Vertical Transmission of *Hepatozoon canis* in Dogs

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**ABSTRACT.** We experienced vertical infections of puppies with *Hepatozoon canis* from 1990 to 1992. In 23 of 29 (79.3%) puppies from a total of 6 deliveries, gamonts or meronts were detected from 16 to 60 days after birth. The mother dogs were delivered of the puppies under tick-free conditions treated with an acaricide. There was no chance of infection of the puppies with *H. canis* after birth. Therefore, the vertical transmission of *H. canis* was supposed to be established in the family of dog.—**KEY WORDS:** canine, *Hepatozoon canis*, vertical transmission.


*Hepatozoon canis* infection is one of the worldwide protozoal infectious diseases of the dog. Until now *H. canis* has been known to be transmitted horizontally by the brown dog tick [3].

We reported a case of *H. canis* infection in Japan [5], afterwards we have observed the family of the infected dog. We epidemiologically investigated *H. canis* infections in the western area of Yamaguchi Prefecture [6]. During the investigations we encountered 6 cases of *H. canis* infection within a dog family from 1990 to 1992.

They consisted of 6 litters from 3 bitches. A family in the genealogical table comprised two mothers (A and B) and their 21 puppies. Another family was made up of one mother and her 8 puppies. Mother A was a 6-year-old beagle. She gave birth to a total of 11 puppies at three deliveries from 1990 to 1992. Mother B was also a beagle and born by mother A in 1989. She was delivered twice of a total of 10 puppies from 1991 to 1992. Both mothers have shown no clinical symptoms of *H. canis* infection, but gamonts have been continuously seen in the peripheral blood. They were kept in cages that had been treated with an acaricide after delivery (litter case 1) or had been kept in cages treated with an acaricide for 30 days before delivery (litter case 2 to 5). Mother C was a beagle and was raised in a place different from the other families. She had no blood-relation to the other families and was raised under different conditions. She was born in 1990 and delivered of 8 puppies in 1992. These litter mates and their mother were kept free from tick infestation by using an acaricide (litter case 6).

Dogs were examined for gamonts in the peripheral blood, and meronts were confirmed by histopathological examination of the main visceral organs of puppies that died.

In the litter cases 1 to 5, gamonts were found in 14 puppies 21 to 31 days after birth (Fig. 1a). Gamonts first appeared in 0.02 to 0.4% of the leukocytes and increased in number slightly over a period of a few months with a peak of 3.3%. Meronts were found in the spleen of one of 3 dead puppies at 16 days of age. The other two puppies had no transparent meronts in the main visceral organs.

No ticks were seen on the body surface of mothers A and B and their puppies until gamonts were detected in the peripheral blood. In the litter case 6, we checked only 4 puppies on the parasites at 60 days of age. In this case, four puppies already had gamonts in 0.05 to 0.2% of the leukocytes (Fig. 1b).

In the life cycle of *H. canis*, horizontal transmission has been known; a dog was infected by ingestion of infected brown dog tick [3]. No vertical transmission of *H. canis* in the dog has been reported, but a case of *H. griseesciuri* in a wild grey squirrel has been reported [2]. Two weeks to 2 months old puppies were reported to have gamonts of *H. canis* in the Philippines and Nigeria [1, 4]; however, they were not investigated on the existence of ticks and their environments and were not checked whether their...
mothers were infected with *H. canis* or not. Nordgren and Craig [7] attempted experimental transmission of *H. canis* to a few dogs by feeding them crushed infected ticks and detected gamonts in the circulating leukocytes, over a period of 3 weeks of one dog that showed severe clinical symptoms. In the present study 23 puppies from 6 deliveries will have no chance to ingest ticks after their birth, because acaricidal treatment has been applied to their cages. Therefore, puppies will have no chance of infection with *H. canis* after their birth, so they must have been infected with the parasite originating from their mothers. Our investigation confirmed that spontaneous *H. canis* infection was established in the puppies at the earliest period of life.

It is known that *H. canis* macromeronts develop and release merozoites in the endothelial cells of the spleen, bone marrow and other main visceral organs [3]. When a puppy is born by its mother infected with *H. canis*, macromeronts might have been passed through the placenta or other pathways from the mother to the puppy.

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