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Short Communications

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Isolation and Identification of a Poxvirus from a Domestic Cat and a Human Contact Case

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With one table

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Summary

A poxvirus infection in a domestic cat and transmission to a human contact have recently been reported. The isolation and identification of the virus from the cat and the owner are described. The viruses isolated show features of a "cowpox"virus.

Key words: pox virus, cat, zoonosis

A poxvirus infection in a domestic cat was first reported in 1978 (Thomsett et al., 1978). The virus isolated was identified as cowpox virus mainly on the basis of its biological characteristics. Also several outbreaks of "cowpox"virus infection in cheetahs have been recorded in English zoos (Baxby et al., 1979, 1982). Infection in cheetahs and other exotic cats with an agent closely related to cowpoxvirus were noticed in the Moscow zoo (Marennikova et al., 1979). After the first description of cowpox in a domestic cat several other outbreaks have been reported (Gaskell et al., 1983; Martland et al., 1983; Hoare et al., 1984). The disease in cats is chronic, multiple skin lesions being the most common sign; also respiratory symptoms are sometimes observed.

Recently we reported a poxvirus infection in a domestic cat in The Netherlands; in contrast to the cases referred to above, however, transmission of the virus to a human contact was noticed. The cat showed primary symptoms of rhinitis and erosive, ulcerative lesions of the labial skin and perinasal area. One week later, multiple nodular skin lesions appeared with firm crusts. The skin lesions healed within 4 weeks with scar formation. The owner, who had not been vaccinated against variola, developed an ulcerative lesion with erythematous borders on the back of her right hand. She felt ill, with lethargy and pyrexia, and consulted a physician (Willemse and Egberink, 1985). In the present communication, we describe the isolation and identification of a poxvirus from both the cat and the owner.

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A 10 % suspension in PBS of scab material from the cat and the cat owner was used to inoculate monolayers of Vero cells and the chorioallantoic membrane (CAM) of twelve-day old chicken embryos. The cell cultures were observed frequently for the appearance of CPE. Samples of cells grown on cover slips were collected 48 hours after infection and stained with HE after fixation.

We also collected serum samples from the cat (cat A), its owner and from a second cat (cat B) which had developed vesicles and skin lesions on the head a few weeks after contact with cat A. Antibodies directed against the isolate were determined using immunofluorescence tests, with vaccinia virus-infected Vero cells serving as a control. Also a plaque reduction assay was employed, using two-fold dilutions of the heat-inactivated sera (from both cats and the owner) and a constant virus amount (50—100 PFU); rabbit anti-vaccinia virus sera and anti-cowpox virus sera were kindly provided by Dr. J. G. KAPSENBERG, RIVM, Bilthoven and served as controls. Serum titres were determined by interpolation from graphs of percentages residual plaques plotted against log antiserum dilutions. The serum titres are expressed as the reciprocal values of the antiserum dilution which produced 50 % plaque reduction as compared to the virus control.

Cytopathic effects (cpe) in Vero cells were first noticed about 24 hours after inoculation; they consisted of syncytium formation and rounding and detachment of the cells from the support. This was observed in the cultures inoculated with both the human and the feline scab suspension. Stained coverslip preparations of both cultures showed large eosinophilic intracytoplasmic inclusions. On the CAM, haemorrhagic pocks, about 0.5—2 mm in diameter could be observed 48—72 hours after inoculation. Electron microscopy of the CAM showed particles with orthopoxvirus morphology (the collaboration of the Central Veterinary Institute Lelystad is gratefully acknowledged). The Utrecht isolates were designated UC 841 (cat isolate) and UH 842 (human isolate). Both were studied in plaque reduction assays, with vaccinia virus serving as a heterotypic control; the results are summarized in Table 1.

Our isolates can be assigned to the Orthopoxvirinae subfamily of poxviruses, since they were neutralized by an antivaccinia serum. Further identification within the subfamily was based mainly on the biological characteristics given by BAXBY (1975). The isolates showed features of a cowpox virus, namely haemorrhagic lesions on the CAM, and the production of large eosinophilic intracytoplasmic inclusions. Although we did not perform cross-neutralization assays using absorbed sera, the results of the plaque reduction assay indicate that the viruses isolated are not vaccinia virus. The antivaccinia serum shows a neutralizing antibody titre against the homologous virus, which is higher than against our isolates, whereas the serum of cat B and from the human contact case only neutralized the cat isolate to a significant extent. Both the sera of cat B and the owner had been collected early in infection which could explain their low titre neutralizing activity limited to the

Table 1. Titers determined by cross plaque reduction assay, using the Utrecht isolates and reference viruses against the respective sera

serum	anti-vaccinia	anti-cowpox	cat A	cat B	owner	spf.**
virus						
vaccinia	21870	4170	630	60	60	60
UC 841 isolate	2400	4570	200	400	240	35
UH 842 isolate	4790	3800	n. d.*	575	n. d.*	50

* n. d. = not done. ** spf. = serum from specified pathogen free cat.

homologous virus. In contrast, the serum of cat A did neutralize vaccinia virus; although we do not know the duration and the history of the infection of this cat before it was introduced into the household, it was certainly the older case in which more broadly cross-reacting antibody would have had time to develop.

The characteristics of the isolates described and the known susceptibility of the domestic cat and man suggest an infection with a "cowpox" virus in our case. We did not find the source of infection of cat A. Contact with cattle cannot be excluded, but there was no evidence of clinical "cowpox" in the herd in the neighbourhood. The current view is that cattle are not the natural reservoir host of "cowpox" virus, and some yet unidentified small rodent has been incriminated (Baxby, 1977). It should be mentioned that viruses isolated from elephants in Germany (Gehring et al., 1972; Baxby and Ghaboosy, 1977), and carnivores in Russia (Marennikova et al., 1979) were found to be very closely related to but distinguishable from cowpoxvirus. Whether the feline isolates should be considered as cowpox virus or classified separately is a matter for discussion, in view of the unknown reservoir and the observation that some feline isolates are not pathogenic for cattle (Martin et al., 1984). More sophisticated laboratory techniques should be used to analyse the relationship between the cowpox-like viruses from different species. Together with epidemiological studies they should also provide a better understanding of the natural history of "cowpox".

It is clear, however, that the domestic cat is susceptible to infection with an orthopoxvirus, which can be transmitted to man; this is of public health importance at a time when general vaccination against variola has been discontinued. The veterinary practitioner especially should be alerted to this zoonosis.

Zusammenfassung

Isolierung und Identifizierung eines Pockenvirus von einer Hauskatze und einer Kontaktperson

Über eine Pockeninfektion bei einer Hauskatze und die Übertragung auf einen Menschen durch Kontakt wurde kürzlich berichtet.

Die Isolierung und Identifizierung des Virus aus der Katze und dem Besitzer werden beschrieben. Die isolierten Viren zeigen die Merkmale des „Kuhpocken-Virus".

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