

The First Outbreak of Aujeszky's Disease in Swine in Japan

By AKIO FUKUSHO

Biological Products Research Division, National Institute of Animal Health
(Yatabe, Tsukuba, Ibaraki, 305 Japan)

Aujeszky's disease is caused by Suid herpesvirus 1. Since Aujeszky first reported the disease in Hungary in 1902¹⁾, the distribution of the disease is now world-wide^{3,6)}. There has been a marked increase in the number of recorded cases in most affected countries, with rapid escalation to epidemic proportions in Holland, France, Belgium and the United States²⁾. Recently, the occurrence of the disease has been reported in several regions of Southeast Asia, Taiwan, Malaysia, Singapore, Thailand and continental China, however, there had been no occurrence of the disease among any animal populations in Japan.

In February, 1981, an outbreak of Aujeszky's disease occurred for the first time in a pig farm in Japan.

Clinical signs

In January to February, 1981, Aujeszky's disease was observed among pigs in a small scale farm in Yamagata Prefecture. Table 1 shows the outline on outbreak of Aujeszky's disease. A total of 378 pigs (44 sows, 2 boars, 280 fattening pigs and 52 suckling pigs) and 11 sheep have been kept in the affected farm. Recently, 14 gilts and 10 sheep have been introduced from the other farms. Great grand parent (GGP) stock of the former have been imported from Holland and the latter from the United States.

Eighty-seven of 119 suckling piglets from 12 sows died after showing the symptoms of the disease. The disease was generally accompanied with depression, dull suckling and nervous symptoms including muscular spasms, muscular trembling, paralysis, incoordination and posterior paresis with high mortality.

Table 1. Outline on outbreak of Aujeszky's disease

District of the affected farm	Yamagata Prefecture
No. of raising pigs	44 sows 2 boars 280 fattening pigs 52 suckling pigs
Date of occurrence	Jan. to Feb. in 1981
No. of the affected pigs	Eighty-seven of 119 suckling piglets from 12 sows died with typical symptoms
Clinical signs	Depression Dull suckling Nervous symptoms including muscular spasms, muscular trembling, paralysis, incoordination and posterior paresis
Recent introduction	4 gilts May in 1980 5 gilts Oct. in 1980 5 gilts Dec. in 1980 10 goats Oct. in 1980

Pathological changes

In gross lesions, petechiation of the renal cortex was often seen in affected suckling piglets, however, no changes were observed except for pneumonia in some cases.

The histopathologic changes were observed in the central nervous systems. They were mainly nonsuppurative meningo-encephalomyelitis with extensive neuronal and glial necrosis. The nuclear inclusion bodies were seen in nervous and glial cells which showed degeneration.

By the fluorescent antibody staining, the specific viral antigen was detected in tonsil and cerebellum of piglets with nervous symptoms.

Virus isolation and identification

The cytopathic virus was isolated in the cultures of PK-15 and CPK cells from the brain and tonsil of piglets with nervous symptoms. The cytopathic effect appeared within 24 hr after inoculation and was characterised by rounding and fusion of cells

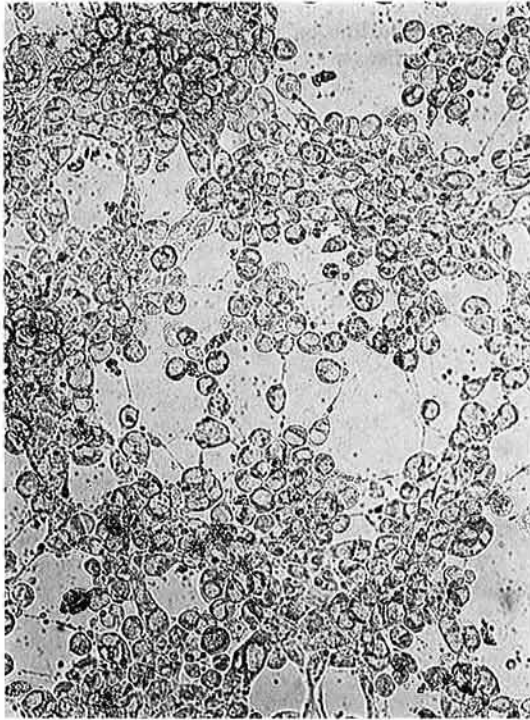


Plate 1. Cytopathic effect by isolated virus

(Plate 1). The cytopathic effect was totally inhibited when the samples were mixed with antiserum to Indiana S strain of Suid herpesvirus 1 before inoculation. The fluorescent antibody staining revealed the presence of Suid herpesvirus 1 antigen in the infected cells (Plate 2). In electron microscopy, virus particles have a typical herpesvirus morphology (Plate 3).

Epizootiological survey

In neutralizing antibody survey in affected farm, the sheep imported from the United States and the wild rats caught in the affected farm, were negative for antibody. Neutralizing antibody was detected not only from the affected sows but also 4 healthy gilts introduced from the grand parent (GP) farm of X pig (Table 2) Fourteen gilts had been introduced from the GP farm approximately one month to one year before occurrence of the disease. The GGP farm imported GGP stock of the X pig from Holland. There were 1 GGP, 11 GP and approximately 300 parent stock (PS) farms of X pig in Japan.

In the GGP farm, neutralizing antibody of the Dutch sows imported in 1975 to 1979 was positive but not in 1980 (Table 3). The findings of neutralizing antibody survey in the GGP farm showed that there were 663 antibody positive pigs out of 1715 raising pigs (Table 4). A few antibody positive pigs

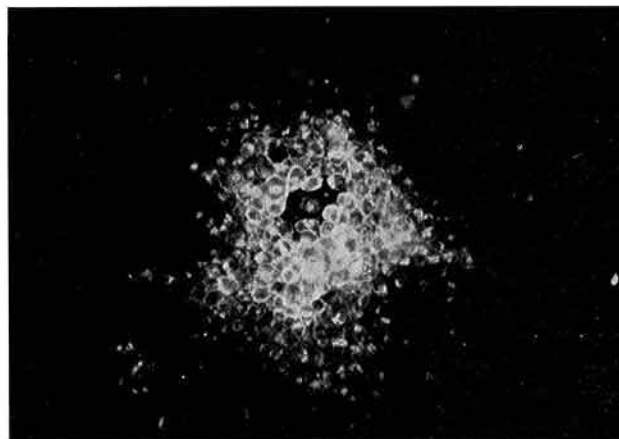


Plate 2. Specific fluorescence in infected cells

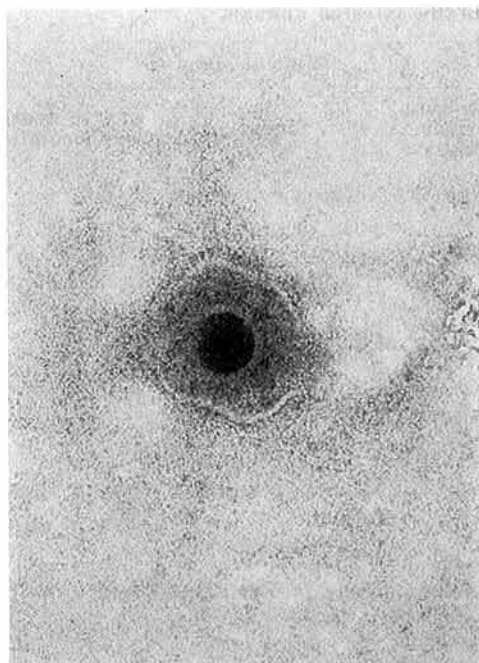


Plate 3. Viral particle morphology
($\times 100,000$)

Table 2. Neutralizing antibody survey on the affected farm

Animals	Ratio of antibody positive pigs
Sow	8/8*
Gilt introduced	5/5
Sheep	0/10
Wild rat	0/10

* No. of antibody positive pigs/No. of pigs tested.

were detected in 7 of 11 GP farms in each Prefecture. The GP farms have introduced GP pigs from the GGP farm in Miyagi Prefecture.

On the other hand, there were no antibody positive pigs in any other farms except for the farms related to X pigs in Japan. In March, 1981, other outbreaks of Aujeszky's disease were found in the PS farms in Ibaraki and Iwate Prefectures. These cases were also related to X pigs from Holland.

Table 3. Neutralizing antibody positive pigs on the GGP farm in each imported year

Year imported	Ratio of antibody positive pigs
1975	3/9*
1976	12/13
1978	10/10
1979	2/10
1980	0/10

* No. of antibody positive pigs/No. of pigs tested

Table 4. Neutralizing antibody positive pigs in GGP and GP farms

Farm	Location (prefecture)	Ratio of antibody positive pigs
GGP	Miyagi	663/1715*
GP 1	Iwate	15/18
GP 2	Gunma	0/181
GP 3	Gifu	3/153
GP 4	Gifu	8/102
GP 5	Okayama	1/70
GP 6	Miyazaki	1/94
GP 7	Akita	3/173
GP 8	Akita	0/102
GP 9	Hokkaido	0/133
GP 10	Fukuoka	0/39
GP 11	Fukushima	2/215

* No. of antibody positive pigs/No. of pigs tested.

Experimental infection

Table 5 shows results of experimental infection to some animals. One-day-old piglets showed nervous symptoms and died after 3 to 4 days of intranasal inoculation. Sixty kg pigs showed the pyrexia and depression in a short duration, however, they recovered within 1 week after inoculation. Cattle, goat, dog, cat and rabbit showed typical pruritus and died after 3 to 7 days of subcutaneous inoculation. By intranasal inoculation, cattle, dog, and goat did not show pruritus but depression and died after 4 to 5 days of inoculation.

Table 5. Clinical signs of experimentally infected animals

Animals	Weight or age	No. used	Samples	Routes of inoculation	Clinical signs		
					Incubation periods (days)	Signs	Day to death after inoculation
Pig	1-day-old	10	EM	IN	2	Nervous symptoms	3 to 4
	60 kg	2	EM	SC	3 to 4	Pyrexia (40 to 41°C) Depression	Recovered
		2	TC	SC			
		2	EM	IN			
		2	TC	IN			
Cattle	500 kg	1	TC	SC	5	Pruritus	7
	300 kg	1	TC	IN	4	Depression	5
Goat	40 kg	1	TC	SC	3	Pruritus	4
	50 kg	1	TC	IN	3	Nervous symptoms	3
Dog	7 kg	1	TC	SC	2	Pruritus	3
	1-month-old	1	TC	OA	3	Nervous symptoms	4
	1-month-old	1	TC	IN	3	Nervous symptoms	4
Cat	2 kg	1	TC	SC	3	Pruritus	4
Rabbit	2 kg	5	EM	SC	2	Pruritus	3

EM: 10% suspension of tonsil and brain from the affected piglets in Yamagata Prefecture.

TC: 1 to 2 passaged virus in culture of PK-15 cells.

IN: Intranasal inoculation.

SC: Subcutaneous inoculation.

OA: Oral administration.

Conclusion

In January to February, 1981, an outbreak of Aujeszky's disease occurred spontaneously for the first time in a pig farm in Japan. The disease was diagnosed as Aujeszky's disease by clinical, virological and pathological investigation. The cytopathic virus was isolated in the cultures of porcine kidney established cell lines and identified as Suid herpesvirus 1 by fluorescent antibody staining, neutralization test and electron microscopy.

The findings of neutralizing antibody survey in the affected farm showed that gilts introduced from GP farm of the X pig in December, 1980 were positive for antibody. There were 663 antibody positive pigs out of 1715 raising pigs in the GGP farm of X pig in Miyagi Prefecture. We presume that the first outbreak of Aujeszky's disease in a pig farm was due to introduction of healthy carrier of X pigs from the GP farm. The antibody positive ad healthy carrier might be

imported from Holland a few years ago.

The baby pigs born to a susceptible sow show the typical symptoms of Aujeszky's disease and the greatest mortality rate. In mature pigs, the mortality rate is very low and the infected pigs immediately recovered, but become carrier. Such pigs occasionally excrete the virus^{4,5}. To prevent the spread of infection, carrier pigs with antibody must be slaughtered.

The most of antibody positive pigs in GGP and GP farms have already been slaughtered to prevent the spread of the disease. We are now continuing check for detecting antibody positive pigs in PS farms of X pig by enzyme-linked immunosorbent assay.

References

- 1) Aujeszky, A.: Ueber eine neue Infektionskrankheit bei Haustieren. *Centralbl. Bakteriologie, Parasitenkd. Infektionskr. I, Orig.*, 32, 353-357 (1902).
- 2) Basinger, D.: A brief description of Aujes-

- zky's disease in Great Britain and its relative importance. *Br. Vet. J.*, 135, 215-224 (1979).
- 3) Baskerville, A.: Aujeszky's disease in pigs. *Vet. Bull*, 43, 465-480 (1973).
 - 4) Beran, G. W. et al.: Persistence of pseudorabies virus in infected swine. *J. Am. Vet. Med. Assoc.*, 176, 998-1000 (1980).
 - 5) Davies, E. B.: & Beran, G. W.: Spontaneous shedding of pseudorabies virus from a clinically recovered postparturient sows. *J. Am. Vet. Med. Assoc.*, 176, 1345-1347 (1980).
 - 6) Gustafson, D. P.: Pseudorabies. In Diseases of swine, 5th ed., Dunne, H. W. & Leman, A. D., eds., The Iowa State University Press, Ames, Iowa, 209-223 (1981).

(Received for publication, January 22, 1982)