Association of ABO blood groups and complicated Plasmodium falciparum malaria in Accra, Ghana

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Impact of macrophages on *Balamuthia mandrillaris* virulence properties using human brain microvascular endothelial cells in vitro

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Background: *Balamuthia* amoebic encephalitis (BAE) is a serious human disease (caused by *Balamuthia mandrillaris*) almost always leading to death. An important step in BAE is amoebae invasion of the bloodstream, followed by their haematogenous spread. *Balamuthia mandrillaris* entry into the central nervous system (CNS) most likely occurs at the blood–brain barrier (BBB) sites. Macrophages are thought to be the first line of defense in many infectious diseases and are present in high numbers during infections. The objective of the present study was to determine the impact of cytokines and macrophages on the virulence characteristics of *B. mandrillaris in vitro*.

Methods: *In vitro*, *B. mandrillaris* were used to demonstrate the effects of cytokines and macrophages on the physiological and morphological characteristics of amoeba. Using human brain microvascular endothelial cells (HBMEC), which constitutes the blood–brain barrier, adhesion and cytotoxicity assays were performed. To investigate the engulfing property of the amoeba, phagocytosis assays were performed using fluorescein isothiocyanate (FITC) labeled *E. coli* K12. Moreover zymography assay were also used to observe the proteolytic activity of amoeba.

Results: It was observed *B. mandrillaris* exhibited >90% binding and >70% cytotoxicity to HBMEC which was further enhanced in the presence of cytokines and macrophages. It has also been observed that cytokines TNF-α and TGF-β significantly increased the *B. mandrillaris* numbers in the presence of macrophages. It is important to note that amoebic numbers were more than doubled in the presence of cytokines and macrophages within 24h. We have shown in the past the bacteria uptake by *B. mandrillaris* is limited which is further significantly inhibited in the presence of cytokines during phagocytosis assays. Zymography assays revealed that cytokines and macrophages have no inhibitory effect on proteolytic activity of *B. mandrillaris*. In addition the activated macrophages also could not show any vital inhibitory effects on amoebic virulence properties.

Conclusion: Overall we described for the first time that cytokines and macrophages has no inhibitory effects on the virulence properties of *B. mandrillaris in vitro*.

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Association of ABO blood groups and complicated *Plasmodium falciparum* malaria in Accra, Ghana

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Background: The clinical outcome of *Plasmodium falciparum* malaria in endemic areas is associated with erythrocyte polymorphisms including the ABO blood groups. Studies have reported association of ABO blood group to susceptibility, resistance and severity of P. falciparum malaria infection. Individuals with blood group 'A' have been found to be highly susceptible to falciparum malaria whereas blood group 'O' is said to confer protection against complicated cases.

Methods: The study was conducted between January to April 2010, at the outpatient department of the Korle-Bu teaching Hospital in Accra, Ghana. Five milliliters of blood sample was collected from each participant and the haemoglobin level, parasitaemia and ABO blood group of the samples collected were determined.

Results: We analysed samples from 239 malaria patients and found that group O was present in 16.1% of complicated cases weighed against 40.9% of uncomplicated controls. Individuals with complicated malaria were about twice likely to be of blood group A and B than O (A vs. O, OR=1.90, 95% CI=1.59 – 2.26, P<0.0001; B vs. O, OR=1.82. 95% CI=1.57 – 2.23, P<0.0001). Blood group O participants with complicated diseases had low parasitaemia compared to the blood groups (P<0.0001). This may give blood group O individuals a survival advantage over the other groups in complicated malaria as suggested. Participants with complicated falciparum malaria were generally anaemic and younger than those with uncomplicated disease

Conclusion: Blood group O offers some protection from complicated falciparum malaria and may possess a survival advantage over the Non-O groups.

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Genotyping of *Plasmodium falciparum* in Bangladesh using Antigenic Polymorphic markers and comparison with anti-malarial drug resistance markers genotype

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Background: Polymerase-Chian-reaction (PCR)- Restriction Fragments –length polymorphisim and Tag-man real-time PCR assay used for molecular characterization of Plasmodium falci-