

Dissemination and manifestation of *Toxoplasma gondii* in the whole mouse organism

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Summary

The aim of this experimental project is to visualize, for the first time, the spread of *Toxoplasma gondii* (*T. gondii*) during infection at the level of an entire organism and to track its dissemination in mice. *Toxoplasma gondii* is a globally distributed tissue parasite that can cause disease in numerous animal species and in humans. Felids serve as definitive hosts and excrete infectious oocysts. Infection can also occur through the consumption of meat containing tissue cysts, which form in the intermediate host following the acute phase of infection.

While it is known that infection with *T. gondii* leads to cyst formation—particularly in the brain and muscle—the exact mechanism by which the parasite reaches the brain and other tissues remains unknown. Research into the parasite's dissemination pathway therefore represents a largely unexplored field.

It is currently assumed that *T. gondii* can enter immune cells through a “Trojan horse”-like mechanism. This hidden presence enables the parasite to move within the host organism and spread freely, unnoticed by the immune system.

The goal of this project is therefore the first direct tracking of *T. gondii* dissemination in a whole organism.

The experiment will be conducted using a novel method that enables mice to be rendered “transparent” (via the wildDISCO technique). This allows the infection pathway of fluorescently labeled *T. gondii* to be tracked without the need for labor-intensive histological preparations. The technique enables three-dimensional visualization of the entire body and detection of pathogen localization.

The project consists of two phases:

Phase A (Pilot Study):

In this initial phase, the method will be evaluated and tested for feasibility (proof of concept). Tachyzoites (infectious units) of *T. gondii* will be administered intraperitoneally to mice. At defined time points, the animals will be euthanized and analyzed for parasite dissemination.

Phase B (Main Study):

If the pilot study is successful, various *T. gondii* strains will be used that carry specific gene modifications (e.g., genetically engineered or knock-out strains) and are fluorescently labeled. Using the wildDISCO technique, the study will determine how these targeted gene alterations affect parasite spread in the mouse.

The main study aims to provide insights into the function of specific parasite genes and contributes to fundamental research on *Toxoplasma gondii*.

Registration details	
Status of the study	Registered
Date of registration	2026-02-12
Notified date of accessibility	2029-01-15
DOI	10.17590/asr.0000430
Planned start of the study	2026-06-01
Planned end of the study	2031-06-01
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