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Diversity of Clinical Signs in Natural Scrapie Cases Occurring in Japan

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Abstract
During the period 1988 to 1991, postmortem brain tissues were examined in 5 cases of pathologically confirmed ovine scrapie in Japan. Although most of tissues were collected from sheep in Hokkaido, some brain tissues originated from sheep raised in other areas. All these sheep which had been transferred from a farm in Hokkaido with a past history of scrapie in Suffolk sheep, died for no obvious reasons. All the cases during the period 1988 to 1991 occurred in Corriedale sheep. It is likely that sheep-to-sheep transmission has taken place in Hokkaido, and that a new of scrapie disease has been spreading in Japan.

Discipline: Animal health
Additional key words: purion, spongiform encephalopathy, unconventional virus

Scrapie, the transmissible spongiform encephalopathy of sheep has been recorded for over 200 years. As scrapie is the most common and geographically widespread spongiform encephalopathy, it is most likely that the scrapie agent is the initial source of other types of spongiform encephalopathy, such as bovine spongiform encephalopathy (BSE), transmissible mink encephalopathy (TME), feline spongiform encephalopathy (FSE) and spongiform encephalopathy in five species of exotic ungulates (nyala, greater kudu, eland, gemsbok and Arabian oryx)[7]. Since the occurrence of the outbreak of scrapie in Hokkaido in 1981, we have attempted to study the pruritus type and ataxia type of scrapie in sheep based on histopathological examination and western blot analysis (WBA). In the past several years we studied diseased sheep from all over Japan. All the cases were diagnosed as having scrapie based on histopathological examination. While some of the cases showed signs of pruritus and ataxia, several cases did not show any clinical signs (Table 1).

From 1989 to 1990, four Corriedale sheep (less than 2 years old) died for no obvious reasons. Based on histopathological examination, a diagnosis of scrapie was made in Hokkaido[6] as well as in a suburb of Tokyo and in Kyushu (Fig. 1). In addition, a few cases of scrapie with pruritus were reported in Suffolk and Corriedale sheep in Japan in the past 5 years[4-6]. All these sheep had been transferred from a farm in Hokkaido with a past history of scrapie

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Table 1. Clinical signs of scrapie in Japan

	Pruritus type	Ataxia type	Asymptomatic type
Age of sheep	3-4 years old	1-2 years old	2 years
Number of sheep*	28	2	1
Reported in	1984-1987	1988-1990	1991
Breed of sheep	Suffolk, Corriedale	Corriedale	Corriedale
Symptoms	Pruritus, Ataxia, Paralysis	Ataxia, Paralysis	-
Duration of disease	2-3 months	0.5-1 month	-
Histopathology	Spongiform encephalopathy	Spongiform encephalopathy	Spongiform encephalopathy

* Number of sheep observed in our institute.

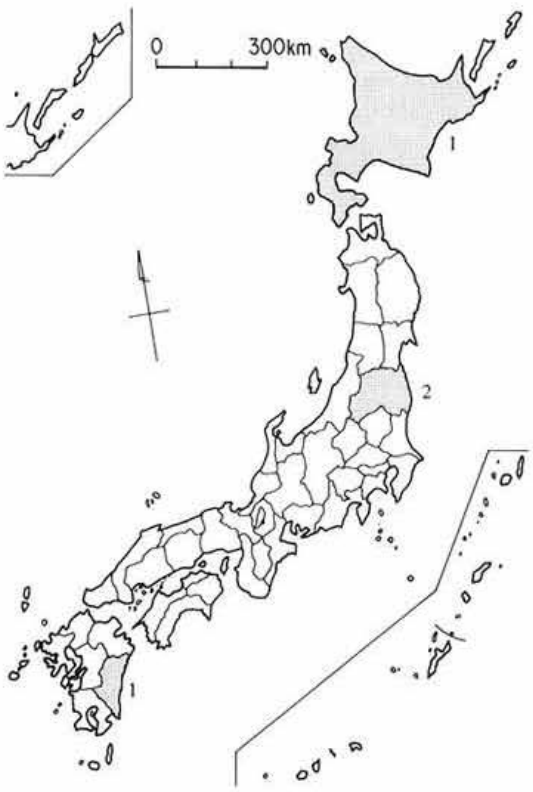

Fig. 1. Distribution of sheep affected with scrapie without pruritus from 1988 to 1991 in Japan

The shaded areas indicate the locations where the affected sheep were reported and where the diagnosis of scrapie was confirmed histopathologically. Figures indicate the number of sheep in each prefecture.

in Suffolk sheep. Some of the animals were pregnant, and histopathological examination and WBA were performed.

It was reported earlier that occasional incidences of temporal and spatial clustering had taken place on a non-familial basis in a few sheep centers in Hokkaido[5]. This geographical and temporal clustering, however, did not apply to the majority of the cases as mentioned above. It was recognized that all of these cases with the ataxia type of scrapie were familial, and all the sheep with the ataxia type of scrapie in Japan belonged to the Corriedale breed. In the recent cases reported in England, 79 exhibited pruritus and emaciation, 36 showed pruritus, emaciation and hyper-aesthesia and 18 displayed these three signs in addition to ataxia. However, 26% of dead sheep were diagnosed as scrapie cases based on histopathological examination. It was concluded that scrapie cannot be consistently diagnosed based on clinical signs alone, even by experienced veterinary surgeons[1,3]. Even in our cases, scrapie in sheep has not been easily diagnosed based on clinical signs consisting of persistent pruritus, weight loss, nervousness and motor incoordination. In one of the Corriedale sheep, which was otherwise healthy and did not show any clinical signs, scrapie was diagnosed based on histopathological examination. Scrapie associated fibril (SAF) protein was detected from the brain. The

forms of natural scrapie are more diverse than usually described in the veterinary literature[1].

The most effective method of control of scrapie consists of a combination of selective culling and alternative husbandry. Selective culling can be very effective in flocks which already have breeding records. Unfortunately, flock recording is not a common practice in Japanese farms, and it takes at least 3 years from the first appearance of scrapie to collect sufficient records to initiate reliable culling. Undoubtedly, selective culling would be more efficient if a diagnostic test were available to identify the infected animals. Detection of the SAF protein could therefore be used in the diagnosis of scrapie before culling. In a previous report it was indicated that the SAF protein from lymph nodes could be used for the preclinical diagnosis of scrapie[2]. However, since a surgical incision is necessary for isolating the SAF protein from lymph nodes for the preclinical diagnosis, this method is therefore not very practical. Current experiments indicate that scrapie agents could be detected from the placentae of naturally infected animals through inoculation into mice intracerebrally. It takes approximately 6 months to detect histological lesions in mice brain (data not shown). Therefore it may become possible to diagnose the scrapie infection in a large number of sheep by the isolation of these transmissible agents from the placentae during the pre-clinical stage without requiring any surgical procedure.

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