

# Hematological predictors of increased severe anemia in Kenyan children coinfecting with *Plasmodium falciparum* and HIV-1.

[Davenport GC](#), [Ouma C](#), [Hittner JB](#), [Were T](#), [Ouma Y](#), [Ong'echa JM](#), [Perkins DJ](#).

## Source

Department of Infectious Diseases and Microbiology, University of Pittsburgh, Pittsburgh, PA, USA.

## Abstract

Malaria and HIV-1 are coendemic in many developing countries, with anemia being the most common pediatric hematological manifestation of each disease. Anemia is also one of the primary causes of mortality in children monoinfected with either malaria or HIV-1. Although our previous results showed HIV-1(+) children with acute *Plasmodium falciparum* malaria [Pf(+)] have more profound anemia, potential causes of severe anemia in coinfecting children remain unknown. As such, children with *P. falciparum* malaria (aged 3-36 months, n = 542) from a holoendemic malaria transmission area of western Kenya were stratified into three groups: HIV-1 negative [HIV-1(-)/Pf(+)]; HIV-1 exposed [HIV-1(exp)/Pf(+)]; and HIV-1 infected [HIV-1(+)/Pf(+)]. Comprehensive clinical, parasitological, and hematological measures were determined upon enrollment. Univariate, correlational, and hierarchical regression analyses were used to determine differences among the groups and to define predictors of worsening anemia. HIV-1(+)/Pf(+) children had significantly more malarial pigment-containing neutrophils (PCN), monocytosis, increased severe anemia (Hb < 6.0 g/dL), and nearly 10-fold greater mortality within 3 months of enrollment. Common causes of anemia in malaria-infected children, such as increased parasitemia or reduced erythropoiesis, did not account for worsening anemia in the HIV-1(+)/Pf(+) group nor did carriage of sickle cell trait or G6PD deficiency. Hierarchical multiple regression analysis revealed that more profound anemia was associated with elevated PCM, younger age, and increasing HIV-1 status ([HIV-1(-) --> HIV-1(exp) --> HIV-1(+)]. Thus, malaria/HIV-1 coinfection is characterized by more profound anemia and increased mortality, with acquisition of monocytic pigment having the most detrimental impact on Hb levels.