

## Laboratory and Epidemiology Communications

### Has *Echinococcus granulosus* Settled in Hokkaido?

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Two forms of human echinococcosis or hydatidosis have been reported in Japan: alveolar hydatidosis (AHD), which is caused by larval *Echinococcus multilocularis*, and cystic hydatidosis (CHD), which is caused by larval *E. granulosus* (1). Three hundred and eighty-three AHD cases were reported from 1937-1998 in Hokkaido, a large northernmost island of Japan (2). In contrast, CHD cases were reported from three other large islands, Honshu, Shikoku and Kyushu (1). The total number of CHD cases in Japan from 1881-1994 was 69 (1).

However, many cases of *E. granulosus* infection among imported animals have been reported from Hokkaido meat inspection centers (3). Table 1 shows data from the Obihiro meat inspection center over the fiscal years of 1994-1999. There were 2,994 *Echinococcus*-infected swine, 34 infected cattle, and 7 infected horses. Diagnosis, based on macroscopic

and histopathological observations, was *E. multilocularis* for all of the infected swine and horses, and *E. granulosus* for all of the infected cattle (the infected cattle were all imported from *E. granulosus*-enzootic countries). Infected sheep or goats were not detected.

Though no human case of CHD has been reported thus far, *E. granulosus* infection was actually found among autochthonous domestic animals in Hokkaido (3). Therefore, occurrence of CHD in residents in Hokkaido has been suspected. Namely, some cases of AHD reported from Hokkaido may have been CHD.

Western blot (WB) using the hydatid 8 kDa antigen (4) for serodiagnosis of CHD has been found sufficiently useful (5). We applied this method to whether any of the echinococcosis patients in Hokkaido were infected by *E. granulosus*. Among 71 AHD patients' sera in Hokkaido, 15 (21.2%) were positive (Table 2). All of the sera from patients with other parasitic diseases were negative, excepting one toxocariasis case, though this case was later found also to have been infected

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Table 1. Domestic animals with echinococcosis found in Obihiro meat inspection center from the fiscal years of 1994 to 1999

Animals	Heads of confirmed animals in each fiscal year					
	1994	1995	1996	1997	1998	1999
Cattle	69,452	65,956	59,372	57,078	58,925	60,070
	7	8	15	1	1	2
Swine	66,382	64,095	54,326	55,320	54,076	49,276
	1,249	1,087	357	160	71	70
Horse	161	178	85	81	52	30
	ND	4	3	0	0	0

Upper row: Total heads of inspected animals.  
 Lower row: Heads of animals diagnosed as echinococcosis.  
 ND: Inspection was not performed for echinococcosis.

Table 2. Results of examination of serum specimens from patients with various parasitic diseases by the Western blot method using the hydatid 8 kDa antigen

Parasitic diseases	No. of tested serum specimens	No. of positive specimens
Cystic hydatidosis	11 <sup>1</sup>	7
Alveolar hydatidosis	71	15
Toxocariasis	6 <sup>2</sup>	1
Amebiasis (amebic dysentery)	2	0
Diphyllobothriasis	5	0
Schistosomiasis japonica	5 <sup>3</sup>	0
Paragonimiasis	6	0
Fascioliasis	5	0
Sparganosis	3	0
Gnathostomiasis	2	0
Anisakiasis	10	0

<sup>1</sup>Nine sera from Italy and two sera from Argentina.

<sup>2</sup>Five sera from Argentina.

<sup>3</sup>Five sera from Philippines

by *E. granulosus*. Sero-positivity among CHD cases was 63.6% (7/11).

All 15 cases positive on the 8 kDa antigen WB test, were, however, found to be the "complete type" by the *E. multilocularis* antigen-WB test (2). Because bands constituting the "complete type" are considered to include both AHD-specific EM18 (6) and Em2<sup>plus</sup> (7) antigens, the above 15 patients were classified as AHD though their sera reacted positively on the 8 kDa antigen WB. Namely, the 8 kDa antigen WB test was not specific enough to differentiate CHD from AHD.

We conclude here that, although many *E. granulosus*-infected cattle have been imported, the parasite has not yet established its life cycle in Hokkaido. This conclusion is supported by the lack of reports of *E. granulosus*-infected dogs or foxes which are the final hosts of *E. granulosus*.

#### REFERENCES

1. Yoshida, Y. (1996): Illustrated Human Parasitology, p. 192. Nanzando, Tokyo (in Japanese).
2. Kimura, H., Furuya, K., Kawase, S., Sato, C., Yamano, K., Takahashi, K., Uraguchi, K., Ito, T., Yagi, K. and Sato, N. (1999): Recent epidemiologic trends in alveolar echinococcosis prevalence in humans and animals in Hokkaido. Jpn. J. Infect. Dis., 52, 117-120.
3. Ohbayashi, M. (1988): Echinococcosis and its wide-spreading distribution. Media Circle, 33, 81-88 (in Japanese).
4. Maddison, S. E., Slemenda, S. B., Schantz, P. M., Fried, J. A., Wilson, M. and Tsang, V. C. W. (1989): A specific diagnostic antigen of *Echinococcus granulosus* with an apparent molecular weight of 8 kDa. Am. J. Trop. Med. Hyg., 40, 377-383.
5. Furuya, K., Kawanaka, M., Sato, N., Yagi, K., Sawada, Y., Honma, H. and Tamura, M. (2000): Evaluation of the Western blot test using hydatid 8 kDa antigen for the serodiagnosis of hydatid disease. Rep. Hokkaido Inst. Publ. Health, 50, 1-5 (in Japanese).
6. Ito, A., Wang, X. G. and Lin, Y. H. (1993): Differential serodiagnosis of alveolar and cystic hydatid disease in the People's Republic of China. Am. J. Trop. Med. Hyg., 48, 208-213.
7. Gottstein, B., Lengeler, C., Bachmann, P., Hagemann, P., Kocher, P., Brossard, M., Witassek, F. and Eckert, J. (1987): Seroepidemiological survey for alveolar echinococcosis (by Em2-ELISA) in an endemic area of Switzerland. Trans. Roy. Soc. Trop. Med. Hyg., 81, 960-964.