日本における牛のオーエスキー病の発生

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Outbreak of Aujeszky's Disease in Cattle in Japan

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Aujeszky's disease (AD) was first recognized as a fatal viral disease of the cattle and dog in 1902, and the natural infections have been reported worldwide in swine, cattle, dogs and variety of wildlife species in more recent years. In Japan, AD first occurred in swine in 1981(6) and has been increasing every year. In March 1985 we experienced the first outbreak of AD in cattle in Japan. The present report describes the epidemiologic, virologic and pathologic findings of these cases.

Three cattle, two of them housed in a combination swine-cattle fattening farm and the other housed in a dairy farm, died suddenly on the same day when symptoms first appeared. It was about 1 month following the occurrence of AD in a swine herd. These two cattle farms were about 700–800m in distance from the swine herd. In the fattening herd, about 170 beef cattle and 800 feeder swine were housed, and some of them were reared together. The disease occurred in two beef cattle weighing approximately 250 Kg. The first case was observed on March 19, 1985 and the other appeared on the 24th of the same month. In the dairy herd, housing 21 cows and 12 heifers, one of the cows died suddenly on April 1. Common clinical signs observed in three cattle were salivation and nervousness. Pruritus was observed in two animals on the face under the right eye in second case and on the right shoulder of the third case.

The three animals were necorpsied, and the heart, lung, liver, kidney, spleen, brain, nasal swab, milk (cow only) and skin (those showed pruritus) samples were taken for etiologic and pathologic examinations. The specimens for pathological examination were fixed in 10% buffered formalin, dehydrated in alcohol, embedded in paraffin, sectioned and stained with hematoxylin and eosin (HE). Ten percent suspension of each samples was made with Earle's solution, and the supernatants after centrifugation at 2500rpm for 10 min. were filtered through a 450nm membrane filter. These filtrates were inoculated in a 0.2-ml amount to cloned porcine kidney (CPK) cells (7) grown on coverslips or tubes. The coverslip cultures were fixed with acetone after 24 to 48 hours and stained with a fluorescent antibody to ADV. Tube cultures were observed daily under an inverted microscope for cytopathic effect (CPE) for 7 days. Paired serum samples were obtained from both cattle and swine on the day of disease outbreak and at the end of May. Antibodies to ADV were examined by serum neutralization test or enzyme-linked immunosorbent assay (ELISA).

No characteristic gross lesion was observed except falling–out of fur and flush of cutaneous localized alopecia and reddening of the skin in two ainmals with pruritus. Histrogic lesions were found in the central nervous system (CNS). They consisted of acute neuronal degeneration and mild cellular infiltlation in the forelobes and medulla oblongata. Intranuclear inclusion bodies were present in the affected nerve cells and in neuroglia cells in all cases (Fig. 1).

Virus agents were isolated from the brain (3/3), tonsil (2/2) and skin (1/2) (Table 1). The CPE characterized by rounding of the cells was observed at about 18 to 24 hours after inoculation of the samples. Intranuclear inclusions were observed in the infected cells by May-grünwald-Giemsa stain. These virus isolates were identified as Suid herpesvirus 1 (ADV) by neutralization test and fluorescent antibody staining (Fig. 2).

When paired serum samples from beef cattle and feeder swine in the fattening farm were tested for antibodies to ADV, neutralizing antibodies were detected in none of the samples. In swine, however, 50% of serum samples were positive in March and 100% were positive in May when they were tested by ELISA (Table 2). Cows of the dairy farm tested for the antibody to ADV were all negative by serum neutralization test (Table 2). On the other hand, sera collected

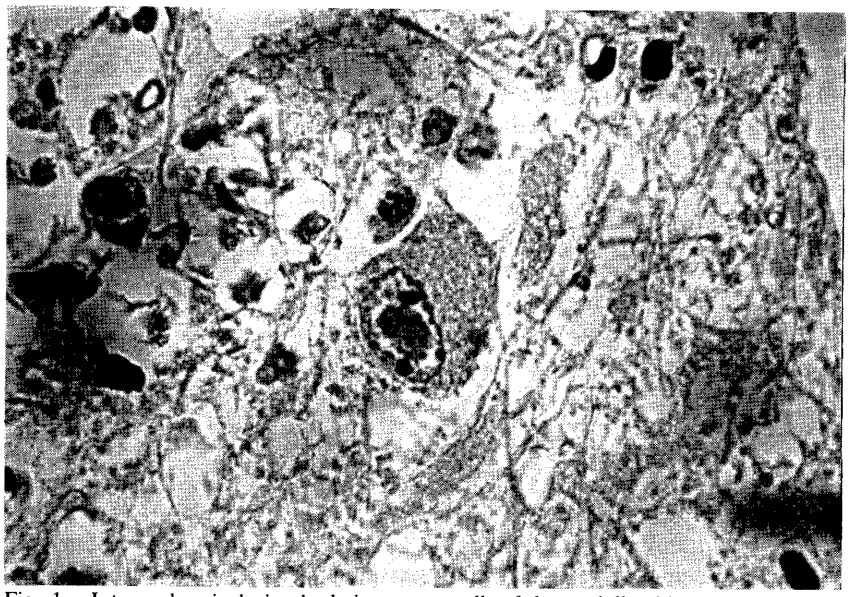

Fig. 1. Intranuclear inclusion body in a nerve cells of the medulla oblongata of the beef cattle died on March 24, 1985. HE stain, ×1,000.

Table 1. Isolation of virus from organs of three affected cattle

Organs	Animal No.		
	1[a)]	2[a)]	3[b)]
Heart	−	−	−
Lungs	−	−	−
Liver	−	−	−
Kidneys	−	−	−
Spleen	−	−	−
Brain	+[c)]	+	+
Tonsil	+	+	·
Skin	·[d)]	+	−

a) Beef cattle died in March.
b) Cow died in April.
c) Viral agents which produce the CPE characterized by rounding of cells. They were identified as ADV by immunofluorescence and neutralization test.
d) Not tested.

from a swine herd, housed 32 sows and 5 boars, adjacent to the dairy farm, turned all positive in May although they were negative in March (Table 2).

Pathologic findings in CNS were similar to those previously reported in swine [6] and cattle [4, 5, 8]. Although BEASLEY *et al.* [1] described that the virus was isolated from only one of five brains of naturally infected cattle, all three cases gave positive virus isolation from the brain in the present study. BITSCH [3] classified the disease patterns in cattle into two groups according to the site of pruritus. The group 1 has pruritus in the anterior part of the body and the virus is isolated mainly from the medulla oblongata and medulla thoracalis, while group 2 with posterior body pruritus has the virus in the medulla lumbalis. This suggests localized distribution of the virus.

BIRONT *et al.* [2] described that the infective dose of the ADV to cattle was geater than 10^5TCID50. CRANDELL [4] *et al.* suggested that the viruses in the nasal discharge quickly lose infectivity although its initial titers in experimental cases were as high as 10^2 to 10^5TCID50. They also suggested that there is a less chance of contact between infected and susceptible cattle because of relatively short incubation and course of disease before death. Therfore, horizontal transmission of this disease among cattle is considered unlikely.

In the present study, there were no serologic and epidemiologic evidences of virus transmission at least in two cattle herds since there was no antibody detectable either at the time of and after the outbreak, and there was no additional case of cattle AD. On the other hand, transmis-

Fig. 2. ADV antigens in CPK cell culture stained with fluorescent antibody to ADV. Eighteen hours after infection. ×400.

Table 2. Detection of antibodies against ADV by neutralization test or ELISA in sera of cattle and swine raised in the affected farms

Farm	Animal	Date of sampling	No. of positive/ No. of examined[a)]
A (Fattening)	Cattle	1985.3.20	0/10
		1985.5.28	0/10
	Swine	1985.3.20	5/10
		1985.5.28	10/10
B (Dairy)	Cattle	1985.4. 1	0/10
		1985.5.25	0/20
C (Breeding)	Swine	1985.3.18	13/34
		1985.5.15	11/11[b)]

a) Cattle sera were tested by neutralization test and swine sera were tested by ELISA.
b) Negative on March 18, 1985.

sion in swine herds was confirmed. Therefore, these results suggest that infected swine may play an important role in the transmissin of AD to the other animal populations, and care should be taken to control this potential source of infection.

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要　　約

日本における牛のオーエスキー病の発生：松岡俊和，飯島雄二，桜井健一，栗原富男，鴻巣泰，田宮和枝，沖三雄，播谷亮[1)]，今田忠男[1)]（埼玉県大宮家畜保健衛生所，[1)] 農林水産省家畜衛生試験場）――牛と豚を同時に肥育している1農家の牛2頭及び酪農家の乳牛1頭が，著しい流延を示し，2頭には，掻痒症が認められ発症後各々約2，7，10時間で死亡した。脳（3/3），扁桃（2/2），掻痒部皮膚（1/2）から豚腎株化細胞の円型化を示すウイルスが分離され中和試験及び蛍光抗体法により suid herpesvirus 1 と同定された。全例に共通して非化膿性脳炎と神経細胞における核内封入体が観察された。これらの所見から，わが国で最初の牛のオーエスキー病と診断され，血清学的に当該地域の豚群の間でウイルスの伝播があったことが明らかとなった。