

## THE GRAND CHALLENGES IN GLOBAL HEALTH INITIATIVE: GENETIC STRATEGIES TO CONTROL INSECT VECTORS OF DISEASE

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The Grand Challenges in Global Health (GCGH) initiative<sup>1</sup> was launched by Bill Gates in January, 2003, to encourage innovative research that, if successful, could result in scientific or technical breakthroughs that would overcome one or more bottlenecks in an imagined path towards the solution of several significant global health problems. The initiative takes as its model the grand challenges formulated more than 100 years ago by mathematician David Hilbert, a list of important unsolved problems that has encouraged innovation in mathematics research ever since. In October, 2003, the GCGH Scientific Board announced a list of 14 Grand Challenges<sup>2</sup>, ranging from creating vaccines that can be delivered more easily to people in the developing world to developing more accurate methods for measuring health status in those regions. Two of the Grand Challenges seek better methods to control insects that transmit agents of diseases particularly relevant to developing countries. One of these deals with development of chemical strategies for making vector populations incompetent to transmit disease agents, or for substantially reducing the prevalence of the vector. The other seeks to develop genetic strategies for a similar purpose.

The GCGH initiative supports three projects aimed at development of genetically engineered mosquitoes to control dengue or malaria, and an additional project aimed at using a life-shortening strain of *Wolbachia* as a form of biological control of dengue vectors<sup>1</sup>. Of the three projects proposing genetic engineering of mosquitoes, one has plans to conduct caged field trials in a disease endemic region within the 5 year award period, i.e. before 2010. These trials, to be conducted under fully caged conditions and using uninfected genetically engineered *Aedes aegypti*, are intended as proof of principle to establish the potential of this strategy with regard to whether genetically engineered mosquitoes can compete with and mate with wild-type mosquitoes in semi-field environments. It is also the intent of this project to develop a pathway for the performance of such studies with regard to: 1) procedures for appropriate conduct of contained field trials, 2) strategies for community engagement and other ethical, social and cultural considerations, and 3) appropriate institutional, national and international approval mechanisms. The first point is currently being addressed by a scientific working group, which is developing a guidance document for contained field trials, including recommendations for physical containment, surveillance and remediation, as well for a phased testing process with points to consider for risk assessment at each phase.

### Reference:

1 The Grand Challenges in Global Health <http://www.gcgh.org/default.aspx?SecID=180>

2 Varmus, H., R. Klausner, E. Zerhouni, T. Acharya, A.S. Daar, and P.A. Singer. 2003. Grand Challenges in Global Health. *Science* **302**: 398-399.