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Secondary Transmission of Cryptosporidiosis Associated with Swimming Pool Use

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Cryptosporidiosis is a diarrheal disease initiated by ingestion of *Cryptosporidium* oocysts. The incubation period is 2-10 days, and the chief symptom is watery diarrhea. The transmission to humans can occur by close association with infected animals, via person-to-person transmission, or from contaminated drinking water or less frequently a sprinkler fountain or a swimming pool (1,2). Here, we report secondary transmission of cryptosporidiosis through using a swimming pool.

From August 20-24, 2004, school children in a sports center participated in a joint swimming training in Nagano Prefecture using a swimming pool in a hotel. Two hundred and twenty-two among 273 participant children developed diarrhea and other intestinal symptoms from August 20 to September 1 with a peak incidence at August 27. The outbreak was considered to be cryptosporidiosis caused by use of the contaminated swimming pool in the hotel.

After returning from the joint training, the participants used 10 swimming pools belonging to the sports center in Chiba Prefecture. On September 4 these swimming pools were investigated for the presence of *Cryptosporidium* oocysts, and on September 8 it was recognized that two of them tested positive.

The Chiba Prefecture public health authority suspended use of the two swimming pools and ordered that they be cleaned. The family members of patients were advised to consult doctors when they developed symptoms. The author-

ity also alerted and called citizens' attention to the infection.

N and K public health centers that control the two swimming pools searched for possible secondary infection through the use of the two swimming pools. A search was made for people developing diarrhea, abdominal pain or fever later than August 25 from among the population who had a chance of contracting secondary infection, i.e., those who did not participate in the joint training in Nagano Prefecture but used either of the two swimming pools. Investigation by N public health center identified 41 symptomatic patients among 1,819 (2.2%), and investigation by K public health center identified 7 symptomatic patients among 1,004 (0.6%). *Cryptosporidium* was detected from one of the four symptomatic patients (first symptom on September 10) in N public health center and from one of the two symptomatic patients (first symptom on September 9) in K public health center (Fig. 1, Table 1). These cases were considered as secondary infections on the following grounds. First, the patients used the swimming pools from which *Cryptosporidium* oocysts were detected. Second, there was a cluster of patients with diarrhea and other symptoms in the 1st to 2nd week of September and the oocysts were

Table 1. Results of investigation by N and K public health centers

	N public health center	K public health center
No. of people investigated	1,819	1,004
No. of patients with symptoms (%)	41 (2.2)	7 (0.6)
No. of patients investigated for stool specimens	4	2
No. of patients positive for the oocysts	1	1
No. of oocysts detected (per 20 liter)	30	2

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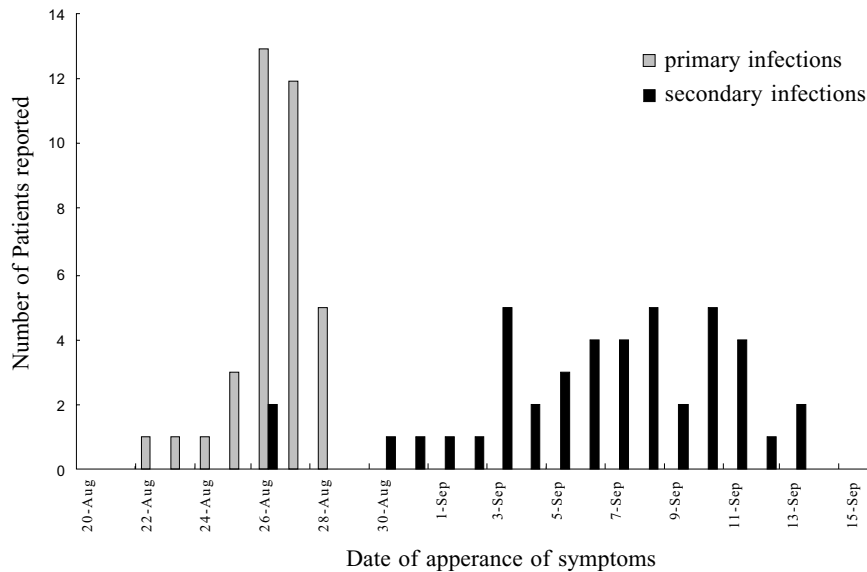


Fig. 1. Incidence of patients in the primary infection (infection at a hotel in Nagano Prefecture) and in the secondary infection (infection at swimming pools of the sports center in Chiba City).

detected from two of six patients examined. Third, the incubation period of cryptosporidiosis is 2 - 10 days (average 7 days), and the oocysts continue to be released for 2-4 weeks even after symptoms subside. Fourth, the oocysts are strongly resistant to the chlorine concentrations routinely used for disinfection of the swimming pools. Because infected patients continue to release oocysts in their stools for a long time after the disappearance of symptoms, it is recommended that patients be prohibited from using swimming pools for at least for 2 weeks after the disappearance of their symptoms (3). This is an important guideline in preventing the spread of cryptosporidiosis.

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