

# Immunological studies on relapse infections of *Plasmodium cynomolgi ceylonensis* in its natural host, *Macaca sinica sinica*

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Colombo : Faculty of medicine, 1999; Degree: M.Phil

## Abstract:

Sporozoite-induced and blood-induced infections of *Plasmodium cynomolgi ceylonensis* in *Macaca sinica sinica* was studied using laboratory bred *Anopheles tessellatus* mosquitoes as the vector. Sporozoite-induced infections had longer prepatent periods than blood-induced infections. Peak parasitaemias reached in sporozoite induced infections were lower than those reached in blood-induced infections. However, the durations of infection of the primary peaks were similar in both types of infections. Splenectomy caused a significant rise in the peak parasitaemias in both types of infections, indicating that the spleen plays a significant role in bringing immune responses in blood induced infections irrespective of the origin of infection, i.e., blood - induced or sporozoite induced. Out of five sporozoite - induced infections studied four gave rise to relapses. The infection that did not give rise to relapses reached a comparatively low parasitaemia peak possibly due to a low sporozoite count in the inoculum. The three sporozoite-induced infections that gave rise to frequent relapses showed a similarity in the relapse patterns, i.e., a gradual decrease in the peak parasitaemia and duration of infections beginning from the primary infection along with each relapse to the last relapse. In the 4th animal which relapsed after long intervals, neither the parasitaemia peaks nor the infectivities to mosquitoes decreased gradually; peaks of parasitaemia and infectivities to mosquitoes of parasites of primary and relapse infections, in this animal was similar. This suggests that the immunity that is built in the animal after an infection is boosted if the infections occur frequently (92 to 91 days) and that it wanes gradually when the infection occurs after long periods (137 and 139 days). IFA on live unfixed schizonts of infected erythrocytes to detect surface antigens and challenge studies were performed to address the question; as to whether the parasite populations of primary and relapse infections were antigenically and immunologically similar or not. Results indicate that these parasite populations were similar in composition. A gradual decrease in infectivity along with the decrease in the peak parasitaemia in the frequently relapsing animals suggest a gradual increase in transmission blocking immunity in the host along with each relapse. The membrane feeding technique was used to confirm this and it was shown that transmission blocking immunity increased along with each frequent relapse. In the animal which relapsed after long periods this blocking effect was not observed suggesting that anti sexual stage immunity is

short lived and it wanes with time. These observations suggest that anti asexual stage and sexual stage parasite immunities in malaria infections caused by primary and relapse infections are short lived.

Key Words : Plasmodium cynomolgi / Malaria-immunology / Plasmodium-immunology