Epidemiological Report

**DETECTION OF ANTIBODY AGAINST HEMORRHAGIC FEVER
WITH RENAL SYNDROME (HFRS) VIRUS IN SERA OF
HOUSE RATS CAPTURED IN PORT AREAS OF JAPAN**

CHIHARU MORITA, KAZUYOSHI SUGIYAMA¹, YOSHIHARU MATSUURA,
TAKASHI KITAMURA¹, TOSHIHIKO KOMATSU¹, YORIYUKI AKAO²,
WATARU JITSUKAWA³ and HISAO SAKAKIBARA⁴

*Department of Veterinary Science, ¹Department of Enteroviruses, and ²Central Virus
Diagnostic Laboratory, National Institute of Health, Musashimurayama,
Tokyo 190-12, ³Yokohama Quarantine Station, Yokohama,
and ⁴Kobe Quarantine Station, Kobe*

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Three types of hemorrhagic fever with renal syndrome (HFRS), i.e., urban, rural and laboratory types, have been observed in Japan (Tamura, Yatsukura and Okano, 1979; Kawamata, 1981; Umenai et al., 1979). The laboratory-type outbreaks were exclusively associated with laboratory rats (Umenai et al., 1979) and the rural type was suspected of *Microtus* or *Apodemus*-borne (Umenai et al., 1981).

An urban-type outbreak with more than 100 cases of HFRS occurred from 1960 to 1972 in the central area of Osaka City where there were no wild *Microtus* or *Apodemus* species (Lee et al., 1979). Nevertheless, house rats were assumed to be the reservoir without any further epizootical survey. Recently, a mild-type infection in urban areas in China was related to house rats (Xu et al., 1982; Hang et al., 1982). In addition, house rats captured in port areas in the United States, i.e., New Orleans, Philadelphia and Houston, were found to have antibody against Hantaan virus (Tsai et al., 1982; LeDuc et al., 1982).

The sera of house rats (*R. norvegicus* and *R. rattus*) collected in the port areas of Kobe and Yokohama during the period from 1978 to 1980 were examined by the indirect fluorescent antibody (IFA) method described previously (Kitamura et al., 1983). The antigen preparations used were smears of VERO-E6 cells infected with SR-11 strain HFRS virus at the 7th passage in these cells after

森田千春・松浦善治 (国立予防衛生研究所 獣疫部)
杉山和良・北村敬・小松俊彦 (同 腸内ウイルス部)
赤尾頼幸 (同 ウィルス中央検査部)
実川渉 (横浜検疫所)
榊原久雄 (神戸検疫所)

TABLE I

Indirect fluorescent antibody among house rats from Kobe and Yokohama 1978-1980

Port	Year	Number Positive*	/	Number tested	Titer
Kobe	1978	2	/	168	64-128
	1979	5	/	129	64-128
	1980	0	/	19	
subtotal		7	/	316	
Yokohama	1978	1	/	33	4,096
	1979	1	/	42	2,048
	1980	0	/	6	
subtotal		2	/	81	
Total		9	/	397	

* IFA titer higher than 1:64.

isolation from the lung tissue of an experimental rat related to the outbreak in Sapporo Medical College (Kitamura *et al.*, 1983). The antigen smears were overlaid with 1:10 diluted serum in the screening test. Serial twofold dilutions made from 1:16 dilutions of tentatively positive sera were examined. When the IFA endpoint titer of a serum was higher than 1:64, the serum was considered as positive of antibody against HFRS virus.

The antibody to HFRS virus was found in six of 318 *R. norvegicus* and three of 79 *R. rattus* sera. Seven of 316 sera from the port of Kobe and two of 81 sera from Yokohama revealed positive HFRS virus antibody. The ratios of positive sera in 1978, 1979 and 1980 were 1.5%, 3.5% and 0%, respectively (Table I).

In Houston, USA, five of 92 sera were found to be positive. All five positive sera were collected from the same site (LeDuc *et al.*, 1982). Focal condensation of HFRS virus-infected rats observed was suggested from the fact that three of five positive rats from the port of Kobe in 1979 were captured on the same wharf.

Since the present survey was limited to the rats from the port areas, the question of whether the distribution of antibody-positive rats was restricted to the port areas or found also in rat population in other inland areas was not clarified.

The incidence of HFRS among human population has not been recorded in port areas or urban areas in Japan since 1972. There may be one possibility that the antibody detected in rats is against another virus closely related and antigenically cross-reactive to HFRS virus.

Further investigations should be made on the ecology of HFRS-associated virus among wild rodents and human beings.

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REFERENCES

- HANG, C. S., SONG, G., QIU, X. Z., DU, Y. L., ZHAO, J. N., KONG, B. X., GAO, G. Z. AND LIAN, H. X. (1982): Etiological study of outbreaks of a mild type of hemorrhagic fever. *Chin. J. Epidemiol.*, **3**, 204-205 (in Chinese).
- KAWAMATA, J. (1981): Studies on the surveillance and control measures of zoonoses associated with animal experimentation in special reference to the hemorrhagic fever. A report to the Ministry of Education, Science and Culture (in Japanese).
- KITAMURA, K., MORITA, C., KOMATSU, T., SUGIYAMA, K., ARIKAWA, J., SHIGA, S., TAKEDA, H., AKAO, Y., IMAIZUMI, K., OYA, A., HASHIMOTO, N. AND URASAWA, S. (1983): Isolation of virus causing hemorrhagic fever with renal syndrome (HFRS) through a cell culture system. *Japan. J. Med. Sci. Biol.*, **36**, 17-25.
- LEDUC, J. W., SMITH, G. A., BAGLEY, L. R., HASTY, S. E. AND JOHNSON, K. M. (1982): Preliminary evidence that Hantaan or closely related virus is enzootic in domestic rodents. *New Engl. J. Med.*, **307**, 624.
- LEE, H. W., LEE, P. W., TAMURA, M., TAMURA, T. AND OKUNO, Y. (1979): Etiological relation between Korean hemorrhagic fever and epidemic hemorrhagic fever in Japan. *Biken J.*, **22**, 41-45.
- TAMURA, T., YATSUKURA, T. AND OKUNO, K. (1979): Clinical features of epidemic hemorrhagic fever. *Kansen, Ensho, Men-eki (Infection, Inflammation and Immunity)*, **9**, 280-289 (in Japanese).
- TSAI, T. F., BAUER, S. P., SASSO, D. R., MCCORMICK, J. B., BRADFORD, H., CARAWAY, C. T., MCFARLAND, L. M., MEDRAND, O. AND SOULIE, G. (1982): Preliminary evidence that Hantaan or a closely related virus is enzootic in domestic rodents. *New Engl. J. Med.*, **307**, 623-624.
- UMENAI, T., LEE, H. W., LEE, P. W., SAITO, T., HONGO, M., HASHINAGA, K., NOBUNAGA, T., HORIUCHI, T. AND ISHIDA, N. (1979): Korean hemorrhagic fever in staff in animal laboratory. *Lancet*, *i*, 1314-1316.
- UMENAI, T., WATANABE, M., SEKINO, H., YOKOYAMA, S., KABURAGI, T., TAKAHASHI, T., LEE, H. W. AND ISHIDA, N. (1980): Korean hemorrhagic fever among rural residents in Japan. *J. Infect. Dis.*, **144**, 460-463.
- XU, C. W., ZI, C. Q., MA, Z. T., MENG, Y. S., WANG, S. J., AN, M. J. AND ZHANG, X. Q. (1982): Epidemiological study of an outbreak of a mild type of hemorrhagic fever. *Chin. J. Epidemiol.*, **3**, (in Chinese) (to be published).