

Course of Infection of *Trypanosoma lewisi* in the Rat

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Trypanosoma lewisi infection in the rat provides an excellent model for investigating immunological mechanisms for undergraduates. Trypanosome infections are easily established by inoculating rats intraperitoneally with a sample of infected blood. Trypanosomes are available in infected rats from Carolina Biological Supply Co. Following inoculation the trypanosomes are found in the bloodstream and are readily observed and quantified by examination of blood samples. They are large flagellated protozoa (15–25 μ), and details of structure are clearly seen with an oil-immersion objective.

Trypanosoma lewisi is referred to as a non-pathogenic trypanosome, because rats acquire immunity and survive the infection. The course of the infection was described many years ago by Taliaferro (1932). The trypanosome numbers in the blood increase to a peak about 1 week post-inoculation. The numbers remain stationary for a brief period, and then there is a decrease to imperceptible levels. Taliaferro (1932) called the factor which inhibits trypanosome reproduction during the stationary phase ablastin. It appears now that ablastin is an IgG antibody which coats the trypanosome surface. The decrease in trypanosome numbers is thought to be due to a lytic event which follows the appearance of an IgM antibody specific for the IgG coating the trypanosome surface (Clarkson and Mellow, 1981).

Various factors are known to influence the course of this infection. Some of these can be easily investigated in an undergraduate laboratory and can provide additional insight into the immune response. For example, both size of the inoculum and age of the rat affect the outcome. In addition, previous exposure to trypanosomes as well as administration of immune plasma alter the course of the infection.

Aside from the overall value of introducing students to the immune response with an animal model, where they can actually participate in the inoculation process and follow the course of infection by examining blood samples, experience with the following procedures is also gained: (1) animal care and handling; (2) injection and blood collection; (3) blood smear preparation and staining, blood dilution, and hemacytometer cell counting; (4) trypanosome counting, measuring with a calibrated ocular micrometer, and drawing with a camera lucida from stained blood smears; and (5) data collection and semi-logarithmic graph preparation (showing trypanosome numbers on the logarithmic axis and days post-inoculation on the arithmetic axis), and statistical analysis. Statistical analysis of trypanosome measurements illustrates the influence of the rat on trypanosome reproduction.

I was first introduced to the *T. lewisi*-rat model by the late Leslie A. Stauber at Rutgers University in 1961.

Clarkson, A. B., and G. H. Mellow. 1981. Rheumatoid factor-like immunoglobulin M protects previously uninfected rat pups and dams from *Trypanosoma lewisi*. *Science*, 214:186–188.

Taliaferro, W. H. 1932. Trypanocidal and reproduction-inhibiting antibodies to *Trypanosoma lewisi* in rats and rabbits. *American Journal of Hygiene*, 16:32–84.