How the U.S. case might tie into the global upswing in polio - Updated August 17, 2022

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The Americas were declared polio-free in 1994.

But now there's a new case that indicates community transmission in the United States for the first time since 1979: **An unvaccinated young adult in Rockland County, N.Y., contracted the highly contagious virus and was paralyzed as a result.**

Initially, authorities suspected that the individual was exposed when traveling abroad because the type of virus acquired is only seen in other countries: It's what is known as vaccine-derived polio rather than "wild polio."

Vaccine-derived polio stems from the oral vaccine used in low- and middle-income countries. This vaccine is cheap and easy to administer. Two doses confer lifetime immunity. But it is made with living, weakened virus. Those who've been immunized with live virus can shed it in their stool, which can then spread through sewage in places with poor sanitation. If the virus stays weak, it can expose the unvaccinated to polio and give them immunity. But if the virus mutates and regains virulence, someone who isn't vaccinated can become sick with vaccine-derived polio after contact with the contaminated wastewater.

The United States by contrast uses an injectable vaccine with no live virus.

So what does this tell us about the U.S. case?

The individual in Rockland County had no history of recent international travel.

The Centers for Disease Control and Prevention suspects that the individual could have come in contact with another unvaccinated individual who did travel overseas and contracted vaccine-derived polio and perhaps showed no symptoms, as is often the case. There's also the possibility that the person with the case of paralytic polio contracted it not directly from an individual who traveled overseas but through some chain of transmission within the U.S.

It's a worrisome development, indicating that polio could be circulating more widely in the United States. Indeed, the virus has turned up in wastewater surveillance in Rockland and Orange counties and, more recently, New York City.

Is this polio's comeback?

The U.S. case ties into a global question: Is polio making a comeback because of vaccine-derived disease?

The world has spent billions of dollars over the last 15 years in an effort to wipe out the virus through vaccination efforts – with encouraging results.

Rates plunged from an estimated 350,000 cases in 1988 to just several dozen by 2016.

But in recent years, polio incidence has started to inch back up. And now countries that had previously eradicated polio in Africa, the Middle East and parts of Asia are seeing new outbreaks of vaccine-derived polio.

One reason for this rise in cases, say polio experts, is that gaps in immunization in recent years have created more opportunities for the unvaccinated to become infected. "Vaccination campaigns have been certainly affected by the pandemic," says Raul Andino, a virologist at University of California, San Francisco.

In early 2020, for example, there was a 4-month pause in polio vaccination efforts in more than 30 countries, according to Ananda Bandyopadhyay, deputy director for polio at the Bill & Melinda Gates Foundation. (Editor's note: The Gates Foundation is a funder of NPR and this blog).

"The result of this pause and disruption can be seen in the close to tripling of [vaccine-derived polio] cases from 2019 to 2020," he says, "and an increase in the number of outbreaks."

The composition of the oral vaccine has also been a factor. In 2016, eyeing an uptick in vaccine-derived polio, global health officials altered the composition of the oral vaccine. Previously, the vaccine protected against all three types of wild polio — the virus that circulates naturally in the environment. Then they withdrew one of those types — the one that was leading to most of the vaccine-derived cases but whose wild form had been successfully eradicated.

Only there was a development that hadn't been anticipated. Vaccine-derived poliovirus of that type was still in circulation from earlier iterations of the oral vaccine — and now with the reformulated vaccine, increasing numbers of people who were no longer vaccinated against it. So there was further spread.

With 25 countries reporting cases last year, public health officials have sounded the alarm. They say that even a single case in a country is worrisome since the virus can spread — and may already be circulating there undetected. So scientists are once again trying to outmaneuver polio by rolling out a new kind of vaccine in these places. And so far, it's showing promise.

Over the past few years**,** Andino and his collaborators have been developing a new oral vaccine due to the recent outbreaks of vaccine-derived polio and an influx of funding from the Bill & Melinda Gates Foundation. The novel vaccine still contains a weakened version of the virus, but it's been hobbled even further.

"What we did is three independent modifications" to make reactivation less likely, says Andino. The researchers tweaked the virus so that it has to accumulate more mutations to become virulent and has a harder time amassing those mutations. For example, they've altered the polymerase, one of the key enzymes responsible for introducing mutations, reducing its ability to mix and match genes from different viruses.

After performing well in clinical trials, the vaccine was approved for emergency use by the World Health Organization last year. Since March 2021, 265 million doses have been administered to children across 14 countries, primarily in Africa, which have either seen documented cases of vaccine-derived polio or are neighbors to locations where this type of polio has been recorded.

Dr. Modjirom Ndoutabe, the polio coordinator in WHO's Regional Office for Africa, hopes this new vaccine will help turn a corner when it comes to eradication. "I am confident we can very quickly [stop] this outbreak," he says.

In fact, following an assessment by a team from the Global Polio Eradication Initiative, an official declaration was made that Tajikistan's polio outbreak was the first to be stopped following supplemental use of the new vaccine.

But some polio researchers are skeptical — like Svea Closser, a medical anthropologist at the Johns Hopkins Bloomberg School of Public Health who studies vaccination programs with a focus on polio. She says public health officials have made similar declarations that polio was on the cusp of eradication before — only to be stymied by viral mutation and logistical complications with distributing vaccines.

"On the other hand," she adds, "if you have an oral polio vaccine that truly doesn't cause vaccine-derived polio, it's something that we'll probably need in order to secure eradication eventually."

Uganda is one of the countries that's been administering the new vaccine.

Over just two weeks this January, Uganda vaccinated more than 8 million children with no side effects reported, says Dr. Sabrina Kitaka, an infectious disease pediatrician at Makerere University in Kampala.

Kitaka says there haven't been any vaccine-derived polio cases reported in Uganda. But the virus was detected in wastewater last year. And officials worry about refugees from conflict zones in neighboring countries where vaccination programs have lapsed.

She says the potential benefits of the new vaccine can't be understated. "For us, as pediatricians, as researchers, we think that this is going to be part of the end game to end polio in the whole world," she says. "I am optimistic. But I'm not yet comfortable that we are out of the woods."

It helps that, for the most part, parents and their kids have been open to getting the new vaccine, says Muhammad Camara, a health worker in the West African country of Gambia. In March, his team and others went door to door in remote communities across the country to administer it. They vaccinated 400,000 kids over just four intensive days.

For kids, there's no difference. The vaccine is a sip of liquid that they call "juice," says Camara, and they get a purple mark on their left pinky fingernail after their dose that they think looks like cool nail polish.