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EXPERIMENTAL INFECTION OF DOMESTIC CATS BY COWPOX VIRUS

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Summary. - Infection of young domestic cats by cowpox virus isolated from sick rodents (family Muridae) revealed their high susceptibility to the virus; a severe disease with 100 % lethality developed after oral inoculation as well as upon skin scarification. The disease in dermally infected animals was accompanied by eruptions on the site of inoculation. High concentration of the virus was detected in lungs of animals infected by either of inoculation routes. The data testify the possible participation of domestic cats as intermediate hosts in the circulation of cowpox virus.

Key words: cowpox virus; experimental infection; Felidae family

High susceptibility of Felidea family members including wild cats to cowpox virus was first reported by Marennikova *et al.* (1975). Later on Thomset *et al.* (1978) described the first case of pox infection in domestic cats which appeared to be caused by cowpox virus. Further papers were published dealing with the possibility transmission of infection from cats suffering from cowpox to humans (Pethe *et al.*, 1986; Willemse and Emberink, 1985). Nevertheless, was a not quite clear what was a source of cat infection. According to certain data (Marennikova *et al.*, 1978; Tsanava *et al.*, 1989) natural cowpox virus carriers are some species of wild rodents widly spread in Europe, for instance *Microtus oeconomus* (Lvoff *et al.*, 1988). As this species of rodents can be a subject of hunting for cats and can serve as food for them we considered interesting to study the susceptibility of cats to cowpox virus isolated from a rodent of family Muridae. Cowpox virus of strain Gen-86 was used for experimental infection of cats. It was isolated in 1986 from the organs of a white rat during an outbreak of the pox disease among these animals in an animal house of one of the Moscow research institutes.

Comparison of the properties of this strain and of the isolate from *Microtus oeconomus* demonstrated their similarity. Suspension of CAMs infected with Gen-86 virus was used for inoculation of cats in a dose of 10^4 PFU/0.1 ml.

Out bred kittens of the same breed (aged 1.5-2 months, weighing 300-400 g) were inoculated under light ether narcosis by three routes: intranasally, pero-

Table 1. Susceptibility of kittens the cowpox virus (strain Gen-86, dose - 10^4 PFU/0.1 ml)

Inoculation route	Number of animals	Clinical manifestation	Outcome*	Presence of virus in internal organs
Per oral	3	+	3/3	+
Intranasal	3	+	1/3	+
Onto scarified skin	3	+	2/2	+

*number of dead animals per number of infected ones

rally and on scarified skin. Animals were under observation for 3 weeks. Body temperature, clinical features and deaths were registered. Sick animals were autopsied, macroscopic changes in internal organs were noted and pieces of lungs, liver and kidney were removed for virus isolation by routine techniques (Westwood *et al.*, 1957) applying suspension of ground cats organs on CAM of chick embryos. The isolates were identified as described earlier (Marennikova *et al.*, 1984).

The cowpox virus used was highly pathogenic for kittens inoculated by intranasal, oral and dermal routes; it caused severe illness and in the majority of cases death. First signs of disease in were noted on days 2-3 p. i. The animals became flabby, moved slowly and their temperature raised. The animals did not accept food, later dispnoe appeared and discharge from nose and eyes. In animals inoculated on the scarified skin papules on the inoculation site developed on 4 day p. i. Out of 8 kittens 6 died on 4-th to 11-th days p. i. (Table 1). Autopsy demonstrated that lungs were the most affected organ showing complete or partial hepatization. Liver and spleen were enlarged and haemorrhagic; the intestine was blown, its mucosa was thinned and anaemic. The virus was detected in internal organs and in skin lesions. The highest concentration of the virus has been found in lungs ($>10^6$ PFU/g).

Our data on high susceptibility of cats support the observations of Gaskell *et al.* (1983) who followed the natural and experimental infection by cowpox virus of these animals. The more severe course of disease in our experiments can be explained by the younger age of cats. We believe that data obtained testify the possible role of cats as an intermediate host in cowpox virus circulation.

References

Gaskell, R. M., Gaskell, C. J., Evans, R. J., Dennis, P. E., Bennett, A. M., Udall, N. D., Voyle, C., and Hill, T. J. (1983): Natural and experimental poxvirus infection in the domestic cat. *Vet. Rec.* **112**, 164-172.

Lvov, S. D., Gromashevskyi, V. L., Marennikova, S. S., Bogoyavlenskyi, G. V., Bajluk, F. N., Butenko, A. M., Gushchina, E., Shelukhina, E. M., Thukova, O. A., and Morozova, T. N. (1988): Poxvirus isolation from *Microtus oeconomus* Pal. 1776 in Colsky peninsula. *Vop. Virus.* **1**, 92–94 (in Russian).

Marennikova, S. S., Maltseva, N. N., Korneeva, V. I., and Garanina, V. M. (1975): Pox disease in Carnivora of the Family Felidae. *Acta virol.* **18**, 260.

Marennikova, S. S., Ladny, I. D., Ogorodnikova, Z. I., Shelukhina, E. M., and Maltseva, N. N. (1978): Identification and study of poxvirus isolated from wild rodents in Turkmenia. *Arch. Virol.* **56**, 7–14.

Marennikova, S. S., Woinarovska, I., Bohenek, V., Dziok, A. F., Shelukhina, E. M., Maltseva, N. N., Matsevich, G. R., and Efremova, E. V. (1984): Human cowpox. *Zh. Microb. Epidem.* **8**, 64–69 (in Russian).

Pether, J. V. S., Trevains, P. H., Harrison, S. R. B., Baxby, D., Bennett, M., and Gibb, A. P. R. (1986): Cowpox from cat to man. *Lancet* **i**, 38–39.

Tomsett, L. R., Baxby, D., and Denham, E. M. M. (1978): Cowpox in the domestic cat. *Vet. Rec.* **16**, 567.

Tsanava, S. A., Marennikova, S. S., Sakvarelidze, L. A., Shelukhina, E. M., and Yanova, N. N. (1989): Cowpox virus isolation from *Meriones libycus*. *Vop. Virus.* **1**, 95–97 (in Russian).

Westwood, J. C. M., Phipps, P. H., and Boulter, E. A. (1957): Titration of vaccinia virus on CAM of developing chick embryo. *J. Hyg.* **55 i**, 123–139.

Willemse, A., and Emberink, H. F. (1985): Transmission of cowpox infection from domestic cat to man. *Lancet* **i**, 1515.