Our Team

Professor Scot O’Neill from the University of Queensland, in Australia is the primary investigator on the project. From his Brisbane base he coordinates scientists and researchers in Brisbane, Melbourne and Cairns and internationally in Vietnam, Thailand, and the USA.

Collaborators on the project include:

- The University of Queensland (Australia)
- The University of Melbourne (Australia)
- Queensland Institute of Medical Research (Australia)
- James Cook University (Australia)
- National Institute of Hygiene and Epidemiology (Vietnam)
- Mahidol University (Thailand)
- Queensland Health (Australia)
- University of California, Davis (USA)
- North Carolina State University (USA)

New partners include:
- FIOCRUZ, Brazil
- Michigan State University, USA
- Oxford University Clinical Research Unit (OUCRU), Vietnam
- Family Health International (FHI), SE Asia

Contact Us:
Email: eliminatedengue@uq.edu.au     Phone: 1800 811 054

Funding and Support

In January 2003 the Grand Challenges in Global Health initiative was announced by the Bill & Melinda Gates Foundation to fund research on diseases that disproportionately affect people in the developing world.

The initiative aims to engage creative minds from diverse scientific disciplines to work on 14 major challenges. The challenges vary but they share one essential element: their solutions could lead to breakthrough advances in global health. The Eliminate Dengue project is one of those projects.

The Eliminate Dengue Project acknowledges and thanks the following organisations for their continued support:

- Foundation for the National Institutes of Health
- The Bill & Melinda Gates Foundation Grand Challenges in Global Health initiative
- The Queensland Government
- National Health and Medical Research Council (NHMRC)
- McLaughlin-Rotman Centre for Global Health at the University of Toronto.

Find out more >>
Go to www.eliminatedengue.com

An alternative strategy to eliminate dengue fever
In July 2011, FHI became FHI 360.
Dengue fever is a mosquito-borne viral disease that occurs in over 100 countries worldwide in tropical and subtropical regions. The World Health Organisation (WHO) estimates that up to 50 to 100 million cases of dengue occur annually. Of these cases 500,000 develop into dengue haemorrhagic fever which can result in up to 25,000 - 40,000 deaths.

Our Research
The Eliminate Dengue project is an international collaboration, pioneered by an Australian led research team that has the potential to provide a real solution to reduce the global burden of dengue fever.

Currently, there are no specific treatments or effective vaccines to fight dengue fever; therefore, disease monitoring and mosquito control programs are the only methods available for dengue prevention. However, these measures largely involve insecticide-based programs that are expensive to maintain and large-scale applications often cause considerable environmental concerns. The ‘Eliminate Dengue’ project is the first of its kind in the search for a long term solution to dengue fever.

Control the carrier
The goal of the Eliminate Dengue project is to stop the Aedes aegypti mosquito from transmitting the virus from person to person. Our method of control is Wolbachia, a natural bacterium that has been identified by scientists in up to 70 percent of the world’s different insect species, including many mosquitoes that bite but don’t harm people.

Early findings
Members of the project team have been carrying out research into Wolbachia since the 1980s. Early work demonstrated that one particular strain of the bacterium, Wolbachia pipientis (wMelPop) had a life-shortening effect in adult fruit flies (Drosophila sp.). This was of huge interest to the Eliminate Dengue project because only old female Aedes aegypti mosquitoes transmit the dengue virus, and the question was asked; ‘If Wolbachia was introduced into the Aedes aegypti would it reduce the mosquito’s life span and stop the spread of Dengue?’

A ‘vaccine’ for the mosquito
Over a three year period scientists in laboratories at The University of Queensland introduced the Wolbachia from the fruit flies into Aedes aegypti mosquitoes. During the course of studying these mosquitoes an exciting discovery was made. When the mosquitoes carried the Wolbachia bacterium they could no longer support the growth of the dengue virus. The Wolbachia was acting like a mosquito ‘vaccine’ that blocked the virus, leaving the mosquito unable to transmit dengue to another person.

Safety of the approach
Over an eight month period The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia’s national science agency, undertook its own social and environmental risk analysis of the project. CSIRO wanted to understand all the concerns the community and other national and international scientific advisors might have. The analysis considered 90 different potential hazards from harm to the environment to impact on the business economy. The final assessment rated the research method as ‘negligible’ risk, the lowest rating possible.

Not transferrable
We have also carried out experiments to see if Wolbachia can be transferred to humans and shown that this does not occur. Members of our project team have received hundreds of thousands of bites from Wolbachia infected mosquitoes over a four year period. We have also undertaken experiments with a range of natural mosquito predators such as spiders, geckos, fish and crustaceans and shown that Wolbachia is not transferred to these organisms through eating Wolbachia-Aedes aegypti.

A natural control
Underpinning these various experiments is the knowledge that Wolbachia commonly occurs in a range of insect species including well known species like the Cairns Birdwing butterfly. Most importantly Wolbachia occurs naturally in a number of nuisance mosquito species that commonly bite people but do not transmit disease.

What this means
We have shown that introducing Wolbachia into Aedes aegypti can prevent the mosquito from becoming infected with dengue, making it unable to transmit the virus between people.

Large field cage trials confirm that Wolbachia will successfully invade wild Aedes aegypti.

Independent analysis has concluded that introducing Wolbachia into natural mosquito populations is safe. CSIRO concluded that this method poses negligible risk to both the environment and human safety.

The project is unique in that, once a sufficient number of Wolbachia mosquitoes have been released into the wild, the method will be self-sustaining.

Our current information suggests that the Wolbachia method could possibly stop the spread of dengue fever at a relatively low cost and reduce our reliance on insecticides.

The next stage
Based on our successful laboratory work we are now ready to begin the next stage of our research with open field tests in identified communities in Australia and Vietnam where Aedes aegypti are commonly found and where dengue fever has occurred. This will allow us to find the best way to introduce Wolbachia into wild mosquito populations. To move to open field testing the Australian Pesticides and Veterinary Medicines Authority (APVMA) an Australian Government authority has undertaken additional risk assessment together with the Australian Government’s Department of Environment and Heritage and the APVMA has issued regulatory approval for field trials to be undertaken in north Queensland.

Field trials will begin this wet season and involve an initial series of experiments where we will release the Wolbachia-Aedes aegypti. These mosquitoes will mate with wild mosquitoes and Wolbachia will spread into the wild mosquito population. Our experiments will determine how best to establish Wolbachia into a wild mosquito population. Before field trials begin we will reduce natural mosquito numbers by emptying out mosquito breeding sites and manually removing mosquito eggs. There is no expectation that mosquito populations during the field trial period will be any higher than they normally would be at this time of year.

Further afield
If successful these initial tests will be followed by larger scale field tests in Vietnam in areas where consistently high outbreaks of dengue fever occur and where we hope to demonstrate how effective the method is in reducing disease in these communities.

If all our field-testing proves positive we hope to be able to roll out a new approach to dengue control that will dramatically improve the lives of millions of people living in dengue-affected regions throughout the world.

Talking to the community
From the beginning of our research program we have been actively talking to the wider community in far north Queensland and specifically within our identified research areas of Yorkeys Knob and Gordonvale. We have been doing this to both talk to people about the work we are carrying out and to listen to any concerns. Through this engagement we have been hearing that residents of north Queensland are concerned about future outbreaks of dengue fever and support our research project. Cairns residents see the potential benefits of the project locally, and in dengue affected areas around the world.

During the course of the field trials we will be providing regular updates to the community on how the research is progressing and the results that are being obtained and at the same time we encourage the community to contact us (see back page for contact details).

www.eliminatedengue.com
A Global Burden

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Images from left to right:

• Members of the Eliminate Dengue team have received hundreds of thousands of bites from the Wolbachia - Aedes aegypti.

• Professor Scott O’Neill inspects the field cages in Vietnam.

• Wolbachia is a naturally occurring bacterium present in up to 75% of all insect species including the Cairns Birdwing butterfly, fruit flies, moths and Darned flies.

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