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The Isolation of Human Parechovirus 1 from Cases of Acute Respiratory Illness in Children

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Picornaviridae is a large family of single-strand positive-sense RNA viruses that includes a number of important human and animal pathogens (1). Until recently, picornaviruses were classified into five genera, but two former enteroviruses (echovirus 22 and 23) have now been placed in a new genus, *Parechovirus*, and renamed human parechovirus 1 and 2 (HPEV1 and 2), respectively, because of their unique molecular and biological properties (2,3). Previous studies have shown that in most cases HPEV1 causes infections of the gastrointestinal or respiratory tract, and in rare cases can cause encephalitis (1). Although earlier studies have shown that HPEV1 is a common human pathogen and that infection with this virus occurs early in life (1,4,5), the isolations of this virus were less frequent than those of other enteroviruses (6). In this paper, we report 14 cases of acute respiratory infections caused by HPEV1.

From September 1999 to December 2000, a total of 2,257 clinical specimens (nasopharyngeal swabs: 1,803, cerebrospinal fluids: 201, stools: 179, urine: 38, others: 36) were collected from 2,105 mostly pediatric patients (93.6% of cases) aged 0-12 years for the purpose of virological surveillance in Hiroshima Prefecture, Japan. From the specimens, a total of 709 viruses were isolated in cell cultures and/or detected by viral antigen-specific EIA, electron microscopy, or viral genome-specific RT-PCR (Table 1). In the virus-positive specimens shown in Table 1, HPEV1 was isolated sporadically from 14 patients. All the patients were infants aged under 2-years-old and showed upper or lower respiratory illness with fever, and diarrhea was noted in two patients (Cases No.4 and 13) (Table 2). Interestingly, all of the HPEV1 isolates were isolated by using BGM (buffalo green monkey kidney) cells as shown in Table 2. In a previous study, Birenbaum et al. reported that BGM cells are susceptible for the growth of

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Table 1. Summary of clinical symptoms and isolated/detected viruses from the patients in virological surveillance from September 1999 to December 2000 in Hiroshima

Clinical symptoms and syndrome	Number of specimens	Viruses isolated[1] or detected[2] (Number of positive specimens)
Influenza	378	INFLU(199), ADENO(4), MUMPS(1), ROTA(1)
Upper respiratory illness	715	ADENO(117), ENTERO(64), INFLU(21), HPEV(9), HSV(9), MUMPS(1), ROTA(1), SRSV(1)
Lower respiratory illness	404	ENTERO(14), ADENO(11), INFLU(17), HPEV(6), HSV(1), MEASLES(1), SRSV(1)
Pharyngoconjuctival fever	33	ADENO(12), ENTERO(3)
Hand-foot-and-mouth disease	38	ENTERO(30)
Herpangina	22	ENTERO(5)
Exanthems	64	MEASLES(6), ENTERO(19), INFLU(2), SRSV(1)
Mumps	29	MUMPS(15), ENTERO(1)
Aseptic meningitis	164	ENTERO(36), MUMPS(19), ADENO(3)
Encephalitis	59	INFLU(6), ADENO(1), ENTERO(1), HSV(1), ROTA(1)
Gastroenteritis	153	SRSV(31), ROTA(12), ADENO(7), ENTERO(4)
Others	196	ENTERO(9), HSV(8), INFLU(6), ADENO(5), SRSV(2), MEASLES(1), MUMPS(1)

[1] Several cell lines (BGM, HEp2, RD-18S, FL, Vero and MDCK) were used for virus isolation.
[2] Virus antigens were detected by the specific EIA or electron microscopy, and virus genomes were detected by the specific RT-PCR.
ENTERO: enterovirus, HPEV: human parecovirus, INFLU: influenza virus, ADENO: adenovirus, HSV: herpes simplex virus, MUMPS: mumps virus, MEASLES: measles virus, SRSV: small round structured virus.

Table 2. Characteristics of the patients with isolated HPEV1 from September 1999 to December 2000 in Hiroshima

Case No.	Sex	Age (year, month)	Specimens	Date of specimen collection	Clinical symptoms	Cell lines with isolated HPEV1
1	male	1y, 0m	nasal swab	Sept. 8, 1999	fever (39.0°C), upper respiratory illness	BGM
2	male	0y, 10m	throat swab	Oct. 20, 1999	fever, bronchitis	BGM, HEp2
3	male	0y, 10m	throat swab	May 28, 2000	fever(38.0°C), bronchitis	BGM
4	male	0y, 11m	stool[1]	June 22, 2000	fever, upper respiratory illness, diarrhea	BGM
5	male	2y, 3m	throat swab	July 2, 2000	fever (40.0°C), upper respiratory illness	BGM
6	female	1y, 5m	nasal swab	July 14, 2000	fever (39.7°C), upper respiratory illness	BGM, Vero
7	male	0y, 2m	nasal swab	Aug. 2, 2000	fever, upper respiratory illness	BGM, Vero
8	male	2y, 1m	throat swab	Aug. 4, 2000	fever (39.0°C), upper respiratory illness	BGM
9	male	0y, 11m	throat swab	Aug. 22, 2000	fever (38.0°C), upper respiratory illness, bronchitis	BGM
10	male	1y, 2m	throat swab	Oct. 29, 2000	fever (40.0°C), bronchitis	BGM
11	male	1y, 0m	throat swab	Nov. 10, 2000	fever (40.0°C), bronchitis	BGM
12	male	0y, 7m	throat swab	Nov. 16, 2000	fever (40.0°C), upper respiratory illness	BGM
13	female	1y, 2m	throat swab	Dec. 9, 2000	fever (38.0°C), bronchitis, vomiting, diarrhea	BGM
			stool[2]	Dec. 9, 2000		BGM
14	female	1y, 2m	nasal swab	Dec. 19, 2000	fever, upper respiratory illness	BGM

[1] Coxsackievirus A10 was also isolated from the same stool specimen with RD-18S cells.
[2] Norwalk-like virus was also detected from the same stool specimen by RT-PCR and electron microsopy.

HPEV1 (7), and our present findings confirmed that BGM cells were suitable for HPEV1 isolation. In addition, BGM cells are sensitive for coxsackieviruses (8,9). Thus, BGM cells might be a useful cell line for virological surveillance.

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