CENTER FOR VACCINE INNOVATION AND ACCESS

PATH

Advancing novel oral polio vaccines

Planning for long-term protection against polio resurgence

ON THE CUSP OF ERADICATION

Poliomyelitis (polio) is a highly infectious disease caused by a virus that can invade the nervous system and cause permanent paralysis. Thanks to vaccination efforts, the number of polio cases per year is down by more than 99 percent since the inception of the Global Polio Eradication Initiative in 1988. The type 2 strain has been eradicated, and the last appearance of type 3 was in 2012. Type 1 is the only wild type strain still circulating, paralyzing less than 40 children in 2016: fewer children than in any other year.

As the world narrows its focus on stamping out the virus in the last three polio-endemic countries—Nigeria, Afghanistan, and Pakistan—global stakeholders are also laying a necessary foundation for tools that will enable complete eradication and minimize the risk of polio making a comeback.

PATH/Gabe Bienczycki

POLIO VACCINES: THE STATE OF THE FIELD

Improvements in hygiene and sanitation have helped minimize exposure to the polio virus and thus the number of polio cases, but the only way to truly prevent the disease is through vaccination.

Inactivated polio vaccines (IPV) and oral polio vaccines (OPV) have propelled us to historically low levels of polio incidence, but new tools are needed for the last mile of disease eradication.

OPV is highly effective in high-burden regions and during disease outbreaks because it protects the individual and halts person-to-person disease transmission. However, on very rare occasions in under-immunized populations, the live, attenuated (weakened) virus used in OPV can mutate and circulate in a community. This is known as circulating vaccine-derived poliovirus (cVDPV). cVDPVs that develop from the use of currently available OPV add a complicating factor to ending polio transmission for good, due to the potential of cVDPVs to cause future outbreaks.

IPV is highly effective at preventing disease and does not carry the risk of generating cVDPVs, but it also does not confer the same type of immunity that prevents person-to-person transmission, necessary in controlling outbreaks. It is also much more expensive than OPV and more difficult for untrained health workers to deliver in settings where the vaccines are needed most.

NOVEL ORAL POLIO VACCINES: CLOSING POLIO'S LAST LOOPHOLE

To stamp out the last pockets of polio and to protect against potential outbreaks, PATH and partners are advancing novel oral polio vaccine candidates (nOPVs) against poliovirus types 1, 2, and 3. Like the currently available OPVs, the nOPV candidates are designed to prevent person-to-person disease transmission, but without carrying the same risk of seeding new vaccine-derived polio cases. The hope is that, if successful, nOPVs will ultimately replace the current OPV stockpile set aside to respond to outbreaks.

The live, attenuated (weakened) type 2 strain in the currently available OPV causes the majority of cVDPV, so early efforts are focused on novel oral polio vaccine candidates against type 2 (nOPV2). A Phase 1 clinical trial is currently under way at the University of Antwerp to assess the safety and

immunogenicity of two nOPV2 candidates. Novel oral polio vaccine candidates against types 1 and 3 are in preclinical development in preparation for forthcoming clinical trials.

ENDING POLIO—AND MAINTAINING LONG-TERM PROTECTION

If the global community succeeds in ending polio, it will mark only the second time in history that an infectious disease in humans was fully eradicated, the first being smallpox in 1979. We are very close, but we will succeed only if we invest in the tools necessary to completely stamp out the virus, without the risk of planting seeds for future outbreak opportunities. nOPVs hold great promise for ensuring that we can make polio a thing of the past—and make certain it stays there.

nOPV2 program partners:

University of Antwerp leads the nOPV2 Phase 1 trials. Fighting Infectious Diseases in Emerging Countries will implement nOPV2 Phase 2 trial.

Stony Brook University, University of California, San Francisco, the UK National Institute for Biological Standards and Control, the US Centers for Disease Control and Prevention (CDC), and the US Food and Drug Administration developed the nOPV2 candidates being tested in the program clinical trials.

PATH provides program management and coordination.

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