

What is the single best strategy for decreasing dengue virus incidence worldwide?

Genetic modification of *Aedes aegypti* using lethal genes

Jennifer Baltzgar, Johanna Elsensohn, Nicole Gutzmann, Sophia Webster
North Carolina State University

Four diverse serotypes

Morbidity and mortality increase with subsequent infections

Current control methods are insufficient

Need control approach to
eliminate transmission

Genetically engineering *Aedes aegypti*
using lethal genes is the most promising
approach for dengue control

A dead mosquito cannot transmit dengue

Alphey et al. 2013, Bourtzis et al. 2016

Lethal genes are the superior technology:

Targeted
Reversible
Versatile
Responsible

Lethal Genes are **TARGETED**

Insert specific genes

Gene mechanism(s) understood

Lethal Genes are **REVERSIBLE**

Limited persistence

Lethal Genes are **VERSATILE**

Large library of genes and promoters

Protects against multiple pathogens and serotypes

Lethal Genes are **VERSATILE**

Brazil, Malaysia, Panama, Mexico,
Grand Cayman, United States

Lethal Genes are **RESPONSIBLE**

80-95% reductions at release sites

Extensive regulatory scrutiny and approval

Lethal Genes are **RESPONSIBLE**

Intensive public engagement

Public approval

Lethal Genes are **RESPONSIBLE**

Does not increase dengue transmission

Lethal Genes are **RESPONSIBLE**

Surveillance with fluorescent marker

Potential genetic sexing strains

Wolbachia is a black box

Alphey et al. 2013, Bourtzis et al. 2016, Bull and Turelli 2013

TARGETED?

Introduces an entire foreign genome

REVERSIBLE?

No.

VERSATILE?

Not culturable
Few useful strains

VERSATILE?

Affected by environmental factors:
temperature, nutrients, density

RESPONSIBLE?

Unknown mechanism
Susceptibility to other pathogens

Alphey et al. 2013, Bourtzis et al. 2016, Bull and Turelli 2013, Hughes et al. 2014

Uncertain interactions with mosquito

Leftwich et al. 2016

Uncertain interactions with mosquito

Uncertain interactions with pathogen

Same end goal: different strategies

Lethal genes target mosquito
Wolbachia targets virus?

Population suppression

Population suppression

Population replacement

Genetically modified mosquitoes with
lethal genes is the single best strategy:

Targeted
Reversible
Versatile
Responsible

If we want to eliminate dengue, we need
to eliminate transmission

Thank you

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