Year 2000 pivotal for Lab Network

The Laboratory Network workload increased considerably during 2000 as polio immunisation and surveillance activities intensified in the final push toward eradication. The majority of Laboratories met the challenges with extraordinary capability and greatly improved reporting quality and timeliness. Others found it trying. This article examines Network performance during the year 2000 and discusses the lessons for the future.

Responding to accelerated demands

Timeliness of reporting continued to improve in each of the three remaining endemic Regions, despite increased testing demands (figure 1). Of particular interest is the remarkable performance of India’s laboratories in the South East Asian Region (SEAR). In 1997, faecal specimens were received from about 3,300 AFP cases. In 1998 and the years following, the number increased to almost 10,000. Concerted efforts to improve management, staffing levels and distribution of supplies in the Indian laboratories resulted in major improvements in reporting timeliness from 40% in 1998 to 95% in 2000, all the while maintaining high levels of sensitivity for poliovirus detection. Sequencing results from the newly recognised Specialised Reference Laboratory in Mumbai are being reported promptly, ensuring timely monitoring and evaluation of the eradication programme.

Two Pioneer Network Virologists Retire

The first global workshop in response to the World Health Assembly resolution to eradicate polio was held in Bilthoven, The Netherlands, in 1989. From that small beginning, the Global Laboratory Network has grown to its present 148 laboratories and a level of sophistication undreamed of at the time. Two pioneers who participated in that workshop and became stalwart contributors to the growth and maturity of the Network have retired, Margery Kennett and Tary Naguib.

Margery retired in February after 40 years as a virologist at Fairfield Hospital and the Victorian Infectious Diseases Reference Laboratory, Melbourne, Australia. Her poliovirus experience dates back to the early 1960s when polio was endemic in Australia. She remembers well the Bilthoven workshop where she made long-lasting friendships and appreciated for the first time the enormity of the task ahead. She feels her greatest challenge as Director of the Western Pacific Region (WPR) Regional Reference Laboratory was administering the annual proficiency tests, viewed by her as essential teaching tools. Each year required renewed creativity to ensure the panels reached the National Laboratories intact and on time. Fittingly, her retirement coincides with the certification of the Region as polio-free. Her contributions to that achievement are a tangible tribute to her mother, who acquired polio as a child. We thank Margery for her outstanding efforts and wish her the best for a well-deserved retire-
During the past two years, the African Region (AFR) has experienced a similar increase in surveillance activities, particularly in the Democratic Republic of Congo and Nigeria (figure 2). The 15 AFR laboratories received samples from approximately 1800 AFP cases in 1998 and close to 5000 in year 2000. Timely reporting has been close to the target 80% in most of the AFR laboratories but two laboratories serving the largest countries in the region were overwhelmed with samples, with consequential difficulty in meeting reporting timeliness criteria. Both laboratories have been carefully assessed and strategies implemented to increase capacity, including alleviating the testing backlog by sharing samples among other members of the network, increasing staffing levels, and refining management of equipment and supplies. Both laboratories are now on track, with a minimal backlog of unreported samples.

Figure 2: Workload – Democratic Republic of Congo and Nigeria 1997-2000

### Accreditation

At the end of 2000, 128 of the 148 laboratories in the network (86%) were accredited (table 1). Seven percent were provisionally accredited, having missed one or more of the performance criteria by a small margin. The inability to report results within 28 days was the source of most problems. Laboratories unable to meet this criterion were primarily those Laboratories described above with large increases in numbers of stool samples. Previous experience has shown that virtually all network laboratories with sudden large increases in sample numbers have had difficulties meeting the criterion for timeliness until strategies can be developed to cope with the extra workload.

Eleven laboratories were not accredited because of difficulties in passing the annual proficiency test. Ten of these laboratories are splitting samples and sending them to an accredited laboratory for testing. Arrangements have been made for the one remaining laboratory to send samples to a Regional Reference Laboratory for parallel testing, beginning this year. All non-accredited laboratories have developed and implemented plans of action to achieve accreditation. Two of the non-accredited laboratories in endemic countries are on the threshold of reaching full accreditation. BOTH will be assessed in 2001, but will require careful observation and support for at least 12 months after accreditation. The goal of the laboratory network is to bring all non-accredited laboratories up to full accreditation in 2001.

### Maintaining laboratory strengths

Year 2000 served as a reminder that a laboratory is only as strong as the quality and experience of its key staff. All Network Laboratories in the Eastern Mediterranean Region (EMR) were fully accredited at the beginning of the year. However, departures of their respective directors left two National Laboratories understrength and struggling to maintain performance. Rigorous support from the Regional Laboratory Coordinator and visiting consultants assisted in bringing the laboratories back up to strength, but this experience illustrates how fragile some Laboratories may be.

### Improving detection of poliovirus in stools

The non-polio enterovirus (NPEV) rate was discontinued as an accreditation criterion in January 2000. However, it continues to be assessed during annual laboratory review, and remains a highly useful gauge of laboratory performance. Experience has shown that NPEV rates of <10% in countries with endemic or recently endemic polio may lack sensitivity for detecting enteroviruses, and possibly polioviruses. Lack of NPEV sensitivity can be caused by several factors, including inadequate reverse cold-chain, poor cell sensitivity, or use of non-standard virus isolation techniques. Because several laboratories reporting low NPEV rates in 2000 were serving recently endemic countries, investigations were

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undertaken in conjunction with the EPI programme to determine the root causes of the problem. Measures included reviewing the stool collection methodology and transport to the laboratory, reviewing laboratory procedures, replacing all cell lines, and providing specialised cell culture training for key personnel. Representative stool samples were tested in a reference laboratory to ensure no wild polioviruses were missed.

Data analysis showed that where the reverse cold chain was adequate and specimens were transported to the laboratory within 3 days, laboratories have a good chance of isolating wild poliovirus from stools collected even as late as 4 weeks post onset of paralysis. In India, wild polioviruses were isolated from stools taken at four weeks post-paralysis at 55% of the rate from stools collected at 1 week post onset (figure 3). In the African Region, wild polioviruses were isolated from stools collected at 4 weeks post-paralysis at 73% of the rate of isolates from stools taken within one week of onset.

 Eliminating the spectre of virus contamination

Incidents of wild poliovirus contamination are rare in proportion to the more than 50,000 samples tested during 2000, but rare incidents may have severe repercussions. Several such incidents during 2000 almost triggered major immunisation activities that would have been unnecessary, wasting precious vaccine, human resources, and funds. Because repeated incidents of contamination can cause loss of confidence in the whole Network, all laboratory personnel must be fully trained in WHO recommended procedures, which are designed to reduce the likelihood of contamination. Even so, poliovirus contamination may sometimes occur in the best of laboratories. If contamination is suspected, the laboratory must promptly repeat the isolation and identification procedure using the original stool sample. Sequencing of purported wild poliovirus isolates can greatly assist in distinguishing contaminants from genuine isolates. Any suspected contaminants must be given highest sequencing priority.

As the polio eradication programme approaches its final stages, Laboratories can expect greater pressure to ensure accurate and prompt identification of every wild poliovirus. The Laboratory Network is gaining strength every year. Continued progress depends on individual contributions of every person in the Network.

Excerpted from a presentation by David Featherstone, HQ/WHO

**Editorial Note**

Reports from India and AFR of successful wild poliovirus isolation from stools collected after the recommended period of < 14 days post-paralysis deserves further emphasis. Conclusions drawn from these findings are that best isolation results are obtained within the recommended time-frame. However, valuable information can still be gained by collecting and testing stools from AFP patients identified well after the < 14 day sampling window.

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AFRO: No wild polioviruses have been isolated from any of the Southern and East Africa countries since a case detected in Madagascar in 1997. Overall in 2000, 287 wild virus were identified from 144 cases in Angola, Benin, Cape Verde, Central African Republic, Chad, Côte d’Ivoire, Ethiopia, Democratic Republic of Congo, Nigeria, Niger, Republic of Congo, and Sierra Leone. This compares with 243 wild virus cases confirmed in 1999. Outbreaks of polio in Cape Verde, Angola, Republic of Congo and increased surveillance activities increased workload on the lab network but in a true spirit of cooperation, samples from overwhelmed laboratories were willingly tested by other laboratories in the network, with spare capacity.

AMRO: No wild polioviruses have been detected in the Americas since 5 September 1991. OPV-derived polioviruses were isolated from AFP cases in Haiti and Dominican Republic in the last half of 2000. Intensified surveillance and immunisation activities have extended into 2001.

EMRO: Wild polioviruses were detected from 286 cases in seven countries compared to 479 cases in the same countries in 1999. Of these countries Iraq has not seen a case since January 2000 which was the tail end of the 1999 outbreak and Iran detected 3 cases in Aug-December of 2000 from which sequencing indicated the virus was imported from a neighbouring province of Pakistan where virus is still endemic. Afghanistan, Egypt, Somalia and Sudan also detected wild viruses in 2000.

EURO: The last reported case of wild poliovirus detected in the European region had an onset of paralysis on 26 November 1998.

SEARO: There were dramatic reductions in the number of wild polio cases detected in 2000 compared with 1999. India detected 264 cases in 2000 compared with 1,126 in 1999, Bangladesh 1 compared with 28 and Myanmar, 2 compared with 4 respectively. However Nepal saw an increase, with 4 wild cases detected in 2000, all from the Terai region close to the Indian Uttar Pradesh border where wild virus is still endemic. The type 3 virus outbreak in India continued from 1999 and made up 130 (48%) of the total of 271 wild viruses detected in the region.

WPRO: No evidence of endemic wild poliovirus circulation since March 1997. The region was certified free of polio in October 2000.