



**RABIES**

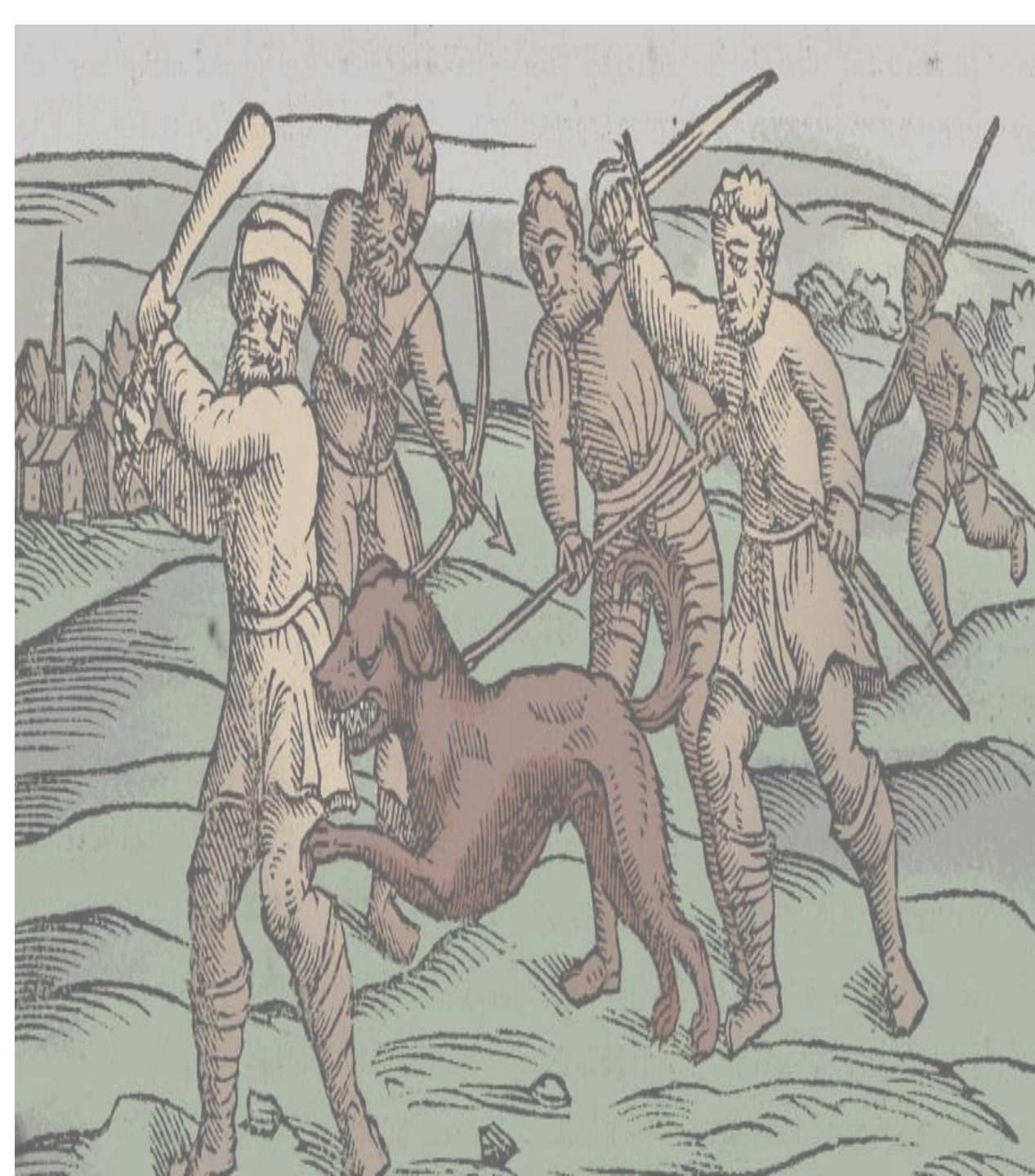
# INTRODUCTION

- **Rabies**, also known as **hydrophobia**, is a highly fatal viral disease that causes inflammation of the brain in humans and other mammals.
- It is caused by Lyssavirus type 1.
- Transmission of Rabies to human-
  - Bites (95%), • Scratches & • Licks from infected animals.
- It is a zoonotic disease of warm blooded animals such as – Dogs, Skunk, Cats, Jackals, bats and wolves.





# HISTORY OF RABIES



- **Man described the disease in 2300 B.C.**
- **The word ‘Rabies’ originated from “rabhas”, meaning “to do violence”. It comes from ancient Indian Sanskrit dating 3000 B.C.**
- **Since Roman times, man established the link between the infectivity of a rabid dogs saliva and the spread of the disease.**
- **Because there is no cure, those that had been bitten by a rabid dog would commonly commit suicide to avoid the painful death that would inevitably follow.**

- **Louis Pasteur (a French biologist, microbiologist and chemist) was the first person to diagnose that rabies targets the Central Nervous System (CNS)**
- **In 1890 created the rabies vaccine and saved 9 year old Joseph Meister after he had been bit by a rabid dog**







## EPIDEMIOLOGY

- **A very wide distribution-** Human rabies is present in 150 countries and territories and on all continents, except for Antarctica.
- **Globally:** estimates indicate that human mortality is highest in Asia, with the highest incidence and deaths reported in India, followed by Africa.
- **The virus claims an estimated of 59,000 (95% confidence intervals (CI):25–1,59,000) human lives annually, mostly in Africa and Asia.**
- **Over 95% of rabies deaths in humans result from virus transmission through the bites of infected dogs.**

## IV. Epidemiological triad

### ❖ Agent

(Lyssavirus type 1 of Rhabdovirus family)



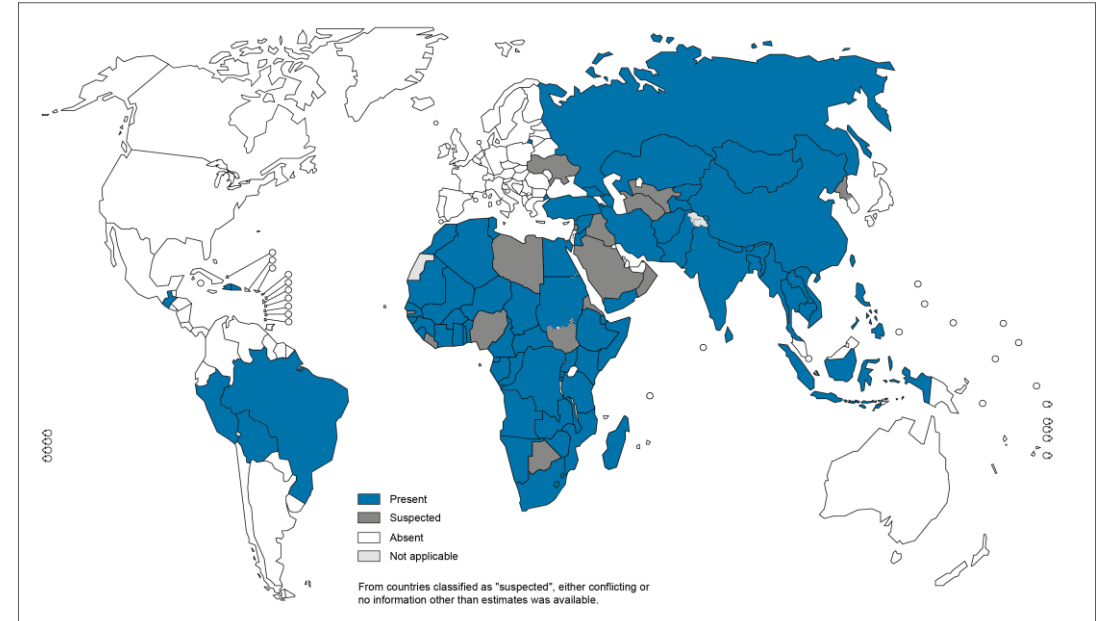
### ❖ Host

- Warm blooded animals
- Dog handlers
- Hunters
- Veterinarians
- Laboratory Staff

### ❖ Environment

- Rabid dogs
- Cats
- Vampire Bats
- Jackal
- Hyena
- Fox, etc.

Presence of dog-transmitted human rabies based on most recent data points from different sources, 2010-2014



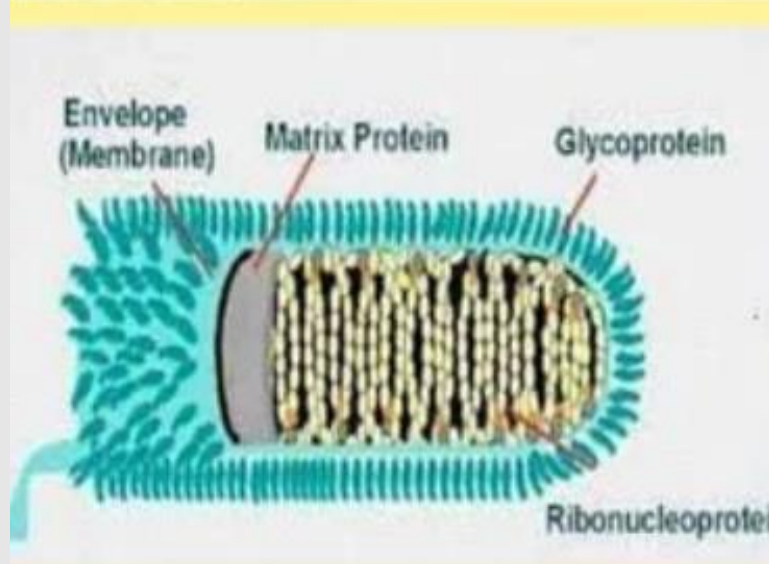
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. © WHO 2015. All rights reserved

Data Source: World Health Organization  
Map Production: Control of Neglected  
Tropical Diseases (NTD)  
World Health Organization



## AGENT

- Rhabdovirus
- Lyssavirus type 1
- Bullet shaped virus
- Size is 180 \*75nm
- Has a lipoprotein envelope
- Knob like spikes or glycoprotein G.
- Matrix protein layer
- Genome –unsegmented ,linear, negative sense RNA.







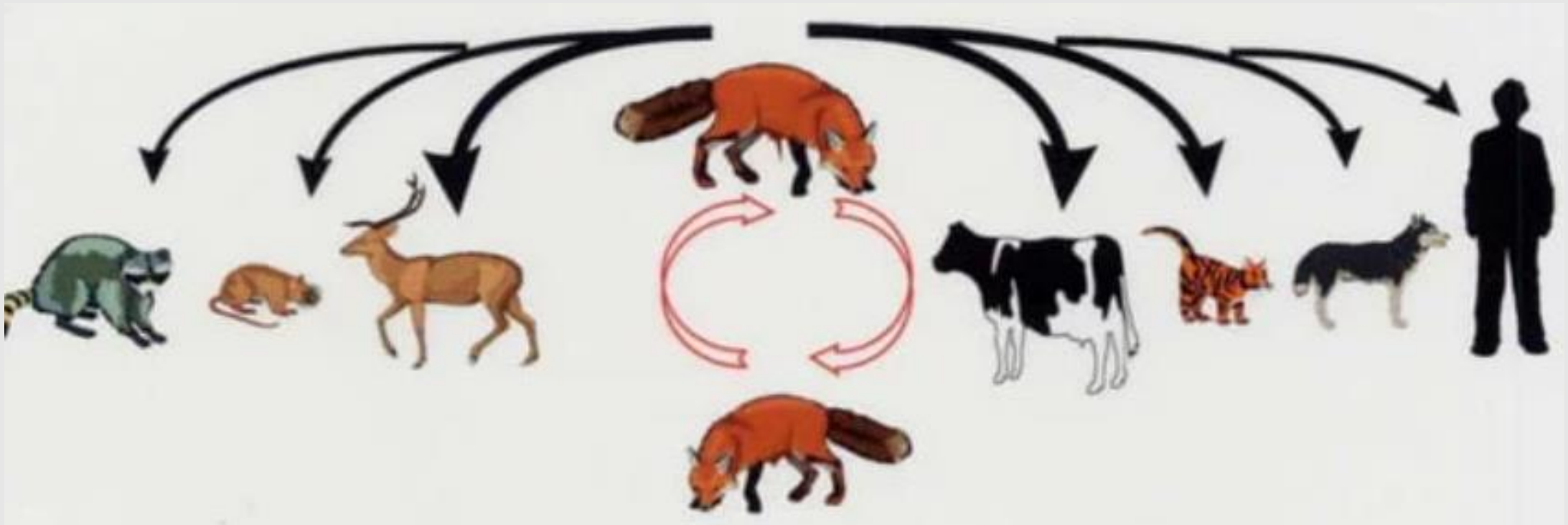
## RESERVOIR OF INFECTION

- **URBAN RABIES:**
  1. 99% cases are from dogs and cats.
  2. A single infected dog capable of transmitting over an area of 40 km.
- **WILD LIFE RABIES :** 1. sylvatic rabies 2. Unidentified reservoir of infection 3. Foxes, jackals, hyenas , skunks etc. 4. Transmit infection among themselves and to dogs and man.
- **BAT RABIES:** 1. Latin American countries ,USA 2. Vampire bats feed on blood of humans and animals. 3. Cause havoc to cattle population 4. Not reported in India 5. Constant sources of infection to man and animals 6. Transmission by bite and aerosols.



# HOST FACTORS

- All warm blooded animals including man.
- Rabies in man is a dead end infection
- People at risk-lab workers, veterinarians, dog handlers , hunters etc



## TYPES OF RABIES VIRUS

	<u>STREET VIRUS</u>	<u>FIXED VIRUS</u>
	The virus recovered from naturally occurring cases of rabies is called street virus.	The virus which has a short , fixed and reproducible incubation period is called fixed virus.
<b>SOURCES</b>	It is naturally occurring virus . It is found in saliva of infected animal	It is prepared by repeated culture in brain of rabbit such that its IP is reduced and fixed.
<b>FEATURES</b>	<ol style="list-style-type: none"><li>1. It produce negri bodies</li><li>2. Incubation period is 20 to 60 days.</li><li>3. It is pathogenic for all mammals</li><li>4. Cannot be used for preparation of vaccine</li></ol>	<ol style="list-style-type: none"><li>1. It does not form negri bodies</li><li>2. Incubation period is constant between 4-6 days.</li><li>3. It can be pathogenic for humans under certain conditions.</li><li>4. It is used to prepare anti-rabies vaccine.</li></ol>

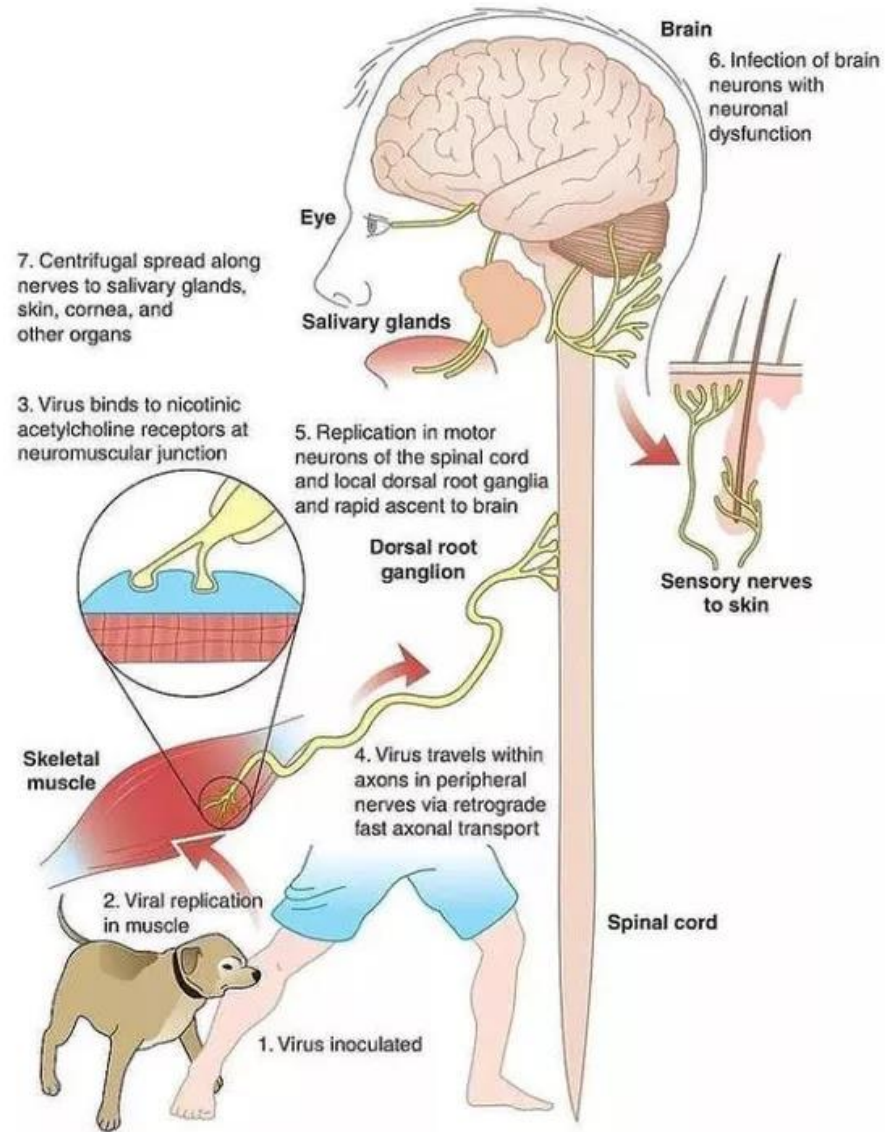
## Pathology of Rabies Infection



# PATHOGENESIS

- Virus is inoculated by the bite of a rabid animal and replicates in skeletal muscle cells (incubation period – postexposure prophylaxis has the greatest effectiveness).
- Then it binds to nicotinic acetylcholine receptors at neuromuscular junctions and travels within axons in peripheral nerves via retrograde axonal transport.
- Rabies virus reaches the spinal cord, replicates in motor neurons and local dorsal root ganglia and then rapid ascent to the brain.
- Infection of the brain neurons is accompanied by mild inflammation and neuronal dysfunction with characteristic clinical features of rabies.
- Finally rabies virus centrifugally spreads along nerves to salivary glands, skin, cornea and other organs.
- Rabies virus replication in salivary glands results in viral excretion in the saliva of rabid animals





# CLINICAL MANIFESTATIONS

- The average incubation is usually 1-3 months (vary from 2 weeks to more than 1 year).
- Depends on site of, bite, Severity of bite, Number of wounds, Amount of virus injected, Species of biting animal, Protection provided by clothing Treatment taken or not.
- After an asymptomatic incubation period clinical rabies progresses through three general phases: a prodrome, an acute neurologic phase and coma/death.

## Rabies Symptoms

### Incubation Period



fever/headache



tingling/burning  
at site of bite or  
scratch

### Prodromal Period



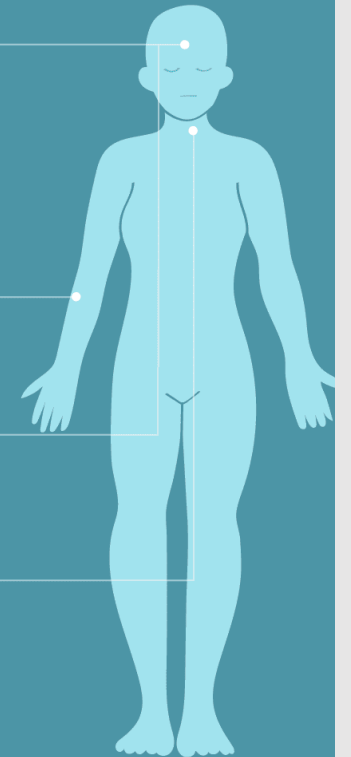
fatigue/malaise



sore/swollen  
throat



nausea/vomiting/  
diarrhea



# RABIES

## Source



## Treatment

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More than 50,000 people die from rabies each year in the world.



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## First aids

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flush the wound



go to the hospital



vaccination



6 months quitting alcohol



6 months do not supercool

## Symptoms

### STAGE 1



headache



heat



loss of appetite



nausea, vomiting



diarrhea



runny nose

### STAGE 2



aggression



photosensitivity



cramps

### STAGE 3



paralysis of the eye muscles

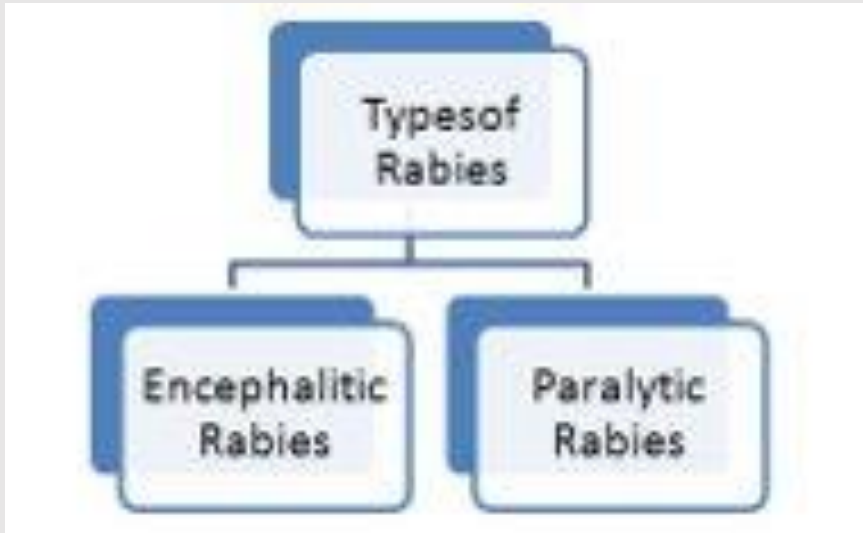


salivation foam from the mouth



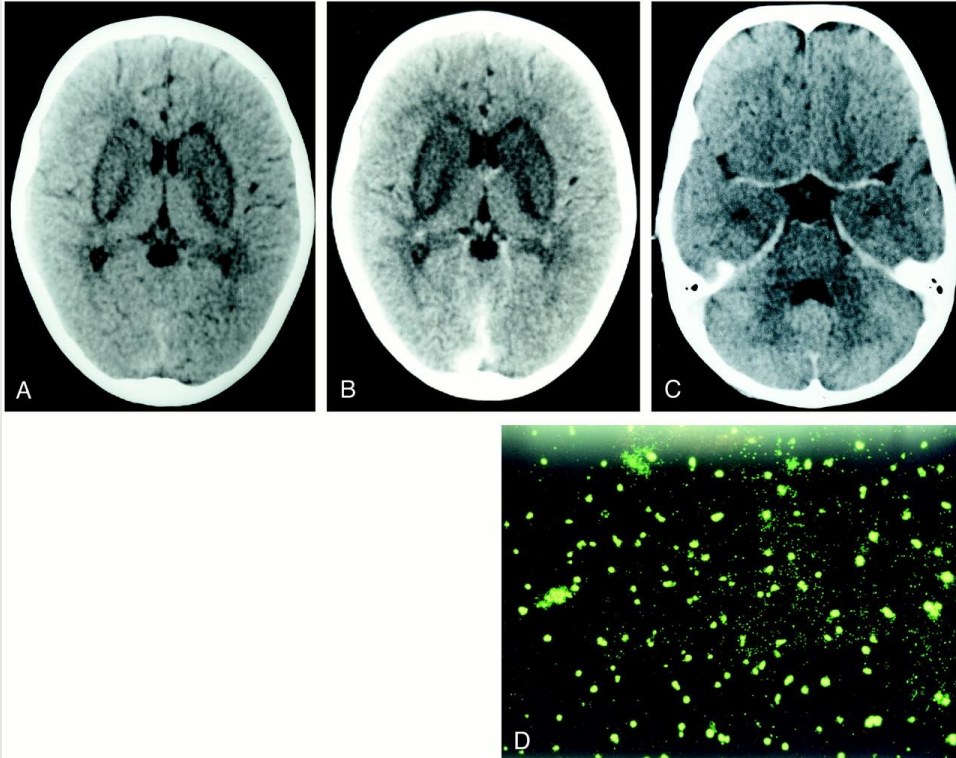
hydrophobia





- **Prodromal features**
- The prodrome lasts 2 to 10 days. Patients may note paresthesias, pain or pruritis at the site of the initial bite. They also have constitutional symptoms and signs (low-grade fever, malaise, nausea, vomiting, sore throat etc).
- Acute neurologic period. Two acute neurologic forms of rabies are seen in humans: encephalitic in 80% and paralytic in 20%. This stage lasts about 1 week and progresses to coma and death.

# TYPES OF RABIES



- ENCEPHALITIC FORM
- Features include fever, confusion, hallucination, muscle spasms, hyperactivity, seizures and autonomic dysfunction (hypersalivation, excessive perspiration, gooseflesh, pupillary dilation and/or priapism).
- The typical features of rabies encephalitis are early brainstem involvement which results in the classic symptoms of hydrophobia and aerophobia
- Coma followed within days by death is the rule unless the course is prolonged by supportive measures. With supportive measures may be registered late complications (water disbalance, noncardiogenic pulmonary edema and cardiac arrhythmias due to brainstem dysfunction and/or myocarditis).



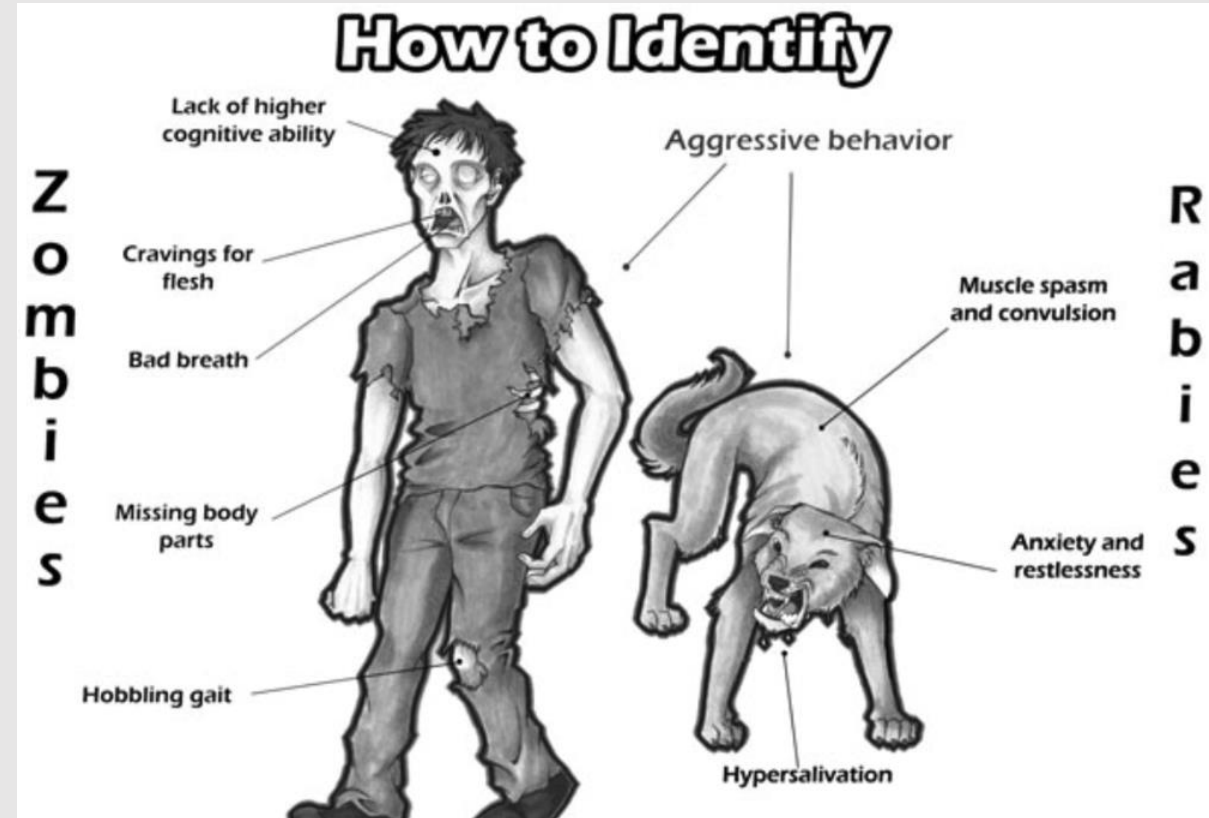
# PARALYTIC FORM

- rabies is characterized by early and prominent muscle weakness, often beginning in the bitten extremity and spreading to produce quadriparesis and facial weakness. (Symmetrical ascending paralysis)
- Sphincter involvement is common but sensory involvement is usually mild.
- Patients with paralytic rabies generally survive a few days longer than is typical in encephalitic rabies, but multiple-organ failure develops even with aggressive supportive care.



# RABIES IN MAN

- Known as hydrophobia (fear of water)
- Duration of disease: 2-3 days prolonged to 5-6 days (exceptional cases)
- Prodromal symptoms (3-4 days) • Headache • Malaise • Sore throat • slight fever
- Followed by excitation and stimulation off all parts of nervous system • Sensory system • Nervous system • Motor system • Sympathetic system • Mental system



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- Patient becomes intolerant to noise, bright light, cold draught of air (sensory).
  - Aerophobia (fear of air ) may be present.
  - Increased reflexes and muscle spasms(motor).
  - Dilatation of pupil and increased perspiration , salivation , lacrimation.(sympathetic).
  - Fear of death , irritability , anger and depression (mental changes).
  - Patient dies abruptly due to convulsions or pass to coma and paralysis.



## Rabies Diagnosis



animal testing



lumbar puncture



skin biopsy



blood tests



head MRI or CT scan



# DIAGNOSIS

- On basis of clinical history of bite by rabid animal
- Characteristic signs and symptoms
- Confirmatory tests
  - Antigen detection by immunofluorescence (skin biopsy).
  - Virus isolation (saliva and other secretions)
  - Immunofluorescence of corneal impression smears proven unreliable.





# TREATMENT

- No specific treatment . Palliative approach.
- Case management
  - Isolation in a quiet room protected as far as possible from external stimuli to prevent spasms and convulsions
  - Relieve anxiety and pain by use of sedatives
  - Morphia 30-54 mg
  - If spastic muscle contractions present use drugs with curare like action
  - Ensure hydration and diuresis
  - Intensive therapy in the form of respiratory and cardiac support

# PREVENTION

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- This may be considered under 3 heads
- Post-exposure prophylaxis.
- Pre-exposure prophylaxis.
- Post-exposure treatment of persons who have been vaccinated previously
- Passive antibody administration with human rabies immune globulin at a dose of 20 IU/kg should be given.
- One-half of the dose should be administered around the wound and the other half given intramuscularly in the thigh or upper outer buttocks.
- Vaccination should be given in 1-mL doses on days 0, 3, 7, 14 and 28 in the deltoid area.



# RABIES PREVENTION

Vaccinate Pets



CONTRA COSTA  
HEALTH SERVICES

Read an Animal's  
Body Language



Teach Kids to Tell  
You if They are  
Bitten/Scratched

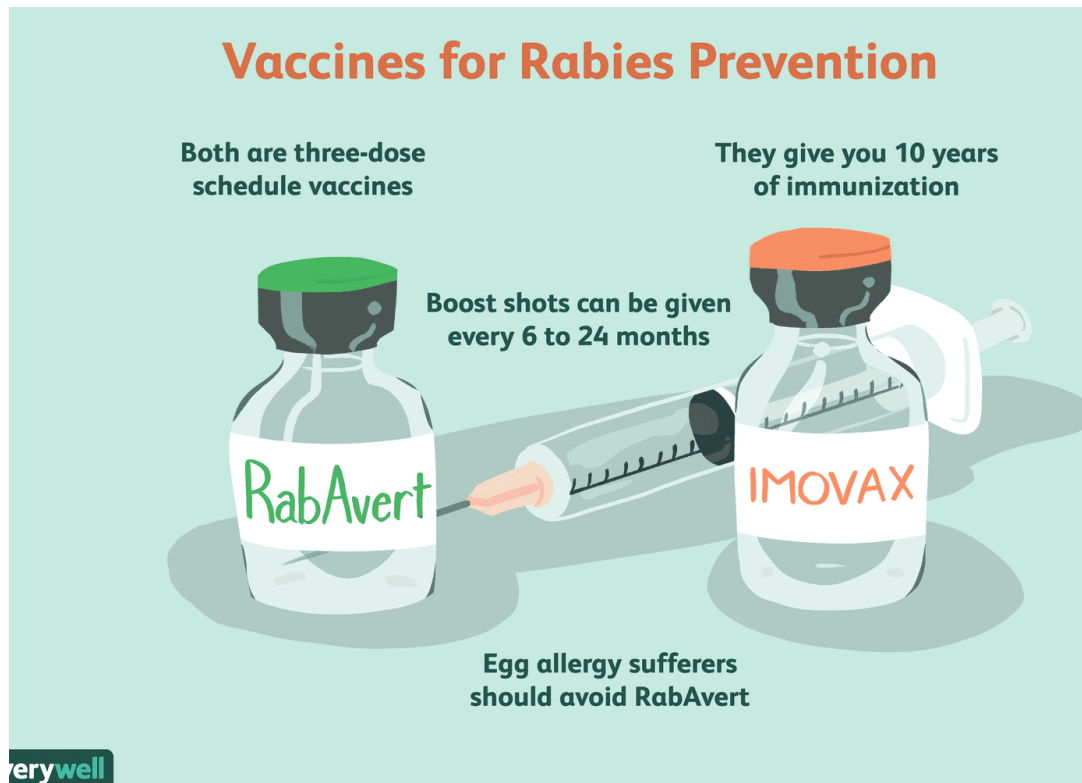


## POST- EXPOSURE PROPHYLAXIS

- 1. General consideration
- 2. Local treatment of wound
  - (a) Cleansing
  - (b) Chemical treatment
  - (c) Suturing
  - (d) Antibiotics and anti-tetanus measure
- 3. Immunization



# IMMUNIZATION



- Rabies vaccines prequalified by WHO do not contain preservatives such as thimerosal.
- The shelf-life 3 years
- Stored at +2°C to +8°C and protected from sunlight.
- Following reconstitution with the accompanying sterile diluents, the vaccines should be used immediately, or within 6-8 hours if kept at the correct temperature.
- All CCEEVs should comply  $\geq 2.5$  IU per single intramuscular dose .



WORLD  
RABIES  
DAY



SEPTEMBER 28

**RABIES**

