

HIGH PERFORMANCE

BODY + MIND



The End of Malaria

Can a multibillion-dollar push stop the world's deadliest killer?

BY DANIEL GRUSHKIN

■ FOR GRETCHEN GARMAN, 29, a Peace Corps volunteer in Malawi, the symptoms came on suddenly and violently. "I was exhausted but otherwise fine, and then all at once I was nauseous, vomiting, and had a 103-degree temperature," she says. Two weeks earlier Garman had accidentally fallen asleep without a protective mosquito net and been bitten by the checker-winged species that carries malaria.

The majority of malaria victims worldwide are children under five, "but travelers who enter into endemic regions are just as susceptible as small children because they're naive about the risks," says

ism can multiply several hundred million times and destroy enough oxygen-carrying red blood cells to suffocate and kill a person, organ by organ. Or in the case of cerebral malaria, the parasites commandeer red blood cells and block capillaries in the brain, leading to a coma.

"Because there is such an astronomical population of malaria parasites, it's likely that every genetic mutation will occur within a given time," explains Tovi Lehmann, Ph.D., facility head of the National Institutes of Health's Laboratory of Malaria and Vector Research. The result is an epidemiologist's nightmare: Through trial and

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Joseph Vinetz, M.D., president-elect of the American Committee on Clinical Tropical Medicine and Travelers' Health. Of the 1,564 diagnoses in the United States in 2006, for instance, all involved travelers who had contracted the disease abroad, according to the Centers for Disease Control. Six cases were fatal.

Garman was lucky. Within a day she recognized malaria's telltale symptoms and was able to get treatment quickly. But even after an intense course of medication, "it took weeks to get back up to speed," she says. "I've been through some malarious places since, and you can bet I take prophylaxes now."

A MOVING TARGET

We may be closer to eradicating malaria than ever before. At a United Nations summit in September 2008, a new global initiative was unveiled that promises to save at least four million lives by 2015. The Roll Back Malaria Partnership is the first coalition between governments and NGOs of its size. It details plans to allocate \$5 billion a year, over at least nine years, to multiply the distribution of available treatments and to speed innovations. And not a moment too soon: Malaria threatens half of the world's population—3.3 billion people in 109 countries—and is to blame for more than a million deaths every year.

The disease is caused by a parasite that is transmitted from one human to another by the bite of infected female anopheles mosquitoes. They can drain only a few drops of blood at a time, but all it takes is one microscopic plasmodium protozoan to wreak havoc. Within two weeks of entering the bloodstream, the organ-

How long a trip?

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error, the parasite will inevitably unlock the right genetic code to counter whatever new treatment is developed.

SLOW PROGRESS

In 1955 the World Health Organization first attempted to eliminate the disease with a combination of insecticides and a new medicine called chloroquine. Its plan wiped out malaria from the Caribbean to the South Pacific, but over the past 40 years, the parasite has evolved resistance to chloroquine in parts of Africa and Asia. Today the epidemic has returned with a vengeance: The annual death rate has doubled in the past decade.

The Roll Back Malaria Partnership will reinforce proven methods—like the distribution of insecticide-treated bed nets—but will also devote \$750 million a year to research and development. The newest and most powerful treatment derives from a 2,000-year-old Chinese herbal remedy called artemisinin, or sweet wormwood. Combined with other treatments, artemisinin “is 100 percent effective in successfully treating malaria,” says Jan Van Erps, M.D., with the Roll Back Malaria Partnership. “Every other drug available right now is only between 25 and 90 percent effective—anything less than 100 percent is just not good enough.” One artemisinin treatment is currently awaiting FDA approval.

Doctors still recommend prophylactic drugs as an effective defense against malaria, but popping pills can be complicated. (See “Beat the Bite,” below.) “It’s not a one-size-fits-all thing. There are different strains of malaria in different regions, so treatments have to be tailored,” says Alberto Acosta, M.D., medical director of

The newest drug in the malaria arsenal derives from an ancient Chinese herbal remedy.

Traveler’s Medical Service. The deadliest strain, falciparum, is most prevalent in sub-Saharan Africa, while another strain, vivax, thrives in Asia and Central and South America. Vivax can remain in a person’s system months after infection, but it is entirely curable. Each requires different medication, though “there is a finite success rate with even the best drugs,” says Vinetz.

RACE TO THE END

A vaccine is our greatest hope to beat back the disease once and for all. The most promising two are now in development. One, called RTS,S, stimulates an immune response in our bodies and has been shown to be 65 percent effective in a three-month trial. Another, called PfSPZ, also works by helping the human body develop immunity, but it amounts to a full-bore assault on the malarial genome. It works by incorporating the parasite’s entire genetic code, rather than just one gene, in its formula, according to Stephen Hoffman, M.D., CEO of Sanaria, the Maryland-based biotechnology company developing the vaccine. “There are about 5,300 genes in the malaria genome,” he explains. “But all the other vaccines in development, including RTS,S, are based on just one of those genes. Ours uses all 5,300, so it provides far broader protection.” The first clinical trial of PfSPZ begins early this year, and it could be available for human use as soon as 2014. “A vaccine is going to be the best public dollar spent,” says Johanna Daily, M.D., a malaria researcher at Harvard Medical School. But even then, she cautions, “it’s going to be a race against the disease to get there.” ▲



BEAT THE BITE

Traveling to a malaria hot spot? Bring a mosquito net—and your prescription pills. What kind? Let your itinerary be your guide.

