

Heterologous Protection by *Leishmania donovani* for *Leishmania major* Infections in the Vervet Monkey Model of the Disease

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Abstract

The study was aimed at analyzing immunological cross-reactivity between *Leishmania major* and *Leishmania donovani* and possible cross-protection between the two parasite species in the vervet monkey model of the disease. Nine vervet monkeys (*Cercopithecus aethiops*) from the institute animal colony were used in the study. Five of the animals had been previously infected with *L. donovani* but had remained asymptomatic while the other four animals were naive and comprised the control group. Immunological responses to both *L. major* and *L. donovani* antigens in the five animals with prior exposure to *L. donovani* were examined before challenge. High antibody titers to the two antigens were demonstrated in an enzyme-linked immunosorbent assay, but the antibody titers to *L. donovani* were significantly higher than those to *L. major* ($P < 0.005$). Positive *in vitro* peripheral blood leucocyte (PBL) proliferation to *L. major* and *L. donovani* antigens was also demonstrated, but there was no significant difference in the response to the two antigens ($P > 0.1$). High and varying levels of interferon gamma (IFN- γ) were secreted in PBL from the five vervet monkeys when stimulated with *L. major* antigen, but vervet monkey 1296 secreted marginal levels of IFN- γ . When the animals were challenged intradermally with 1×10^5 virulent *L. major* promastigotes mixed with sandfly vector salivary gland lysate all four vervet monkeys in the control group developed nodules of varying sizes at the inoculation sites that eventually ulcerated. However, nodule formation and ulceration occurred at different times among these animals. The other five animals (animals with prior exposure to *L. donovani*) did not pick up the infection at all, but one animal from this group, vervet monkey 1296, developed a transient lesion that healed within 9 weeks, the same animal that had been shown to secrete low levels of IFN- γ . The results demonstrate high cross-reactivity between *L. donovani* and *L. major* and that *L. donovani* protects against *L. major* infections. This finding is important for vaccine development studies against leishmaniasis.

Keywords

- Vervet monkey: African green monkey (*Cercopithecus aethiops*), a nonhuman primate;
- Leishmania: an intracellular protozoan parasite;
- *Leishmania donovani* (*L. donovani*): causes visceral leishmaniasis (VL);
- *Leishmania major* (*L. major*): causes cutaneous leishmaniasis (CL);
- Phlebotomous duboscqi: an insect sandfly vector for *L. major*;
- promastigotes: vector and cultural form of *Leishmania*