In the 1950s, the budding science of urology scored its first major victories against the virus that causes polio. Two vaccines, developed by Dr. Jonas Edward Salk and Dr. Albert Sabin, were proven safe and effective in preventing the disease. Across the Western world, infection rates dropped dramatically. And for many, polio became nothing more than a distant memory. But despite the availability of effective vaccines, still, more than 50 years later, in the developing world, the fight to end polio continues.

Polio is a crippling disease caused by a highly contagious virus. In its most debilitating form, the virus attacks the central nervous system, weakening muscles, causing paralysis, and death, most often the result of muscle tissues becoming too weak to sustain breathing.

Today, the virus remains endemic in only four countries: Afghanistan, Pakistan, India, and Nigeria.

Prevalence of the disease around the globe is down more than 99.8 percent since the vaccine was created. But to wipe it out completely, every child in every region where the virus still lives must be vaccinated. To find all these children, to stop this disease in its tracks, a high-tech collaboration is underway between governments, public health professionals, and researchers using genetics to track the disease in its last remaining reservoirs on earth.

Dr. Olen Kew: We are part of a global laboratory network of 145 laboratories serving every country in the world.

Dr. Mark Pallansch: The system begins with the notification of a child with acute flaccid paralysis. The surveillance officer or medical officer in the field then visits that child to collect specimens for the detection of polio virus.

Narrator: After isolation and culture in their region of origin, polio viruses come to labs like this one where the genetic sequence within each virus is recovered.

It's an exacting process but one which, when successful, can yield precise information about where each specific viruses come from and, therefore, where it might be headed next.

Dr. Olen Kew: We do the molecular characterization, we do the sequence analysis. From the sequence analysis we build genetic trees showing the genetic relationships among the viruses.

Dr. Mark Pallansch: Each of these branches, or trees, on the trees are actually then translated into a specific color coding which helps to visualize the viruses that are related to each other.

Dr. Olen Kew: And from those trees we build maps, and those maps show the distribution of different members of the local polio virus family.

Dr. Mark Pallansch: You can put a spot on a map for an individual paralyzed child and say that all of the red dots are viruses that are genetically related to each other.

Dr. Olen Kew: And from that we can actually reconstruct chains of transmission and we can also determine where the virus is coming from. We call them reservoir communities, where the virus is originating and how it's moving in the population during the polio season.

Narrator: Based on this chain of genetic relationships, a geographic guide is created. The most dangerous variants of the virus are identified. The precise movements of the disease are revealed. Information gleaned from these maps is sent back to health officers on the ground. Shipments of vaccine are redirected, and the children most at risk are finally immunized.

Taking advantage of this global network, the Bill and Melinda Gates Foundation supports the development of new, more potent vaccines and the
purchase and distribution of existing vaccines in high-risk areas. The foundation has joined forces with the World Health Organization, the Centers For Disease Control and Prevention, Rotary International, and UNICEF, to ensure that there are no new cases of polio by the year 2010 and to eradicate the disease entirely by the year 2013.

The end of polio appears within our reach. But until then, there's a very big job to finish.

Transcription by www.HRICART.com