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STUDIES ON "KASEN" OF HORSES IN HOKKAIDO

II. RESULTS OBTAINED IN 1954

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INTRODUCTION

In the previous paper,[3] the authors described the results of the first study, conducted in 1953, on the clinical, hematological, pathological and the parasitological observations for "Kasen" of horses in Hokkaido.

The present work was conducted in the same manner as last year. The symptoms of "Kasen" of horses in Japan, on the basis of the clinical findings, seem to be similar to those of "Qeensland itch" or "Allergic dermatitis" caused by the bites of sandflies, *Culicoides robertsi* reported by RIEK. Further, the interesting fact was found that the affected horses might be placed in the allergic conditions from the results of "Allergin" therapy. The authors may generalize the experimental results as follows.

ETIOLOGICAL EXAMINATIONS

1. Clinical Observations

Out of the present 18 cases, as indicated in table 1, 9 bred in Futomi district (Nos. F 1~9) and another 9 in Kakuyama district (Nos. K 1~9). Seven cases of Kakuyama district were also studied in 1953. All these horses were well nourished, female mongrel Percheron,

of every case. The average numbers of erythrocytes and leucocytes were respectively 6.69 (5.77~8.05) millions and 8,200 (6,000~10,800). The differential count of leucocytes showed a remarkable increase in eosinophilic cells: it was 7.5 (3.0~12.5) % on the average and was found to increase over 5% in 16 cases out of which 5 showed a high increase of over 10%.

2. Parasitological and Histopathological Observations

Living dermo-microfilariae were detected in 2 out of 18 cases: about 40 bodies from withers of No. F 2 and several from rump of No. K 7. In the morphological examinations they were found to have no sheath and their body length and width, as indicated in table 2, were respectively 191.6 (150~225) μ and 3.5 (3.0~4.2) μ. Average values of measurements

TABLE 2. *Size of Microfilaria (10 bodies)*

TABLE 1. *Experiment Horses*

HORSE NO.	AGE	HAIR COLOR	BODY WEIGHT (kg)	RECURRENCE OF DISEASE	REGIONS AND DEGREES OF PATHOLOGICAL CHANGES								ITCHINESS
					Up-neck	Low-neck	Withers	Shoulder	Fore-head	Back	Rump	Tail	
F 1	5	Black	550	2	+	+	+	−	−	−	−	−	+++
" 2	14	"	450	9	+	+	+*	−	−	−	−	+	+++
" 3	10	"	580	8	+	++	++	−	−	−	−	+++	+++
" 4	7	"	500	5	+	+	+++	−	−	−	−	+++	+++
" 5	3	Brown	480	2	++	++	+++	−	−	−	−	+++	+++
" 6	4	Black	480	3	++	++	++	−	−	−	+	+++	+++
" 7	19	"	550	16	+++	+++	+++	−	−	+	+	+++	++
" 8	9	"	580	8	+++	+++°	+++	+++	+	−	+	+++	+++
" 9	19	"	500	2	+	+	−	−	−	−	−	−	++
K 1	7	Black	460	2	−	+	±	−	−	−	−	+	+
" 2	5	Black-brown	450	2	+	+	+	+	−	−	−	+	+
" 3	10	"	430	1	++	++°	++°	++°	−	−	−	+++	+++
" 4	3	"	400	2	+	+	+	−	−	−	−	++	++
" 5	3	Chestnut	400	2	++	+++	++	−	−	−	−	+++°	+++
" 6	7	Brown	500	5	±	±	±	−	−	−	−	+	+
" 7	4	"	400	3	+	+	+	−	−	−	−*	+	+
" 8	8	"	430	3	++	+++	+	−	−	−	−	++°	+++
" 9	5	"	400	4	+	+	−	−	−	−	−	+	+

* Dermo-microfilariae were detected from the region.

° Ulcer formation.

of every case. The average numbers of erythrocytes and leucocytes were respectively 6.69 (5.77~8.05) millions and 8,200 (6,000~10,800). The differential count of leucocytes showed a remarkable increase in eosinophilic cells: it was 7.5 (3.0~12.5) % on the average and was found to increase over 5% in 16 cases out of which 5 showed a high increase of over 10%.

2. Parasitological and Histopathological Observations

Living dermo-microfilariae were detected in 2 out of 18 cases: about 40 bodies from withers of No. F 2 and several from rump of No. K 7. In the morphological examinations they were found to have no sheath and their body length and width, as indicated in table 2, were respectively 191.6 (150~225) μ and 3.5 (3.0~4.2) μ. Average values of measurements

TABLE 2. *Size of Microfilaria (10 bodies)*

NO.	LENGTH (μ)	WIDTH (μ)
1	188	3.6
2	150	3.0
3	203	3.6
4	188	3.0
5	203	3.6
6	188	3.6
7	210	3.6
8	225	4.2
9	173	3.6
10	188	3.6
Average	191.6	3.5

of fixed points of 5 bodies are as follows: body length 216.0~219.6 μ; body width 3.4~3.6 μ; ENC 3.6~6.0 μ; NR 36.6~57.5 μ; EP 79.3~82.2 μ; EC 85.4~87.5 μ; G_1 136.7~164.7 μ; G_2 142.8~183.0 μ; G_3 148.9~189.1 μ; G_4 155.0~195.2 μ; and AP 161.1~201.3 μ. The results of measurements were compared with those of other workers.[8,9,11] The specimens closely resemble to the microfilariae of *Onchocerca cervicalis* and also their nucleic distribution agreed fairly with that of them. Detection of microfilariae from sandflies caught in 2 districts were unsuccessful because their appearances were limited by time or by weather and of the gathered sandflies there were too few for detailed examination.

On the histopathological examination, lesions were generally lighter than those of the last year. Two cases indicated eczematous lesions while hyperkeratosis was observed in 9 patients. The former 2 cases had recognizable eczema; they exhibited various degrees of crust formation of epidermis, hyperkeratosis and neutrophilic cell accumulation in the corium layer. Microscopic examination in 1 case was conducted at 1 week after treatment, however, the findings were almost similar to those of the before-treatment-examination.

TABLE 3. *Therapeutic Methods*

GROUP	MEDICINE	NO. OF CASES	METHODS OF MEDICATION	AT 1ST CURE	REST (day)	AT 2ND CURE	OBSERVATION PERIOD AFTER TREATMENT (day)
I	Stinal / Neostinal	5	Intravenously	Stinal, Sb 3 mg/kg per day for 7 days	5	Neostinal, Sb 5-6-7-7-7 mg/kg per day for 5 days	14
II	Neostinal	5	Subcutaneously	Each 5 ml for 10 parts of left and right neck for 5 days	4	Identical with at 1st cure	14
III	Supatonin	4	*Per os*	50 mg/kg per day for 5 days	.	.	14
IV	Hetrazan syrup	4	*Per os*	50 mg/kg (add to 1000 ml of water) per day for 10 days	.	.	14
V	Solminol	2	Intravenously	As 0.9-1.0-1.1-1.2-1.3 mg/kg per day for 5 days	4	As 1.4-1.5-1.6-1.7-1.8 mg/kg per day for 5 days	14
	Solminol & Allergin	1	Intravenously & Subcutaneously	As 0.9~1.3 mg/kg, Allergin 100 mg per day for 5 days	4	As 1.4~1.8 mg/kg, Allergin 100 mg per day for 5 days	14
	Allergin	1	Subcutaneously	100 mg per day for 5 days	4	Identical with at 1st cure	14

TABLE 4. *Results of Treatments*

GROUP	MEDICINE	NO. OF HORSES	METHODS OF MEDICATION	AT 1ST CURE SLIGHT RECOVERY	AT 2ND CURE SLIGHT RECOVERY	AFTER 1 WEEK Recovery	AFTER 1 WEEK Relapse	AFTER 2 WEEKS Recovery	AFTER 2 WEEKS Relapse
I	Stinal / Neostinal	5	Intravenously	2 (Stin.)	2 (Neost.)	0	4	0	0
II	Neostinal	5	Subcutaneously	3	5	5	0	4	1
III	Supatonin	4	*Per os*	1	.	0	1	0	0
IV	Hetrazan syrup	4	*Per os*	2	.	0	0	0	2

V	Solminol	2	Intravenously	0	0	0	0	0	0
	Solminol & Allergin	1	Intravenously & Subcutaneously	1	1	1	0	1	0
	Allergin	1	Subcutaneously	1	1	1	0	1	0

TABLE 5. *Hematological Findings in the Course of the Treatments*

GROUP	TIME OF EXAMINATION	R. (million)	W.	DIFFERENTIAL COUNT					
				N-St.	N-Seg.	Ly.	Mon.	Eos.	Bas.
I	Before	7.14	9,200	0.4	52.8	39.9	0.9	6.0	0
	Just after 1 cure	6.37	8,600	0.3	42.0	51.7	0.3	5.7	0
	7 days after 2 cures	7.87	9,500	0.4	47.5	45.9	1.6	4.5	0.1
II	Before	6.82	7,800	0	52.2	39.6	0.9	7.2	0.1
	Just after 1 cure	6.51	8,700	0.7	59.4	36.2	0.7	6.5	0.1
	10 days after 2 cures	6.61	7,900	0.1	55.7	34.9	2.7	6.5	0.1
III	Before	6.69	7,300	0.6	52.5	37.0	1.2	8.7	0
	Just after 1 cure	7.41	9,300	0	44.7	47.6	0.3	7.1	0.3
	10 days after treatment	6.60	7,600	0	50.2	42.0	1.2	6.6	0
IV	Before	6.12	8,400	0	59.0	30.9	1.4	8.6	0.1
	Just after 1 cure	6.50	7,500	0.4	55.3	36.9	1.2	5.5	0.7
	10 days after treatment	6.76	8,100	0.1	56.9	36.0	2.4	4.5	0.1
V	Before *	6.80	8,000	0	57.5	32.2	1.2	9.0	0.1
	Just after 2 cures *	6.79	7,900	0.1	57.5	36.4	1.0	5.0	0
	Before **	6.30	8,000	0	47.5	44.5	1.5	6.5	0
	Just after 2 cures **	7.00	8,200	1.5	50.5	41.0	1.0	5.0	1.0

Note: Numbers indicate average values.
* Applied Solminol alone. ** Applied Solminol + Allergin and Allergin alone.

THERAPEUTIC TREATMENTS

Antimony and arsenic compounds, piperazine derivative and antihistamine preparation were used respectively for treatments. In the therapeutic treatments, 22 patients in total were supplied and they were classified as 5 groups for description of the experimental results. The methods and results of experiments are shown in tables 3~5.

1) In the 1st group, 5 comparatively mild cases were selected and antimony compounds ("Stinal" and "Neostinal") were used intravenously on the patients. "Stinal" was injected in the amount of Sb 3 mg/kg of body weight per day for 7 days, for the 1st cure, and 5 days later, "Neostinal" was applied intravenously at the rate of Sb 5~7 mg/kg of body weight daily for 5 days, for the 2nd cure. At the end of the 1st and the 2nd cures 2 cases each (4 cases or 80% in total) became clinically lighter but all of them relapsed in the 1st week after treatment.

In hematological findings, no alterations were found in erythrocyte numbers, whereas eosinophilic cells decreased to 4.5% in percentage from 6.0% of the before-treatment on the average at 1 week after treatment.

2) The 2nd group consisted likewise of 5 cases. For injection area it was selected the cervical subcutanes located at the low parts of the cervical lesions. "Neostinal" was injected subcutaneously once daily for 5 days, for the 1st cure, at the rate of 5~10 ml per 1 part for several areas to both sides. Then after 4 days interval the injection of the 2nd cure was commenced. Three cases (60%) became clinically lighter just after the 1st cure, and also after the 2nd cure all of the others entirely recovered. Two weeks after treatment 1 case relapsed, but the other cases showed no sign of relapse at all. However, the injection parts of 2 cases were swollen and at last it became necessary to perform surgical treatment on account of suppuration. In the other lesions, except for the injection parts of cervicals, itchiness and pathological dermal changes did not recover in comparison with the before-treatment-condition. Eosinophilic cells which counted 7.2% in average before treatment decreased to 6.2% after treatment.

3) In the treatment of the 3rd group, 4 patients, piperazine derivative ("Supatonin" tablet) was administered *per os* in the amount of 50 mg/kg of body weight per day for 5 days. After the 1st cure, 1 case (25%) became slightly lighter, however, it relapsed 1 week after treatment. On the blood examination, eosinophilic cells which counted 8.7% in average before treatment decreased to 6.6% on the 10th day after medication.

4) The 4th group, 4 cases, were treated with "Hetrazan" syrup of piperazine derivative. Medicine was used *per os* in the amount of 50 mg/kg of body weight daily for 10 days. Two cases became clinically lighter just after treatment, but both animals relapsed at 2 weeks after treatment. In this group, a remarkable decrease in eosinophilic cells was found, that is, 8.6% in average prior to treatment turned into 4.5% at the 10th day subsequent to treatment.

5) In the 5th group, arsenic compound ("Solminol") or antihistamine preparation ("Allergin") were used for 4 patients. "Solminol" was injected intravenously at the rate of As 0.9~1.8 mg/kg of body weight per day for 2 cures to 2 cases. "Allergin" was injected subcutaneously in the amount of 100 mg/kg of body weight daily for 5 days as 1 cure and 2 cures were applied to 1 case; the other 1 case was injected with both medicines at the

same time in manner similar to the above described. In the "Solminol" injection, no beneficial results were obtained, but a decrease of itchiness was recognized for several days. One case treated with "Solminol" and "Allergin" and another 1 case with "Allergin" alone began to recover from the middle of the 1st cure and completely recovered clinically after the 2nd cure. Skin became soft, dermatitis became slight and no sign of relapse was observed. No symptoms of relapse were found at either 2 weeks or 1 month after treatment. The percentages of eosinophlic cells of 2 cases indicated respectively 9.0 and 6.5% in average prior to treatment but they decreased to 5% in both just after the 2nd cure.

Discussion

The results of etiological study in 1954 were almost similar to those of the preceding year. With regard to the causal agents of this disease, at present, it is difficult to evaluate the evidence and to determine whether to certify the parasitic theory as right or whether the theory of nutritive and parasitic allergies have relation to this disease. In the present experiment, living dermo-microfilariae detected from 2 cases were identified with those of *Onchocerca cervicalis* reported by other workers.[4,9~11]

Appearances of microfilariae, in the present examinations, were very low in percentage. It is thought due to the fact that skin materials were limited to only small one piece (about 1 cm^2) of the whole body surface. The fact that microfilariae of *Onchocerca cervicalis* were detected may be one of bit of evidence to confirm the parasitic theory. However, some workers[8,10] have reported that microfilariae were detected also from the skin of healthy horses. Riek[4~8] reported on "Queensland Itch" or "Allergic dermatitis" of horses in Australia. He stated that 225 (80% out of 282 horses) showed the adult *Onchocerca reticulata* in the *ligamentum nuchae*, but obvious signs of the dermatitis could be detected in only 57 (25%) of these animals. Furthermore, in 57 horses amongst them these worms could be found, whilst no less than 22 (39%) had lesions of the disease. This disease was caused by the development of hypersensitivity to the bites of species of sandfly, *Culicoides robertsi* Lee & Reye, which attacked mainly the dorsal parts of the horses. Riek stated, further, that in the affected horses there was a rise in histamine content of whole blood in the summer, that they should respond to "Hapamine" (histamine azoprotein) therapy and that regular spraying with 1% DDT is to be recommended as a preventive treatment against sandflies. According to his descriptions, the symptoms of "Kasen" of horses in Japan seem to be similar to those of "Allergic dermatitis" in Australia.

In the therapeutic experiment of "Kasen", topical subcutaneous injection of "Neostinal" was somewhat effective. However the mechanism of its action is not clarified at all. Some workers[1,2,12,13] reported that piperazine derivative and

arsenic compound were effective for this kind of disease, but in the present experiments, no effectiveness was found. Use of "Allergin" alone and of "Allergin" and "Solminol" at the same time secured beneficial results. Considering from the interesting results in "Allergin" therapy, it may be proved that the patients, at least, were placed in an allergic condition. Therefore, further investigations are necessary concerning "Kasen" of horses in Japan from several view-points.

SUMMARY

Etiological and therapeutical studies on "Kasen" of horses in Hokkaido were made by the authors from the early spring to the late autumn in 1954 in the same manner as in 1953. The results thus obtained may be summarized as follows:

1. Clinical and hematological observations were almost similar to those of the preceding year.

2. Living microfilariae were detected from pieces of cutaneous tissues in 2 patients (11% out of 18 cases) and these microfilariae were identified with those of *Onchocerca cervicalis* by the morphological examinations. The detection of microfilariae from the biting insects was unsuccessful.

3. Histopathologically, 2 cases (11%) showed eczematous lesions, whilst infiltrations of eosinophilic cells were observed in all cases by employing serial sections, however no microfilariae were found at all.

4. In the therapeutic treatments, the result of the subcutaneous injections of "Neostinal" was somewhat effective, however the manner of its operation was not clarified. Use of arsenic compound ("Solminol") and piperazine derivative ("Supatonin" and "Hetrazan" syrup) did not yield beneficial results. Use of "Allergin" (anti- histamine preparation) alone and of "Allergin" and "Solminol" at the same time did obtain beneficial results.

So far as the above described data are concerned, it is thought that the patients of "Kasen" were placed in allergic conditions. Also, it is interesting fact that this disease seems to be similar to "Queensland Itch" or "Allergic dermatitis" reported by RIEK.

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