

Rabies

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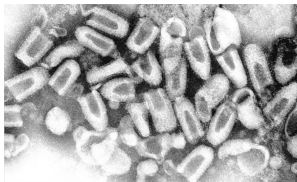
Introduction

- Rabies is Latin for rage or madness.
- It is a viral disease which almost always results in fatal encephalitis.
- Popularly known to be spread by the bite of rabid animals, particularly dogs.
- Around 20,000 people die in India every year from rabies.



The Rabies Virus

- Rabies virus is a lyssavirus of the family *Rhabdoviridae* having a characteristic bullet shape.



- Single stranded (-)sense RNA genome.
- Only a single serotype is known.

Symptoms in Humans

- The incubation period is usually 1 to 3 months in humans, but can be as short as 4 days or as long as 6 years.
 - depends on site of bite. Nerve rich sites such as face and hands are associated with shorter incubation times.
- Preliminary symptoms are mild, varied and non-specific.
- Once CNS is involved, the patient alternates between periods of agitation and intervals of calm.
- Painful spasms of the muscles of mouth and pharynx occur when patient feels air drafts or tries to swallow liquids. Eventually the mere sight or thought of water can trigger the painful spasms (hydrophobia).
- Inability to swallow causes increase in the flow of saliva and frothing at the mouth can occur.

Symptoms in Humans

- 80% of the cases are of *furious rabies*, where the patient becomes highly irritable and restless, even biting other people.
- In other 20%, *paralytic rabies* occurs where the patient remains relatively quiet and unaware of his surroundings.
- Acute neurological phase presents symptoms such as nervousness, hallucinations, and bizarre behaviour.
- Increased lacrimation, pupillary dilation, salivation and perspiration.
- Extensive damage to nerves of brain and spinal cord result in death due to respiratory arrest.
- Death occurs 2 to 10 days after appearance of symptoms.

Symptoms

Dogs

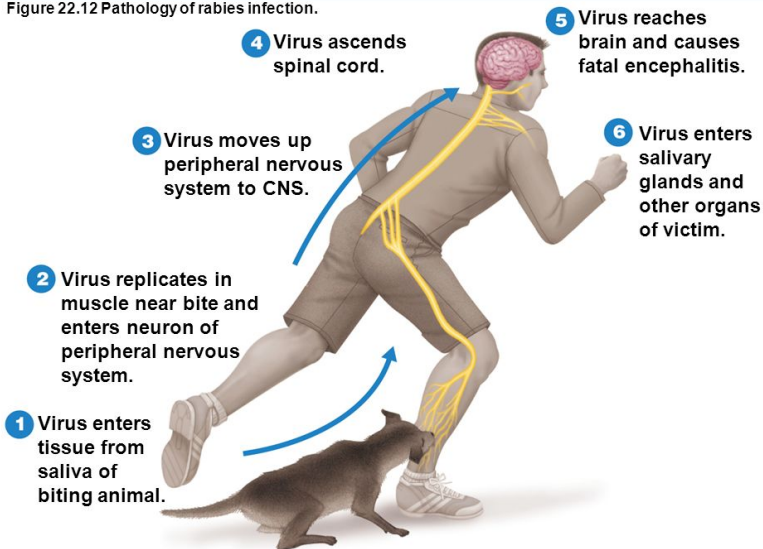
- Dogs usually present with symptoms of *furious rabies*.
- They are restless at first, then become highly excitable, snapping at anything within reach.
- Also display hydrophobia and frothing at mouth.
- Die within a few days of the onset of visible symptoms (usually less than a week).

Cats

- Cats usually suffer from *paralytic rabies*, showing minimal excitability.
- Might get irritable and snap if handled.

Pathogenesis

Figure 22.12 Pathology of rabies infection.

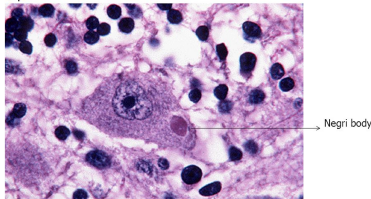


Diagnosis

- Immunofluorescence studies can detect viral antigens in saliva, serum or cerebrospinal fluid.
- After death, diagnosis is confirmed using a fluorescent antibody test performed on brain tissue.
- The presence of inclusions known as Negri bodies in brain tissue is a sure sign of rabies but are present only in 80% of the cases.

Negri bodies

can be seen with a light microscope. A section through a Purkinje cell with Negri body in the cytoplasm



Transmission

- Humans are usually infected with rabies from the bite of an infected animal - especially dogs.
- A rabies virus variant found in silver haired bats is capable of causing infection even on contact with unbroken skin.
- A few cases of rabies have occurred due to transplantation of infected tissue.

Prophylaxis

- The incubation period of rabies is usually long enough to allow immunity to develop from post exposure vaccination.
- Any person bitten by an animal suspected to be rabid should undergo Post Exposure Prophylaxis (PEP).
- PEP consists of rabies vaccine as well as anti-rabies immunoglobulin therapy.

People at high risk of rabies exposure such as health care workers, veterinarians etc. should get routine rabies vaccination.

Rabies vaccine

- First introduced in 1885 by Louis Pasteur and Emile Roux. It was prepared by drying the spinal cords of infected rabbits.
 - Notoriously known for requiring multiple (generally stated as fourteen to sixteen) painful injections in the abdomen.
- Human Diploid Cell rabies Vaccine (HDCV), introduced in 1967, is an inactivated virus vaccine made from attenuated strain of rabies virus grown on human diploid cell line.

Current vaccines

- 1 Purified chick embryo cell rabies vaccine.
- 2 Purified Vero cell rabies vaccine.

These vaccines are prepared by inactivation of an attenuated rabies virus known as the Wistar strain.

Treatment

- Prompt washing of a bite with soap and water, followed by povidone-iodine or alcohol helps to reduce the viral load.
- Post exposure treatment using rabies vaccine is highly effective, especially if administered within 10 days of infection.
 - Four doses of vaccine are given on day 0, day 3, day 7 and day 14.
- Human rabies immunoglobulin (HRIG) may be administered around the bite.

Milwaukee protocol

There is no known treatment for rabies once neurological symptoms occur. However, putting patients in an induced coma has resulted in the survival of 5 out of 43 patients, although with significant neurological damage.

Control

- Vaccinate pet animals such as dogs and cats against rabies.
- Avoid handling of wild animals and strays.
- Report suspected rabies cases to local animal control authority.
- Increase awareness about first aid of animal bite and importance of seeking prompt medical attention.