Wolbachia

Wolbachia are natural bacteria present in up to 50% of insect species, including some mosquitoes.

What is *Wolbachia* and why use it?

Wolbachia are natural bacteria present in up to 50 per cent of insect species, including some mosquitoes. *Wolbachia* is not usually found in the *Aedes aegypti* mosquito, the primary species responsible for transmitting human viruses such as dengue, Zika, chikungunya and yellow fever. Research conducted by the World Mosquito Program shows that when introduced into *Aedes aegypti* mosquitoes, *Wolbachia* can help to reduce the transmission of the viruses they carry.

The World Mosquito Program introduces *Wolbachia* into *Aedes aegypti* mosquitoes in the laboratory and releases them into the wild. These *Wolbachia* mosquitoes then breed with the wild mosquito population. Over time, the percentage of mosquitoes carrying *Wolbachia* grows until it remains high without the need for further releases.

Wolbachia is safe for humans, animals and the environment. Three independent risk assessments have been conducted by government scientific research organisations in Australia, Indonesia and Vietnam, all of which gave an overall risk rating of 'negligible' - the lowest possible rating - for the release of *Wolbachia* mosquitoes.

The *Wolbachia* method has some unique advantages. It is safe, natural and can be deployed without posing risk to natural ecosystems. It does not involve genetic modification. Unlike most other initiatives tackling virus-transmitting mosquitoes, the World Mosquito Program's *Wolbachia* method is self-sustaining and does not suppress mosquito populations.

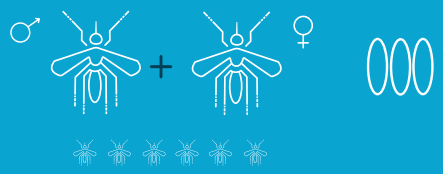
How does *Wolbachia* increase throughout the mosquito population?

The diagram on the right explains a process called cytoplasmic incompatibility, which enables *Wolbachia* to increase in mosquito populations. *Wolbachia* can only be transmitted from parent to offspring inside the female's egg. Although this limits the initial amplification of *Wolbachia* in mosquito populations, over generations the numbers of male and female mosquitoes with Wolbachia steadily increase.

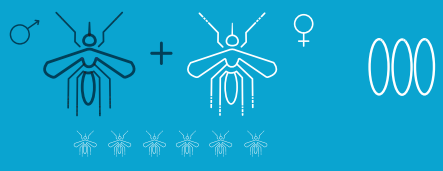
Long-term monitoring by the World Mosquito Program shows that *Wolbachia* is self-sustaining at high levels in most of our international project sites up to 8 years after release.In these areas, there have not been any local transmission of mosquito-borne diseases, such as dengue, Zika, chikungunya and yellow fever.

Cytoplasmic Incompatibility

When male mosquitoes with *Wolbachia* mate with wild female mosquitoes without *Wolbachia*, those females will lay eggs that won't hatch.



When male mosquitoes with *Wolbachia* mate with females with *Wolbachia*, all of their offspring will carry *Wolbachia*.



When female mosquitoes with *Wolbachia* mate with males without *Wolbachia*, all of their offspring will carry *Wolbachia*.

How safe is *Wolbachia* for people and animals?

Years of laboratory and field-based research has concluded that mosquitoes with *Wolbachia* are safe for people, animals and the environment. In the wild, some species of mosquitoes (including those that bite people) already carry *Wolbachia*.

Is *Wolbachia* harmful to the environment?

The World Mosquito Program's *Wolbachia* method is an environmentally friendly intervention that uses naturally occurring bacteria already found in many insect species. Laboratory and field research has found that *Wolbachia* cannot be passed to humans or other mammals. Insecticides, which are relatively expensive and can linger in the environment, killing other beneficial insects and damaging human health, can be used less frequently.

Do other animals carry *Wolbachia*?

Wolbachia is common among arthropods, including insects, spiders and other small animals without backbones. Up to 60 per cent of insect species naturally carry *Wolbachia*, including butterflies, dragonflies, moths and some mosquito species. *Wolbachia* is not found in larger animals such as mammals, reptiles, birds and fish.

Will the bite of a mosquito infected with *Wolbachia* hurt more than a normal bite?

No, people who are bitten by an *Aedes aegypti* mosquito carrying *Wolbachia* will not notice any difference.

Our research shows that when introduced into the *Aedes aegypti* mosquito, *Wolbachia* is capable of blocking the transmission of mosquito-borne viruses, like dengue, Zika, chikungunya and yellow fever.

***Wolbachia* is transferred from the Drosophila fruit fly to *Aedes aegypti* mosquitoes by microinjection.**

***Wolbachia* is:**

- **a naturally occuring bacteria**
- **found in 60% of all insect species**
- **safe for humans, animals and the environment**

About us

The World Mosquito Program (WMP) is a not-for-profit group of companies owned by Monash University that works to protect the global community from mosquito-borne diseases. The World Mosquito Program uses naturally occurring bacteria called *Wolbachia* to reduce the ability of mosquitoes to transmit viruses to humans.

Following decades of research and successful field trial results, the World Mosquito Program is currently partnering with communities in 11 countries around the world to implement our ground-breaking solution. We have staff working in countries across Oceania, Asia, Europe, and the Americas, and offices established in Australia, Vietnam, France and Panama.

Our approach has widespread support from communities, governments, research institutes and philanthropic partners around the world. Through collaboration and innovation, we are making a difference to millions of lives.

Contact us

@ contact@worldmosquito.org

worldmosquitoprogram.org

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A collaboration between:

World Mosquito Program | MONASH University