

Progress toward manipulating disease vector populations via releases of *Wolbachia* infected mosquitoes

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Lymphatic filariasis (Elephantiasis) affects over 120 million people in 80 countries, with 1.2 billion people at risk worldwide. Over 90% of infections are caused by *Wuchereria bancrofti*, for which humans are the exclusive host. The absence of a nonhuman reservoir suggests that transmission can be interrupted by elimination of the microfilariae reservoir via community-wide treatment (Mass Drug Administration, MDA), which is the current focus of the Global Programme for the Elimination of Lymphatic Filariasis. While MDA strategies can be effective, history suggests that elimination of lymphatic filariasis in Polynesia is unachievable without vector control. An example is provided by Maupiti in French Polynesia, where filariasis persists despite five decades of constant MDA. The biology of the primary mosquito vector, *Aedes polynesiensis*, has been blamed for MDA failure. Since mosquitoes are obligate vectors of *W. bancrofti*, this suggests an additional approach for filariasis elimination: eradication of the mosquito vectors will break the disease transmission cycle. Unfortunately *Ae. polynesiensis* currently cannot be controlled, much less eradicated. I will discuss a strategy in which releases of male *Ae. polynesiensis* mosquitoes infected with *Wolbachia* bacteria result in the sterilization of female mosquitoes at a field site endemic for filariasis transmission. Intracellular *Wolbachia* bacteria are obligate, maternally-inherited endosymbionts found frequently in insects and other invertebrates. In mosquitoes, *Wolbachia* causes a form of sterility known as cytoplasmic incompatibility (CI). In the proposed strategy, repeated releases of CI males will be used in the eradication of the targeted *Ae. polynesiensis* population. This strategy is similar to a prior field trial that targeted *Culex* mosquitoes in Burma. The proposed strategy employs a naturally occurring bacteria infection and does not include genetically modified organisms. I will describe the generation of a *Wolbachia*-infected *Ae. polynesiensis* strain that sterilizes female mosquitoes from Maupiti in laboratory cage tests. I will also review recently developed techniques permitting the generation of new *Wolbachia* infection types in mosquitoes via microinjection.

References:

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