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**INDIA-U.S. JOIN FORCES TO COMBAT WORLD'S MOST
WIDESPREAD FORM OF MALARIA**

**Malaria Vaccine Initiative, India's International Centre for Genetic
Engineering and Biotechnology, and Bharat Biotech to Jointly Develop
Malaria Vaccine**

NEW DELHI, INDIA, 11 July 2001— A candidate vaccine developed by Indian researchers that promises to protect against the world's most widespread form of malaria has now received a major boost through a three-way partnership. The Malaria Vaccine Initiative at PATH (Program for Appropriate Technology in Health, a US-based nonprofit organization), the International Centre for Genetic Engineering and Biotechnology (ICGEB) in New Delhi, and the biotechnology firm, Bharat Biotech International Limited in Hyderabad, India, today announced an agreement to jointly develop a vaccine with the potential to prevent malaria caused by the parasite *Plasmodium vivax*, transmitted through mosquito bites. Nearly 65 percent of all malaria cases in India are caused by *P. vivax*. The Indian government spends almost half of its health budget combating malaria.

"With MVI's support, our goal of an effective vaccine for India and the world suddenly seems possible," said Dr. Virander Chauhan, Director of ICGEB and Head of its Malaria Research Group in New Delhi. "Prior to MVI's backing and our partnership with Bharat, we had no clear way to move this vaccine candidate from the lab to manufacturing and clinical testing."

"This project brings together two great resources within India: the world-class scientists at ICGEB and the know-how of the up-and-coming Indian biotechnology sector," said Regina Rabinovich, MD, Director of the Malaria Vaccine Initiative at PATH. "With this partnership and the continued collaboration of the Indian Government, we hope to make a malaria vaccine not only for India, but for the whole world."

"This vaccine would help people in developing and under-developed countries, where malaria is rampant and threatens their very existence," said Dr. Krishna Ella, Chairman and Managing Director of Bharat Biotech. "This is an important step toward Bharat Biotech's goal of providing cost effective solutions to diseases endemic to such regions."

Malaria has been a scourge of India for centuries, and references to it can be found in

Indian Vedic writing from 1600 BC. Today, with one-sixth of the world population, India continues to suffer a tremendous disease burden from malaria caused by two different parasites: *Plasmodium falciparum* and *P. vivax*. *P. falciparum* is most prevalent in Africa and is the major cause of deaths from malaria.

Although the less deadly of the two parasites, *P. vivax* is more widespread and causes severe illness. Beyond India, it is found across large swaths of Asia, Latin America, and Africa. Furthermore, it has been on the rise due to the parasite's increased resistance to anti-malarial drugs. Currently, no vaccines are licensed to protect against any form of malaria, which infects 300 to 500 million people worldwide.

The candidate vaccine developed by ICGEB targets the parasite's "Duffy binding protein." This protein enables *P. vivax* to bind to receptors on red blood cells, in essence opening doors to invade the cells. Because the vaccine is designed to thwart invasion of red blood cells, it may be able to prevent disease caused by *P. vivax*. ICGB initially developed the *P. vivax* candidate vaccine with support from the World Health Organization's Tropical Disease Research Division. ICGB has also received funding for malaria vaccine development from the Indian Government's Department of Biotechnology and the Indo-U.S. Vaccine Action Program, an alliance between the Department of Biotechnology and the U.S. National Institutes of Health.

"The agreement between ICGB, Bharat, and MVI brings international recognition to the malaria vaccine development efforts at ICGB and will provide a major thrust to our work," said Dr. Chetan Chitnis, Scientist, Malaria Research Group at ICGB/New Delhi, and Principal Investigator for the MVI-ICGB-Bharat project.

Under the new agreement, to which MVI brings more than US\$1 million, ICGB will fine-tune the vaccine and transfer its technology to Bharat Biotech. Bharat will manufacture the vaccine in compliance with the highest biological standards for human clinical trials. Located in Hyderabad, the center of India's biotechnology industry, Bharat will use its state-of-the-art process development and manufacturing facilities for the project. Human clinical trials should begin before 2004.

PATH (Program for Appropriate Technology in Health) established the Malaria Vaccine Initiative (MVI) through a \$50 million seed grant from the Bill & Melinda Gates Foundation. MVI at PATH seeks to accelerate the development of promising malaria vaccines and ensure their availability for the developing world. For further information about MVI and PATH, visit the Web sites at www.MalariaVaccine.org and www.path.org.

The International Centre for Genetic Engineering and Biotechnology (ICGEB), with laboratories in New Delhi, India, and Trieste, Italy, is dedicated to developing and promoting application of biotechnology for solving problems in health and agriculture, particularly in developing countries. For more information visit www.icgeb.trieste.it/.

Bharat Biotech India Limited, a leading technology-driven venture in India, is focused on providing path-breaking solutions through biotechnology for diseases that are challenging the entire human race. For more information visit www.bharatbiotech.com.