

PA-152 THE EFFECT OF HELMINTH CO-INFECTION ON  
MALARIA-SPECIFIC IMMUNOGLOBULIN G RESPONSES

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**Background** Malaria and helminthiasis overlap extensively in their epidemiological distributions, and co-infections are common. Helminth infection has a profound effect on the immune system such as the induction of immuno-regulatory mechanisms such as potent regulatory T cell responses known to suppress cellular effector mechanisms.

**Methods** The prevalence of malaria parasitaemia, intestinal helminths, co-infection and anaemia was determined in a cross-sectional study (March 2011) of 372 children aged 6 months to 10 years resident in Mutengene in south-western Cameroon. Plasma total IgG and IgG1–4 subclass antibody levels to *P. falciparum* apical membrane antigen 1 (AMA1), the N-terminal non-repeat region (GLURP R0) and the C-terminal repeat region of glutamate rich protein (GLURP R2) and merozoite surface protein 3 (MSP3) were measured by standardised ELISA.

**Results** Prevalence was as follows: malaria parasitaemia (mp) 18%, pyrexia 25.4%, helminths 19.7%, and anaemia 71.5%. Amongst those who were mp-positive, 25.4% were symptomatic (4.5% overall). Almost all helminth infections were the soil-transmitted helminths *Ascaris*, *Trichuris* and hookworm (96.4%) with a few cases of *Hymenolepis* and *Enterobius*. Haemoglobin concentration (g/dl) correlated positively with age and negatively with mp density ( $p \leq 0.001$ ). The mean haemoglobin (g/dl) level of participants co-infected with both parasites (3.4%) was higher compared to participants infected with either *Plasmodium* (15.8%) or helminths (16.1%) alone ( $p < 0.01$ ). IgG and IgG1–4 subclass antibody levels to all recombinant antigens correlated positively with age ( $p < 0.01$ ). Total IgG, IgG1, 2 & 3 levels to all the antigens tested were significantly (except MSP3 IgG2,  $p=0.08$ ) higher in participants infected with *Plasmodium* alone, compared to the co-infection, helminths only and no infection groups. Decreased levels of AMA1 IgG associated significantly with co-infection (OR=0.27, 95% CI:0.11–0.68). Increased MSP3 IgG and IgG1–4 levels were significantly associated with children infected with *Plasmodium* alone compared to children co-infected with both parasites.

**Conclusions** Infection with intestinal helminths stifles protective anti-plasmodial antibody responses.