OneWorld Health, a drug development affiliate of PATH

Founded in July 2000, Institute for OneWorld Health (OWH) is a nonprofit drug development program with a mission to discover, develop, and deliver safe, effective, and affordable new treatments for diseases disproportionately affecting people in the developing world. In 2011, OWH became a drug development affiliate of PATH, an international nonprofit organization that transforms global health through innovation. OWH is headquartered in South San Francisco, California. OWH operates as a product-development partnership (PDP) to develop high-quality treatments and bring them to the market cost effectively.

CURRENT GLOBAL HEALTH INITIATIVES

Diarrheal disease

Diarrheal disease accounts for approximately 1.3 million deaths annually in children under five years of age—it is the second most common cause of death in young children after pneumonia. Survivors who are inadequately treated suffer from long-term health problems. With about 2 billion cases of diarrheal diseases globally every year, there is an urgent need for safe, effective, and affordable treatments.

OWH is working to address various aspects of cholera and other diarrheal diseases. In 2011, OWH received US Food and Drug Administration approval to proceed to phase 1 trials for its Investigational New Drug iOWH032 to treat secretory diarrhea resulting from diseases like cholera. This new synthetic drug reduces fluid loss and is designed to be used in conjunction with oral rehydration therapy (ORT), providing faster relief of diarrhea symptoms and encouraging wider adoption of and compliance with ORT. iOWH032 is scheduled to enter phase 2 trials in 2012. OWH is also collaborating with Anacor Pharmaceuticals to discover antibacterial compounds for treating bloody diarrhea (shigellosis) and with the Center for World Health and Medicine to identify potential anti-secretory drug candidates.

Malaria

Malaria is a life-threatening disease transmitted by mosquitoes infected with parasites of the genus *Plasmodium*. With proper surveillance and care, malaria can be prevented and treated. Every year, malaria infects an estimated 216 million people, causing 655,000 deaths—most of them young children in sub-Saharan Africa.

Artemisinin-based combination therapy (ACT) is the gold standard of malaria treatment. However, the supply of plant-derived artemisinin (ART) can be unstable, resulting in shortages and high cost of ACTs. To meet this challenge, OWH formed a partnership with synthetic biology innovator, Amyris Inc., and a leading pharmaceutical company, Sanofi, to develop a semi-synthetic form of artemisinin. The synthetic biology technology is based on pioneering inventions licensed from the University of California at Berkeley and the National Research Council Plant Biotechnology Institute (Canada). The collaboration, known as the Artemisinin Project, supported by the Bill & Melinda Gates Foundation, aims to create a complementary source of non-seasonal, high-quality, and affordable ART to supplement the current botanical supply, making ACTs more accessible to the hundreds of millions of impoverished people who contract malaria each year. In 2011, after successful completion of the scientific work necessary to enable production of semi-synthetic ART, OWH announced that the Artemisinin Project has entered the production and distribution phase. Integration of semisynthetic ART into the supply chain and ACTs is expected in 2012.

Kala-Azar

Kala-Azar (visceral leishmaniasis, or VL) is a potentially fatal infectious disease that is transmitted through the bite of a sandfly and affects the visceral organs, causing chronic fever, weight loss, and anemia. VL is endemic in 65 countries, primarily in the developing world, and the population at risk is estimated at 200 million. If left untreated, VL is nearly always fatal. Officially, 50,000 to 60,000 deaths result from VL each year.

OWH developed the Paromomycin Intramuscular Injection (PMIM) as a safe, effective, and affordable treatment for Kala-Azar. A full course of treatment costs less than US$20. PMIM was designated by the World Health Organization for inclusion on its Model List for Essential Medicines and has been approved for the Essential Drug Lists of Bangladesh, India, and Nepal. PMIM is currently registered in India, Nepal, and Uganda. In 2011, OWH completed a major phase 4 pharmacovigilance study of PMIM for the treatment of VL in India (Bihar) and conducted field research to better understand the impact of the disease and treatment on rural communities. In October 2011, together with the Drugs for Neglected Diseases *initiative*, and Special Programme for Research Training in Tropical Diseases, OWH announced launch of a major consortium project aimed at establishing and implementing new treatment modalities as successful tools towards VL elimination in South Asia.

Access program

The Access program works to ensure that the treatments OWH develops are available and acceptable to at-risk patients at an affordable cost via private- and public-sector markets and healthcare systems. This program aims to expand access to drugs and diagnostics to patients by conducting epidemiologic and market research into the barriers to access and evaluating delivery models designed to expand access.

In 2009, OWH completed a study in India in collaboration with the government's Rajendra Memorial Research Institute of Medical Sciences (RMRIMS) and ten other Indian physicians to demonstrate how to expand access to PMIM—a low-cost, safe, and effective treatment for the deadly disease Kala-Azar—in private health clinics outside of the main urban centers and closer to the rural population most at risk. Doctors in five districts of the State of Bihar in India were trained to diagnose and treat rural patients on an outpatient basis, while making lodging and a healthy diet available during the course of treatment. The evaluation of the model demonstrated a significant reduction in the delay in time before patients received treatment from a qualified physician and a reduction in their expenditures on ineffective treatments.

The Access team, in collaboration with RMRIMS, also completed extensive field research on Kala-Azar in India. The team conducted a population-based survey of the annual incidence of Kala-Azar and its economic impact on rural households in one VL-endemic district in the State of Bihar. Findings have been published in *Tropical Medicine and International Health*[1].

Helminth program

Soil-transmitted helminth (STH) infection is highly endemic in tropical and subtropical areas of sub-Saharan Africa, Asia, and Latin America. It is estimated that approximately 2 billion people (nearly one third of the world's population) have active STH infections. STH infection has remained largely neglected by the global health community because the people most affected are among the most impoverished and the infection causes chronic ill-health with insidious clinical presentations, rather than severe acute illness or high incidence of death. It is common for a single individual, especially a child, to be infected chronically with all three types of soil-transmitted worms.

OWH's Helminth program aims to develop a new safe and affordable drug against soil-transmitted helminthiasis, with a defined access strategy that supports global helminth control efforts. The Helminth program has worked to establish collaborations with researchers at the Swiss Tropical Institute and the University of California, San Diego, to evaluate potential new anthelmintic drug candidates. The program has conducted clinical capacity building and epidemiology training at selected sites in India and Vietnam. The training ensured that the participants are now better equipped to conduct epidemiological studies. OWH provided equipment to research institutes in Vietnam to help expand laboratory capacity and aid in the proper diagnosis of helminth infections.

In 2011, OWH partnered with the Jharkhand State Department of Health (India) on a control initiative aimed at reducing chronic worm infection and high incidence among children. The project combines education, epidemiology, and de-worming in selected districts of Jharkhand, with OWH providing support in training public health personnel in STH epidemiology and control, conducting sample surveys in rural blocks to determine the prevalence of STH infections in a village setting, implementing a school-based de-worming campaign, and developing behavioral change communication strategies that can have a long-term impact to improve health and hygiene in the communities and reduce the spread of intestinal worm infection.

For more information about our global efforts, visit www.oneworldhealth.org. To learn more about PATH, visit www.path.org.

[1] Das P, Samuels S, Desjeux P, et al. Annual incidence of visceral leishmaniasis in an endemic area of Bihar, India. *Tropical Medicine and International Health*, 2010;15(suppl.2):4-11 and Sarnoff R, Desai J, Desjeux P, et al. Visceral leishmaniasis supplement: the economic impact of visceral leishmaniasis on rural households in one endemic district of Bihar, India. *Tropical Medicine and International Health*, 2010;15(suppl.2):42-49.

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