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***Neospora caninum* and *Toxoplasma gondii* in Lion  
(*Panthera leo*) from Senegal, West Africa**

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**Abstract:** The prevalence of antibodies to *Neospora caninum* and *Toxoplasma gondii* were investigated in seven lions (*Panthera leo*) from Hann's zoo of Dakar-Senegal. Seven sera samples were examined for antibodies against *Neospora caninum* (*Neospora caninum* antibodies test kit, eELISA) and *Toxoplasma gondii* (ID Screen® Toxoplasmosis Indirect ELISA). All sera were positives to *Neospora caninum* antibodies whereas 3 for 7 (42.86%) were positives to *Toxoplasma gondii*. Serological results indicate a common exposure to *Neospora caninum* and *Toxoplasma gondii* among lions (*Panthera leo*) from zoo in Senegal.

**Key words:** Lion (*Panthera leo*), *Neospora caninum*, *Toxoplasma gondii*, Senegal

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## INTRODUCTION

*Toxoplasma gondii* and *Neospora caninum* are two closely related apicomplexan parasites with a worldwide distribution. Both parasites have indirect life cycles with carnivores as their definitive hosts, i.e., felines in the case of *T. gondii* (Dubey and Beattie, 1988) and canids in the case of *N. caninum* (Gondim *et al.*, 2004; McAllister *et al.*, 1998). After sexual recombination within the definitive host, the parasites are excreted as infective oocysts and can cause infection in a wide range of intermediate host species. *Toxoplasma gondii*, which can cause serious disease in humans, seems to be common in wild animals, especially canids. Accordingly, canids may be important in the sylvatic cycle of this parasite (Hill and Dubey, 2002).

Prior 1984, *N. caninum* was misidentified as *T. gondii*, but since its original description in dogs (Bjerkås *et al.*, 1984; Dubey *et al.*, 1988), a large number of studies showed this presence among several domestic and wild species (Costa *et al.*, 2008; Dubey *et al.*, 2007).

Neosporosis is especially important in cattle, where the infection can cause neonatal mortality and abortion in pregnant cows as well as paralysis in newborn calves (Dubey *et al.*, 2007).

Since, reports of neosporosis in African wildlife are limited to East and Southern Africa (Cheadle *et al.*, 1999; Ferroglio *et al.*, 2003), host range and epidemiology of neosporosis in African wild animals are largely unknown.

The aim of this study was to essay *N. caninum* and *T. gondii* antibodies in lion (*Panthera leo*) from Hann's zoo of Dakar-Senegal.

## MATERIALS AND METHODS

Seven sera samples were obtained from three adult's lions (two male and one female born in 2003) and four cub's lions born July 31, 2006 (*Panthera leo*) from zoo of Hann Dakar-Senegal in

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October 2007. Feeding ration for seven lions was composed to uncooked meat beef and donkey. The animals were under veterinary control and any clinical signs of specific disease or pathology were registered.

Individual animals were anesthetized using ketamine (Imalgène®, Merial Lyon-France: 6-7 mg kg<sup>-1</sup> IM) and xylazine (Rompun® Bayer Paris-France: 1-2 mg kg<sup>-1</sup> IM).

Blood samples were collected from the external saphen veins using vacutainer tubes, stored for 1 to 2 h at room temperature and then centrifuged at 1500x g for 10 min. The sera were stored at -20°C. They were assayed for antibodies against *N. caninum* and *T. gondii* by *N. caninum* antibodies multi-species test kit, cELISA (VMRD Inc, Pullman, WA 99163, USA) (Baszler *et al.*, 2001; Sobrino *et al.*, 2008) and ID Screen® Toxoplasmosis Indirect ELISA multi-species test (ID VET-veterinary diagnostic kits, Montpellier-France).

All sera were analysed at the serology laboratory of the Department of Reproduction Pathology of Nantes National Veterinary School in France.

## RESULTS

Sera analysis of seven lions indicated that all are positive to *N. caninum* antibodies. The couple of lion and their four cubs were positives to *N. caninum*. *T. gondii* antibodies were detected in 3 of 7 lions (42.86%). Female lion and two cub's lions were positives to *T. gondii*.

## DISCUSSION

This is the first report of *T. gondii* and *N. caninum* antibodies detected in lions (*Panthera leo*) from captives felids in Senegal. Serological results indicate a common exposure to *N. caninum* (100%) and *T. gondii* (42.86%) among lions. In addition, the couple of lion and their four cubs were positives to *N. caninum*.

In comparison with other similar study, no antibody [0% (0/2)] of *N. caninum* was observed in Czech-slovak (Sedlák and Bártová, 2006) whereas antibodies were observed at 16.6% (3/18) in Southern Africa (Cheadle *et al.*, 1999), 20% (2/10) in USA (Spencer *et al.*, 2003) and 55% (11/20) in Kenya-East Africa (Ferroglia *et al.*, 2003).

With *T. gondii* which definitive hosts are felids, we found a prevalence of 42.86%. In another similar study, antibodies were observed in 2 of 2 animals in Czech-slovak (Sedlák and Bártová, 2006), in 8 of 10 (80%) in USA (Spencer *et al.*, 2003) and in 14 of 27 lions (51.8%) in Brazil (Silva *et al.*, 2001).

These prevalences are difficult to compare due to differences between serological tests used. Within a single test, the cut-off value of positivity is sometimes different. Nevertheless, the detection of specific antibodies in wild carnivores is a good indicator of the presence of these parasites in the environment.

Most of the studies (*N. caninum*) used Indirect Fluorescence Antibody Test (IFAT) which have 93% of sensitivity and 96% of specificity (Wapenaar *et al.*, 2007). Compared to cELISA (VMRD, Pullman USA), a disadvantage of IFAT was the use of specific species conjugates (Lasri *et al.*, 2004; Sedlák and Bártová, 2006). In contrast, the cELISA *N. caninum* antibodies test (VMRD, Pullman USA) was used for several species (Sobrino *et al.*, 2008) as felids. The VMRD *N. caninum* test had a better specificity (99%) and a lower sensibility (89%) than IFAT. In addition, reproducibility of this competitive ELISA was excellent (Wapenaar *et al.*, 2007).

We think about two hypotheses for the source of contamination. First of all, neonatal transmission could have occurred because the couple of tested lion and their four cubs aged 15 months were positives to *N. caninum*. Secondly, the uncooked meat feeding ration could be another source of

infection. *N. caninum* antibodies were highlighted in local cows (71.4%) from Dakar, in the western region of Senegal (Kamga-Waladjo, personal observations).

To confirm our suspicion, Dubey *et al.* (2007) and Sedlák and Bártová (2006) have shown that, definitive and intermediate host of both protozoan (*N. caninum* and *T. gondii*) may be infected by ingestion of water or food contaminated with oocysts, by ingestion of tissue cysts or by transplacental transmission.

The results of this study indicate that lion (*Panthera leo*) from Hann's zoo of Dakar-Senegal have more exposure to *N. caninum* (100%) than to *T. gondii* (42.86%). Present data confirm assumption of a sylvatic cycle of *N. caninum*. Further researches are needed to evaluate the effect of the infection on the health status and conservation of some vulnerable African wild species. Moreover, it is necessary to follow these animals for the identification of parasites at autopsy of lions through direct detection.

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