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MEMBERS NEWS
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Special Report
5th GABRIEL Network Annual Meeting
9-12 December 2012

Les Pensières, Annecy, France

Organised by the Fondation Mérieux, with the participation of the 'Réseau Science et Technique, Afrique Caraïbes de soutien à la lutte contre les Maladies Infectieuses'

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From December 9 to 12, 2012, more than 75 experts in the field of infectious diseases convened at the Pensières Conference Center of the Fondation Mérieux at Veyrier-du-Lac, near Annecy, France, for the 5th annual meeting of the GABRIEL network. Traveling from 24 countries worldwide, participants gathered to discuss the latest scientific advances related to tuberculosis, multidrug resistance, and local country issues on the epidemiology, diagnostic testing, and prevention of respiratory infectious diseases.

The aim of the conference was to provide a common platform for researchers, physicians, specialists in laboratory diagnostics, university scholars, and scientists, both from the public and private sectors, to share their experiences, innovative ideas, and research findings on the major aspects of emerging trends

and technologies in the field of MDR-TB and other respiratory tract infections. Representatives from each of the GABRIEL network member laboratories (Brazil, Cambodia, Cameroon, China, Haiti, Laos, Lebanon, Luxembourg, Madagascar, Mali, Mongolia, Paraguay and France - with the exception of Georgia and Canada) participated in the meeting.

More specifically, presentations by the participants provided insight on recent tests for laboratory surveillance of pathogens, characterization of new mutant and resistant strains of bacterial and viral pathogens, and the results of pneumonia multicentric studies in the GABRIEL member countries.

Proceedings

The conference opened with welcoming remarks by Benoît MIRIBEL, Director General of the Fondation Mérieux. In his address he spoke of the strong need for GABRIEL to achieve greater visibility, to expand its capacities, and to stimulate its fundraising activities, three objectives that can be summed up in his statement: "GABRIEL brings value for money and value for life".

His talk was followed by an update on GABRIEL and AFRICARAMI presented by Dr Florence KOMURIAN-PRADEL, Manager of the GABRIEL network. She described GABRIEL's organization and membership, and gave an overview of its accomplishments since its foundation in 2008. She reported that in July 2012, GABRIEL joined ISARIC, the International Severe Acute Respiratory and Emerging Infection Consortium that collaborates with scientific research networks to study how to best respond to outbreaks. During the course of the year, GABRIEL also ran the AFRICARAMI project, an international research network, which deals with public health issues related to TB and SARI (Severe Acute Respiratory Infections), and which seeks to improve the dissemination of results of research activities to the scientific community.

Another one of GABRIEL's main tasks is in-country training. Members are taught the essential components of quality systems such as Standard Operating Procedures, Good Laboratory Practices and biosecurity. GABRIEL focuses on capacity building and on the transmission of knowledge required for the development of research projects from their inception to their successful completion and the analysis and sharing of results derived from research. Evaluations are performed at each location by means of a questionnaire, which also measures lab capacities in terms of infrastructures and equipment. Site visits complete the evaluation process. Quality assessments are also frequently run to check the quality of the results of scientific research. GABRIEL also provides logistics support to supply reagents that are locally unavailable.

Programme highlights

Presentations

Session I

Multidrug-Resistant Tuberculosis

Dr. Phimpha PABORIBOUNE and Dr. Silaphet SOMPHAVONG of the Christophe Mérieux Centre of Infectiology of Laos (CICML) gave an update on MDR-TB in their country. The first national workshop on MDR-TB attended by over 72 professionals was held in Vientiane in November 2012 to study the epidemiology of TB resistance, the diagnosis of MDR-TB, and the means of controlling the disease.

The CICML has been operating since 2009, mainly in the areas of hepatitis virus, HIV, and respiratory infections (especially TB).

The current techniques used for the diagnosis of TB in Laos are microscopy by ZN stain, solid culture, and LIPA to detect resistance, however, only a handful of laboratories are able to perform culture and only the CICML can perform LIPA. Fluorescent microscopy is planned for the near future. All first-line TB drugs are available for patient treatment. Second-line drugs have been available since May 2011.

The current situation is still problematic. MDR-TB diagnosis and follow-up treatment are still experiencing long delays, mainly due to the remoteness of wide areas of the country, the low socio-economic conditions of the population, and the severity of infections. There is a high MOTT rate, and research is needed to explain this.

The results of recent epidemiological studies on infectious diseases were presented, and this raised questions from the audience. What are the circulating lineages and trends of *M. tuberculosis*? What is the source of non-TB pathogens? Is HIV screening standardized? The answer to this last question was that in a small research study conducted in 2009, around 20% of the HIV patients screened for TB are also TB+. But the general prevalence of HIV is not known.

Identification of markers of TB resistance

Jean-Luc BERLAND of the Fondation Mérieux Emerging Pathogens Laboratory (EPL) in Lyon, France, presented recent WHO figures on the extent and the degree of multidrug resistance to TB, which is expanding due to its generally poor diagnosis. It is estimated that 97% of all MDR-TB cases are undiagnosed and untreated. The objective of his study is to identify new mutations causing drug resistance to TB. It has been found that many TB strains have resistant phenotypes but have undetected mutations. A more exhaustive list of resistance-conferring mutations is needed to explain this, and would lead to the development of more accurate diagnostic tools.

In the coming year, the following is planned: a study on the identification of new markers, the development of tools for typing and resistance test on the Luminex system, studies (in collaboration with Qiagen), on the molecular epidemiology of TB, and research on the routes of the spread of TB in South-East Asia, conducted in collaboration with IRD of Lao PDR, Vietnam, and Cambodia.

TB typing: basics and application

Marie GAUTHIER of the Fondation Mérieux EPL, presented the most commonly used typing methods: IS 6110 RFLP, spoligotyping, and MIRU-VNTR. These methods can be used in a wide variety of applications.

The focus of the presentation was on mixed strain detection. This can reveal several clinical patterns, such as TB infection associated with an endogenous reactivation or an exogenous reinfection, or an initial TB mixed infection; this can also result from a lab contamination.

Published data on prevalence and impact remain unclear as further investigation is needed. MIRU-VNTR is a good approach, as it is the only method able to detecting a mixture in one single sample. In conclusion, the choice of a typing method depends on the objective of the study.

Tuberculosis in Haiti two years after the earthquake

Prof. Jean William PAPE, Director and Founder of the GHESKIO centres in Haiti, spoke at length of the impact of the 2010 earthquake on tuberculosis. Haiti before the quake had one of the highest incidence of TB 300/100,000.

The West department, the one most affected by the quake, accounts for half of all the reported TB cases in Haiti. All the TB care centres in the West department, where the capital city is located, were destroyed or severely damaged, including the GHESKIO centres. Prisoners being treated for TB at the National Penitentiary escaped. The malnourished population (40% live on less than US $1.00/day) has become more vulnerable to infectious diseases, especially as over 1.5 million homeless persons have been living precariously in tent cities.

The GHESKO centres, the largest TB institution in Haiti, screen 40,000 persons per year for HIV. It is the only lab equipped to diagnose TB using all laboratory methods. A GHESKIO published study showed that 30% of persons coming for an HIV test and presenting with cough have active TB. GHESKIO records

show that the number of TB cases in children has risen fivefold in 2010 compared to 2009, the year before the quake. The number of TB cases in children decreased in 2011 and 2012 compared to 2010. This is probably due to the fact that 1.1 million internally displaced persons living under tents have now been relocated. However, the actual number of TB cases seen at each of the ten largest TB centres rose from 2009 to 2012. The severity of the disease has increased as well with more cases of TB meningitis and Potts disease. The increase in TB cases in Haiti is not associated with HIV infection.

We have documented that 3 main strains of TB are responsible for most of the TB cases seen in the slums near GHESKIO.

Haiti faces seemingly insurmountable challenges, especially evidenced by a cholera epidemic, the first ever in Haiti, that broke out 10 months after the earthquake.

One of the most pressing needs in Haiti is the construction of a TB hospital that will receive patients with TB from the TB field hospital.

Session II: New tests and technologies

A big data approach to disease tracking

Aron COHEN of Azure PCR Ltd, a company specialising in the development of automated solutions for analysis of real-time PCR data, explained how the global impact of infectious disease can be reduced by improving diagnosis, identification and tracking of pathogens (based on their genetic make-up). His cost-effective method provides high quality health statistics in real-time, which are distributed globally to aid the planning and implementation of health policies in all countries.

He then described the Azure PCR technology, providing examples of results obtained, demonstrating the software's ability to accurately classify even noisy and difficult-to-interpret real-time PCR data. Azure PCR seeks to implement a standardised system that avoids bias by eliminating the use of thresholds and manual interpretation of data. Conventional data analysis methods used by different laboratories introduce ambiguity and variations into the data. However, Azure PCR avoids such issues by creating unique fingerprints for each real-time PCR curve, using only the original raw data points, ensuring not only standardised methodology but also accurate diagnostics.

S. pneumoniae genotyping

Jean-Noel TELLES of the Fondation Mérieux EPL, spoke about the need to develop tools for *S. pneumoniae* serotyping to optimize the development of future conjugate vaccines, to deepen our understanding of serotype-specific epidemiology, and to determine the link between serotypes and their associated disease types and invasiveness.

He described the methods used to identify and quantify *S. pneumoniae* serotypes in different clinical sample types and to evaluate the sensitivity of the assay on different strains.

The study was carried out on clinical samples of nasal washes and whole blood taken from cohorts in Togo, Brazil, France, and South Africa. The *S.pneumoniae* serotyping method developed is a multiplex real-time PCR, and is currently used in the pneumonia multicentric study. The results of the geographic distribution of serotypes in each of the countries were given. Perspectives include the adaptation of the typing method to the LUMINEX beads technology in order to increase the throughput and practicability of the assay.

In response to questions from the audience: blood samples and nasal washes give different results of serotype distribution due to the person's immune status, the presence of antibiotics, and methods of sampling.

Session III: Keynote lecture

Pneumococcal density as a diagnostic assay and impact of respiratory viruses on pneumococcal density and transmission

Prof. Keith KLUGMAN, from the Schools of Public Health and Medicine of Emory University in Atlanta, USA, spoke about the etiological role of the pneumococcus in pneumonia and of the challenging task of making new molecular tools quantitative.

The main issue is the difficulty in detection of the presence of the pneumococcus in pneumonia. The microorganism is detected from blood in only 10 to 15% of adult patients with presumed pneumococcal pneumonia, and 1% in children. A new serological test using monoclonal antibodies to detect urine antigen (UAD) is sensitive and specific for 13 serotypes. Assays are needed to detect other serotypes and are now being developed.

Results of a study comparing the UAD and the BinaxNOW assay were displayed, as well as other findings related to the correlation between nasopharyngeal qPCR and the severity of pneumonia in adults. Prof. Klugman believes that the response in pneumonia to the narrow spectrum drug, penicillin, strongly supports a major role for the pneumococcus in pneumonia even if blood cultures are negative.

In his conclusions, he reported that UAD is more sensitive than Binax, even though only 13 serotypes can be detected. Also he mentioned that rt-PCR on nasal swabs may be the diagnostic of the future for pneumococcal pneumonia, and finally, that density of detection by rt-PCR may be prognostic in blood and NP.

How can PCVs impact pneumonia?

Dr. Ron DAGAN, the Director of the Pediatric Infectious Disease Unit at Soroka University Medical Centre and the Ben-Gurion University in Beer-Sheva, Israel, talked about viral-bacterial interaction and pneumonia, and the impact of pneumococcal conjugate vaccines on this interaction, as well as pneumococcal nasopharyngeal carriage. His current research interest lies in the development of new conjugate vaccines, with particular emphasis on those against the pneumococcus.

There is a relationship between the bacterium's capsule structure and carriage prevalence as demonstrated in a study that was carried out in children in Massachusetts. Capsule structure is also linked with the carriage of specific serotypes.

Viral vaccines reduce the bacterial disease burden, as demonstrated by the measles vaccine that can prevent pneumonia. However, as shown with the pneumococcal conjugate vaccines, they can, in turn, protect against diseases that were perceived as viral infections, by reducing the carriage and the resulting infection of the virus collaborators, namely pneumococci. Thus, the contribution of pneumococcal conjugate vaccines to reduce lower respiratory tract infections is much greater than has been initially expected.

Dr. Dagan further spoke about the findings from a study on the effectiveness of pediatric PCV against radiologically-confirmed pneumonia on a per country basis, and against viral-associated pneumonia in hospitalized children. In addition, there falsely appears to be an inverse relationship between vaccine efficacy in alveolar (lobar) pneumonia and all-cause (unspecified) pneumonia cases. However, since the latter are much more common, when one looks at reduction of vaccines attributable disease, a significantly greater number of cases of non-specific pneumonia are reduced by the vaccine than the less prevalent alveolar cases.

Invasive pneumococcal disease in Bangladesh and the possible impact of PC

Dr. Samir SAHA, the Director of the Child Health Research Foundation in Dhaka, Bangladesh, focused his presentation on pneumonia, the leading killer in Bangladesh. His group is currently doing surveillance on invasive childhood diseases to better understand the burden, drug resistance and epidemiology of pneumonia, meningitis, and typhoid. Even though 25% of the deaths of children in Bangladesh are attributable to pneumonia and meningitis, there is no dedicated organization or initiative against these infections.

There are multiple modalities of surveillance. These include hospital networks comprising 4 hospitals on 3 sites, rural field sites, and nested populations based around sentinel sites. This surveillance must cope with several challenges: the rate of urbanization in Bangladesh, and the complexity of active surveillance in terms of cost, and slum living conditions of the population, which makes severe cases hard to detect.

The surveillance process was described in detail, starting from the enrollment at the hospital to clinical procedures conducted by a physician.

Many challenges in determining the etiology of pneumococcal disease remain, as 32% of patients admitted in hospitals already come with prior antibiotics. Contamination of blood cultures is also an issue. However, laboratory diagnosis has slowly progressed since 1995.

PCV was introduced in 2012. Its impact will be a challenge due to the number of multiple serotypes present in Bangladesh and low coverage. The surveillance program will continue for an additional 5 years.

Mycobacterium tuberculosis typing: application in South-East Asia

Dr. Anne-Laure BANULS, from the Institut de Recherche pour le Développement based in Montpellier, France, stressed the importance of genetic studies to understand the spread of infectious diseases, to identify the emergence and the transmission of resistant strains, and to develop efficient diagnostic tests. Her talk was centered on molecular epidemiology, the evolution of drug resistance, and the impact of HIV/MTB co-infection on the epidemiology and clinical outcome of TB.

The various methods of *M. tuberculosis* typing were reviewed, and the localization of the different genotypes in South-East Asia was described. It is important to classify lineages, define clusters and the distribution of genotypes so that the sources of transmission can be identified. However, this is an arduous task, and much work has yet to be accomplished.

A GDRI (Groupement de Recherche International) project is being launched in 2013 on the biodiversity and infectious diseases in South-East Asia with the aim of studying the circulation and evolution of TB in the Mekong region through a molecular epidemiological approach.

Other projects are aimed at studying the genetics of *M. tuberculosis* and its effect on the clinical outcomes of HIV/TB co-infected adults in Cambodia. In Burkina Faso, an INSERM project is investigating the impact of HIV/MTB co-infections on the dynamics of TB transmission. The goal is to develop an international research network in this field.

Toolbox for TB diagnosis: a multicentric study in India

Dr. Delia GOLETTI from the National Institute for Infectious Diseases in Rome, Italy, described a multicentric study done in India on tools to improve the microbiological diagnosis of tuberculosis. India was chosen because it accounts for 26% of the world's cases of TB. Cities with the highest prevalence of TB were identified: New Delhi, Agra, Chennai, Hyderabad, and Mumbai.

Dr. Goletti presented the study plan and explained the methodology of enrolling TB subjects and described their demographic and clinical characteristics.

The specific aims of the project were to improve smear microscopy, to compare solid and liquid culture techniques, to determine the impact of clinical suspicion of TB on the sensitivity of the microbiological diagnostic tests, and to investigate MOTT frequency in *M. tuberculosis* culture-positive specimens.

It has been found that in India, most of the HIV-infected subjects with active TB are male and have a greater proportion of extra-pulmonary TB. These subjects have had prior TB disease or infections and have a higher MOTT rate compared to the subjects without HIV infection. The current study has been successful in that it has demonstrated that routine microbiological diagnosis of TB in India can be significantly improved. The set-up of a laboratory network and the training of lab personnel in microbiology and immunology are important steps for the development of a coherent health policy in India.

The growing epidemic of multidrug resistance tuberculosis in South Africa

Dr. Martie VAN DER WALT, from the Medical Research Council of South Africa, gave an overview of the current situation in her country. South Africa is third highest in the world in terms of numbers of persons infected with TB, ranks second in terms of the rate of incidence, and is fifth for the prevalence of MDR-TB. The high number of cases represents a tremendous burden for the country, and the control of the disease has been therefore extremely difficult.

MDR-TB is underdiagnosed, as the disease is characterized by social stigma, discrimination, ignorance, and fear. People therefore do not come forward for treatment. They do not have health-seeking behavior, as they assume they are HIV+.

The drivers of drug resistance to TB are related to factors involving previous TB treatment, and co-infections with HIV. MDR-TB has huge consequences for TB control. There is also resistance to second-line drugs, and the remaining drugs available for treatment are of low potency. The future looks bleak, as new MDR forms of TB are continually appearing through mutations.

In response to questions from the audience, Dr. Van de Walt said that there is no evidence that being HIV+ is a risk factor for MDR-TB. One main risk originates from prison environments, as released prisoners spread the disease.

Session IV

Presentation and clinical research management of the pilot study on the surveillance of pneumonia

Dr. Glaucia PARANHOS-BACCALÀ, the research director of the Fondation Mérieux EPL, and Valentina PICOT, the scientific advisor at the Fondation Mérieux, described the pneumonia pilot multicentric study currently underway in ten countries. The purpose of this project is to identify the viral and bacterial agents involved in pneumonia in children under 5 years of age so that the prevalence and involvement of the microorganisms in the onset of SARI can be ascertained.

Fully described in the presentation, were the design of the case control study, the sampling methods with inclusion and exclusion criteria, and the algorithm for the controls. The preliminary results showing the distribution of bacteria in blood, urine, and nasal samples were presented, as well as the distribution of *S. pneumoniae* serotypes. The study is expected to be completed in 2013, and the results will provide data on the etiology of pneumonia pathogens, on the epidemiology of pneumonia, on the demographic and risk factors involved, on the prognosis for the severity of the disease, and on the association between host markers and etiology. Finally, the project should lead to the development of a biosampling bank.

Per-country overviews of the pilot study on the surveillance of pneumonia

Representatives of the countries participating in the pneumonia multicentric pilot study presented an update of the progress currently being made in each of their laboratories. They explained the preliminary results of the study in the context of local conditions. Each country encounters specific challenges in running the project, ranging from problems in the collection of blood and urine, the matching of controls, the long enrollment process, the impact of prior vaccinations, costs, limited resources, seasonal variations, contamination of samples, staffing issues, inadequate amount of supplies, etc.

Local country presentations were given by:

- Dr. Graciela RUSSOMANDO at the National University of Ascuncion, Paraguay
- Dr. Vanessa ROUZIER, physician at the GHESKIO centres, Haiti
- Dr. Bréhima TRAORÉ, from the Charles Mérieux Centre in Bamako, Mali
- Dr. Muriel MAEDER from the Fondation Mérieux, Madagascar
- Dr. Monidarin CHOU of the Rodolphe Mérieux Laboratory, Cambodia
- Dr. Lili REN, of the Institute of Pathogen Biology in Beijing, China
- Prof. Pagbajabyn NYMADAWA, research director of the National Influenza Centre, Mongolia
- Dr. Shally AWASTHI, professor of pediatrics in Lucknow, India
- Dr. Ashish BAVDKAR from the KEM Hospital in Pune, India

Proposal for pneumonia data analysis

Prof. Philippe VANHEMS, the head of Epidemiology and Public Health at the Biometry and Evolutionary Biology laboratory in Lyon, and Dr. Thomas BÉNET, a public health physician and epidemiologist, explained the current epidemiological research projects that are currently underway on infectious diseases, including nosocomial infections – ventilator-associated pneumonia, influenza, *C. difficile* infections, and invasive pulmonary aspergillosis – and community-acquired infections – HIV/AIDS, legionellosis, and pneumonia caused by *S. aureus*.

A summary of the analysis planned for the project was depicted. Some issues were more detailed, such as data validation, descriptive statistics, and comparisons between cases and controls. Limitations of the study to be anticipated were also discussed.

Beyond the identification of agents and risk factors, also discussed were co-infections, and spatial and seasonal distribution of cases as controls. Some hypotheses related to specific disease foci might be tested and reviewed with local investigators.

It is expected that at the end of the study, the final analysis will help identify the causative pathogens for the entire cohorts and by country, will provide a deeper knowledge of pneumonia pathogens so as to provide improved treatment and prevention, and pinpoint the risk factors in all the countries studied. It is hoped that the results will improve patient care and help the development of appropriate public health care policies.

The Global Influenza Hospital Surveillance Network (GIHSN)

Clotilde EL GUERCHE-SEBLAIN, epidemiologist at Sanofi-Pasteur in France, discussed Sanofi-Pasteur's focus on a high quality national influenza surveillance program to gain a better understanding of the epidemiology of influenza. The GIHSN seeks to document the burden of severe influenza that leads to hospitalization, the burden of the disease attributable to individual strains, and the effectiveness of influenza vaccines against hospitalization and related complications.

France, Spain, Russia, Mexico, and Turkey are currently participating in the program through a network of

hospitals linked with health authorities. Brazil, the Czech Republic, and China may also join at a later date.

It is expected that the results from this project will reveal a pattern of the circulating influenza viruses in various regions of the world, will demonstrate the burden of severe influenza infections in different age groups by viral strain, and will establish the effectiveness of vaccines against hospitalization.

The GHISN is an international platform for research in the epidemiology of influenza coordinated by The Valencia Institute of Public Health (CSISP) which has performed a yearly pooled analysis. A core protocol is indeed standardized across all sites with local adaptation based on national priorities and feasibility.

Session VI: Workshops

Introduction to quality management systems in laboratories

Dr. Paul KLATSER, head of the department of Biomedical Research at the Royal Tropical Institute in Amsterdam, the Netherlands, spoke about the development of quality standards, since quality is essential in health laboratories and healthcare systems. Reliable results improve the decision making capacity of clinicians and public health authorities.

The International Organization of Standardization (ISO) is a body that sets standards with requirements, specifications, and guidelines to ensure that products and services are safe, reliable and of good quality.

Dr. Klatser explained the distinction between certification, accreditation, and licensure. ISO 15189, in particular, sets the international standard for medical laboratory quality and competence. It requires that specific instructions under defined criteria be given for each step of the process within a laboratory to ensure that there is no weak link in managing the system.

A software tool has been developed to acquire the knowledge on laboratory quality management: the GLI Stepwise Process towards TB Laboratory Accreditation. This GLI Tool is a stepwise plan for implementing a quality management system specifically developed for TB Each step consists of an activity (one sentence stating what should be done), with a description of an explanation on why, what, how, and by whom an activity must be completed, and with links to additional support materials (checklists, explanations, examples, templates, etc.).

Based on the GLI, a similar tool, generically designed to suit all public health laboratories, and currently under development, is called the World Health Organization - Laboratory Quality Stepwise Implementation tool (LQSI). It will become available early 2013. The GLI tool and the WHO tool are intended to help labs adopt a systematic approach to QMS implementation, without having to resort to extensive consultancy and training.

Representatives from various countries were asked about the quality management systems in their laboratories.

In conclusuion, Dr. Klatser asked the representatives of the labs to think about the measures to put in place to improve quality.

Workshop I: grants and funding

Dr. Leticia LOBO LUPPI from the Fondation Mérieux EPL, summarized the discussions that were held during the workshop on grants and funding. Different sources of funding have to be explored.

A plan for attracting funding must be structured. A database is currently being developed that will include the CVs of the members of GABRIEL and a description of current projects. We must be consistent, prepared, and coherent.

Workshop II: brainstroming on a future multicentric project in GABRIEL

Dr. Glaucia PARANHOS-BACCALÀ from the Fondation Mérieux EPL, summarized the discussions that were held during the workshop.

Investigation on the diversity and epidemiology of viruses, based on the platform used for the pneumonia project, has been proposed for the next project. Protocol for the preparation of the samples to deep sequence the different viruses, will be provided.

GABRIEL Research Committee meeting

Dr. Delia GOLETTI spoke about the Research Committee composed of six members, whose task is to enhance the quality of research and come up with new research projects. They also assist in the publication of articles, help choose the appropriate journals, and support scientists so that they can increase the number of articles published via the GABRIEL network.

GABRIEL Steering Committee meeting

Dr. Florence KOMURIAN-PRADEL spoke about the Steering Committee composed of seven members. During their meeting they discussed the applications of new members to GABRIEL, the criteria for new membership, and the ways to enhance the visibility of GABRIEL.

The laboratory in Zaporozhye, Ukraine, has been provisionally approved for a one-year period, after which time, membership will be re-reviewed. The second new applicant, the RML of Tajikistan, has also been approved, and will be operational in 2013.

GABRIEL's visibility should be enhanced by developing contacts with clinicians, (build a database with population characteristics available at each site, etc.), by citing GABRIEL in members' publications, and through presentations at international congresses.

Conclusion

Guy VERNET from the Fondation Mérieux EPL, made concluding remarks. He thanked all participants for their presentations at 5th GABRIEL meeting: "The quality of the topics and content was better than ever, the interest and motivation behind the GABRIEL network has never been higher."

The 5th annual GABRIEL meeting provided an opportunity for participants to discuss relevant issues of the prevention, assessment and control of emerging infectious disease, that pose a constant threat to the health, prosperity, and security of all regions in the world. GABRIEL members fully recognise the need for the construction of the surveillance and report system, laboratory capacity building, preparedness plans, risk communication and international cooperation.

GABRIEL promotes the prevention, assessment by research projects, and control of emerging infectious through GABRIEL's laboratory networks to enhance, test, share knowledge and build research capacity of laboratories. GABRIEL is committed to promoting infectious disease surveillance networks and the development of human resources for health and intensifying training of professional staff to enhance the capacity for preparedness and response to infectious disease.