

Epidemiology of cowpox virus infections in Europe and clinical features

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Family: *Poxviridae* Genus: *Orthopoxvirus*

Variola virus
Vaccinia virus
Monkeypox virus
Cowpox virus
Camelpox virus
Ectromelia virus

Tatera poxvirus
Raccoon poxvirus
Skunk poxvirus
Vole poxvirus
Uashin Gishu virus



„Cowpox“ 200 years ago



Cowpox was known since a long time as a sporadic disease of cows that could infect milkers

Cowpox entered medical history by Jenner's publication „Inquiry“ in 1798: he demonstrated the efficacy of cowpox virus inoculation by challenge with variola virus

„Cowpox“ 200 years ago



Cowpox was a rare disease.

At that time it was confused with a more common parapoxvirus infection also affecting milkers (now known as „milker's nodules“)

Is cowpox virus misnamed?

Till 1970: **cow** (humans were infected via cows)

Since 1970: **domestic cat** (humans are infected via cats) and various **zoo animals** (elephants, rhinoceros, horse, okapi, beaver, bearcat) and **rats**:

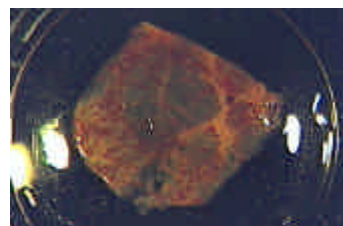
Catpox, rodentpox, elephantpox, cowpox-like virus

Phenotype of cowpox viruses

Hemorrhagic pocks on the chorioallantoic membrane of embryonated eggs

and

the formation of large **eosinophilic inclusion bodies** in the cytoplasm



What is the natural reservoir of cowpox virus?



- Moscow zoo outbreak in 1973: cheetah, lion, panther, jaguar, puma, ocelot, anteater (infected via white rats kept for feeding)
- Serosurveys demonstrated antibodies in bank voles, field voles and wood mice, especially in autumn.
- Bank and field voles are susceptible to very low doses of virus.
- Few clinical signs were seen, but it has been shown to have an adverse effect on the reproductive output.



Geographic distribution of cowpox virus

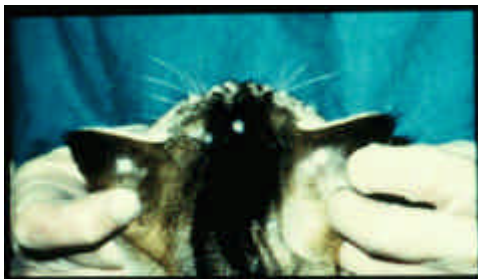
Cases were reported from cows and cats:

United Kingdom, Germany, Austria, The Netherlands (cats and rats), France, Norway, Sweden, Finland, Poland, Russia (rats)

Cowpox virus is endemic to Western Eurasia

Are different virus strains associated with different rodent species?

Cowpox virus



Cowpox virus in elephants



Cowpox virus in a beaver



Cowpox virus infection in humans

Virus enters via skin lesions

usually produces a localized painful lesion with successive macular, papular, vesicular, pustular, ulceral and eschar stages for 2 to 4 weeks

accompanied by local lymphadenopathy and ca. 30% of the patients are admitted to hospital

>50% had contact with an infected cat

Cave: immunosuppression!

Cowpox virus



Cowpox virus



Cowpox virus can mimick anthrax



Case report

(Wolfs et al., 2002, EID 8: 1495)

- A 14-year-old girl presented with ulcerated nodules on her upper lip and eyelids, feverish but otherwise in good health
- Treatment with ciprofloxacin: within days the lesions developed into crater-like ulcers
- Lesions were covered with black crusts, edema and erythema

Case report

(Wolfs et al., 2002, EID 8: 1495)

- **The outcome:** ulcerated lesions healed within 4 weeks and left atrophic scars
- 2 weeks ago she had found an ill wild rat (*Rattus norvegicus*) for which she cared and which had died after 6 days
- A cytopathogenic agent was isolated from a skin lesion of the girl and from the brain of the rat
- PCR and sequencing demonstrated: cowpox virus
- First proven wild rodent-to-human transmission

Generalized cowpox in an immunosuppressed child

(Pelkonen et al., 2003, EID 9: 1458)





**Fatal cowpox virus
infection in an
immunocompromized
man (1990)**

Summary

Despite of it's name cowpox the virus is not enzootic in cattle, but seems to be maintained in a rodent reservoir.

Cowpox virus is endemic in Western Eurasia

Humans are predominantly infected via infected pet cats (no human-to-human transmission reported).

Infections are rare and usually localised lesions are seen (cave immunosuppression).