**Rhabdoviridae**

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**Introduction**

- Encompasses > 150 viruses
- Rabies – only important human pathogen
- One of the most lethal of all infectious diseases

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**History**

- Adapted from Latin meaning “to rage”
- Greeks – lyssa – “frenzy”
- Rabies represents one of the oldest and most feared diseases
- Recognized in Egypt before 2300 B.C.
- Well described by Aristotle
- Iliad – “canine madness”

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**Taxonomy**

- 3 Genera – Ephemerovirus, Lyssavirus, Vesiculovirus
- Infect vertebrates, invertebrates, and plants
- Genus Lyssavirus comprises rabies virus and 3 rabies-like viruses
- Each capable of causing rabies-like disease in humans

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**Viral Structure**

- 170 nm x 70 nm
- Bullet-shaped enveloped virion
  - Glycoprotein peplomers & matrix protein under envelope
- Helical symmetry
- Linear minus sense ssRNA – 11-12 kb
- Glycoprotein spikes in outer membrane bilayer

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**History**

- 1885 – Louis Pasteur – rabies vaccine
  - Attenuated form of virus produced by inoculation of rabbit spinal cord
- Occurs throughout the world except in Australia, Japan, Great Britain, and islands such as Hawaii
- “Reportable” disease
Virus Replication

- Receptor-mediated endocytosis
- Uncoat and release nucleocapsid into cytoplasm
- Production of 5 monocistronic mRNA species - N, P (NS), M, G, L – by L+P viral transcriptase
- Each mRNA capped and poly-A'ed
- dsRNA replicative intermediate

N+P+L and (-) ssRNA form core
M forms matrix around core
Virus buds from glycoprotein area of plasma membrane and thus acquires its envelope

Transmission

- Unstable in the environment
- Mostly transmitted via bite or scratch from infected animal
- Can be transmitted via aerosol in places with high virus levels (bat caves)
- Also transmitted iatrogenically via corneal transplant
Epidemiology

- Rabies-free countries
  - Eradicated twice in UK (1902 and 1922)
- Developing countries
  - Enzootic dog rabies represents a serious problem
  - Need for stray dog and cat population control and immunization, accurate incidence data, surveillance, and public education programs

Epidemiology

- Vaccination of animals has reduced transmission rate
  - 18,000 receive postexposure prophylaxis
  - Approx 1 case of human rabies per year in U.S.
- India records 25,000 human cases annually mainly from dog bites

Epidemiology

- Zoonotic infection
- As humans as concerned, the dog is the most important reservoir
- Skunks, raccoons, bat, and foxes also reservoirs

Clinical features

- Incubation/prodrome
  - Usually 14 to 90 days but can be far longer
  - Pain/itching at site of wound
  - Fever, headache, gastrointestinal problems
- After incubation
  - CNS effects, hydrophobia from fear of pain associated with drinking
  - Seizures and hallucinations
- Following neurological phase, patient becomes comatose
- Respiratory paralysis and death
Diagnosis

- Overt symptoms define rabies but by this time therapeutic intervention is too late
- Lab tests of animal can ascertain presence of rabies
- Antemortem diagnosis in humans – immunofluorescence or PCT assay on skin biopsy, corneal impression, or saliva
- dFA test most frequently used
- Negri bodies are histologically characteristic

Treatment

- HDCV rabies vaccine
- Through cleansing of wound
- Postexposure vaccination
  - Infecting event is recognizable and incubation period is long
  - Regularly and successfully practiced
- Administration of rabies immune globulin IM and around bite.
- Reduce mortality from 100% => 0%

Summary

- Virus is enveloped with linear (-) ssRNA
- Transmitted via animal bite (saliva), aerosol, and corneal transplant
- Negri bodies are histologically characteristic
- 100% mortality from untreated rabies
- Incubation typically 14 – 90 days

Sources

- http://www.fda.gov/bbs/topics/CONSUMER/CON00053.html
- http://www.health.ufl.edu/anires/Rabies/tsld001.htm