

# RABIES

FECAVA WORKING GROUP  
ON ZONOOSES

## 1. DISEASE

Rabies

## 2. NAME, DEFINITION, ETIOLOGICAL SPECIES

Rabies virus, an RNA virus  
(genus *Lyssavirus*, family *Rhabdoviridae*)

- Rabies is a fatal zoonotic disease that affects the central nervous system.
- "Classical" rabies virus strains (genotype 1, phylogroup I, serotype 1) have a worldwide distribution.
- All warm-blooded animals are susceptible. Mammals are both vectors and reservoirs of the virus.
- Susceptibility varies depending on the site of viral inoculation, the amount of virus delivered and the affected animal species.

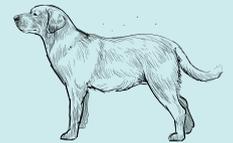
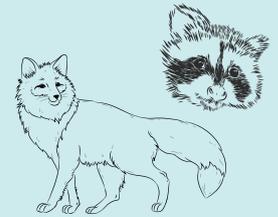
## 4. CLINICAL SIGNS, IF THERE ARE ANY

- The incubation period is prolonged, due to the unique mechanism of viral entry and spread in the nervous system.
- Common signs lasting for 2-3 days include anxiety, irritability, fear, and a tendency for isolation. Fever of variable intensity can also occur.
- Focal hyperesthesia and pruritus at the site of inoculation (i.e., bite wound) are seen in some cases and can lead to self-mutilation.
- Encephalitis signs include seizures, behavioral abnormalities, cognitive dysfunction, incoordination. The duration of these signs varies from 2-7 days.
- Cranial nerve dysfunction (masticatory muscle and laryngeal paralysis) is also seen and indicates the potential of virus transmission via saliva.
- Generalized flaccid (lower motor neuron) paralysis, coma and death follow within the next 3-5 days.



## 3. DESCRIPTION OF THE ANIMAL RESERVOIRS

- Wildlife is the reservoir of rabies in the northern hemisphere, with red foxes (*Vulpes vulpes*) and raccoon dogs (*Nyctereutes procyonoides*) being the most important reservoir wildlife species in Europe.
- In the countries of the southern hemisphere the feral dog population living in large urban areas is the main reservoir, followed by other wildlife species (including bats).
- Vampire (blood-feeding) bats are an important reservoir in Central and South America.



## 5. WAY OF TRANSMISSION TO HUMANS

- The disease is transmitted by the bites of infected animals.
- In up to 99% of human cases domestic dogs are responsible for virus transmission.
- Bats are a major source of transmission to humans in the American continent and an emerging public health threat in Europe.
- Transmission through inhalation of virus-containing aerosols is considered rare.

# RABIES

## 6. CLINICAL SIGNS IN HUMANS

- The incubation period for rabies is typically 2-3 months, dependent upon factors such as the location of virus entry and viral load.
- Once the patient becomes symptomatic, treatment is almost never effective, and mortality exceeds 99%.
- Clinical signs resemble those observed in animals. Initial symptoms of rabies include fever with pain and paraesthesia at the wound site.
- Progressive encephalomyelitis develops with signs of hyperactivity, excitable behaviour, hydrophobia and sometimes aerophobia.
- Gradual paralysis ensues, starting at the site of the bite or scratch. A coma slowly develops, and eventually death occurs, due to cardio-respiratory arrest.

## 8. PREVENTION OF THE DISEASE

- Vaccination of domestic and wild animals.
- Vaccination of humans at high risk of exposure, such as international travelers, wildlife workers in enzootic areas, laboratory personnel and veterinarians.
- Application of post-exposure prophylaxis (PEP) for bite victims to prevent virus entry into the central nervous system.
- Control of stray animals.



## 7. DIAGNOSIS IN HUMANS

- The WHO-recommended reference method for rabies diagnosis is the direct fluorescent antibody test (dFAT; immuno fluorescent staining for viral antigen), performed preferably on brain tissue obtained post-mortem.
- RT-PCR assays comprise sensitive and specific tools for routine diagnostic purposes.
- Saliva, nuchal skin biopsy, urine and cerebrospinal fluid can be tested for intra-vitam diagnosis, however with lower sensitivity. Thus, to rule out rabies, testing of multiple of these specimens is required, including serum for virus-specific antibodies.
- Antibody detection is accomplished via the indirect immunofluorescence or virus neutralisation-based methods, such as the rapid fluorescent focus inhibition test (RFFIT).

## DIAGNOSIS IN ANIMALS

- dFAT is the most rapid method applied on brain tissue of suspect animals for routine diagnosis.
- LN34, a pan-Lyssavirus real-time RT-PCR-based test could help identify bite victims needing post-exposure prophylaxis.
- Light-microscopy methods of low-cost, such as the direct rapid immunohistochemical test (dRIT) can be used for virus identification in economically disadvantaged areas.
- Other virus detection methods such as electron microscopy, viral isolation in cell cultures and mouse inoculation test can also be applied for diagnosis and research.
- Fluorescent antibody virus neutralisation test (FAVNT) and RFFIT are being used for the determination of immune responses to vaccination.