IMMUNITY INDUCED BY LIVE MALARIAL SPOROZOITES UNDER CHLOROQUINE TREATMENT IS STRAIN-SPECIFIC

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Place(s) where the work was carried out:
Work of the project was conducted at Malaria Research Unit, Dept of Parasitology, Faculty of Medicine, University of Colombo.
Pyrosequencing™ analysis was performed at School of Biological Sciences, Institute of Immunology & Infection Research, University of Edinburgh, UK.

To-date, data is limited on *Plasmodium vivax* pre-erythrocytic (PE) stage specific protective immunity and its strain-specificity. We addressed the latter issue in an analogous non-human primate model, *P. cynomolgi* in toque monkey (*Macaca sinica*), using two immunologically and genetically distinct strains, Pc746 and PcCeylon. We immunized two groups of monkeys with either Pc746 (n=5) or PcCeylon (n=4) strain by giving bites of 2-4 sporozoite-infected *Anopheles tessellates* mosquitoes/monkey under chloroquine (starting from day 4 after infective bites) and premaquine (one month after infective bites) treatment to abrogate blood infections. Subsequently, a group of unimmunized monkeys (n=4) and the two groups of Pc746 and PcCeylon immunized monkeys were given a mixed-strain sporozoite challenge infection (2-5 infective mosquitoes from each strain/monkey) 140 and 100 days respectively after infective bites. Using Pyrosequencing™ assay based on SNPs in *msp1* and *csp* genes, we quantified proportions of parasites of the two strains in the challenge infections using parasite DNA collected for 5-8 consecutive days from the day which parasitaemia reached 0.03%. In the mixed-strain challenge infection, proportion of parasites of a particular strain was significantly lower in the monkeys immunized against the homologous strain ($P<0.05$- Mann-Whitney U test), compared to those in the monkeys immunized against the heterologous strain. This shows induction of strain-specific protective immunity following a single live sporozoite/choloroquine immunization which persists for 3-5 months. We also show a pan-specific effect of this immunity on blood-stage parasites as indicated by early reduction of parasitaemia ($P<0.05$- Mann-Whitney U test) in the immunized monkeys compared to the non-immunized ones during the challenge infections. These findings may have implications on *P. vivax* sporozoite vaccines.

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