

Case Study: *Toxoplasma gondii* in Australian Macropods

Kangaroos, wallabies and wallaroos are all susceptible to *Toxoplasma gondii*, a common zoonotic parasite of mammals (including macropods), people, and birds. *Toxoplasma* is genetically highly variable, with many different strains that vary in how much damage they cause to the host animal. Some animals with *Toxoplasma* remain healthy because their immune system produces antibodies that keep the infection under control. If an animal's immune system is suppressed due to disease or stress, infection may cause toxoplasmosis, which may be fatal.

Multiple infections with *Toxoplasma* are considered relatively rare. If animals develop strong immunity during an initial infection, this may prevent infection with another strain of *Toxoplasma*. However, a unique study conducted by Murdoch University has shown that macropods (such as kangaroos) can have multiple infections with *Toxoplasma*.

In 2008, researchers took tissue samples from five organs (heart, liver, lung, spleen and diaphragm) in 16 macropods to test for the parasite. Animals included Western Grey Kangaroo (*Macropus fuliginous*), Red Kangaroo (*Macropus rufus*), and Common Wallaroo (*Macropus robustus*). None of the animals had any obvious symptoms of infection.¹

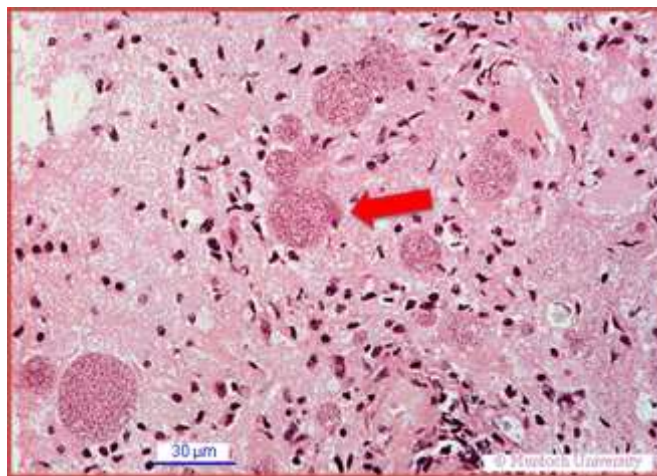


Photo: *Toxoplasma* cysts in a wallaby. Source: Murdoch University

Analysis showed that all of the macropods were infected by *Toxoplasma*, with the parasite detected in tissue samples from at least one organ. Thirteen of the macropods had infections in more than one organ. Two macropods had infections in all five organs.¹



Macropods are herbivores, so it is likely that the source of infection was from eating oocysts shed by feral cats (*Felis catus*) in their faeces.¹ Oocysts are the hardy, thick-walled stage of the life cycle of parasites that infect the intestine of animals. In cats, *Toxoplasma* reproduces sexually and environmentally resistant oocysts are passed in the faeces. These oocysts can then infect other hosts when they are accidentally eaten. Following infection, the parasite multiplies in various tissues in the animal and cysts develop.

In kangaroos, studies have also found that the parasite can be transmitted from the mother to the joey.² In urban areas the transmission of *Toxoplasma* to macropods is likely to be different to that of the bush if humans feed animals meat products. Food, particularly meat scraps left in gardens to encourage wildlife, is a common source of *Toxoplasma* in wildlife.

It had previously been assumed that because of the rarity of multiple infections with *Toxoplasma*, most infections within cats are from a single genotype of the parasite. However, the results of the Murdoch University study suggest that the diversity of strains found in macropods indicates a similar diversity in the oocysts shed by cats. The researchers hypothesise that further studies of feral cats, and small mammals preyed on by cats, would find multiple infections with *Toxoplasma* in these animals.

Infections with *Toxoplasma* probably do not cause many any adverse effects in healthy wildlife. However, animals which are stressed or in poor condition may be much more prone to toxoplasmosis, and the effects of this disease may be exacerbated if multiple strains of the parasite are present.

Source:

¹ Pan S, Thompson RCA, Grigg ME, Sundar N, Smith A, et al. (2012) *Western Australian Marsupials Are Multiply Infected with Genetically Diverse Strains of Toxoplasma gondii*. PLoS ONE 7(9): e45147. doi:10.1371/journal.pone.0045147

² Parameswaran N, O'Handley RM, Grigg ME, Wayne A, Thompson RCA (2009) *Vertical transmission of Toxoplasma gondii in Australian marsupials*. Parasitology 136: 939–944.

About Healthy Wildlife

The 'Healthy Wildlife Healthy Lives' – A One Health project aims to educate the public about people's interaction with wildlife in urban areas, particularly how people and domestic animals spread diseases to wildlife, such as birds, quenda (bandicoots), native fish, bobtails and kangaroos. The project informs people about how to avoid harm to wildlife, create positive interactions with wildlife and protect and conserve the environment. The aim is to keep wildlife healthy for a healthier world.

The project is a partnership between Eastern Metropolitan Regional Council and Murdoch University, supported by Lotterywest.

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