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The National Molecular Subtyping Network  
for Foodborne Disease Surveillance



# PulseNet News

State & Local Public Health Laboratories  
in the United States



SPECIAL ISSUE

FOCUS ON

SUMMER 2004

## PulseNet Asia Pacific - Expanding the Net

*Kai Man Kam, Consultant Medical Microbiologist, Public Health Laboratory Services Branch, Centre for Health Protection, Department of Health, Hong Kong SAR*

The Second PulseNet Asia Pacific Meeting was held March 18-19 at the Public Health Laboratory Centre (PHLC) in Hong Kong under the leadership of the Steering Committee (formed during the first meeting in December 2002 in Honolulu) and auspices of the Centers for Disease Control and Prevention (CDC) and Association of Public Health Laboratories (APHL), USA. All twelve countries and areas who attended the Honolulu meeting were present except Taiwan, due to the Presidential Election. India participated for the first time.

During the two-day meeting, delegates had numerous opportunities to share their progress and experiences in building pulsed-field gel electrophoresis (PFGE) capability and setting up infectious disease surveillance network within their countries. The delegates discussed problems and difficulties to help partners better understand the process.

The first morning session, "PulseNet Asia Pacific - Building the Vision," led by Dr. Jun Terajima, Japan, and Dr. Celia Carlos, The Philippines, allowed participants to share their expectations of this meeting. Dr. Diane Lightfoot, Australia, then recapitulated events and results of the Honolulu meeting. She was followed by Ms. Sharon Rolando, APHL, who summarized the PulseNet Asia Pacific Workshop held also in PHLC in the three days prior to the meeting (March 15-

17). The PulseNet Asia Pacific Workshop was the first such training workshop held outside of North America. Dr. Kwai-Lin Thong next presented her work on the PFGE investigation of typhoid in Malaysia. Her results demonstrated significant genetic diversity among sporadic isolates of *Salmonella* Typhi from different geographical regions. During outbreaks, this diversity in isolates was more limited. Dr. Thandavarayan Ramamurthy, India, followed with his laboratory's data on

pathogens of concern in the region. *Salmonella* still ranked number one on the regional priority list. Towards the end of this session, Dr. Kai Man Kam, Hong Kong, invited delegates to consider setting up Work Groups to facilitate PulseNet Asia Pacific effectiveness by focusing on specific and common issues.

The second day was separated into a morning session titled "Surveillance of Foodborne Infections - Looking Forward" and an afternoon "PulseNet Asia Pacific - Weaving the Net" session with the overall emphasis of moving things forward.

Chaired by Dr. G. Balakrish Nair, Bangladesh, and Dr. Kai Man Kam, the morning session provided a platform for the delegates to share experiences and to explore solutions for many common problems in building their national surveillance system. Several countries expressed difficulty in raising funds to set up, as well as maintain a laboratory-based surveillance network. Delegates discussed possible approaches to obtain monetary assistance from international bodies such as World Health Organization and Asia-Pacific Economic Cooperation. They also talked about options to raise awareness of policy-makers in order to increase national funding. Training was identified as another important key to the success of PulseNet Asia Pacific. Delegates agreed more workshops are needed and standardized protocols should be adopted to ensure compatibility of fingerprinting data. Dr. Bala Swaminathan, CDC, ended the morning session with a presentation on the latest development in typing technology and on the forthcoming PFGE protocols.

the molecular epidemiology of *Vibrio cholerae* in India, including the evolution of serotype O139. Ms. Kelley Hise, CDC, talked about the importance of quality assurance and quality control in PulseNet and gave an update on the current PulseNet USA certification program.

In the afternoon's "Surveillance of Foodborne Infections - Focusing the Scope" session, chaired by Dr. Diane Lightfoot and Dr. Jian-Guo Xu, People's Republic of China, each of the twelve countries presented its current epidemiological concerns and enteric laboratory developments. Although Asia Pacific has a very diverse culture, lifestyle, and climate, there were still common

*(Continued on page 2)*

## Expanding the Net (Continued from page 1)

The afternoon session began with a discussion on the way to set up Work Groups. The Work Groups will be platforms to start initiatives, promote professional communications, and coordinate research. Each Work Group will begin by defining a scope of work and participation will be voluntary. Initially, four Work Groups were proposed: first, *Salmonella* Subtyping (SS); second, Laboratory Resource and Support (LRS); third, Server Development (SD); fourth, Platform for Inter-laboratory Comparison (PIC). Dr. Diane Lightfoot, Dr. Haruo Watanabe, Dr. Brent Gilpin, and Dr. Kai Man Kam agreed to be coordinators of the SS, LRS, SD, and PIC Work Groups, respectively.

Dr. Brent Gilpin, New Zealand, presented several approaches for setting up the central server. One idea he proposed was to decentralize the server, allowing individual countries to take charge of housing particular organism databases. No plan has been finalized and the



**PULSENET ASIA PACIFIC MEETING PARTICIPANTS** (left to right, back row): Kan BAO, Orn-Anong RATCHTRACHENCHAI, Jian-Guo XU, Asish Kumar MUKHOPADHYAY, Phung Dac CAM, Celia CARLOS, Kwai-Lin THONG, Brent GILPIN, T. RAMAMURPHY & Shuk Ho KIM. Front row: Diane LIGHTFOOT, Balakrish NAIR, Jun TERAJIMA, Bala SWAMINATHAN, Kai-Man KAM, Sharon ROLANDO, Bok Kwun LEE & Cindy LUEY.]

SD Work Group is expected to follow up on this topic which is fundamental to our Pulse-Networking.

The development of a formal Memorandum of Understanding (MOU) for PulseNet Asia Pacific was discussed, but nothing definite was decided. The participating countries agreed to provide feedback on what elements should be included in the MOU; however, the participants felt that the MOU should not impede the progress of setting up the PulseNet Asia Pacific network. The meeting was closed with a rapporteur session by

Ms. Sharon Rolando and closing remarks delivered by Dr. Bala Swaminathan.

In summary, the net is expanding. Not only do we have more countries and areas coming on board, but more pathogens were added to the list of agents being tracked. All the participating countries and areas have made impressive progress since 2002, showing determination to lift this long-term collaboration off the ground. PulseNet Asia Pacific will be beneficial to all of us who call Asia Pacific home. **CDC**

## PulseNet Asia Pacific Workshop - March 15-17, 2004

*Yiu Wai Chu, Scientific Officer (Medical), Public Health Laboratory Services Branch, Centre for Health Protection, Department of Health, Hong Kong SAR*

Nine scientists from Bangladesh, Korea, Malaysia, People's Republic of China, Taiwan, and Thailand attended the PHLC training workshop from March 15th-17th in Hong Kong for PulseNet Asia Pacific. It was the first of its kind to be held outside North America. PulseNet Asia Pacific was very grateful to Ms. Sharon Rolando, Ms. Mary Ann Lambert-Fair, and Ms. Kelley Hise who came all the way from the U.S. to take part in the organization and teaching of the workshop. During the three workshop days, participants were introduced to the principles of PFGE and the basics of BioNumerics. From plug making and gel electrophoresis, to gel image acquisition and fingerprint analysis, all the participants gained hands-on experience in following the CDC standardized protocol for



**PULSENET ASIA PACIFIC LABORATORY WORKSHOP PARTICIPANTS** (left to right, back row): Shuk Ho KIM, Bala SWAMINATHAN, Danny CHEUNG, Shari ROLANDO, Orn-Anong RATCHTRACHENCHAI, Wei LI, Kwai Lin THONG, Ashrafus SAFA, Terence CHEUNG, Nurul Amin BHUIYAN, Larry CHAN, Sriwanna Huttayanonont UTTAYANANONT, Yanmei XU & Agatha CHIU. Mid row: Vivien TSANG, Jun TERAJIMA, Kelley HISE, Mary Ann LAMBERT-FAIR, Susanna LEUNG, Choi Ha MA. Front row: Catherine LAW, Alf CHU, Cindy LUEY, Man-Yu CHU & Hsiao-Lun WEI.]

*Salmonella* subtyping. Several issues were discussed in detail, such as the importance of standardization and possible variations to the protocol. The workshop also provided opportunities for the participants to share their own PFGE experiences. The international and local organ-

izing committees were delighted with the participants' positive feedback and overjoyed to learn that they planned to take their new knowledge back to colleagues in their home countries/areas. **CDC**



# ASIA PACIFIC a closer look

## Vietnam

Phung Dac Cam, Associate Professor, Head of Division of Enteric Infections, National Institute of Hygiene and Epidemiology

The National Institute of Hygiene and Epidemiology together with the Pasteur Institute in Ho Chi Minh City, Nha Trang, Ban Me Thuot, and 64 Centers for Preventive Medicine are the infrastructure of the national preventive medicine system. However, a nationwide surveillance network for foodborne diseases is not yet in place. Also, due to insufficient funds, the Enteric Laboratory of the Institute does not have equipment for pulsed-field gel electrophoresis or staff trained in the technique. Nevertheless, the importance and benefits of joining PulseNet Asia Pacific are well recognized and Vietnam PulseNet will hopefully start in the third quarter of 2004.

## People's Republic of China

Jian-Guo Xu, Director and Professor, Priority Laboratory of Molecular Medical Bacteriology, Ministry of Health, People's Republic of China

China is making good progress in establishing a nationwide laboratory-based surveillance system for infectious diseases. The Chinese Centers for Disease Control and Prevention (Chinese CDC) has successfully obtained a grant from

the Ministry of Science and Technology for the creation of a National Bacterial Infectious Disease Laboratory Surveillance Network (PulseNet China). While the new Chinese CDC is still under construction in the north of Beijing, the National Institute of Communicable Disease Control and Prevention, responsible for the network, is already actively engaged in PFGE subtyping of five pathogens: *Vibrio cholerae*, *Salmonella* Typhij, *Salmonella* Paratyphi A, Shiga-toxin-producing *Escherichia coli*, and *Leptospira*. Initially, fingerprint databases of these selected microbes will be constructed and the PulseNet standardized protocol will be adopted where applicable. In collaboration with provincial laboratories, PulseNet China will host their first meeting before the end of this

year. Sharing of the databases is expected once the Network is established and Chinese scientists are gearing up to contribute to the tracking of not only Foodborne but also other bacterial pathogens that are important to China.

## Thailand

Orr-Anong Ratchtrachenchai, Enteric-Bacteria Laboratory, National Institute of Health, Ministry of Public Health

The Thai Department of Medical Sciences (National Institute of Public Health) and the Diseases Control Department and Bureau of Epidemiology have come to an agreement on Thailand's participation in PulseNet Asia Pacific and priorities for the pathogens have also been determined. Capitalizing on the effort expended to participate in the WHO Global *Salmonella* Surveillance and the set up of the National *Salmonella* Surveillance, molecular subtyping of non-typhoidal *Salmonella* will be developed at first, followed by *V. parahaemolyticus*, and Shiga-toxin producing *E. coli*. National Institute of Health, Ministry of Public Health, currently houses two PFGE instruments and is actively seeking funds to further improve its PFGE capability, including systems for gel documentation and software for

image analysis. The laboratory is also fully aware of the importance of training, use of standardized protocols, and quality assurance. They expect to contribute nationally as well as internationally to the application of PFGE in tracking infectious diseases.

## The Philippines

Celia Carlos, Chairperson, Committee on Antimicrobial Resistance Surveillance, Research Institute for Tropical Medicine, Philippines

The antimicrobial resistance surveillance program, coordinated by the Research Institute for Tropical Medicine (RITM), functions as a nationwide surveillance program of foodborne infections involving aerobic bacteria, even though it was primarily established to monitor the antimicrobial resistance patterns of bacteria of public health importance. National Epidemiology Center (NEC) also conducts a syndromic surveillance program for diarrheal diseases. Since the PulseNet Asia Pacific 2002 Honolulu meeting, there have been some breakthroughs. Participation in the WHO Global *Salmonella* surveillance program (GSS) has provided impetus for the establishment of a laboratory-based surveillance network. Visits by representatives of WHO and the U.S. Centers for Disease Control and Prevention resulted in the initiation of GSS in the Philippines and RITM becoming part of

(Continued on page 4)

## CONGRATULATIONS!

At the Annual PulseNet Update Meeting held in San Diego, California, Dr. Kai Man Kam of the Public Health Laboratory Centre in Hong Kong was presented an award for his continued efforts toward building and improving the PulseNet Asia Pacific Network.

## ICDDR, B: Centre for Health and Population Research

Dr. G.B. Nair, Director, Laboratory Sciences Division

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) is an international health and population research and training institution located in Dhaka, the capital of Bangladesh. Cholera has been the main focus of activities since its investiture in 1960. Over the years, ICDDR, B has expanded to address many critical global health needs and it is now becoming well known as ICDDR, B: Centre for Health and Population Research.

In Bangladesh, ICDDR, B is responsible for several diarrhea surveillance groups including the hospital-based surveillance in Dhaka (urban) and Matlab (rural) since 1980. Additionally, they perform sentinel surveillance in six geographic areas beginning

in 1996 and the Epidemic Control Preparedness Programme conducts surveillance in the rural districts prior to and during epidemic seasons.

ICDDR, B has five divisions of which one is the Laboratory Sciences Division (LSD). The Enteric Microbiology Laboratory, one of the 10 research units under LSD, is responsible for the development and application of phenotypic and molecular techniques to identify and characterize diarrheagenic organisms from clinical and environmental sources. Scientists in LSD have been using PFGE since 1992 to study the molecular epidemiology of a variety of enteric pathogens. Therefore, when the meeting to explore the set up of a regional molecular subtyping surveillance network for foodborne diseases was convened in Honolulu in 2002, ICDDR, B quickly expressed a keen interest. Since then, Dr. G. Balakrish Nair, Director of LSD, has played a pivotal role in PulseNet Asia Pacific as a member of the steering committee. Currently, ICDDR, B is working closely with the PHLC,

Hong Kong and the National Institute of Infectious Diseases, Japan validating a PFGE protocol for *Vibrio cholerae* developed by PulseNet USA. These three institutions collected a set of 40 strains (O1 and O139) and are performing the CDC protocol individually. They have exchanged and compared results and TIFF images. ICDDR, B is also actively developing the skills of PulseNetworking and intends to conduct training programs to disseminate this technique within National Laboratories in Bangladesh, thus expanding the molecular surveillance network. **CDC**



## The Philippines (Continued from 3)

the Department of Health Food Safety committee as the lead agency of the laboratory-based surveillance. The Department of Agriculture is now working towards establishment of an integrated surveillance of foodborne infections. Much is yet to be done, including continued enhancement of the *Salmonella* surveillance program, initiation of molecular subtyping studies to establish databases and networking, expansion of the sentinel surveillance to cover more pathogens such as *Campylobacter*, *Listeria monocytogenes*, *Vibrio cholerae*, and *E. coli* O157:H7, and linkage of the epidemiology (NEC) and the laboratory (RITM) databases.

(STEC). PulseNet PFGE protocols are being implemented for each of the four organisms, and a central server has been established with databases for each of the four organisms.

*Campylobacter* has a particular focus for New Zealand with a notified rate approaching almost 400/100,000. Currently (June 2004) the New Zealand *Campylobacter* databases contain 1126 isolates, of which 91% are *C. jejuni*. They can be separated into 229 different *SmaI* PFGE types. Isolates come from human, animal, food and environmental sources.

Over the coming year, a key goal is to provide training and assistance to laboratories based at universities, other Crown Research Institutes, medical schools, and

These laboratories will then be encouraged to submit typed isolates to the databases. At least initially, they will not have direct access to the server, but will submit isolates by email or CD, and in return receive bundles of unique patterns, pattern designations for their isolates, and comparisons of the distribution of particular patterns in different sources. The involvement of these institutes beyond the Public Health Laboratories will allow the creation of an archive of all PFGE typing that occurs in New Zealand. This will facilitate the extension of epidemiological surveys and outbreak investigations and provide more effective detection or exclusion of

linkage between human case isolates and food/environmental isolates. Additional organisms and typing methodologies will be added to the databases as needed and as funding emerges.

The development of PulseNet New Zealand has been jointly funded by the New Zealand Ministry of Health, the New Zealand Food Safety Authority, and Dairy Insight, New Zealand.

For further information please contact Brent Gilpin (Brent.gilpin@esr.cri.nz, phone: 64-3-3510044, fax: 64-3-3510010).

*Aotearoa is the native Maori name for New Zealand, and means "land of the long white cloud".*

## PulseNet New Zealand

Brent Gilpin, Institute of Environmental Science & Research Limited, Christchurch, New Zealand

The Institute of Environmental Science & Research Limited (ESR) is a Government owned Research Institute that includes New Zealand's Public Health and enteric reference laboratories. PulseNet Aotearoa<sup>1</sup> New Zealand has been established this year with an initial focus on *Campylobacter* spp., *Salmonella* spp., *Listeria* spp., and Shiga-toxin-producing *Escherichia coli*

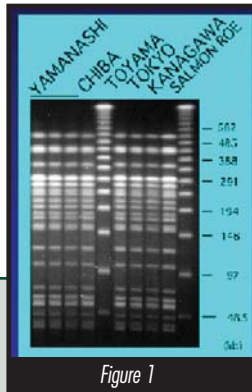


Figure 1

## Japan- Evolving from PFGE network as PulseNet Japan to participation in PulseNet Asia Pacific

Jun Terajima, Hidemasa Izumiya, Sunao Iyoda, Kazumichi Tamura, Haruo Watanabe Department of Bacteriology, National Institute of Infectious Diseases, Tokyo, Japan

Since 1991, the Japan National Institute of Infectious Diseases (NIID) has been collecting information on strains of Enterohemorrhagic *E. coli* (EHEC) in cooperation with prefectural and municipal public health institutes (PHI). Every EHEC incident has since been recorded in the Infectious Agents Surveillance Report. The number of EHEC isolations was 525 in the five years between 1991 and 1995. However, the number, mostly of serogroup O157, increased abruptly to 1,329 in May-June, 1996 when a series of O157:H7 outbreaks occurred in primary schools involving over 1,300 people; two children died as a result. The number of O157:H7 increased further in July with another large outbreak involving 47 primary schools in Sakai City, Osaka. Three more people died and over 7,500 were ill.

Since 1996, we analyzed O157:H7 EHEC isolates from outbreaks as well as sporadic cases by PFGE for surveillance purposes. This has identified not only delineation of different outbreak strains, but also linked widely dispersed cases. The

## Flow of Data through PulseNet Japan

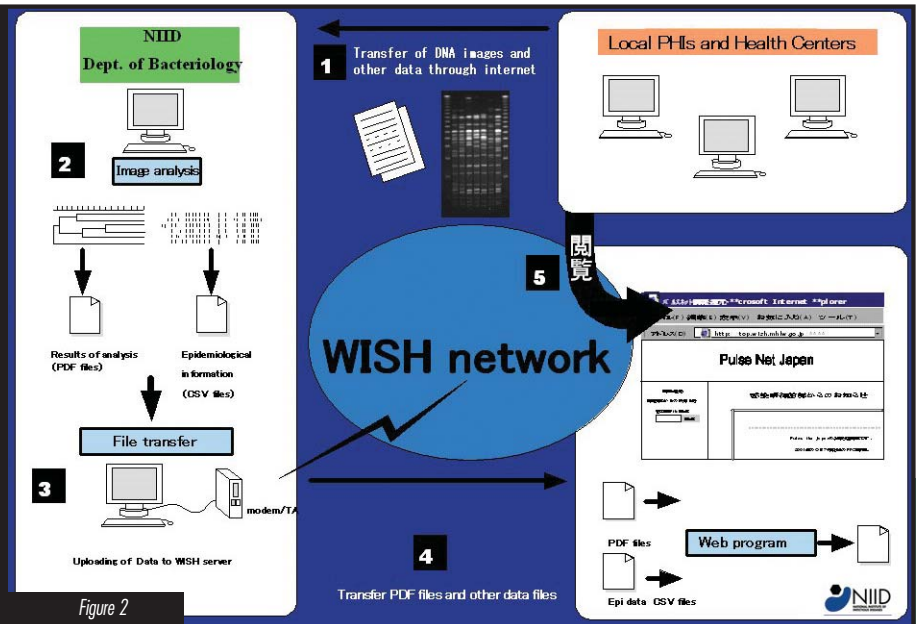


Figure 2

remarkable discriminatory power of PFGE has helped NIID to convince PHI laboratories to employ PFGE analysis during outbreak investigations. Most of the 75 PHI laboratories acquired PFGE apparatuses soon after the series of EHEC outbreaks in 1996. NIID held three training courses in May 1997 to standardize the protocols used among the laboratories. Although there was still some way to go before the establishment of a PFGE fingerprint exchange network, it was a significant first step. Nonetheless, the use of PFGE at local PHIs and the exchange of information through the internet between PHI and NIID did shorten the time for the recognition of a multi-prefectural outbreak. For instance, in 1998, diffuse outbreaks of O157:H7 were reported in Toyama and Tokyo where 49 patients and 13 asymptomatic carriers were identified. Infections were associated with consumption of rice cakes with salmon roe (Ikura-sushi). Strains of O157:H7 from the patients and the Ikura-sushi gave indistinguishable PFGE patterns and the salmon roe implicated was subsequently traced back to a single manufacturer in Hokkaido (Fig 1).

Based on the initial information exchange network,

NIID established a more specific network for PFGE called PulseNet Japan (Fig 2) through an existing closed network Wide-area Information-exchange System for Health, labor and welfare administration (WISH). PulseNet Japan is currently a simple home page displaying the results of PFGE fingerprinting and the associated epidemiological information sent to NIID. We are collaborating with six PHI area representatives to evaluate and improve the standardized protocol. Although the network started with EHEC O157:H7, it is gradually expanding to other EHEC serotypes and also other bacterial pathogens such as *Shigella*, *Salmonella*, and *Vibrio*. NIID is also seeking other collaborating institutes under the Ministry of Agriculture, Forestry and Fisheries of Japan in order to assist the tracing the source of contamination. Furthermore, as a result of globalization and outsourcing of the food supply, Japan will be facing an immediate challenge once imported food products are involved in outbreaks and tracking of the pathogen becomes an international task. On that note, we see the importance in collaborating with international partners through a global network such as PulseNet Asia Pacific. **CDC**



## PulseNet Status in Korea

Bok Kwan Lee & Shuk Ho Kim, Laboratory of Enteric Infections, National Institute of Health, Korea

### Surveillance System

The Korean Center for Disease Control and Prevention (KCDC) is responsible for national research and management of diseases. It provides training and conducts studies related to public health. KCDC receives isolates of infectious agents and their related information from 17 Institutes of Health and Environment in metropolitan cities and provinces in Republic of Korea. These institutes collect and identify bacterial as well as viral isolates from humans, foods and environments, and serve as local reference centers for many public health centers and hospitals. KCDC also processes specimens from 12 quarantine offices in airports and harbors, and stocks all the strains received for further study.

### PulseNet Development in Korea

The Division of Enteric Infections KCDC began building its PFGE capacity for epidemiological investigation in 1997. Protocols were mostly adopted from publications until 2000, when KCDC collaborated with Dr. Gautom at Washington Public Health Laboratory. Dr. Gautom developed a rapid PFGE protocol for typing gram-negative bacteria, and the standardized one-day PFGE protocol was then introduced to KCDC. Between 2000 and 2003, KCDC acquired the CHEF Mapper system and BioNumerics software; PFGE fingerprint databases for *Shigella sonnei*, *Salmonella* Typhi, and *Salmonella* Typhimurium (totaling approximately 750 TIFF files) were created. In 2003, KCDC received assistance from CDC, USA in PFGE data management and networking and is now constructing a network with the Institutes of Health and Environment around the country for comparing analyses of PFGE image files. At present, 10 provincial Institutes of Health and Environment are capable of performing PFGE on *Shigella* and *Salmonella* species. This year, KCDC is

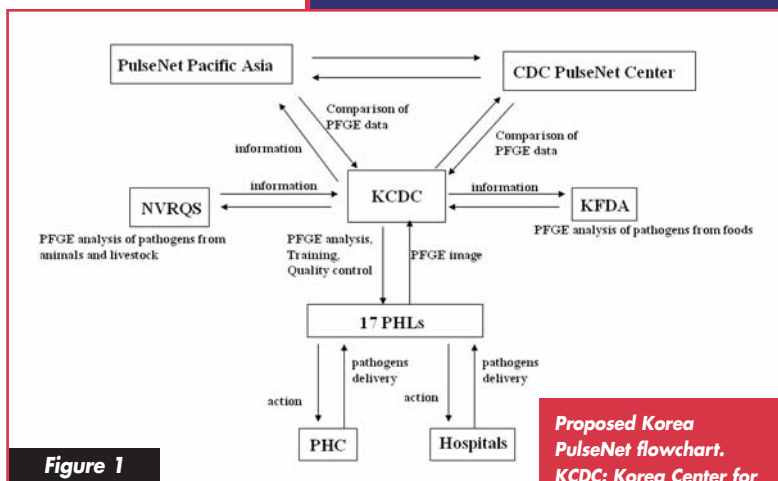


Figure 1

going to provide training of the standardized PFGE protocol for microbiologists from provincial institutes and plans to inaugurate a program for quality control.

### Future Plans

Many Korean microbiologists and policy-making officials agree that PulseNet is important for efficient infectious disease control and prevention. KCDC will lead the development of the Korean PulseNet system with government funds next year (See Figure 4). In addition, KCDC will take part in PulseNet Asia Pacific and play a leading role as a nation in alleviating the world's infectious disease burden. **CDC**

## SURVEILLANCE OF FOODBORNE DISEASES IN MALAYSIA: Scope and the current status of the application of PFGE

Dr. Thong Kwai Lin, Professor, Faculty of Science, University of Malaya and Dr. Rohani Md. Yasin, Bacteriology Unit, Institute of Medical Research, Kuala Lumpur, Malaysia

Five of the 27 notifiable diseases in Malaysia are of foodborne origin. These include cholera, typhoid and paratyphoid fevers, hepatitis A, food poisoning and dysentery. Non-typhoidal *Salmonella* is still the top pathogen, causing most of the food related infections.

Existing systems for foodborne disease surveillance include statutory notification, outbreak investigation, laboratory-based and passive surveillances. The laboratory-based surveillance of *Salmonella* spp. (including Typhi and Paratyphi) and *Vibrio cholerae* was initiated in October 2002, and it has a role in determination and monitoring of circulating pathogenic strains, prediction and detection of clusters of cases, and outbreak investigation through subtyping.

All microbiology laboratories in government hospitals and universities that process clinical samples notify the Communicable Disease Surveillance Section of the Disease Control Division under the Ministry of Health using a laboratory-based surveillance notification form when a suspicious strain is found. The strain is sent to a reference laboratory where the serotype and antibiogram is determined. If an outbreak is

suspected, we also perform PFGE fingerprinting. The surveillance section is responsible for analyzing the data and producing a weekly report. This report indicates the isolate trends according to the serotype, antibiogram, demographic, and geographic distribution. Upon evidence of an outbreak, we initiate further investigation. A similar laboratory-based surveillance involving the food laboratories for *Salmonella* spp. was also initiated in October 2003. We report the results of this surveillance in the form of a newsletter.

Four public health laboratories are now actively involved in outbreak investigation for food poisoning, namely, the Institute of Medical Research (IMR), Central Public Health Laboratory Sg Buluh, Public Health Laboratory Ipoh, and Public Health Laboratory Johore.

Upon request, IMR performs PFGE on outbreak and nosocomial pathogens and provides training to technical staff from other public laboratories. PFGE is routinely done to assist epidemiological investigations of *Salmonella* spp. In the past, the protocols used were mostly from publications, but now efforts are being made to switch to the CDC standardized *Salmonella* protocol. The main problems with developing PulseNet Malaysia are the lack of human resources, technical expertise and funding.

Currently, we are considering plans to consolidate resources for bench training of the CDC standardized protocol. Our first target is to have at least one technician trained in the standardized protocol in each public health laboratory by the end of this year. Acquisition of BioNumerics will be in the next phase of development.

## Laboratory-based Surveillance for Foodborne Diseases in Hong Kong

Danny T.L. Cheung, Scientific Officer (Medical), Public Health Laboratory Services Branch, Centre for Health Protection, Department of Health, Hong Kong SAR

Hong Kong, a popular tourist destination, has an estimated mobile population of half a million. The dining experience in Hong Kong is among the finest in the region, offering a huge variety of cuisines with imported ingredients from all over the world. Tracking foodborne diseases is therefore becoming a global task. In the past few years, a number of measures have been ongoing to build laboratory capacity for PFGE typing for tracking bacterial infectious diseases. At the same time, several in-house workshops were conducted to train our workforce. Currently, there are four dedicated laboratorians working in the PFGE laboratory equipped with seven CHEF Mappers and six BioNumerics licenses. The PulseNet standard-

(Continued on page 6)

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## Hong Kong (Continued from page 5)

ized PFGE protocols have been in use since 2001 for *Listeria monocytogenes*, *E. coli* O157:H7, *Salmonella*, *Shigella*, *Campylobacter*, and *Clostridium perfringens*. We are also actively participating in the evaluation of a new PFGE protocol for the typing of *Vibrio cholerae*.

The Centre for Health Protection (CHP), a newly established agency under the Department of Health, is responsible for coordinating efforts among government departments, hospitals, universities and private sectors, began functioning this June. As one of the six branches of CHP, the Public Health Laboratory Services Branch will actively contribute to the enhanced surveillance and epidemiology of communicable diseases in Hong Kong. To this end, there are plans to enhance subtyping on many bacterial pathogens and PFGE is the method of choice for enteric pathogens. Using the PulseNet Asia Pacific platform, the orderly implementation of a strategic plan is essential for inter-laboratory comparison and support of training activities in the region. Through close collaboration with

## PFGE: A Valuable Technique for the Detection and Investigation of International Outbreaks of Foodborne Gastroenteritis

*Dr. Diane Lightfoot, Senior Scientist, Microbiological Diagnostic Unit,  
Department of Microbiology and Immunology, University of Melbourne,  
Victoria 3010, Australia*

Australia has had successes in tracking pathogens using PFGE. The following examples illustrate how the technique helped the elucidation of the sources of foodborne salmonellosis, thus enhancing the detection of international disease outbreaks.

After extensive investigation, an outbreak of *Salmonella* Typhimurium DT104, in the Australian state of Victoria in June 2001 involving approximately 20 people, was linked to the consumption of halva imported from Turkey. In a similar period, an outbreak of *S. Typhimurium* DT104 associated with the consumption of imported halva was reported by Sweden. Following a report in Eurosurveillance, cases of *S. Typhimurium* DT104 linked to consumption of the same contaminated imported product were detected in other

European countries. Halva outbreak-associated isolates from each country were sent to one reference laboratory and analyzed by PFGE. All of these isolates exhibited the same PFGE profile, thus indicating the same source, contaminated halva.

Over 90 cases of gastroenteritis in Australia caused by an antibiotic-sensitive *Salmonella* Stanley strain were found to be associated with consumption of a particular brand of peanuts imported from China. An alert was posted on ProMED. Investigation of *S. Stanley* cases occurring at the same time in Canada were also found to be linked to consumption of imported peanuts. *S. Stanley* isolates, from both Australian cases and cultured from the implicated brand of peanuts, exhibited the same PFGE profile.

PFGE profiles of the *S. Stanley* outbreak isolates were exchanged between Canadian and Australian laboratories. All the outbreak-associated *S. Stanley* isolates exhibited the same PFGE profile. Hence the same strain, found in both peanuts and humans, was responsible for the cases of *S. Stanley* gastroenteritis in both Australia and Canada.

PFGE profiles sent via email can be compared very quickly in specialized public health laboratories worldwide. This process enables a much faster means of detecting international outbreaks of enteric disease.

CDC and other countries and areas in the Asia Pacific Region, the common goals of

laboratory networking and information exchange can be further enhanced.