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Virus Survey in Environmental Waters in Miyagi Prefecture

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Water-borne transmission is one of the main routes of viral infection to humans. The viruses released from sewage water are trapped in mud and shellfish, and have been detected in these sources frequently. It is of crucial importance to assess the degree of virus contamination of the environment in order to prevent widespread infection and the prevalence of viral strains. We collected water from five sources: river water flowing towards the dam, the water of its dam, the drinking water supplied from its dam, river water near the sea, and the sea water near the river, and investigated these samples for viral contamination.

The sea water samples were concentrated from 20 liters to 10 ml by the cation filter (Zetapor Membrane, CUNO, Inc., Meriden, Conn.) method, the other samples by the DEAE-cellulose (SIGMA CHEMICAL Co., St. Louis, Mo.) absorption method. An aliquot of the concentrated materials, which corresponded to 2 liters of each original sample, was inoculated to four cell lines, including BGM, HeLa, HEP-2, and RD, for isolation of viruses. Then each virus was identified by the micro-neutralization method using standard antibodies (DENKA SEIKEN Co. Ltd., Tokyo). Detection of Norwalk-like virus was performed by polymerase chain reaction (PCR) method (1).

The results are shown in Table 1. Untypable non-polioviruses that showed $10^{-4.5}$ – $10^{-5.25}$ TCID₅₀ per ml were isolated from the samples of river water flowing towards the dam collected

in July, October, and November of 1996. Type 3 poliovirus was isolated from the river water in September of 1997. The origin of the isolated poliovirus was determined as a vaccine strain by the intratypic differentiation method, PCR-restriction fragment length polymorphism (RFLP) (2). Furthermore, the Norwalk-like viruses were detected in the four samples of river water near the sea by PCR.

Our results suggested the possibility of viral infection to humans from contact with river water. Most notably, the isolation of a vaccine-derived strain of poliovirus from a sample of river water in September indicated the possible survival of polioviruses for long periods in environmental water or mud; vaccination in our area was performed in April of 1997. Conclusively, virus survey of environmental water sources is necessary to assess the possibility of contamination from sewage water, and the prevalence of particular strains.

REFERENCES

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Table 1. Virus survey in environmental waters

Year/ Month	1995/ 9 10 11			1996/ 7 8 9 10 11 12						
river water flowing towards dam	0/3	0/3	0/3	1/3 ¹⁾			1/3 ¹⁾	1/3 ¹⁾		
the water of its dam	0/1	0/1	0/1	0/1						
the drinking water supplied from its dam	0/2	0/2	0/2	0/2						
river water near the sea										
sea water near the river					0/4	0/4	0/4	0/4	0/4	

Year/ Month	1997/ 1 2 3 9				1998/ 10 11 12 1 2 8 9 10 11 12									
river water flowing towards dam														
the water of its dam														
the drinking water supplied from its dam														
river water near the sea				1/3 ²⁾	0/3	0/5	0/1	1/3 ³⁾	1/1 ³⁾	0/1	0/1	0/1	0/2	1/7 ³⁾
sea water near the river	0/4	0/4	0/4	0/3	0/6	0/7	0/2	0/8				0/1		

¹⁾Untypable non-poliovirus, ²⁾Poliovirus, ³⁾Norwalk-like virus

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