Transmission-blocking immunity to human *Plasmodium vivax* malaria

by

Dona Yamuna Munesinghe, B.Sc.

CR

A thesis submitted to the Medical Faculty
of University of Colombo
for the Degree of Doctor of Philosophy

1987

ABSTRACT

The present study has demonstrated that Plasmodium vivax like several other malaria parasites is highly susceptible to anti-gamete transmission-blocking immunity.

Rabbits were immunised intravenously with live unfixed or cryopreserved female gametes without the use of an adjuvant. Sera obtained from these rabbits were shown to react with the surface of female gametes by the Indirect Immunofluorescence technique (IFT). When in membrane feeding experiments, these sera were fed to An. tessellatus mosquitoes with heterologous parasite isolates they were found to suppress the infectivity of the parasite isolates tested. The degree of suppression correlated with the anti-gamete antibody titre of the serum. Immunoglobulins separated from a serum also blocked transmission to the same degree as did the immune serum indicating that antibodies were primarily responsible in mediating the suppressive effect.

Transmission-blocking immunity was also found to be acquired naturally by humans during an acute infection of P. vivax. The transmission-blocking effects of the human sera too correlated with anti-gamete antibody titres; above an anti-gamete IFT titre of 1:160, the infectivity of parasites was markedly reduced. In most sera, the suppression of infectivity was complement

dependent. Naturally acquired transmission-blocking immunity was shown to last for about 4 months in the absence of a reinfection/relapse and was boosted by subsequent blood infections, only when they occurred within 4 months of the previous attack, confirming that the immunity is characterised by a short "memory". In some immune human sera containing anti-gamete antibodies, not transmission-blocking but infectivity enhancing effects were observed. It was further shown that the transmission-blocking effects of human immune sera were not narrowly isolate specific.

The findings of this study imply that naturally acquired transmission-blocking immunity in humans has an impact on the disease by reducing transmission rates in nature and regulating the epidemic spread of malaria.