MULTI-DRUG TESTING OF KNOWN ANTIMALARIALS VIA FLUORESCENCE-BASED HIGH-THROUGHPUT DRUG SCREENING

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ABSTRACT

Malaria is caused by the protozoan Plasmodium and can be from one of four species: falciparum, ovale, malariae, and vivax. The parasite is transmitted to humans by the female Anopheles mosquito. For years malaria was treated with quinine and later the synthetic aminoquinolines, such as chloroquine, until their efficiency diminished. The newest and most effective compound, artemisinin, is currently being used in conjunction with other antimalarials as specified by the World Health Organization. But overuse and low, non-curative doses have resulted in increased resistance to these conventional pharmaceutical agents. Therefore, there is an urgent need to find alternative, cost effective treatments. Our lab identified antimalarial activity in extracts of four North American sages whose historical use, although unrelated to malaria, is documented within the literature on traditional Native American medicine. These extractions were obtained using a sequential gradient extraction method which separates compounds based on varying degrees of polarity. The extracts were evaluated against the chloroquine resistant Plasmodium falciparum D6 strain to determine growth inhibition (IC$_{50}$/IC$_{90}$). We incubated the parasite with the plant extracts at various dilutions in a 96 well micro titer plate for 72 hours. Upon completion of the incubation period, we treated the solution with SYBR Green which intercalates with the parasite DNA. Only the red blood cells that are infected with P. falciparum will fluoresce when exposed to 520nm light. This assay gives an indication which plant extracts have antimalarial activity and can control the P. falciparum. It was also used to determine potency of the extracts (IC$_{50}$/IC$_{90}$).