

Rabies Virology

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History

- Has been around for centuries
 - The Iliad (700 BC)
 - Chinese scholars (500 BC)
 - Celsus (1st century AD): “The patient is tortured at the same time by thirst and by invincible repulsion toward water.”
 - Transmission experiment using dog saliva in 1804 by Zinke
 - July 6, 1885 – first successful PEP (Pasteur vaccine) given to 9-year-old Joseph Meister, and he survived

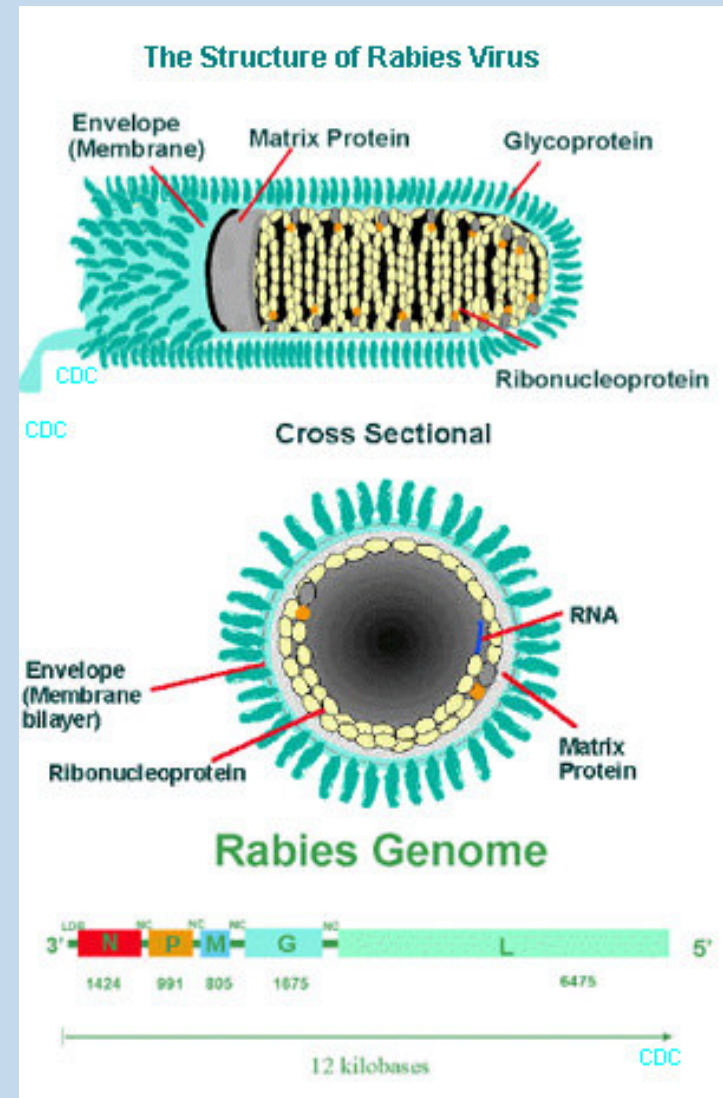
Classification

- Order: Mononegavirales
 - Family: Rhabdoviridae
 - Genus: Lyssavirus
 - Species:
 - Rabiesvirus
 - Lagos bat virus
 - Mokola virus
 - Duvenhage virus
 - European bat lyssavirus 1
 - European bat lyssavirus 2
 - Australian bat lyssavirus
- Have been isolated in South Africa

Species	Source	Known distribution
1 Rabies virus	Dog, fox, raccoon, skunk, bat etc.	Widespread
2 Lagos bat virus	Fruit bats NOT detected in human beings	Africa (rare)
3 Mokola	Shrews, cats, dogs	South Africa, Nigeria, Cameroon, Ethiopia (rare)
4 Duvenhage	Insectivorous bats	South Africa, Zimbabwe, Kenya (very rare)
5 European bat lyssavirus	1a Insectivorous bats 1b Insectivorous bats	Northern and Eastern Europe Western Europe
6 European bat lyssavirus	2a Myotis dasycneme bats Myotis daubentonii bats 2b Myotis daubentonii bats	Netherlands (rare) UK Switzerland (very rare)
7 Australian bat lyssavirus	Fruit bats or flying foxes, insectivorous bats	Australia
<i>Unclassified</i> Irkut Aravan Khujand West Caucasian bat virus	Murina leucogaster bat Myotis blythi bat Myotis mystacinus bat Miniopterus schreibersi bat	Siberia Kyrghyzstan Tajikistan Russia

Structure

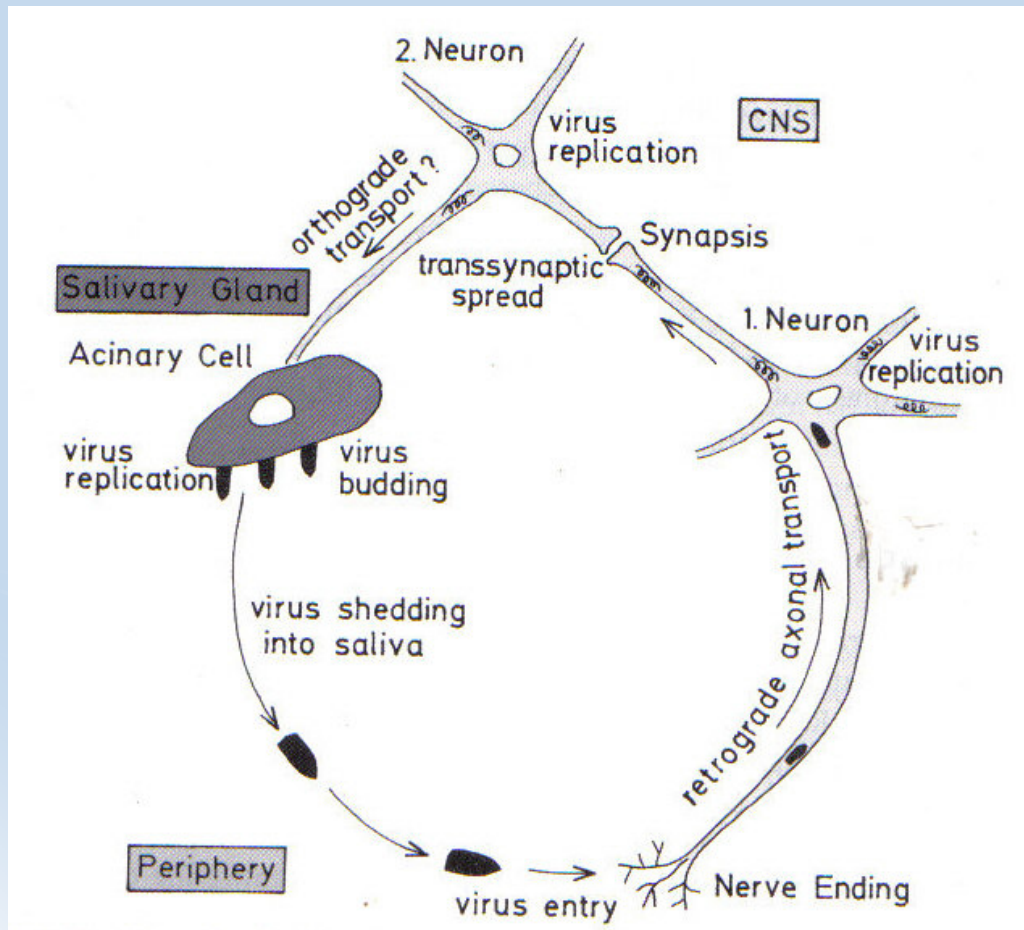
- Bullet-shaped particle approx. 180 nm long & 80nm wide
- Negative sense, non-segmented ssRNA genome, 12 kb long



Pathogenesis

- Virus-containing saliva inoculated through skin into muscle and subcutaneous tissue or onto mucosal surfaces
- May also be spread through organ transplantation (2 donors and 7 deaths in 2004)
- Initial replication in peripheral sensory or motor neurons and muscle tissue
- Virus spreads to CNS via retrograde axonal transport
- Extensive viral replication within neurons

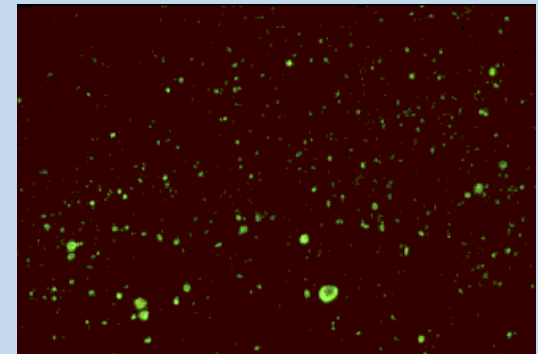
Pathogenesis



- Trans-synaptic spread
- Transport along efferent nerves to salivary gland, where productive viral replication occurs
- Minimal inflammation and cell death seen in CNS
- Neuron remains intact despite gross dysfunction

Laboratory diagnosis

- Ante-mortem testing:
 - Saliva (min. 200 μ l) \rightarrow RT-PCR
 - CSF (min. 200 μ l per test) \rightarrow RT-PCR and IFA
 - Serum (min. 200 μ l) \rightarrow IFA
- Post-mortem testing:
 - Brain (half in 50% glycerol saline and half in 10% neutral buffered formalin) \rightarrow FAT (gold standard)
 - Brain, saliva or CSF: Mouse inoculation test



Laboratory diagnosis

- Case history including details of the nature of the attack and type of exposure is crucial
- Tests done at the Special Pathogens Unit at the NICD
- Contact:
 - Dr Jacqueline Weyer, Tel 011 386 6376
 - Dr Lucille Blumberg, Tel 011 386 6337

Thank you



search ID: cga0254

Come on! It's not rabies!
I was just cleaning my teeth when you rang...