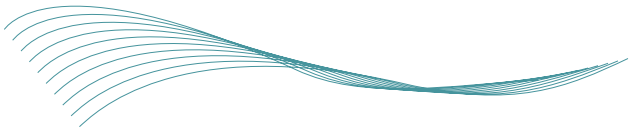
PACIFIC HEALTH SUMMIT
SEATTLE 2009

# Summit Challenge

## MULTIDRUG-RESISTANT TUBERCULOSIS: OVERCOMING GLOBAL RESISTANCE

Connecting science, industry, and policy for a healthier world



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1215 Fourth Avenue, Suite 1600
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**Phone** 206-632-7370
**Fax** 206-632-7487
**E-mail** nbr@nbr.org
http://www.nbr.org



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Compiled and edited by Claire Topal and Nualchan Sakchalathorn
Designed by Duc Nguyen

# Table *of* Contents

# Introduction

## Multidrug-Resistant Tuberculosis (MDR-TB): Overcoming Global Resistance

Much like those who aspire to climb the world's tallest mountain, we have our own extraordinary and demanding challenge before us. Our summit is to make the future healthier than the past—to prevent and detect disease early enough to save lives at a much lower cost, in terms of both suffering and money. Reaching this summit is a matter of extraordinary importance to us all, as the indiscriminating transmission of disease makes every person a member of the global health community.

The aim of the Pacific Health Summit is to connect science, industry, and policy for a healthier world. In doing so, we can confront the many nuanced issues of TB and M/XDR-TB, which continue to plague the developed and developing worlds.

# About the Summit

## MISSION

The mission of the Pacific Health Summit is to connect science, industry, and policy for a healthier world through effective utilization of scientific advances combined with appropriate policy for the prevention, early detection, and early treatment of disease.

## PARTICIPANTS

Every June we invite to Seattle top decision-makers from science, policy, industry, medicine, and public health to discuss how emerging science and technology can be connected to appropriate policy in order to realize the dream of a healthier future.

## OPERATIONS

The Summit is a year-round process. In addition to the June meeting, the Summit provides an ongoing forum for world leaders to improve health by working together to grapple with problems and solutions, share best practices, and forge effective collaborations. The Center for Health and Aging at The National Bureau of Asian Research (NBR), the Secretariat, directs operations for the Pacific Health Summit.

## THEMATIC FOCUS

Each year the Pacific Health Summit focuses on a single theme designed to tackle an important challenge in global health. In 2007, our theme was "Pandemics: Working Together for An Effective and Equitable Response." The 2008 Summit targeted "The Global Nutrition Challenge: Getting a Healthy Start." This year, our theme is "MDR-TB: Overcoming Global Resistance."

## GEOGRAPHICAL FOCUS

Although our initial focus was on the Asia-Pacific, we are no longer constrained by geography. Indeed, over 25 countries will be represented in 2009.

## ORGANIZATION

The Summit is co-presented by NBR, Fred Hutchinson Cancer Research Center, Bill & Melinda Gates Foundation, and the Wellcome Trust. The Summit is governed by a Senior Advisory Group chaired by Lee Hartwell. The Summit's Executive Director is Michael Birt.

# The Pacific Health Summit A Five-Year Climb:
## Our Milestones and Challenges

**Michael Birt**
**Executive Director, Pacific Health Summit**
**Director, Center for Health and Aging, The National Bureau of Asian Research**

**Lee Hartwell**
**President and Director, Fred Hutchinson Cancer Research Center**

***...the Summit has always looked to the private sector as a catalyst to translate discovery into technologies, products, and services that deliver better health...***

Each year the Summit tackles an important problem in global health. The 2009 theme—"MDR-TB: Overcoming Global Resistance"—is particularly timely and challenging, and we have worked hard to integrate the Summit into an arc of activities in an effort to create maximum collaboration and impact on this global health threat.

In preparation for the Summit, you have helped us build on the discussions at the Stop TB Partners Forum in Rio de Janeiro, the Beijing ministerial meeting in April, and the World Health Assembly in May. Employing an interactive and off-the-record format, the Summit invites country and industry leaders to outline their visions, delineate their possible contributions, and demonstrate political will and economic commitment to overcoming the MDR-TB threat. In particular, we would like to focus on three areas:

1. The prominence of emerging economies, such as Brazil, India, China, and South Africa as leaders in the fight to overcome MDR-TB;

2. Broader industry engagement in the development and delivery of new tools and services; and

3.Stronger systems and infrastructure that enable us to leverage new and existing tools more effectively.

The 2009 Pacific Health Summit is our fifth Summit—a milestone that warrants a glance backward to remember where we began and what launched our journey. Let's begin with our logo. The character chosen to represent the Pacific Health Summit in our logo, pronounced *sheng* in Chinese and *ikiru* in Japanese, means "life" or "to live." The character is simple in meaning, and powerful in scope. In the same way that this character also combines easily with other characters to build hopeful and strong compounds in Chinese and Japanese, we, too, hoped that the Pacific Health Summit would become a gathering of leaders who would build partnerships, launch collaborations, and make the world a healthier place.

We began our summit ascent in 2004 hopeful, and we are gratified by the partnerships that have been launched at the meeting—partnerships that span across borders, oceans, disciplines, and vastly different experiences of health and disease. In a world divided by language, we worked to make "health" into the lingua franca of the 21st century—a language spoken and understood by all of us. Science has given us a common "alphabet" for this language of health with DNA's four base pairs of C, G, A, and T.

In addition to academia, foundations, governments, and health systems, the Summit has always looked to the private sector as a catalyst to translate discovery into technologies, products, and services that deliver better health, whether in health systems or our homes. In this regard, the Summit has considered industry to be a powerful engine of innovation for better health.

A quick review of past Summit themes shows that we tackled tough challenges—chronic diseases have accelerated their toll on the health and economies of developing countries, avian flu continues to threaten us, malnutrition destroys the lives of the world's poorest children, and the all-too-familiar specter of TB has now been trained, by man, to resist our best efforts, becoming an urgent global health threat of the highest magnitude. Moreover, many of us have witnessed the gap between our mission to detect and treat disease early enough to reduce the human and financial cost of disease and the heartbreaking loss of loved ones in our personal lives.

We began five years ago with the hope that the Pacific Health Summit would become the base camp where we assemble powerful teams of climbers and then equip them with the scientific, technological, and organizational tools to enable a successful summit ascent. In order to reach this summit for MDR-TB, we will have to create fundamentally new levels of organization, cooperation, and teamwork. This *Summit Challenge* is nothing less than a call to action. Our authors ask that you join us in the demanding global team effort to climb this summit and make the world a healthier place.

***This Summit Challenge is nothing less than a call to action.***

# Local Tuberculosis Control in a Global Health City

**David Fleming**
**Director and Health Officer, Public Health – Seattle & King County**

***...some might argue that we should put TB in the rear-view mirror and move on to new challenges.***

***Do not listen to them.***

If you were born in Seattle in 1909, the prevalence of communicable diseases such as TB would have led the smart gambler to bet against you ever celebrating your 45th birthday. Today, a century later, the smart bet now is that you will eventually see a birthday cake with a lot more candles. With proper sanitation, clean water, and antibiotics and vaccinations to prevent infectious diseases, our life spans have nearly doubled. Today, we face new challenges from non-infectious threats like tobacco and obesity.

Our century of successful work against TB is part of why we are living longer today. As a consequence, some might argue that we should put TB in the rear-view mirror and move on to new challenges.

Do not listen to them.

Only constant, active effort is keeping people in Seattle free from TB and living long enough to be affected by our new health challenges.

In King County, Seattle's home, over 100,000 people are infected with TB, and that number is growing. Seattle's emerging reputation as a global crossroads, for all its wonderful benefits, makes our residents more likely to have the disease that infects one third of the globe. Our local TB rate is 50 percent above the national average, and over 80 percent of those we identify with active disease are born outside the United States.

Our local TB control program is our community's front line defense against this disease, working to ensure that people are diagnosed and treated and their contacts at highest risk of infection are identified and screened. This work is intensive. In 2008, our program evaluated and tested hundreds of contacts in dozens of investigations at worksites, schools, medical facilities, and homeless con-

gregate settings. During the year, over 2,800 clients make nearly 12,000 visits to our clinic to treat their infections.

This hard work has brought us success. Last year, in our highly diverse and vulnerable group of patients with active TB, no one discontinued or refused to complete TB treatment. And our prevalence of multi-drug resistance is very low, currently hovering below 2.5 percent.

So, some might argue, even though our fight against TB remains an active battle, we can rest easy because we are winning.

Again, do not listen.

Unfortunately, we face a major setback, not from a new strain or old drugs, but from a lack of resources. Across the country, including here in King County, health departments are struggling to deliver essential services, including TB services, as deficits loom, dollars are cut, and programs are eliminated.

TB will take advantage when we drop our guard. In the early 1990's, the United States saw a resurgence of the disease as funding fell for TB control activities. But if learning means changing behaviors, we have not yet learned the need for maintaining active public health programs, including TB control. Public Health—Seattle & King County has cut our TB program twice in the last year—not because we do not know better, but because there is no public health money to support it.

Sadly, in these difficult economic times, cutting TB control activities is not only bad health policy, it is also bad economic policy. The inevitable result of less detection and effective treatment for TB today is more disease in the future, as well as time consuming and costly drug resistance.

This year's Pacific Health Summit ushers in a new era of opportunity for global TB prevention. It is ironic that locally, in our city of increasing global health prominence, we face a crisis in delivery of proven TB control measures because of a lack of financing.

This state of affairs is an important reminder of our collective need to assure the integrity of the entire chain of discovery, development, and delivery if the promise of new science and technology is to translate into better health. And, perhaps more sobering, we must acknowledge that the soundness of this chain is not just an issue in Sudan, Somalia, and Sierra Leone, but in Seattle as well.

# How IT Can Help Address MDR-TB and Other Global Scourges

**Peter Neupert**
**Corporate Vice President, Health Solutions Group, Microsoft**

***MDR-TB is representative of the many challenges we face with other diseases—HIV, malaria, and even chronic disease—not only to drive prevention, but also earlier detection and effective therapies.***

MDR-TB is an urgent, global threat with staggering human and financial implications. With two billion carriers worldwide, one person in ten will suffer from active TB and MDR-TB. Furthermore, improper diagnosis and treatment of MDR-TB is leading to increased cases of Extensively Drug-Resistant Tuberculosis (XDR-TB). In our highly interconnected world, M/XDR-TB has the potential to impact each of us from a health and economic perspective.

The 2009 Summit theme offers a powerful lens that reveals why we need to improve health systems globally. In a way, MDR-TB is representative of the many challenges we face with other diseases—HIV, malaria, and even chronic disease—not only to drive prevention, but also earlier detection and effective therapies.

Technology can be a key enabler of improvements in disease surveillance, diagnosis, treatment monitoring, and prevention—a transformative force that shifts the way care is delivered and how people can better manage their own health. Specifically, we can already rapidly leverage information technology to provide the following:

1. broad, yet culturally sensitive education and awareness for patients, families, and communities;

2. training for entry and mid-level practitioners on specimen collection, safer testing, and treatment;

3. documentation and order entry to support logistics for improved drug and diagnostic test availability and distribution;

4. patient compliance tracking; and

5. centralized aggregation of data for epidemiology and research.

Imagine a rural village in Africa with a high incidence of active MDR-

TB. Public health officials travel to the area and distribute laptops (such as OLPC[1] or battery operated handhelds) to provide training for selected lay people. These devices, equipped with a lightweight electronic medical record, can catalogue patients and even perform biometric identity capture, which ensures proper matching between sputum samples and therapies. New advances in affordable light microscopy can capture images and transmit them to microbiologists for further analysis, if necessary. This same tool can be used to order medications from strategically located depots operated by governments, NGOs, and/or private organizations. Properly identified sputum samples can be transported from these depots for further analysis. Practitioners can also record Directly Observed Therapy, short-course (DOTS) and responses to therapy. Data can then be transmitted back to those same organizations for analysis and action.

In areas without access to cellular or mesh networks, more traditional "sneaker nets" can be used to transport flash memory cards to regional satellite uplinks. Furthermore, public health officials can use data on individuals with active TB to support appropriate quarantines and infection control. Finally, these same devices can play culturally-appropriate digital content to help patients and families understand TB and how to protect themselves and their community.

There are so many possibilities where technology can have an impact on decreasing the scourge of TB. Imagine this world. This technology exists today. Let us—the public and private sectors—work together to make this world a reality.

1. One Laptop Per Child
http://laptop.org/en/index.shtml

***There are so many possibilities where technology can have an impact on decreasing the scourge of TB. Imagine this world. This technology exists today.***

# TB challenges:
## Our Need for a New, Effective Tool Box

**Mark Walport**
**Director, The Wellcome Trust**

***Surmounting basic research roadblocks ... will be crucial to achieving worldwide control of the disease.***

The tools we currently possess to respond to the TB burden are inadequate. We are still using antiquated diagnostic and treatment regimes for control and management, and these are only effective in optimal conditions. With the emergence of TB strains resistant to all anti-TB drugs, we are greatly in need of a more effective tool box. The gathering of top leaders from science, industry, and policy at the Pacific Health Summit showcases the commitment from the world's top institutions and organizations to develop and deliver such tools.

Approximately one-third of the world's population has latent TB, with approximately 10 percent of infected individuals going on to develop active TB. Our understanding of TB latency and reactivation is still rudimentary, with neither host nor bacterial factors adequately understood. Surmounting basic research roadblocks such as these will be crucial to achieving worldwide control of the disease.

While TB is traditionally associated with poverty and overcrowding, the recent emergence of co-infection with HIV is a lethal combination, and HIV has caused TB incidence in sub-Saharan Africa to escalate since the 1990s. In some countries, 80 percent of TB patients are co-infected with HIV.

Diagnosing TB in resource-poor settings relies mainly on the use of smear microscopy of sputum samples, a very labor-intensive process with low sensitivity. Diagnosis of TB needs to be fast, sensitive, and accurate at the point of care—discriminating between drug-resistant strains and allowing rapid commencement of appropriate antibiotics. As if this were not enough of a challenge, treatment regimes are currently complex, lengthy, and expensive.

Even so-called 'short-course' standard TB treatment lasts six to nine

months, while drug-resistant TB is much harder to cure and may require treatment for up to two years or more. Compliance with treatment regimes can therefore be poor, and patients may abandon treatment for a variety of reasons—because they feel better or because they can no longer afford the drugs, for example. However, stopping treatment early means that many still harbor viable bacteria, which may in turn cause a relapse.

The WHO's currently recommended DOTS regime has successfully treated many patients, but it is human resource intensive and inaccessible for many patients. Even treatment of uncomplicated TB requires four different drugs.

Beyond compliance, the reliability of the drug supply chain in many countries is a real issue. New drugs allowing shorter, simpler, and cheaper treatment regimes should be a primary research and development priority. We have a pressing need for drugs targeting mycobacteria during their long dormant phase. National TB control programs require more resources and better tools to achieve success. While there is a role for the private sector in TB control, this must be supportive of, and consistent with, government services.

There are new TB vaccines in development. Encouraging results have been achieved in safety and immunogenicity trials for some, and crucial efficacy trials are now underway. An important challenge will be to characterize specific protective responses that can be used as immune correlates of efficacy for the new generation vaccines. Key to this is the capacity of health systems to undertake appropriate clinical trials. Building this vital infrastructure and this new tool box will have a health impact far beyond TB.

***New drugs allowing shorter, simpler, and cheaper treatment regimes should be a primary research and development priority.***

# Innovation and Leadership:
## Requirements for Addressing the Global TB Burden

**Tachi Yamada**
**President, Global Health Program, Bill & Melinda Gates Foundation**

***...[TB] has not received the attention that a public health problem of this magnitude should.***

Great strides have been made in boosting access to TB treatment. Programs supported by the Global Fund, for example, have detected and treated some 4.6 million cases of TB worldwide, allowing people to return to productive lives[1]. According to the WHO, global TB mortality rates have declined steadily since 2000[2]. Yet the disease has not received the attention that a public health problem of this magnitude should. There are nearly 10 million new cases of TB each year.

Despite recent progress, we are facing an uphill struggle in the battle against TB because the technologies at our disposal are inadequate. The most widely-used diagnostic test was developed over a hundred years ago, today's vaccine is 85 years old, and the most common drug regimen has not changed in 50 years. We have an opportunity to stem the deaths and illness that still result from TB, but it is going to take more than the effective use of old tools. This is a challenge that requires both new ideas and a sense of urgency to implement them.

New drugs, vaccines, and diagnostics could help turn the tide in the battle against TB. Even a relatively simple innovation, such as fixed-dose combination TB drugs, can reduce the number of pills patients have to take from as many as 13 to as few as three, making it easier for patients to comply with the challenging treatment program. This treatment has been available for decades, but so far it is used by only 15 percent of patients around the world.

Molecular diagnostic tests that detect TB with 98 percent accuracy and screen for drug resistance are in late stage development. Within 10 years, we could have new TB drugs that are effective against all forms

of TB, including drug-resistant bacteria. Similarly, clinical trials are currently underway that could lead to an effective TB vaccine.

To ensure that these new tools have impact, we are going to need leadership. These innovations provide real hope for dealing effectively with TB. To keep up the momentum, however, we need to see greater investment in resources, smarter collaboration, and more creative partnerships.

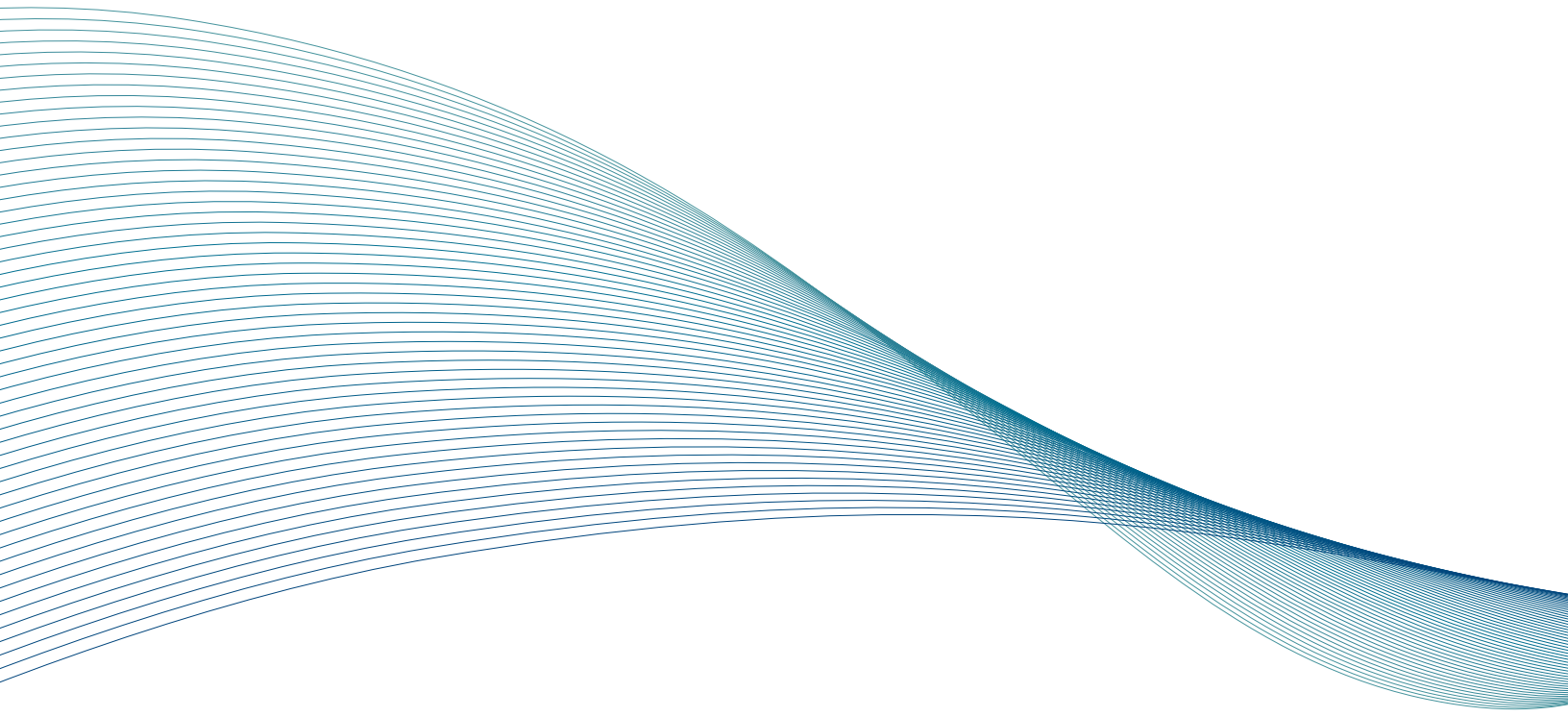
Businesses have the capacity to lead by contributing to the development of innovative solutions. In particular, early collaboration among companies could allow for TB drug combinations to be tested before Phase III trials begin and save years in the product development process. At the Gates Foundation, we are firmly committed to innovative technologies, new ideas, and effective public-private collaborations, and toward those ends we have invested more than $750 million in TB.

The magnitude of the TB challenge has catalyzed new global leaders with the will to act. In March, the Brazilian government pledged to reduce rates of TB in Brazil in part by implementing fixed-dose combination TB drugs. In April, China hosted a WHO meeting of 27 high-burden countries to discuss innovative ways to combat drug-resistant TB. At this meeting, the Gates Foundation and the government of China announced a new partnership to develop, demonstrate, and scale up innovations to fight TB. Other high-burden countries have taken on the problem of TB within their borders and their efforts promise to have a global impact. Traditional donors must stay involved as well if these efforts are to be successful.

We now stand at a critical juncture in the battle to reduce the global TB burden. We must be even more effective in diagnosing and treating patients with the tools that we have but we must also have a renewed focus on innovation if we are to create new tools to combat the convergence of the HIV and TB epidemics, confront the emergence of resistance, and protect others from becoming infected. The Pacific Health Summit is the ideal platform for leaders from the private sector, public sector, and non-profit organizations to take advantage of this opportunity.

***To keep up the momentum... we need to see greater investment in resources, smarter collaboration, and more creative partnerships.***

1. The Global Fund. Fighting Tuberculosis. http://www.theglobalfund.org/en/tuberculosis/.
2. WHO. Global tuberculosis control 2009: Epidemiology, Strategy, Financing. http://www.who.int/tb/publications/global_report/2009/en/index.html.



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