Negative serosurvey of *Toxoplasma gondii* antibodies in Golden-headed Lion Tamarin (*Leontopithecus chrysomelas*) from Niterói/RJ, Brazil

Pesquisa sorológica de anticorpos anti-*Toxoplasma gondii* em Mico-leão-da-cara-dourada (*Leontopithecus chrysomelas*) de Niterói/RJ, Brasil

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Abstract

New World Nonhuman Primates are highly susceptible to clinical toxoplasmosis. Serum samples from 126 recently captured *Leontopithecus chrysomelas*, from an exotic and invasive population, were tested for *Toxoplasma gondii* antibodies by the modified agglutination test (MAT, cut-off 1:25); all were seronegative. The MAT is highly specific and is not species-specific. This is the first report of *T. gondii* survey in this tamarin in the wild. This result is consistent with prior reports that showed the high susceptibility of the species to infection by *T. gondii* usually with high mortality rates.

Keywords: New World Nonhuman Primates, Callitrichidae, environmental health, invasive fauna, exotic fauna, free-ranging.

Resumo

Primatas não humanos são extremamente susceptíveis a toxoplasmose. No presente estudo, 126 *Leontopithecus chrysomelas* foram capturados de uma população de vida livre, exótica e invasora, e amostras de soros foram testadas para a presença de anticorpos anti-*Toxoplasma gondii* pelo Teste de Aglutinação Modificado (MAT, ponto de corte 1:25). Todos os animais testados foram negativos. O MAT é um teste altamente específico e não é espécie-específico. Esse é o primeiro estudo de pesquisa por anticorpos anti-*T. gondii* nessa espécie em vida livre. O resultado corrobora com o conhecimento prévio sobre a susceptibilidade dessa espécie a infecção pelo parasita *T. gondii*.


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*Leontopithecus chrysomelas* is a New World Monkey (NWM) from the Callitrichidae family, which is commonly called the Golden-Headed Lion Tamarin (GHLT), is classified as Endangered (EN) by IUCN, and endemic to the state of Bahia, Brazil (KIERULFF et al., 2008a). In the 1990s some GHLT groups were accidentally introduced into an urban Atlantic forest remnant in Niterói, State of Rio de Janeiro, Brazil. The GHLT is considered an exotic and invasive species in this area. Due to the risk of hybridization with local and endangered *Leontopithecus rosalia* (KIERULFF et al., 2008b), environmental authorities proposed the removal of the GHLT population. Some of the animals captured were translocated to a protected area in southern Bahia while others remained in captivity.

Degradation and fragmentation of habitats foment major contact between humans, domestic, and free-ranging animals. This proximity may affect the ecology of diseases, increasing the transmission of pathogens between these groups (DASZAK et al., 2000; DEEM et al., 2001; COOK & KARESH, 2008). The Niterói area is fragmented and the GHLT population had been in close contact with humans and domestic animals.

Toxoplasmosis is a worldwide zoonotic disease caused by the protozoan *Toxoplasma gondii*. Felines are the only known definitive hosts (DUBEY & BEATTIE, 1988). NWMs are considered highly susceptible whereas the Old World Monkeys are resistant to clinical toxoplasmosis, worldwide reports of *T. gondii* infection in monkeys have been described (DUBEY & BEATTIE, 1988; CATÃO-DIAS et al., 2013; DUBEY, 2010). Although there are numerous reports of acute toxoplasmosis in captive monkeys naturally exposed and infected experimentally with *T. gondii* (DUBEY & BEATTIE, 1988; DUBEY, 2010), there are few reports of toxoplasmosis in tamarins (PERTZ et al., 1997; EPIPHANIO et al., 2000; EPIPHANIO et al., 2001). Four Golden Lion Tamarins (PERTZ et al., 1997), one Black Lion Tamarin (*L. chrysopygus*) (EPIPHANIO et al., 2001), and four GHLTs (EPIPHANIO et al., 2000) were maintained in zoos, all died peracutely with few or no clinical signs. *T. gondii* zoites were identified histologically or by immunohistochemical assays in tissues from necropsied tamarins (PERTZ et al., 1997; EPIPHANIO et al., 2000; EPIPHANIO et al., 2001).

In the present study we investigated the occurrence of *T. gondii* antibodies in a population of exotic invasive GHLT from an urban Atlantic forest in Niterói, RJ/Brazil. The GHLTs were captured in Serra da Tiririca State Park (22°56′04.28″S, 43°02′22.66″W; Niterói/RJ, Brazil) (Figure 1), a protected area managed by the State Institute of the Environment (INEA) of Rio de Janeiro, as part of a project to remove this introduced population of exotic invasive primates from urban areas.

**Figure 1.** Map of Serra da Tiririca State Park, RJ, Brazil.
Species, administered and conducted by the non-governmental organization Pri-Matas Institute from 2012 to 2015.

These animals were taken to the Primate Center of Rio de Janeiro in the municipality of Guapimirim, RJ (22°29′18″S-42°54′53″W). Chemical restraint for sample collection during quarantine was performed using ketamine (10mg/kg) and midazolam hydrochloride (0.25-0.5 mg/kg).

We tested sera samples from 126 (68 females, 58 males) GHLTs. Ages were not known but 36 were juveniles, 79 were adults, and 11 were elder.

All procedures were approved by the Ethical Principles in Animal Research of the Faculty of Veterinary Medicine and Animal Sciences - University of São Paulo (Protocol number 2662/2012) and were in full compliance with Federal permits issued by the Brazilian Ministry of the Environment (SISBIO 30939-12).

Serology

The sera were tested for antibodies anti- *T. gondii* using the Modified Agglutination Test (MAT) (DESMONT & REMINGTON, 1980; DUBEY & DESMONTS, 1987; DUBEY, 2010). The MAT is a highly specific test, both for human and animals. The MAT was validated for human sera using the dye test as the standard (DESMONT & REMINGTON, 1980) and is the only serological test that has been validated extensively in many species of animals using the isolation of viable *T. gondii* as the gold standard (DUBEY et al., 1995, 2016; DUBEY, 2010). A detailed procedure for the test was described (DUBEY, 2010) and was followed here. The test does not require species-specific reagents, and controls are sera from animals before and after experimental infection with *T. gondii*. Sera were diluted 1:25, 1:50 and 1:500 with PBS and a MAT cut-off of 1:25 has been used for many species of animals, and humans (DUBEY, 2010).

The introduced GHLTs had close contact with the local human population and domestic animals, often entering homes and digging into garbage. The GHLTs also had close contact with domestic cats that entered the forest areas. In 2003 a study found 24% of domestic cats that entered the forest areas. In 2003 a study found 24% of domestic cats that entered the forest areas and were in full compliance with Federal permits issued by the Brazilian Ministry of the Environment (SISBIO 30939-12).

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References


