

A World Without Malaria

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It has plagued humankind for tens of thousands of years. It killed people in Plato's Greece, in the Pharaohs' Egypt, and throughout all the ancient Chinese dynasties. Delivered by a prehistoric insect, it is responsible for 800,000 deaths each year; a number roughly equal to the population of San Francisco. Today half of the world's population is at risk of contracting malaria. The disease has had such a significant impact on the human population as well as the economies of developing countries, the effect of the abolition of the disease is much more far reaching than simply saving lives.

Pharmaceutical company GalaxoSmithClyne, in partnership with PATH Malaria Vaccine Initiative (MVI), has developed a promising vaccine candidate. The data from Phase III of their trials were revealed at the Malaria Forum hosted by the Bill & Melinda Gates Foundation in Seattle, Washington. The results are unprecedented. "People have said that you will never be able to make vaccines against organisms this complicated. This shows that it is possible," says Dr. Peter Hotez, President of the American Society of Tropical Medicine and Hygiene.

Phase III of the trials for the vaccine candidate, called RTS,S, were conducted at 11 trial sites in seven countries across sub-Saharan Africa. The drug was shown to

reduce the risk of children experiencing clinical malaria and severe malaria by 56% and 47%, respectively. These groundbreaking numbers have electrified the discussion about malaria research. However, they are still far from indicating a complete solution.

'Vaccine' sounds a lot like 'panacea' which is a typical misinterpretation. For diseases like Polio, once widespread, effective polio vaccines have rendered the practically non-existent. Malaria, because of its complex nature and because it's a parasite and not a single celled organism, is infinitely more difficult to combat with a silver bullet. It will be years before RTS,S will even be reviewed by the World Health Organization (WHO) and potentially recommended for distribution. And it will not present a singular solution if and when it does achieve widespread use. It will continue to take a variety of devices, used simultaneously, to combat the disease.

For the foreseeable future, new drugs will be used in tandem with more traditional treatments. People have relied on some of the same preventative methods for hundreds of years. Quinine, a prophylaxis against malaria, has been used since the 17th century. The British East India Company pioneered the gin and tonic cocktail while searching for a palatable way to administer quinine-infused tonic water to troops. Bed nets – a simple barrier between humans and infected mosquitos – are some of the oldest defenses, and still among the most effective. But they're not effective enough.

Malaria is tenacious. The parasite has developed resistance to some drugs and a cure remains elusive.

Speaking about RTS,S, Dr. Hotez cautions, "It's a big quantum leap, but this doesn't mean that now the control, eradication or elimination of malaria is a given." For now, the aim is to begin to control the disease. Eradication is so far off as to not be in the sites of many experts. It's what the Bill and Melinda Gates Foundation has referred to as "the audacious goal".

Malaria's impact on the world's population is more profound than a simple death toll. Achieving the big goal would result in much more than saved lives. Most compelling are the implications for children. Not only for the 800,000 that die each year, but also for those who survive their infections. Studies have shown that malaria can degrade cognitive function. Although children have a reduced risk of dying from malaria once they reach school age, the chronic condition can compromise their ability to learn and perform in school. Thousands experience these long-term debilitating effects that may be difficult to identify. Eliminating malaria could elevate educational prospects for thousands of children and raise literacy rates in some of the least literate countries in the world.

Chronic malaria stymies adults in many ways as well. Adults can suffer from multiple episodes each year, typically missing 3-5 days of work during each attack. "This

is not just in Africa, but in Asia and the Americas," says Dr. Hotez. "There is a consequence to private sector cotton growers, mining companies... in terms of their work force." Unburdening employees and employers from the 247 million cases of malaria that occur every year could stimulate productivity in developing nations. A huge percentage of the workforce in some countries would no longer contend with lingering anemia, malaria attacks and chronically ill children.

20%-50% of inpatient admissions in some countries are malaria patients. This increases the stress on already over-burdened public and private health systems. Reduce infections, and the effects on the availability of health services are immediately apparent. "I was recently in Western Kenya in the height of transmission season," recalls Dr. Carlos C. Campbell, Director of Policy & Advocacy for PATH's Malaria Control Program, who has been working in the region for twenty years. "Fifteen years ago during that time there would be lines going outside of the facilities. It would be two children to a bed, children sleeping on the floor in various stages of stress. Now clinics are almost empty because the expansion of bed net programs have reduced the amount of malaria infection that is occurring."

For all of these reasons, Dr. Hotez refers to medicines like RTS,S as "Antipoverty Vaccines", stating that diseases like malaria are "not just occurring in a setting of poverty: They are the cause of poverty."

An overwhelming percentage of malaria cases occur in Africa – over 85%. Of course, the causes of poverty in Africa are profuse and elaborate. As with malaria itself, there is no one solution. But the elimination of such a powerful and pervasive disease could create change in many facets of life and community. Treating and studying malaria places heavy demand on too-scarce resources – time, money, facilities, manpower. According to the WHO, the direct loss to the economy in Nigeria alone is estimated at \$830 million, money that could be redirected to alleviate other sufferings and solve other persistent problems. If there were clear definitions for developed nations vs. developing nations, those definitions would almost certainly include benchmarks for education, prosperity, and productivity. All of these would be improved through malaria's defeat.

The future of RTS,S is exciting as well as uncertain. Right now teams are gathering to generate solutions to countless challenges and roadblocks that lie in wait within distribution channels, cold-chain systems, governmental approvals, limited funding sources and remote testing sites. Their efforts move us toward relief from the malaria problem. Perhaps ultimately they will also pave the way to the more "audacious goal." If they succeed, thousands of children will live, and millions more will live better.