

Nanomedicines for malaria chemotherapy: Encapsulation vs. polymer therapeutics

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ABSTRACT:

Malaria is one of the oldest infectious diseases that afflict humans and its history extends back for millennia. It was once prevalent throughout the globe but today it is mainly endemic to tropical regions like sub-Saharan Africa and South-east Asia. Ironically, treatment for malaria has existed for centuries yet it still exerts an enormous death toll. This contradiction is attributed in part to the rapid development of resistance by the malaria parasite to chemotherapeutic drugs. In turn, resistance has been fuelled by poor patient compliance to the relatively toxic antimalarial drugs. While drug toxicity and poor pharmacological potentials have been addressed or ameliorated with various nanomedicine drug delivery systems in diseases like cancer, no clinically significant success story has been reported for malaria. There have been several reviews on the application of nanomedicine technologies, especially drug encapsulation, to malaria treatment. Here we extend the scope of the collation of the nanomedicine research literature to polymer therapeutics technology. We first discuss the history of the disease and how a flurry of scientific breakthroughs in the latter part of the nineteenth century provided scientific understanding of the disease. This is followed by a review of the disease biology and the major antimalarial chemotherapy. The achievements of nanomedicine in cancer and other infectious diseases are discussed to draw parallels with malaria. A review of the current state of the research into malaria nanomedicines, both encapsulation and polymer therapeutics polymer-drug conjugation technologies, is covered and we

conclude with a consideration of the opportunities and challenges offered by both technologies.