

RED ALERT IN HYDERABAD

The chance discovery, of a circulating vaccine derived polio virus (cVDPV), in the murky waters of a sewer in Hyderabad has figuratively raised a stink. The virus was the P2 strain of the poliovirus discovered on routine surveillance from 30 areas in the city on 17 May this year. The entire health machinery was immediately galvanized into action. The Telangana Government declared a global emergency. Vaccines were airlifted from Geneva, and more than 300,000 children in the area were vaccinated.

Why is everybody so antsy? Normally when children are immunized with the oral polio vaccine, the virus replicates in the gut till some antibodies are developed and is soon excreted in the stool. It may circulate briefly in the environment infecting a few more children and eventually die out. However, if an area is seriously underimmunized, it continues to circulate for extended periods of time. The longer it circulates, the higher the probability of developing genetic mutations. And these potentially have the capacity to evolve into strains which can be paralytic and are termed cVDPV. A circulating VDPV means the virus has been circulating for at least 12 months in an area which is largely under-immunized. So, the *hullabaloo* in Hyderabad seems absolutely justified. (*The Times of India 15 June 2016*)

PLANT-DERIVED POLIO VACCINE

One continues to be awestruck by the ingenuity of the human mind. A really deep problem looms before us in the final dénouement of polio eradication. We want to eliminate the use of OPV so that we mitigate the risks of vaccine-derived polio viral epidemics. However the IPV has some major limitations. A person vaccinated with IPV may be completely immune to polio but may get infected with the virus. He/She then continues to excrete it in the stools; hence allowing the virus to circulate in the community.

An imaginative solution to this conundrum is plant-based vaccines. Plant-based vaccines are heat-stable and free from animal pathogens. They can be genetically engineered to produce proteins of interest. Usually the antigen and a trans-mucosal carrier protein are produced by the plant cell. When given orally these proteins are protected from acids and enzymes in the stomach by the

plant cell wall. On reaching the intestine, gut bacteria release the proteins. The transmucosal carrier protein transports the antigen across and delivers it to the circulation and immune system eliciting the required local and systemic immunity. Scientists in the University of Pennsylvania have developed a low cost plant vaccine for polio. The gene for viral protein 1 (VP1) which is a structural protein expressed by all polio viruses was introduced into chloroplasts of tobacco and lettuce leaves. The freeze dried plant material which expressed the protein was given orally to mice already primed with an IPV vaccine. High levels of mucosal and systemic immunity were induced in the mice. The researchers hope to go ahead with human clinical trials next.

The strategy to use a plant-based vaccine as an oral booster in place of the OPV has many advantages. Low cost, no requirement of a stringent cold chain, and no fears of vaccine-derived mutant polio viruses. (*Plant Biotechnol J. 2016;doi:10.1111/pbi.12575*)

AFRICA IS POLIO-FREE FOR 2 YEARS

In July this year, Nigeria celebrated two years without a single case of polio. If this continues another year, Africa will be declared polio-free by next year. Only Afghanistan and Pakistan continue to report a few cases still. In 2003, few Muslim clerics banned the use of polio vaccines. Rumors spread like wildfire that the vaccines had HIV virus and were being used to sterilize muslim girls. As recently as 2012, Nigeria was reporting half the global cases of Polio. Some Northern States had imposed a ban on the vaccine. Immunization teams were attacked after rumors of vaccine safety. In Northeast Nigeria, where the militant Boko Haram group disrupted vaccination campaigns, temporary 'health camps' were established offering a range of health services in addition to the polio vaccine. The continued political support and will has managed to stem the disease. The polio surveillance networks were also exceedingly useful in monitoring and controlling the Ebola outbreak in the last 2 years. So successes in one area spilt over to the entire health system. Fighting polio has taught us many lessons well beyond the narrow confines of just one disease. (*The Guardian 24 July 2016*).

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