webpage update
- Racing Board members contacted individually
- Equestrian Sport- webpage update and email to 5000 members
- NZ Standardbred breeders- webpage update
- Harness Racing – email to members
- NZ Pony Club- webpage update and newsletter to members

Protecting Privacy

- Our ability to respond to high risk equine diseases depends on passive surveillance reporting from vets and horse owners.
- People should not be penalised for reporting suspect disease.
- Blanket rule for MPI to protect privacy.
- The risks of this outbreak were well managed.
- Individuals who were at risk, through animal movements, were contacted on a one on one basis.

International trade of horses

- **All** horses **imported** into NZ must come from premises that have been free from clinical EHV for 3 months and must not have any clinical signs of **any** illness on the day of travel.
- Horses for **export** must meet the import requirements of the country they are being exported to. They must have come from a property free from EHV for a period of time (30 days- 6 months.) This is a certified process and requires declarations relating to the **health status of the premises that any horse for export has been on.**
- **Any false declarations may be prosecuted.**

Why can't we test for EHV-1 at the border?

- Currently there is no testing of horses being imported into NZ for EHV.
- Imported horses are commonly vaccinated against EHV or had natural exposure.
- Meaning a simple blood test would be positive for EHV on most horses.
- **You can not reliably detect EHV-1 neuropathogenic virus in a live horse.**

How long has this virus been in NZ?

- EHV probably arrived in NZ with the first horses.
- It is not known whether the neuropathogenic strain of the virus that causes EHV-1 myeloencephalopathy has arisen by mutation of the common EHV-1 strain, or if it is solely spread by carriers of that strain.
- Research in Kentucky has isolated this neuropathogenic strain as far back as the 1950s.
- Unpublished data from Massey University has detected the neuropathogenic strain in Gore in 2012.
- This shows the virus has been circulating in NZ for some time.

What can you do to minimise impact of this disease?

- Report cases of neurological disease to your vet.
- Vets have a responsibility to report suspicious disease in animals to the MPI Exotic Pest and Disease hotline.
- Neurological disease is a common presentation of high risk exotic diseases eg West Nile Virus.
- Follow routine biosecurity practices when introducing new horses to your farm.

What are MPI and NZEHA doing now?

- Planning for lifting quarantine on the affected farm,
- Contingency planning for possible future outbreaks,
- Research with Massey University and North America,
- Investigating options for disease management.

Questions?

- Acknowledgements:

  Dave Hanlon (MV); Rebecca McKenzie (MV) Joe Mayhew (Massey); Isobel Gibson (NZVP); Wendy McDonald, David Pulford, Richard Spence, Grant Munro, Kelly Buckle (IDC)