Putting an end to epidemic meningitis in Africa

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

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. For a long time, no reliable vaccine against the deadly scourge existed to meet Africa's needs.

Meningitis—a serious infection of the thin lining surrounding 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 it can kill within hours. A quarter of those who survive the infection suffer severe disabilities such as deafness, brain damage, learning disabilities, or limb amputation.

Decades of devastation

In Africa, more than 80 percent[1] 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. Bacteria live in the nose and throat of 10 to 20 percent[1] of people worldwide and are spread to many more during an epidemic.

Even with timely antibiotic treatment one in ten infected people will die within two days of the onset of symptoms. Without treatment, 50 percent[1] of infected individuals can die.

Reactive, emergency mass vaccination campaigns have been the only recourse for African countries during meningitis epidemics. Reactive campaigns, however, offer limited protection because they rely on older polysaccharide vaccines, which can only be used after epidemics have started, do not protect the youngest children or infants or promote herd immunity, and provide only short-term protection.

A young woman holds cotton to her arm after receiving her MenAfriVac® vaccination at the 2010 vaccine launch in Burkina Faso. Photo: PATH/Gabe Bienczycki.

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

Life in the meningitis belt

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

Meningococcal 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 damage long after the disease fades.

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 epidemics in Africa. PATH was listening.

The MenAfriVac® story

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

Despite the size of past epidemics, none of the 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® promotes herd immunity by reducing the bacteria carried in the nose and throat; can be delivered to children younger than two years of age; and provides relatively long-term protection—which prevents 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 305 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 May 2019, 22 of the 26 meningitis belt countries have introduced MenAfriVac® in mass vaccination campaigns. 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 in the meningitis belt to introduce MenAfriVac® as part of a national routine immunization program; by the end of 2018 routine vaccine was in place in eight countries.

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. PATH conducted clinical studies in Ghana and Mali to determine the level of protection those vaccinated with MenAfriVac® retained over time. The results of these studies will help determine ideal dosing levels, vaccination schedules, and whether booster vaccinations will be needed.

Eliminating all epidemic meningitis

Africa's meningitis story does not end with meningitis A. Other kinds of meningococcal meningitis can—and do—cause epidemics, including groups C, W, X, and Y. Globally, polyvalent conjugate vaccines exist against meningitis C, W, and Y, but there is no vaccine against meningitis X. And the polyvalent vaccines that do exist are too expensive for African nations.

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, Y, and X. The vaccine candidate has been designed to provide long-lasting protection in people from 9 months to 55 years of age and entered late-stage clinical development in August 2019.

References

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