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Commentary

A Commentary on Plasma Membrane Derived Extracellular Vesicles (PMEVs)

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DESCRIPTION

Microparticles (MPs) also called plasma membrane derived extracellular vesicles (PMEVs) are a heterogeneous group of small sub-membrane fragments or membrane coated vesicles shed from the plasma membrane of various cells during normal cellular activities like growth, senescence, proliferation and apoptosis. MPs carry proteins, lipids and nucleic acids from host cells and are means of intercellular communication and it has been shown that analysis of MPs from blood samples can provide information about the state and progression of a particular disease or condition.

Malaria is caused by five species of the genus Plasmodium which is a unicellular protozoan parasite. The disease is a major cause of mortality and morbidity in many developing countries especially in Sub-Saharan Africa. It is estimated 3.4 billion people worldwide risk being infected with malaria in 104 countries. Complications associated with malaria infection particularly in severe malaria include fever/chills, coagulopathy and anaemia among other symptoms. At the molecular level, up-regulation of certain cytokines is also thought to relate to malaria associated high fever.

The degree of anaemia experienced in malaria does not always correspond to the parasitaemia level. This is partly caused by a mild bone marrow suppression of erythrocyte production and the collection of complement containing complexes on erythrocyte surfaces after infection which promotes splenic removal of these erythrocytes.

Lysis of both infected and uninfected erythrocytes is also considered to be a contributing factor. Severe malaria caused by Plasmodium falciparum is considered to be associated with the dysregulation of the coagulation system which include endothelial damage, lower levels of anticoagulation and the release of pro-coagulant MPs.

To this end, malaria has been associated with an increase in the level of circulating plasma MPs and plasma concentrations of endothelial MPs (EMPs) which may be proportional to disease severity. The role of infected erythrocyte-derived MPs in cellular communication has been investigated but the protein content (proteomic analysis) of MPs isolated in malaria is yet to be explored. Proteomic analysis on circulating MPs obtained from plasma of malaria positive blood samples once explored will give a general idea of the protein and protein groups borne by these MPs that may influence the pathophysiology of malaria infection. This study therefore sought to examine the protein composition of plasma MPs of malaria samples and comparing them with proteins of MPs from healthy controls in order to explore their effect on the pathogenesis of malaria and the possible linkage of circulating plasma MPs to malaria anaemia.

Existing literature indicate that elevated MPs levels have been seen in cancer, sepsis, pulmonary hypertension, idiopathic thrombocytopenic purpura and atherosclerosis. Researchers also contend that increased endothelial microparticle level correlating with disease severity has been seen in malaria. Again studies in mice models indicate that microparticles contributed to induction of systemic inflammation.

Others have shown that MPs released after malaria infection which are primarily erythrocyte-derived are capable of activating macrophage through toll-like receptors (TLR) and may enhance infectivity as their count elevates and investigations show they contain parasite components some of which promote pathogen invasion of erythrocytes. The perplexing feature of malarial anemia which is increased clearance of uninfected erythrocytes can also be attributed to the release of parasite antigens in MPs during entry in erythrocytes.

These erythrocyte-adhesive proteins probably adhere to erythrocytes resulting in IgG and complement binding which promotes their elimination from peripheral circulation. Proteomic analysis on circulating plasma MPs obtained from plasma of malaria positive blood samples once explored will give a general idea of the protein and protein groups borne by these MPs thereby influencing the pathophysiology of malaria infection.

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