Putting an end to epidemic meningitis in Africa

New vaccines against epidemic-causing strains provide hope in Africa’s meningitis belt

DECADES OF DEVASTATION

With more than 1 million cases reported since 1988 and tens of thousands of deaths to its name, meningococcal meningitis is one of the most feared diseases in Africa. It has paralyzed entire communities under the weight of sprawling illness, overburdened health systems, and economic hardship. Until recently, no reliable vaccine against the deadly scourge existed to meet Africa’s needs.

Meningitis—a serious infection of the thin lining that surrounds the brain and spinal cord—has many causes, usually viruses or bacteria. Viral cases of meningitis typically resolve on their own without treatment; bacterial cases, however, can be much more serious. The infection sets in rapidly with severe fever and headache, and can kill within hours. A quarter of those who survive the infection are left with severe disabilities such as deafness, mental retardation, paralysis, or loss of limbs due to amputation.

In Africa, more than 80 percent1 of meningitis epidemics have historically been caused by Neisseria meningitidis group A, a bacterial form of the disease that mostly attacks infants, children, and young adults. Even with timely antibiotic treatment, one in ten infected people will die within two days of the onset of symptoms. Without treatment, 50 percent1 of infected individuals can die.

Reactive, emergency mass vaccination campaigns have been the only recourse for African countries during meningitis epidemics. Such reactive campaigns, however, offer limited protection for several reasons. First, most are implemented too late, when the epidemic has already progressed significantly. Second, the campaigns have traditionally used polysaccharide vaccines that elicit relatively short-lived protection and do not promote herd immunity. Lastly, the vaccines need to be kept in the cold chain, which slows down or precludes delivery to many areas.

To turn the tables on such a deadly disease, PATH is helping to advance the development of vaccines that may put an end to epidemic meningococcal meningitis for good.

LIFE IN THE MENINGITIS BELT

Meningitis can occur anywhere but is most prevalent in Africa’s sub-Saharan meningitis belt—an area that stretches across 26 countries from Senegal in the west to Ethiopia in the east, and has an at-risk population of about 430 million.

Meningitis epidemics are an annual threat in this area, occurring during the dry season that typically lasts from December to June. An epidemic wave can last two to three years, dying out during the intervening rainy seasons. Such epidemics can be enormous and place a massive burden on the health systems of these countries—inflicting lasting damage on a community long after the disease fades.

Meningitis is spread through the exchange of saliva during close, intimate contact. Bacteria live in the nose and throats of 10 to 20 percent1 of people worldwide and are spread to many more during an epidemic, underscoring the need for widespread vaccination against such a virulent infection.

Following the particularly devastating meningitis A epidemic of 1996–1997 (which sickened more than 250,000 people and killed more than 25,000), African leaders called for a vaccine that would permanently put an end to meningitis A epidemics in Africa. PATH was listening.
MENAFRIVAC®: A SHOT OF HOPE

In partnership with the World Health Organization (WHO) and Serum Institute of India Private Ltd. (SIIPL), PATH launched the Meningitis Vaccine Project, an initiative to develop a low-cost vaccine that would end meningitis A epidemics in Africa.

Despite the size of past epidemics, no multinational vaccine manufacturers were willing to make a vaccine at a price African governments could afford. SIIPL, however, produced the vaccine for less than US$0.50 per dose—the price set by African health ministers. Together, we created a new meningitis A vaccine in record time and at one-tenth of the half a billion dollars usually needed to develop and bring a new vaccine to market.

That vaccine, now known as MenAfriVac®, is a conjugate meningitis A vaccine and the first vaccine to be developed specifically for Africa. In addition to its relatively low cost, MenAfriVac® can be delivered outside of the cold-chain, which eases delivery to remote communities. In addition to helping the body build defenses against meningitis A, MenAfriVac® promotes herd immunity by reducing the bacteria carried in the nose and throat and interrupting the chain of transmission. MenAfriVac® also provides relatively long-term protection, which prevents meningitis A epidemics before they start.

The introduction of MenAfriVac® in 2010 via mass vaccination campaigns has had an immediate and dramatic impact in breaking the cycle of meningitis A epidemics. In the years since its first introduction in Burkina Faso, more than 270 million people 1 through 29 years of age have been immunized across the meningitis belt and meningitis A has virtually disappeared wherever the vaccine has been used.

As of March 2017, 21 of the 26 meningitis belt countries have rolled out MenAfriVac®. The remaining countries should introduce the vaccine in 2017. By 2020, the vaccine is expected to protect more than 400 million people—preventing 1 million cases of meningitis A; 150,000 deaths; and 250,000 cases of severe disability.

To ensure meningitis A epidemics remain a thing of the past, MenAfriVac® must be included in routine childhood immunization schedules across the meningitis belt. If not, the disease could rebound, with another epidemic likely in or before 2025.2 In July 2016, Sudan became the first country to introduce MenAfriVac® as a routine vaccination, followed by Mali and Burkina Faso in early 2017; country introduction will continue through 2018.

PRESERVING IMMUNITY

As WHO works with country leaders to incorporate MenAfriVac® into childhood immunization schedules, PATH is working to evaluate the sustainability of the vaccine over time and inform strategies for maximizing the vaccine’s lifesaving potential. Developing and preserving herd immunity is one of the vaccine’s most important promises and essential research will determine how to use this protection to the fullest.

To meet this need, PATH is conducting clinical studies in Ghana and Mali to determine the level of protection those vaccinated with MenAfriVac® retain over time. This will help determine ideal dosing levels, vaccination schedules, and whether or not booster vaccinations will be needed.

STRATEGIES TO ELIMINATE ALL EPIDEMIC MENINGITIS

Africa’s meningitis story does not end with meningitis A. Other kinds of meningococcal meningitis can cause epidemics, including meningitis C, W, X, and Y. An epidemic caused by groups C and W in Niger, for instance, led to 8,500 cases and 573 deaths in 2015.3 These epidemics are a sobering reminder that the toolkit for preventing meningitis in Africa is not yet complete.

With funding from the UK Department for International Development, PATH is again partnering with SIIPL, this time to develop an affordable conjugate vaccine against meningitis A, C, W, X, and Y. The vaccine candidate has been designed to provide long-lasting protection in people from 9 months to 55 years of age, and began early-stage clinical trials in 2016.

REFERENCES