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US Department of Defense contributions to malaria surveillance

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In response to an Article¹ and a Personal View² on the spread of artemisinin resistance in the November 2012, issue of *The Lancet Infectious Diseases*, we would like to present several examples of previous and continuing malaria resistance work sponsored by the US Department of Defense (DoD).

The US DoD has been actively involved in the study of malaria drug-resistance for several decades, and has supported many antimalarial resistance studies worldwide. The US DoD has played an active part in artemisinin-resistance surveillance in southeast Asia after the recommendation of artemisinin combination therapies (ACT) as first-line antimalarial treatments by WHO in 2006. The US DoD Global Emerging Infections Surveillance and Response System (GEIS) has supported malaria surveillance and drug-resistance studies in southeast Asia through network laboratories such as the Armed Forces Research Institute of Medical Sciences (AFRIMS) in Bangkok, Thailand, and the Naval Medical Research Unit 2 (NAMRU-2) in Cambodia.

AFRIMS was the first institution to report clinical cases of artemisinin resistance in western Cambodia.^{3,4} NAMRU-2 characterised ACT failures in southern Cambodia,⁵ a region previously overlooked in the quest to characterise artemisinin resistance along the Thailand–Cambodia border. The investigation by Chanaki Amaratunga and colleagues¹ is one of several studies showing the existence of artemisinin-resistant *Plasmodium falciparum* parasites in Cambodian provinces. Beyond its initial focus in southeast Asia, the US DoD has increased efforts to characterise artemisinin resistance worldwide. A major effort involves the coordinated execution of harmonised trials of artesunate–mefloquine efficacy in four DoD laboratories in Peru, Ghana, Kenya, and Thailand. These trials will take a

All authors were equally involved in the drafting and reviewing of this manuscript. Authors are the designated representatives from their respective institutions. The GEIS has a scientific coordination role in the preparation and execution of the clinical trials at the four Department of Defence network laboratories. DS, CD, AL, and BA are investigators involved in these harmonised trials at each of the four sites, and represent laboratory staff that have contributed substantially and equally to the development of the harmonised trial protocols and other study documents. All representatives have contributed to this manuscript and have consented to its submission to *The Lancet Infectious Diseases*. The Armed Forces Health Surveillance Center (AFHSC) sponsors the harmonised malaria drug-resistance trials mentioned in this paper. Authors were not funded specifically to write or edit this article.

standardised multicentre approach to characterise and compare parasite clearance rates for 72 h after artesunate dosing with published methods.^{6–8} Clinical and laboratory methods, such as microscopy and in-vitro drug-sensitivity testing will be standardised across all four sites and samples will be contributed to existing genome-wide association studies to identify markers of artemisinin resistance. To our knowledge, this marks the first effort to expand artemisinin-resistance surveillance into the Americas with this approach.

With sites in two countries in Africa, these trials exemplify how the US DoD is helping to establish and support malaria surveillance networks to include the African continent. Ambrose Talisuna and colleagues² called for the reinstitution of pan-African malaria-surveillance networks, citing the need for additional antimalarial-resistance surveillance, and calling for the rapid sharing of baseline parasite clearance-rate data derived from clinical trials. We agree with these sentiments and designed the GEIS harmonised artesunate–mefloquine clinical trials with those needs in mind.

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