

## Comparison of Prevalence of Feline Herpesvirus Type 1, Calicivirus and Parvovirus Infections in Domestic and Leopard Cats in Vietnam

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**ABSTRACT.** A serosurvey of feline herpesvirus type 1 (FHV-1), feline calicivirus (FCV), and feline parvovirus (FPV) in cats from Ho Chi Minh City area in southern Vietnam was conducted in December 1998, and we compared the results with our previous results in northern Vietnam (Hanoi area). The positive rate of FHV and FCV in domestic cats were 44% and 74%, respectively. They were rather higher than those in Hanoi area, while the seropositivity of FPV (44%) was similar to that in Hanoi area. In leopard cats, the positive rate of FPV was high (3/4) and it indicated that FPV was prevailing in leopard cats in Vietnam.—KEY WORDS: feline calicivirus, feline herpesvirus type 1, feline parvovirus.

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Infections of feline herpesvirus type 1 (FHV-1), feline calicivirus (FCV) and feline parvovirus (FPV) are contagious viral diseases that are clinically important in cats. FHV-1 induces rhinotracheitis, chronic conjunctivitis and abortion [4]. FCV infection is associated with upper respiratory diseases and stomatitis [4]. FPV is a causative agent of a variety of diseases including panleukopenia, pyrexia and diarrhea [3]. In advanced countries, cats have been tamed as a companion animal, and the owners well pay attention to these viral diseases. Mixed vaccines against the viruses have been available in the countries and many cats have been vaccinated for prophylaxis. Epidemiological surveys against the viruses have been conducted in such advanced countries [2, 7, 13–17], and the prevalence of the virus infections were seemed to be influenced by human customs for cats. In contrast, there are few reports for the prevalence of the viral diseases in developing countries where people seldom keep the cats as a companion animal and lack their interests to feline diseases although these countries would be proper fields to know the natural infection rates of these viruses. Furthermore, studies and assessments of viral diseases in such free-ranging cat populations are important because they are likely to harbour and transmit diseases more readily than companion cats, as they are subject to the stresses of living in wild. In addition, such free-ranging cats could come into contact with, and transmit diseases to, small isolated populations of endangered wild felids, such as the European wildcat [1, 9] and Iriomote wildcat, *Felis iriomotensis* [11], and could pose a threat to their survival. In Vietnam, one of developing

countries, cats are recognized as a working animal to catch mice. Previously we conducted a serosurvey for the viruses in domestic and leopard cats from Hanoi area in northern Vietnam in 1997 [8, 10]. In the present study, we expanded the study and collected samples of cats from Ho Chi Minh City (HCM) area in southern Vietnam and compared the results with our previous reports in northern Vietnam. As a consequence, we found that prevalence of the viruses was different between the areas.

A total of 54 blood samples were collected from 50 domestic cats (*Felis catus*) and 4 leopard cats (*Felis bengalensis*) in December 1998. Most of the domestic cats were less than 4 years old. In addition, all the cats are considered to be unvaccinated for prophylaxis of viral infections because the vaccines are not commercially sold. As for the leopard cats, one cat from the Saigon Zoo-Botanical Gardens, one cat was household, two cats were captured in the vicinity of HCM. The cats were immobilized by an intramuscular injection with 20 mg/kg of Ketamine before sampling. The blood samples, from which plasmas were isolated, were collected by adding heparin for anticoagulation. The antibodies against FHV-1, FCV and FPV were tested by the indirect immunofluorescence assay (IFA) as described previously [8]. Plasma samples were screened at a dilution of 1:50 in the IFA.

The results of this survey together with our previous reports [8, 10] were summarized in Table 1. In Hanoi area, a positive rate for FHV-1 antibody was only 1.4%. The positive rates of FCV and FPV were 39 and 54%, respectively. On the contrary, in HCM area, the positive rate of FHV-1 antibody was 44%, which is by far higher than in Hanoi area. In addition, we found that the positive rate in male cats was three times higher than that in female cats. The positive rate of FCV antibody was 74% which was two times higher than that in Hanoi area. Unlike the FHV-1 infection, in FCV positive rates, we could not find a

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Table 1. The seroprevalence of FHV-1, FCV and FPV in domestic and leopard cats from Vietnam

District	Cat species	Sex	No. of cats tested	No. of positive cats (positive %)		
				FHV	FCV	FPV
Northern <sup>a)</sup>	domestic	male	37	1 (2.7)	18 (48.6)	19 (51.4)
		female	32	0	9 (28.1)	18 (56.3)
		total	69	1 (1.4)	27 (39.1)	37 (53.6)
	leopard	male	7	1	3	5
		female	2	0	0	2
		total	9	1	3	7
Southern	domestic	male	24	16 (66.6)	17 (70.8)	13 (54.2)
		female	26	6 (23.1)	20 (76.9)	9 (34.6)
		total	50	22 (44.0)	37 (74.0)	22 (44.0)
	leopard	male	2	1	0	2
		female	2	1	1	1
		total	4	2	1	3

a) These results in northern Vietnam are incorporated from our previous report (Miyazawa *et al.* 1999, Ikeda *et al.* 1999).

significant difference between male and female cats. The seropositive rate of FPV in HCM area is similar to that in Hanoi area.

Seropositive rates of FHV-1 in advanced countries were reported to be relatively high [13, 14, 16, 17]. However in Hanoi area, the positive rate of FHV-1 was extremely low and the virus seemed not to spread under a certain circumstance. On the contrary, we found in this study that the positive rate of FHV-1 was much higher in HCM area than in Hanoi area. FHV-1 is an enveloped virus and is not so stable in environment [4]. The infective source is cats showing clinical symptoms which shed infectious viruses. Transmission of the virus is most likely by direct contact between cats or sneezed macro-droplets which travel only a distance of approximately 1–2 meters [12]. It would appear that infected cats do not generate an infectious aerosol during normal respiration and sentinel cats that share the same airspace as virus shedders are infrequently infected [4, 5]. Therefore relatively high density of cat population appears to be needed for the high prevalence of FHV-1 infection. We suspected that the density in HCM area was much higher than that in Hanoi area to explain in part the higher prevalence in HCM. Between male and female cats, we found a profound difference in seropositive rate of FHV-1, while we could not find any significant difference in those of FCV and FPV. These data suggested that behavioral differences between male and female cats might influence the prevalence of FHV-1. Unlike FHV-1, FPV is highly stable in environment and certain clinically healthy FPV-infected cats shed FPV [3, 6]. In addition, FCV is also shed from clinically healthy FCV-infected cats [4]. Therefore, the risks of the infections of FCV and FPV might be similar between male and female cats irrespective of the density of the cat population.

Our previous report revealed that among the 9 leopard cats (*Felis bengalensis*) in Hanoi area, 1, 3, and 7 cats were

seropositive against FHV-1, FCV, and FPV, respectively [8]. Among the 4 leopard cats in HCM area, 2, 1 and 3 cats were infected with FHV-1, FCV, and FPV, respectively. From these data, we considered that FPV is prevailing in the population of the leopard cats in Vietnam. Further studies are required to know the influence of the FPV-infection on the leopard cats in Vietnam.

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