Dengue Field Trial Update
By Professor Scott O’Neill, Program Leader
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Eliminate Dengue is a research program developing an innovative biological approach to make mosquitoes incapable of transmitting dengue viruses between people.

We have shown that the presence of Wolbachia, a natural bacterium already found in up to 70% of all insects, when introduced into the dengue carrying Aedes aegypti mosquito, reduces its ability to transmit dengue virus, effectively acting ‘like a vaccine’ for the mosquito.

World-first trials in Cairns - Having worked with Wolbachia and mosquitoes in the laboratory for over 15 years it is exciting and rewarding to work with the Cairns community in these world-first field trials involving the release of mosquitoes that contain Wolbachia. Similar trials will be undertaken in other countries and we hope that one day this research will help to greatly reduce, if not eliminate, dengue transmission which today affects more than 50,000,000 people in over 100 countries.

Yorkeys Knob and Gordonvale – In the 2011 wet season we released the first Wolbachia Aedes aegypti mosquitoes in Yorkeys Knob and Gordonvale and we showed that Wolbachia can establish in the wild mosquito population. Our continued monitoring in these communities tells us that over 95% of Aedes aegypti mosquitoes still have Wolbachia and these mosquitoes have a reduced ability to transmit the virus. This means that the risk of dengue transmission if the virus is brought into these communities is reduced.

Machans Beach and Babinda - Earlier this year we released a different strain of the Wolbachia bacterium to the first trial this time into Machans Beach and Babinda. Like Yorkeys Knob and Gordonvale both are isolated communities, which allow us to monitor mosquito populations more easily. This second strain provides very high protection against dengue but while doing this weakens the fitness of the mosquitoes. This trial is to see if the stronger strain would establish in the wild mosquito population like the first strain did in Yorkeys Knob and Gordonvale.

Our current data from Machans Beach and Babinda indicates that there are differences in the results from the two communities. In summary Wolbachia is currently being maintained in the mosquito population in Babinda with over 70% of mosquitoes containing Wolbachia; however, the level of Wolbachia in the mosquito population in Machans Beach has dropped to less than 50%.

The reason for the difference is currently unknown although this could be due to the fact that rain fed containers are providing more habitat in Machans Beach for wild type mosquitoes than in Babinda. We don’t have the answer at the moment; however we are carrying out further studies to better understand why we see these differences.

Additional Cairns trials in 2012 – While we will continue our monitoring at all the previous release sites, based on the encouraging results from these earlier trials and with continued strong support from Cairns’ residents, we plan to undertake additional trials in selected areas of Parramatta Park, Whitfield, Edge Hill, Cairns North, Manunda and Westcourt later this year.

Similar to the previous trials, this will involve weekly releases of mosquitoes that contain Wolbachia that we will then monitor to determine whether Wolbachia is establishing.

Eliminate Dengue Cairns project members Brian Montgomery (left) and Frederico Muzzi release Wolbachia Aedes aegypti outside Gabrielle Gelly’s home in Machans Beach.

We will also monitor mosquito populations in nearby areas to determine whether Wolbachia is spreading into these areas.

We need your support – As we did in all the previous trial sites before we release any mosquitoes we try to talk to as many residents and business owners in these suburbs as possible to listen to all questions and concerns and ensure they are addressed. We then ask residents to show us their support by completing a Trial Participation Form to give permission to the Field Team to either release Wolbachia mosquitoes near their property and/or allow us to set monitoring traps on their property.

To register your support or to find out more about our project please call 1800 811 054 to speak to a member of the Cairns team or go to www.eliminatedengue.com

Eliminate Dengue is a not-for-profit, international research collaboration led from Monash University, Melbourne with many partnering institutions including James Cook University, Cairns.

E: eliminatedengue@uq.edu.au
www.eliminatedengue.com
Free call from a landline in Australia Ph: 1800 811 054
An international solution

Dengue fever is ranked by the World Health Organization (WHO) as the most important mosquito-borne viral disease in the world.

Over 2.5 billion people in over 100 countries are at risk of infection with the most significant epidemics occurring in Southeast Asia, the Americas and the Western Pacific.

With no specific treatments or effective vaccines currently available to fight dengue, disease monitoring and vector control programs are the only methods available for its prevention.

The Eliminate Dengue Program in addition to developing the Wolbachia method in Australia is also working with local scientists and field sites in Vietnam, Indonesia (pictured above), Brazil and China. To find out more about the progress of this work visit www.eliminatedengue.com and subscribe to our e-newsletter.

How we hope to control dengue – Our aim is to stop the Aedes aegypti mosquito from passing dengue virus between humans (Diagram A). We have found that when Wolbachia is introduced into the Aedes aegypti mosquito it acts like a ‘vaccine’ for the mosquito, and reduces its ability to pass the dengue virus to people (Diagram B). When mosquitoes carrying Wolbachia are introduced into the environment, they mate with wild mosquitoes, and pass Wolbachia to their offspring (Diagram C). Our laboratory trials and independent analysis has concluded that Wolbachia is not harmful to humans, animals or the environment.

A. How dengue is transmitted

1. **Bites dengue infected person**
   - That person gets dengue 4-13 days later

2. **Mosquito ingests blood with dengue virus. Takes 8-10 days for dengue virus to incubate.**
   - Dengue infected mosquito bites another person
   - That person doesn’t get dengue
   - Wolbachia Aedes aegypti

3. **Dengue infected mosquito with Wolbachia bites another person**
   - That person doesn’t get dengue

4. **Mosquito ingests blood with dengue virus. Takes 8-10 days for dengue virus to incubate.**
   - Bites dengue infected person

B. Wolbachia blocks dengue virus

1. **Bites dengue infected person**
   - That person gets dengue 4-13 days later

2. **Mosquito ingests blood with dengue virus. Takes 8-10 days for dengue virus to incubate.**
   - Dengue infected mosquito with Wolbachia bites another person
   - That person doesn’t get dengue

3. **Wolbachia Aedes aegypti**

C. Wolbachia dengue control method

- Wild mosquitoes with no Wolbachia
- Mosquitoes released with Wolbachia
- Wolbachia continues to spread in the wild mosquito population
- All mosquitoes have Wolbachia

*Up to 30% reduction in mosquito population

Approximate number of weeks released

Visit the Cairns project office at: Suite 11/36 Grafton St, Cairns. Open Monday - Friday 8.30am – 5.00pm.

Visit the program website www.eliminatedengue.com for progress updates