Method to Control the Spread of Mosquitos Carrying the Zika Virus by a Split Trans-Complementing Gene-Drive System for Suppressing Aedes aegypti Mosquitos

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Technology description

Researchers from the laboratory of Ethan Bier at UC San Diego have developed an alternative technology for mosquito control by specifically targeting the mosquitoAedes aegypti. Genetically modified strains ofAedes aegyptiwill be introduced into the general mosquito population to suppress as well as eliminate the target populations. Specifically,Aedes aegyptiwill have a Cas9-mediated split gene-drive system for masculinizing the mosquito and ensuring that any female carries a sterile mutation. In addition, gRNAs direct Cas9 cleavage of insecticide-resistance loci, renders female mosquitos that escape the male converting gene drive, are sensitive to insecticides. This novel approach works by combining split gene drives and a female sterile fail-safe mechanism that acts as a secondary built-in population suppression strategy.

TheAedes aegyptimosquito is known to transmit dengue fever, yellow fever, chikungunya virus, and Zika virus which have a worldwide impact on people’ s health. Moreover, both Chikungunya and Zika virus were recently introduced into the western hemisphere and are poised to sweep throughout the areas in the range of mosquitos with the potential of infecting people who live in these broad areas. Attempts to eradicate these diseases by eliminating theAedes aegyptimosquito by conventional use of spraying insecticides has met with limited success. So, in the absence of effective mosquito abatement, vaccines may provide the best strategy of preventing disease. Currently, there are vaccines for Yellow Fever and Dengue Fever (undergoing further testing); no vaccines exist for either Chikungunya or Zika virus at present. In the absence of such vaccines, UC San Diego researchers have developed a novel approach to control the spread of mosquitos.

Related Materials

Gantz V., N. Jasinskiene, O. Tatarenkova, A. Fazekas, V.M. Macias, E. Bier*, and A.A. James*. (2015). Highly efficient Cas9-mediated gene drive for population modification of the malaria vector mosquito, Anopheles stephensi. Proc Natl Acad Sci U S A. 2015 Dec 8,112(49):E6736-43

Application area

The technology provides a mechanism for reducing or eliminating populations of*Aedes aegypti*mosquitos.

Advantages

Offers a lower cost than Sterile Insect Technology and may be more effective method for elimination of*Aedes aegypti*mosquitos

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