

New meningitis strains could thrive following vaccine success

Outbreaks of meningitis A have all but vanished from sub-Saharan Africa, but health officials worry that the bacteria could return.

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Monique Bertier/PATH

Nurses in Tenkodogo, Burkina Faso give meningitis vaccine in the midst of an outbreak.

A deadly bacterial infection once common in Africa, meningitis A has been virtually wiped out thanks to a [massive vaccination effort](#). But researchers and health officials warn that other deadly strains of meningococcal bacteria may emerge in its place, as has happened with vaccines against other types of bacteria. And meningitis A could still return if African countries fail to routinely vaccinate against it because of competing health priorities.

The successful elimination of meningitis A, which is documented in a series of articles published on 10 November in *Clinical Infectious Diseases*¹, might already be allowing other deadly varieties, to become more dominant, adds Brian Greenwood, an epidemiologist at the London School of Hygiene and Tropical Medicine.

The bacteria *Neisseria meningitidis* once drove cyclical outbreaks of meningitis in a band of 26 countries from Senegal to Ethiopia, known as the meningitis belt. Between 1996 and 1997, for instance, the disease struck more than 250,000 people and killed 10% of them. The bacteria can infect the lining of the brain and spinal cord, leading to deafness, paralysis and seizures.

But since the first vaccination campaign in the region began in 2010, 220 million people in 16 countries have received the meningitis A vaccine, called MenAfriVac. Meningitis A, once the most dominant variety, or serotype, in the region, has all but vanished, with just a handful of cases recorded in the meningitis belt in 2013 and 2014².

Routine vaccination

The vaccine seems to offer long-lasting immunity to those vaccinated, and to their contacts³ through herd immunity. But meningitis A epidemics are likely to return if the vaccine is not now introduced routinely into the schedule of immunizations given to newborn and young children in Africa, says Marie-Pierre Preziosi, the director of the Meningitis Vaccine Project at the World Health Organization (WHO) in Geneva, Switzerland, whose team made predictions for the future spread of meningitis A⁴.

The WHO approved MenAfriVac for routine use this year. Ghana's programme already has the go-ahead, and Preziosi expects 8–10

meningitis-belt countries to introduce MenAfriVac into their immunization programmes next year. She hopes that others will follow suit. But competing health priorities, such as the [roll-out of injectable polio vaccines](#) and complacency arising from the disappearance of meningitis A, could slow the introduction of MenAfriVac, she and other specialists worry.

“If we don’t introduce the vaccine into routine immunization programmes, we predict that a massive epidemic will return in about 15 years from the start of a country’s campaign,” says Preziosi.

Emergent strains

Others, meanwhile, are watching the behaviour of other serotypes. In the first six months of this year, outbreaks of meningitis C have been responsible for 12,000 cases of the illness and 800 deaths in Nigeria and Niger — unusually high numbers for that serotype in those countries, notes Greenwood. “Was that something to do with the vaccine or not?” he says. “I think it’s an open question.” Mark Alderson, the director of the pneumococcal and the polyvalent meningococcal vaccine projects at PATH in Seattle, Washington, agrees that the possibility is a concern.

To investigate, Greenwood’s team is characterizing the meningococcal bacteria that colonize the nasal passages of around 3–4% of people in meningitis-belt countries such as Chad. The vast majority of even that small percentage will never develop meningitis, but Greenwood hopes to spot serotypes emerging in response to the disappearance of meningitis A. So far, only relatively harmless serotypes have taken hold, but this could change. “These bugs are clever and they will fight back,” he says. “They change very quickly, and they can swap DNA very easily.”

Health officials hope that if new strains of meningococcal bacteria do emerge, researchers will soon have a vaccine to combat them. Clinical trials will begin next year on a ‘pentavalent’ meningitis vaccine that targets meningitis A and C and three other serotypes known to cause disease, says Alderson. He hopes that this vaccine will be available by 2021. “This is a vaccine that would potentially eliminate all meningococcal disease in that part of the world,” he says.

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References

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