Prevention of cerebral malaria in children in Papua New Guinea by SoutheastAsian ovalocytosis

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Abstract

Southeast Asian ovalocytosis (SAO) occurs at high frequency in malarious regions of the western Pacific and may afford a survival advantage against malaria. It is caused by a deletion of the erythrocyte membrane band 3 gene and the band 3 protein mediates the cytoadherence of parasitized erythrocytes in vitro. The SAO band 3 variant may prevent cerebral malaria but it exacerbates malaria anemia and may also increase acidosis, a major determinant of mortality in malaria. We undertook a case-control study of children admitted to hospital in a malarious region of Papua New Guinea. The SAO band 3, detected by the polymerase chain reaction, was present in 0 of 68 children with cerebral malaria compared with six (8.8%) of 68 matched community controls (odds ratio = 0, 95% confidence interval = 0-0.85). Median hemoglobin levels were 1.2 g/dl lower in malaria cases with SAO than in controls (P = 0.035) but acidosis was not affected. The remarkable protection that SAO band 3 affords against cerebral malaria may offer a valuable approach to a better understanding of the mechanisms of adherence of parasitized erythrocytes to vascular endothelium, and thus of the pathogenesis of cerebral malaria.