Analysis of Molecular Parameters Determining the Antimalarial Activity of Polymer-Based Nanomimics

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Malaria and other infectious diseases are major global public health problems, which need to be tackled using new technologies to cope with the lack of efficacious vaccines and emerging drug resistance. A recently developed anti-infectious concept based on nanomimics tested with Plasmodium falciparum is analyzed for the molecular parameters determining its applicability. Nanomimics—nanoscaled polymer-based mimics of host cell membranes—are designed with a reduced number of surface-exposed malaria parasite receptor molecules (heparin), resulting in less potent invasion inhibition as determined in antimalarial assays. In contrast, when shorter receptor molecules are used to form nanomimics, more molecules are needed to obtain nanomimic potency similar to nanomimics with longer receptor molecules. The interaction of heparin on nanomimics with the processed Plasmodium falciparum merozoite surface protein 1–42 (PfMSP142) have a high affinity, Kd = 12.1 ś 1.6 Œ 10−9 m, as measured by fluorescence cross-correlation spectroscopy (FCCS). This detailed characterization of nanomimics and their molecular variants are an important step towards defining and optimizing possible nanomimic therapies for infectious diseases.
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