New research lays groundwork for future malaria treatments

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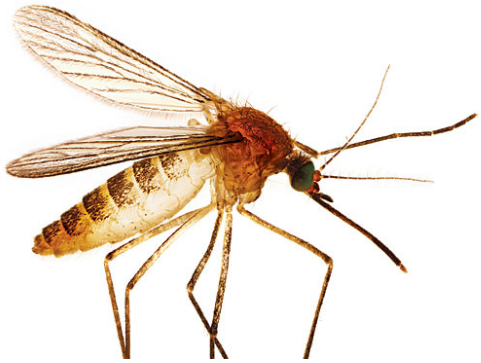
New insights on the invasion process of malaria parasites may pave the way for development of new medications as treatments for the disease.



A team of Australian researchers has taken a close look at the process by which malaria parasites invade and infect red blood cells – a crucial step in the progression of the disease. The parasites use a collection of proteins found on the outer surface to penetrate red blood cells and hide from the immune system. The research team focused their attention on one of these surface proteins, called 'Apical Membrane Antigen 1', or 'AMA1'. This protein is essential for the invasion step; if AMA1 can't do its job, the red blood cells don't get infected.

The research made use of a much shorter protein called 'R1', which has previously been shown to bind tightly to AMA1 and inhibit the invasion of red blood cells. By carefully probing the interaction between AMA1 and R1 by various methods, the team uncovered two binding 'hotspots', which are responsible for the tight binding and, presumably, the inhibitory effect. Identifying such hotspots is the crucial first step in the process of rational structure-based drug design, which relies on knowledge of the specific chemical interactions made between a drug and its target. In an iterative process, candidate drugs are designed to take advantage of the identified interactions, tested for their effectiveness, and then redesigned to become even more effective. Although R1 is not suitable as a drug candidate, further research could lead to 'mimic' molecules that take advantage of the same binding interactions while being more easily administered. Such mimics will take time and effort to produce and perfect, but thanks to this research the path is now open.

Wang et al. "Molecular insights into the interaction between plasmodium falciparum apical membrane antigen 1 and an invasion-inhibitory peptide." PloS one 9, no. 10 (2014): e109674.